

EXHIBIT A-1

Scope of Services

Scope of Work

Change: Art and Education

Task 20010

Malcolm Pirnie Inc. (MPI) was asked by Ann Arbor to investigate the potential and estimated costs to install a water line from the effluent water south of the UV Facility to the new Administration Building. This line was intended to provide a public display in the form of a fountain or water wall exhibit showing treated water directly from the WWTP Plant. It was contemplated that the cost to construct this display would be from the City of Ann Arbor Public Art Ordinance. This preliminary investigation effort may be expanded based on the feasibility and estimated cost to install the pipe and construct a display using treated plant effluent.

Scope of Work

Change: Hot Water Return and Service Design

Task 20030

The City requested MPI to provide engineering design services for the replacement of the East Plant Hot Water Return and Service (HWRS) system. The existing East Plant HWRS system leaks and cannot be used to provide the required glycol heating system for the East Plant. Because of the age and poor condition of this piping, MPI designed two alternatives for the City's review and for Walsh to provide proposals to install the new HWRS systems for the East Plant. The second alternative was selected and a WCD was issued to Walsh to proceed with the work on a time and materials basis.

The Hot Water Return and Service Design will include the following activities:

- Design of alternative No. 1 which was the replacement of the existing East Plant HWRS as it currently runs throughout the East Plant including the design within the Solids Handling Building.
- Design of alternative No. 2 eliminated the need for the existing HWRS run between the Solids Handling Building and the East Primary Building. This design alternative was requested due to the existing conditions that would be encountered along this path including plant road shutdowns and excavating in areas full of buried process piping and utilities.
- MPI provided separate design drawing for the portion of the East Plant HWRS within the Solids Handling Building so that work in this building could begin immediately.
- MPI provided cost estimates for each alternative
- MPI attended meetings to describe the scope of work and to negotiate the proposed cost of the work with the Contractor.
- MPI provided field work to determine the existing conditions and pipe routing prior to and during design.

Scope of Work

Change: Hot Water Return and Service Construction

Task 20031

Malcolm Pirnie will provide Resident Project Representative (RPR) serviced during construction and testing of the HWRS pipe network. This work will include the following activities:

- Daily inspection of the work.
- Record daily project time and materials including verification of work completed at the end of each day.
- Address Submittals and RFIs for this work.
- Resolve field issues with Walsh their sub-contractors.

Scope of Work

Change: Restricted Use Soil - South

Task 20040

During preliminary excavation for construction of the West Plant Secondary Clarifiers the contractor complained of odors emanating from the soil that caused several of their workers to feel ill. Malcolm Pirnie collected initial soil samples that determined there were no volatile compounds responsible for the contractor's reported odor. The results noted that several metals were present in the soil at concentrations exceeding the applicable soil criteria but no volatiles were detected in the samples analyzed. Malcolm Pirnie developed a plan for further sampling and testing of soil around the secondary clarifiers to determine what soil disposal options and uses were applicable to the site.

West Plant - South Area Soil Sampling and Testing

Soil sampling and laboratory testing will include the following activities:

- Review laboratory test results for the initial soil samples collected from the secondary clarifier area.
- Prepare a soil investigation plan to characterize soil from the West Plant Secondary Clarifier Area.
- Implement soil investigation sampling plan and laboratory testing.
- Compare soil test results to applicable State of Michigan soil criteria.
- Provide recommendation to City of Ann Arbor for management of the Secondary Clarifier area.
- Provide manifests or other direction to contractor for offsite disposal of Secondary Clarifier area.

Scope of Work

Change: Restricted Use Soil North

Task 20041

Metals impacted soils were identified during excavation for the two West Plant secondary clarifiers. The City of Ann Arbor requested Malcolm Pirnie/ARCADIS to prepare and implement a soil investigation plan for the remaining unexcavated areas of the West Plant. The soil investigation plan is to determine the vertical extent of impacted soil around the existing aeration tanks, primary clarifiers, and sludge digesters.

West Plant - North Area Soil Borings and Soil Testing

This task will include the following activities:

- Develop a soil investigation plan for the West Plant North Area. Plan will include the drilling of soil borings in the 5-acre North Area.
- Soil data will be compared to Michigan Department of Environmental Quality (MDEQ) soil cleanup criteria. Soil concentrations that exceed applicable exposure pathway criteria will be highlighted.
- Malcolm Pirnie will present recommended alternatives to the City of Ann Arbor for management of impacted soil.
- Additional services may be necessary depending on the extent of impacted soil identified and the method selected for future soil management

Scope of Work

Change: Electric Generator Air Permit

Task 20050

Installation of the two-new diesel fired generators for the Ann Arbor Facilities Renovations Project requires a permit from the Michigan Department of Environmental Quality (MDEQ) Air Quality Division. Ann Arbor requested that Malcolm Pirnie/ ARCADIS prepare a permit application for the new generators for Ann Arbors submittal to MDEQ.

Prepare Air Permit Application

Prepare Air Permit Application Package for the two new emergency diesel generators at the Ann Arbor Wastewater Treatment Plant. This permitting effort will include:

- Prepare and finalize emission calculations
- Perform regulatory review
- Conduct pollutant and toxic air contaminant (TAC) modeling evaluation
- Complete TAC Best Available Control Technology Analysis
- Prepare cover letter, process description and process flow diagrams

- Complete and submit draft Air Permit Application Package for Client review
- Revise Draft Air Permit and submit final Air Permit Application to Ann Arbor

Scope of Work

Change: West Secondary Clarifier Concrete Curing Evaluation

Task 20060

Walsh Construction and their subcontractor did not provide the contract required water curing during construction of the West Plant Secondary Clarifier walls. Malcolm Pirnie required testing to demonstrate that concrete was properly cured and meets the contract specification.

Concrete Curing Evaluation/ Testing

This task will include the following activities:

- Identify a concrete testing laboratory able to perform the following test on concrete cores.
 - o Petrographic Examination
 - o Permeability Measurement
 - o Compressive Strength Measurement
 - o Density Measurement
- Select locations for collection of concrete cores from clarifier walls based on contractor curing practices during construction.
- Review concrete testing laboratory data and compare with contract required criteria.
- Meet with City of Ann Arbor to discuss laboratory results and provide recommendations.
- Submit testing report and required changes to Walsh Construction.

Scope of Work

Change: Raw Sewage Lift Station Level Indicator/Transmitter

Task 20070

Modification to the Raw Sewage Lift Station to include the design and construction of new level indicator/transmitter (LIT) for the lift pump forebay that receives flow from the 48-inch interceptor.

This work will include the following activities:

- Discuss requested change with City Engineer, Assistant Manager, and shift supervisors to understand the current operation and requested modifications.
- Collect data for existing LIT system needed for design.
- Evaluate options for LIT system modifications.
- Determine if the level will be used for monitoring purposes only, or if it will be used for control.
- Prepare plans and specification for the Raw Sewage Lift Station LIT design.
- Review proposed plans and operation with appropriate City staff.
- Prepare and issue Work Change Directive for construction of requested modifications.

- Review Contractor quotation and discuss with City.
- Provide written direction to proceed to Contractor.

Scope of Work

Change: Raw Sewage Lift Station Actuator Design and Construction

Task 20071

Design of a new Raw Sewage Lift Station Rotork Actuator for slide gate modulation is expected to include the following improvements:

- Inspect the gate and operator condition.
- Select a Rotork actuator.
- Replacement of the existing corroded terminal/junction box near the gate, and reconfiguration of the incoming power and control wiring.
- Replacement of existing corroded steel support stand.
- Reconfiguration/replacement of conduit and wiring to the ultrasonic level transmitter and transducer.

Preparation of the Rotork Actuator Design will include the following activities:

- Discuss requested change with City Engineer, Assistant Manager, and shift supervisors to understand the current operation and requested modifications.
- Collect data for existing Rotork actuators needed for design.
- Evaluate options for current Rotork actuators.
- Prepare design layouts for replacement of the electric actuator for the 78-inch raw water inlet gate and prepare plans and specification for new Rotork actuator.
- Prepare plans and specification for new Rotork actuator.
- Review proposed plans and operation with appropriate City staff.
- Prepare and issue Work Change Directive for construction of requested modifications and review Contractor quotation and discuss with City.
- Observe actuator installation and other improvements.

Scope of Work

Change: Telephones for Solids Handling Building

Task 20080

Preparation of the SHB Telephone Design will include the following activities:

- Discuss requested change with City Engineer, Assistant Manager, and shift supervisors to understand the Solids Handling Building (SHB) telephone needs.
- Collect data for existing system that will provide phone service to the SHB.
- Prepare plans and specification for new SHB phone system.

- Review proposed plans and operation with appropriate City staff.
- Prepare and issue Work Change Directive for construction of requested modifications and review Contractor quotation and discuss with City.
- Provide written direction to proceed to Contractor.
- Assist with AT&T coordination.
- Inspect phone system installation.

Scope of Work

Change: Scum Pump Design

Task 20090

Preparation of the East Plant Secondary scum pump design will include the following activities:

- Gather relevant information concerning the scum pumping equipment and PICS monitoring of existing equipment.
- Develop plans and specifications for installation of the selected scum pumping system and coordination with PICS.
- Issue Work Change Directive to Contractor for development of a cost proposal. Review cost proposal, discuss with Plant staff, and provide recommendation.
- Issue direction to Contractor to proceed with the selected design.

Scope of Work

Change: 3 Gas Detector Design in Screen & Grit

Task 20100

Preparation of the 3-gas detector design for the Screen & Grit and Raw Sewage Lift Station Buildings will include the following activities:

- Meet with City staff to discuss objective of the modification and potential locations for gas detectors.
- Identify alternative systems from various equipment manufacturers for City consideration.
- Contractor will hire a subcontractor to perform a smoke test to optimize detector locations.
- Review Contractor's smoke test results and report.
- Develop plans and specifications for installation of the City selected gas detection equipment and coordination with PICS.
- Issue Work Change Directive to Contractor for development of a cost proposal. Review cost proposal, discuss with Plant staff, and provide recommendation.
- Issue direction to Contractor to proceed with the selected design.

Scope of Work

Change: Primary Sludge Line Extension to Solids Handling Building

Task No. 20130

The City of Ann Arbor requested modifications to the West Plant Primary Sludge line. The revised design will add piping to allow primary sludge pumping to the sludge holding tanks, in the Solids Handling Building, in addition to pumping sludge to the sludge thickener.

Design of the primary sludge piping to the Solids Handling Building sludge holding tanks will include the following activities:

- Discuss requested change with City to understand the current operation and requested modifications.
Collect and review existing pump data and piping system data needed for engineering calculations, including the East and West Primary sludge pumps, thickened waste activated sludge pumps, sludge transfer pumps, and thickened sludge pumps.
- Field verify existing piping and process flow arrangement.
- Perform hydraulic calculations and analysis to verify coordination and pumping capacity between East and West Plant primary sludge pumps, sludge transfer pumps, thickened sludge pumps, and thickened waste activated sludge pumps.
- Field verify piping layout in Solids Handling Building for the new piping and interconnection with the existing sludge piping to the sludge holding tanks.
- Prepare draft plans and specification for new valves and piping.
- QA/QC hydraulic calculations and design.
- Review draft piping plans and sludge pump operation with appropriate City staff.
- Prepare final plans based on review with City staff.
- Prepare and issue Work Change Directive for construction of requested modifications.
- Review Contractor quotation and discuss with City
- Provide written direction to Contractor to proceed with the work
- Review Contractor's piping layout submittal.
- Inspect Contractors work.

Scope of Work

Change: Primary Sludge line to Retention Building Return Line

Task No. 20131

The City of Ann Arbor requested a potential modification to the West Plant Primary Sludge line to allow sludge return to the plant lift station in the Retention Building.

Evaluation of the proposed connection with the return line to the Retention Building will include the following activities:

Discuss requested change with City to understand the current operation and requested modifications.

- Collect and review existing pump and piping system information needed for engineering calculations, and feasibility evaluation.
- Field verify existing piping and process flow arrangement.
- Perform hydraulic calculations and analysis to evaluate feasibility of proposed change.
- Prepare memorandum that summarizes the feasibility investigation and findings.
- Meet with City to discuss memorandum feasibility findings.

Scope of Work

Change: Modifications to Service Air

Task No. 20140

The City of Ann Arbor requested modifications to the service air (SA) between the Solids Handling Building, West Primary Building and the Screen and Grit Building. The modifications include the following:

- Relocate the underground portion of the 1" SA from the Solids Handling Building to the northeast corner of the West Primary Building instead of the northwest corner and modify SA piping inside the West Primary Building, as required.
 - Extend the underground portion of the 1" SA to the Screen and Grit Building.
 - Provide receiver tank and associated pressure regulator, pressure gauge, air filter, air dryer and lubricator in the West Primary Building and Screen and Grit Building.
- Extension of SA piping inside the Screen and Grit Building, as required, to one service air station.

Design of the new service air from the Solids Handling Building to the West Primary Building and Screen and Grit Building, as noted above, includes the following activities:

- Discuss and field verify proposed SA piping route with City staff to identify preferred pipe location for air receiver tank in the West Primary Building, West Blower Building, and Screen and Grit Building.
- Review design criteria, including required pressure and air flow rates with City staff. Perform engineering calculations for SA system and piping as modified by this change.
- Develop draft piping plans and receiver location drawing and specifications for contractor quotation.
- QA/QC SA system design.
- Review proposed SA piping design with City staff.

- Prepare final plans based on review with Citystaff.
- Prepare and issue Work Change Directive for construction of requested modifications.
- Review Contractor quotation, discuss with City, and meet with the contractor to resolve additional costs.
- Inspect the work as the Contractor installs it.

Scope of Work

Change: Fiber Network Revisions

Task 20150

This change, to modified the fiber optic ring from Multi Mode Cable to Single Mode Cable, was requested by the City IT Department. The Work included:

- Coordination between the Project Team and the City's IT Department.
- Coordination with the Contractor
- Participation in Project meetings to determine the details of this change with the City and the City's IT Department.
- Preparation of the work change directive.
- Response to the Contractor's proposal
- Preparation of a change order to do this work.

Scope of Work

Change: Screen and Grit Hot Water Evaluation

Task 20170

During the Winter months, when problems with heating of the Screen & Grit Building were experienced, the City requested Malcolm Pirnie of Michigan, Inc. (MPI) to investigate the operation of the temporary heating system installed by Walsh Construction Company II LLC (WCC). The purpose of the investigation was to understand the boiler and heating system operation and identify limitations of the existing system. The investigation identified the following factors that limited building heating.

- The coil pump associated with the roof top mounted air handling unit (AHU) was removed. Removal of this pump appears to have limited the circulation of hot water through the coil and contributed to the coil freezing.
- When the City removed the coil pump in January 2015, the hot water piping was connected in reverse (i.e. the coil inlet was connected to the boiler return line and coil outlet connected to the boiler supply line).
- The fan for the unit heater located in the garage located on the south side of the Screen & Grit Building was shut off so no heat was being introduced to that space.
- Only the unit heater in the Screen & Grit Building electrical room was observed to be operating.

- The two unit heaters located in the truck bay in the central portion of the Screen & Grit Building were not in service. Efforts by WCC and their subcontractor, Decal, determined that no hot water was reaching the eastern unit. Hot water was reaching the western unit but the fan on that unit was inoperable.
- The temperature of air introduced by the AHU was below freezing on cold mornings in February. The AHU was not able to temper the incoming fresh air to roughly 40 or 50 degrees F as it was designed to. This condition was likely due to several factors including: limited temporary boiler capacity, removal of the coil pump, and reverse plumbing of the boiler piping to the coil.

Based on the investigation results outlined above, MPI recommends the following modifications be implemented prior to the 2015 - 2016 heating season.

- Install two new unit heaters in the truck bays to replace the two nonfunctional units for heating the central portion of the Screen & Grit building. A specification for recommended unit heaters for the Class I, Division 1 area is attached. The existing unit heaters should be replaced in kind (i.e. approximately 100,000 BTU/hr. each). We will ask WCC to verify the nameplate capacities of the existing unit heaters.
- Reinstall or replace the coil pump for the roof top AHU.
- Reverse the boiler piping to the AHU so the boiler supply piping is connected to the coil inlet and the coil outlet is connected to the boiler return piping.

Scope of Work

Change: Potable Water Investigation at the Administration

Building Task 20190

The PW Investigation included the following work items:

- Review of the initial Potable Water (PW) sampling and testing data conducted by the Contractor.
- Discussion of the specific locations for additional PW sampling and testing.
- Coordination and discussion with the City of Ann Arbor on proper sampling methods to be used.
- Coordination with testing laboratory (Brighton Analytical and MDEQ), bottle pick up, and testing to be performed.
- Site PW sampling at five locations throughout the Administration Building and one location in the Retention Building.
- Multiple PW sampling at each location for sampling first flush, after flushing, hot and cold PW.
- Review of data received from testing laboratories.
- Reduction of all laboratory data collected by the Contractor and Arcadis into one format for review and reporting.
- Discussion with MDEQ and Brighton Analytical regarding laboratory results and potential causes of PW odor and taste issues.
- Discussions with the Project Team.

- Discussion of issue with City of Ann Arbor drinking water plant and Washtenaw County Health Department regarding the odor and taste issues at the WWTP.
- Preparation, review and discussion of the "**Administration Building Potable Water Investigation Report**" transmitted to the City.
- Brighton Analytical/ MDEQ laboratory cost for analytical testing of PW samples.

Scope of Work

Change: Blower No. 8 Operations during a Power Outage

Task 20191

The Blower No. 8 Investigation included the following work items:

- Review data files and OCP device settings immediately after Blower 8 starting tests (Note: there were 2 instances where attempts to start Blower 8 were done)
- Review electrical system OCP device settings at Bus 3 and tie breakers at Bus 1 and 2
- Evaluate generator starting capabilities and specifications for Blower 8 starting and identify available capacity, capabilities, etc.
- Investigate generator QC protection capabilities with Cummins engineering rep. and incorporate generator decrement curve into electrical model.
- Analyze MCE electrical model for alternate configuration with existing Blower 8 in service.
- Develop proposed protective device settings to allow Blower 8 starting while system was on backup generator power system
- Coordinate with Walsh and Motor City Electric to obtain existing OCP settings and update electrical system model.
- Prepare meeting notes for coordination with Motor City Electric, Walsh, and Ann Arbor staff review.
- Several meetings with Walsh, MCE, and Ann Arbor to discuss approach, finding and provide recommendations.
- Conduct final meeting with City staff and Walsh with final resolution of this issue not to modify Blower No. 8 and to lock it out so that it would not be possible to start during a power outage.
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Scope of Work

Change: DO Probe Relocation, Light and Road Additions

Task 20193

The DO probe relocation and light and road additions includes the following work items:

- Site investigation to determine existing conditions at the outfall site for mounting the DO probe and light in/at the outfall manhole existing panel.
- Evaluation of existing equipment stand to be used to mount DO probe at new location.
- Determination of power requirements at the outfall location for the DO probe.

- Determination of instrumentation controls requirements at the new location
- Provide new location and power source in Tertiary Building for new light at outfall manhole.
- Provide requirements for installation of light including power source for, and physical support of, the light.
- Decommission previous DO location at UV structure
- Extend road to provide cart path to outfall manhole.
- Prepare WCD-168 and negotiate additional costs with Contractor.

Scope of Work

Change: EQ/Retention Building Gate and Valve Investigation - Phase 1

Task 20194

The EQ/Retention Building gate and valve task includes the following work items:

- An initial coordination meeting with the Project Team.
- Assume 12 hours for the field investigation with the Contractor, Contractor's sub-contractors and a representative from the gate manufacturer.
- Note: for Phase 1 the Contractor will not be entering the EQ/Retention Building. Phase 1 will be conducted from the roof of the EQ/Retention Building.
- Review of the manufacturer's report of the status of the gates and valves.
- Follow-up meetings with the City and the Contractor.
- Daily tracking of the Contractor's work on a time and materials basis.

Phase 2 scope of work and estimated budget will be provided if it is required to define future work, including investigation inside the building to inspect the gates, inspection of repair or replacement work, submittal preparation, preparation of construction estimates, and preparation of WCDs.

Scope of Work

Change: Relocation of Electrical Room 102 MCCs V and W

Task 20195

The Relocation of Electrical Room 102 MCCs V and W includes the following work items:

- Field investigation of revised location for new MCCs, electrical panels and PLC cabinet in East Primary Building. Coordinate with weeand MCE.
- Provide preliminary sketch of revised location to City and WCC. Obtain approval of concept from City.
- Investigate acceptability of splicing fire rated cable already purchased and cut to length.
- Review submittal of fire-rated cable splicing materials.
- Sheet A04-01: Revise first floor plan and elevations to show new wall layout, door locations, wall openings for HVAC equipment, and miscellaneous items.

- Sheet D04-02: Revise first floor demolition plan and demolition notes.
- Sheet H04-01: Revise first floor plan to show the required modified existing duct system that conveys exhaust air from the existing space. Revise duct that serves the existing space by blanking off the existing exhaust grille in the duct vertical and adding a new exhaust duct with grille that penetrates through the relocated Electrical Room 102 west wall.
- Sheet H04-01: Revise first floor plan to show EPB-EF-1, EPB-MD-1, EPB-EUH-1, EPB-ATC-1 and associated control items installed in the relocated Electrical Room 102.
- Sheets E04-01 through E04-04: Revise MCC-EPB-A and MCC-EPB-B one-line diagrams, elevations, and notes as applicable for potential East Flow Splitter and East Aeration Tanks sluice and slide gate MCC reassignments.
- Sheet E04-05: Revise first floor power and lighting plan.
- Sheet E04-06: Revise basement power plan.
- Sheet E04-07: Revise notes affected by any revised MCC reassignment of East Flow Splitter and East Aeration Tanks sluice and slide gates.
- Sheet E04-11: Revise conduit and cable schedule for any revised MCC reassignment of East Flow Splitter and East Aeration Tanks sluice and slide gates.

Scope of Work

Change: Design North Access Road to the Thickener Complex

Task 20196

It is recommended that this road be designed as a permanent access to the thickener complex using the pavement details shown in the Contract Documents. The additional design noted below is for properly laying out the new road from the existing (partially constructed) north/south road west of the detention pond. The new road will travel east to the thickener complex. See attached plan sheet showing general location of this new road. We do not recommend that a temporary road be used for access to the thickener complex as previously discussed due to the site requirements in this area of the plant and the loads this road will experience.

Design of the north access road to the thickener complex includes the following work items:

- Develop preliminary concept(s) for new access road to review with the City.
- Survey area of new road to confirm existing contours for civil/site design.
- Coordinate this work with the requirements of the stormwater site plan.
- Provide civil/site drawing(s) showing contours/grades of new road.
- Use typical pavement details and specifications provided in the Contract Documents.
- Prepare WCD and submit to Contractor for Contractor's proposal.
- Prepare estimate and negotiate costs and prepare change order element for this work.

Scope of Work

Change: Screen and Grit Lintel Design and Inspection

Task 20197

The lintels at the overhead doors on the north side of the S&G Building were inspected by Arcadis and found to be structurally deficient. The existing lintel is corroded beyond repair and needs to be replaced. We have issued WCD-178 to the Contractor to remove the existing lintel and replace it with a new one. We have attached our costs for our inspection, design, and inspection for this work.

Please note that the repair of this lintel is included in the Contract as one of the repair items except for the removal and replacement of the lintel.

Scope of Work

Change: S&G Actuator Code Issue Resolution

Task 20198

Resolution of the S&G actuator code issue includes the following work items:

- Field investigation of the existing actuator configuration.
- Meetings with Contractor to determine best solution to the code issue.
- Preparation of and response to RFI 607.
- Preparation of WCD 182 and CO for additional work.
- Field Inspection of removal of existing actuators and installation of new actuators.

Scope of Work

Change: Secondary Effluent to UV

Analysis

Task 20200

Arcadis has performed a preliminary investigation to identify a route for secondary effluent to by-pass the Tertiary Building. We investigated three routes to provide the by-pass each involving a different amount of effort including:

- Construct a shaft over the existing secondary effluent line with gates to divert the flow into the west side of the UV structure,
- Construct a shaft at the southwest corner of the UV structure to tie the secondary effluent into UV utilizing the existing gates in that part of the UV structure for isolation and by-pass,
- Utilize the existing weirs and pumps in the Tertiary Building to by-pass the filters and divert the flow to UV.

We reviewed the advantages and disadvantages of these alternatives with the Plant this week. As a result of our discussions, the Plant will review these alternatives and other options, such as repairing the gates that separate the east and west plant flow to the filters. We agreed to meet again after the Plant meets to review these preliminary findings.

Scope of Work

Change: Additional Operations Assistance

Task 20202

Additional startup and operations assistance through the end of the facilities renovation project to be provided by Phil Anderson:

- Verify all mechanical equipment continues to operate as intended.
 - o Advise Ann Arbor of any issues
 - o Develop and provide an issues list to Walsh/MCE
- Review Process Instrumentation and Controls operating systems (control loops) after Operational Demonstration.
 - o Advise Ann Arbor as to any deficiencies
 - o Develop and provide an issues list to CCI
- Verify all input and output signals for PICS are active and working.
- Verify PICS trending continues to present accurate values and information.
- Review operational and lab data and provide a summary verifying the WWTP is meeting all intended treatment goals and effluent limits.
- Prepare recommendations for operational changes deemed necessary by Arcadis.
 - o Hold meetings with Ann Arbor to discuss recommendations for operational changes to the WWTP. Prepare meeting minutes.
 - o Develop meeting minutes and action plan for operational changes approved by Ann Arbor
- Recommend any additional Vendor Training necessary for Ann Arbor staff if necessary.
- Provide additional System Training sessions as requested and approved by Ann Arbor.
- Provide additional standard operating procedures assistance as requested and approved by Ann Arbor.
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Scope of Work

Change: East Primary Building Heating and Ventilation Unit -1 and Exhaust Fan Replacement

Task 20203

The Work associated with this task included the following:

- Arcadis conducted an inspection of the HV unit and fan and collected background information.
- Arcadis provided a preliminary engineering estimate for the replacement of the unit and fan for Heating, Ventilation and Air Conditioning, architectural and structural engineering. CADD,

electrical, shop drawing review, inspection and project controls and management added in engineering estimate attached to this submittal.

- A preliminary opinion of probable construction costs for this work was developed.
- Arcadis will prepare a WCD for this additional work including preparation of a detailed design, final design elements, the preparation of drawings and specifications, and meetings with Ann Arbor and the Contractor to address all issues during construction.
- Arcadis will provide inspection of the work in accordance with our original scope of services including shop drawing review, RFI responses and the resolution of construction issues.

Scope of Work

Change: East Aeration Tunnel Beam Repair and Replacement

Task 20206

The Work associated with this task included the following:

- Arcadis conducted an inspection of the East Aeration tunnel beams on January 5, 2017. During this inspection, our structural engineer was on site to do an evaluation of the tunnel beams which support a variety of process piping. The inspection was to determine the condition of the existing beams and corresponding repair or replacement of the beams.
- A memorandum, dated January 26, 2017, of that inspection was prepared for the City's review.
- As the memorandum states, of the 21 beams inspected by Arcadis, six (6) of the beams are required to be replaced rather than an attempt to repair them. This recommendation is primarily due to rust which has resulted in a reduction in section of the existing beams.
- The other beams were found to be structurally adequate and we are recommending that these beams are refurbished rather than replaced.
- Arcadis provided a preliminary design for the replacement beams and the repair of the remaining beams including beam sizing and connection details.
- Arcadis will prepare a WCD for this additional work including final design elements, preparation of drawings and specifications, and meetings with Ann Arbor and the Contractor to address all issues during construction.
- Arcadis will provide inspection of the work in accordance with our original scope of services.

Scope of Work

Change: Add Oxygen Reduction Potential Sensors to East and West Aeration Tanks

Task 20208

The Oxygen Reduction Potential Sensor Design included the following work items:

- Coordination and review with manufacturer (HACH) for equipment to be specified.
- Prepare "Oxygen Reduction Potential Sensor and Transmitter" specifications.

- Revise Contract Drawings.
- Prepare detailed requirements for equipment procurement and installation.
- Prepare work change directive to incorporate change into project.
- Review shop drawings and equipment selection.
- Prepare engineer's estimate.
- Evaluate Contractor's estimate and negotiate final costs.
- Inspect installation and trouble shoot performance issues.

Scope of Work

Change: Fire Alarm System Development and Design

Task 20209

Note: The Contract Documents provided a performance specification for the design of the fire alarm system. This approach is typical for specialty disciplines such as fire protection which required the specialty fire prevention contractor to design and construct the system. Through the submittal process, it was noted that the contractor's submittals were not in complete accordance with some of the Code requirements and that Ann Arbor Township requirements included additional elements not required by the fire code. As such, at the request of the City, Arcadis performed a complete design of the fire protection system for the West Plant taking into consideration the Contractor's, Ann Arbor Township's, and the City's requirements for a fire alarm system.

The Fire Alarm System Design included the following work items

- Reviewed multiple fire alarm system layout for facility from township and contractor. These reviews were in addition to Contract required submittal reviews.
- Coordinated with Ann Arbor Township's requirements which in some cases exceeded the Contract and code base requirements.
- Reviewed and provided clarifications on NFPA 72, Michigan Building and Fire Codes, contract document as they pertained to the WWTP fire alarm system requirements
- Designed and located the required fire alarm initiating devices and notification appliances for each building within the facility that requires a fire detection and alarm system
- Developed Contract Drawings for fire protection implementation by the Contractor.
- Attended numerous internal and external review meetings regarding the fire alarm system design review.
- Conducted several negotiation meetings with the City and the Contractor to resolve the additional scope and costs related because of Ann Arbor Township's additional requirements and the Contractor's Contract obligations.
- Site visits to evaluate fire alarm devices, location requirements and meet with Project Stakeholders.

Scope of Work

Change: East Blower Building (EBB) Electrical Room Revisions

Task 20210

The reason for this change is due to existing electrical equipment in the EBB that had to remain in service until the new equipment was in place and made operational. The existing equipment was in the footprint of the proposed equipment and as such, Arcadis revised the configuration of the new equipment and electrical room so that the existing equipment could remain in service. The existing equipment had to remain in service because the wiring of the existing equipment was not known and only discovered after the contractor had begun the electrical revisions to this area. These revisions were required to maintain plant operations.

The EBB electrical room revisions included the following work items:

- Site work to determine if the existing electrical equipment could be removed and the proposed equipment installed as designed. It was decided that given the complex and unknown routing of the existing equipment, revising the new equipment and room layout would benefit the Plant by keeping equipment in this area operational and keep the construction of this area on schedule.
- Site work to determine how the existing equipment could be reconfigured to keep the existing equipment operational during construction.
- Modifications to the EBB electrical room layout to accommodate the revised electrical equipment layout.
- Architectural changes in the layout of the room.
- HVAC revisions to accommodate the revised room layout.
- Revision of drawings
- Preparation of WCD for the contractor and negotiation of Contractor's estimate to make the revisions.

Scope of Work

Change: Administration Building Lunchroom and Conference Breakroom Revisions

Task 20211

The Administration Building lunchroom and conference break room revisions are summarized below:

- Install new 240V circuit to power new range/oven using two spare circuits from LP-ADM-2.
- Extend soffit over oven and end cabinet.
- Provide new cabinets above refrigerator and microwave.
- Install 120V circuit for refrigerator from LP-ADM-2.
- Install electrical junction box and wall switch for soffit mounted light over sink.
- Relocate 120V GFCI outlets at the three countertop areas; 1) above dishwasher, 2) between range and sink, and 3) between range and wall.
- Provide 120V duplex receptacle in cabinet above microwave/hood.
- Fabricate new counter top as necessary for the revised layout.

- Install new 8-foot long by 24-inch wide laminate counter/integral backsplash on west wall.
- Install ADA compliant sink in lieu of the installed sink.
- Move fire extinguisher from sink area to Room 111 entry door area.
- Install three-way light switches so there is an overhead light switch at both entry doors to the Coffee Room.
- Lengthen sink counter by 6 inches to provide a wider surface area around ADA sink.

Scope of Work

Change: Door Replacement

Task 20212

The Work associated with this task included the following:

- Arcadis conducted an inspection of the door locations at existing buildings identified by the City of Ann Arbor for replacement. The inspection was to obtain photographs of the condition of the existing doors and openings to assess for replacement of the doors.
- Arcadis recovered and reviewed the historical drawings and data for the existing proposed locations for door replacement.
- Arcadis provided architectural preliminary design costs for door replacement.
- Arcadis will prepare a WCD for this additional work including: final design elements, preparation of drawings and specifications (as required), and meetings with Ann Arbor and the Contractor to address all issues during construction.
- Arcadis will provide inspection of this work in accordance with our original scope of services.
- Arcadis will negotiate the Contractor's estimated costs as required.

Scope of Work

Change: Inspection and Evaluation of Grit System

Task 20213

The Work associated with this task included the following:

- Arcadis will review the existing drawings of the Eutek grit removal system.
- Arcadis will meet with the Plant to do an inspection of the existing grit removal system including a review of the physical system, and building limitations and constraints.
- Identify grit system operational/performance issues during site visit (scheduled for 2/7/17) and through discussions with Plant personnel.
- Identify potential options to address operational/performance issues including
 - Existing grit system retrofit.
 - Existing grit system replacement
- Meeting with WWTP management staff to discuss options, alternatives, cost, and recommendations.
- Prepare Summary Memorandum including estimated costs for retrofit and replacement.

Detailed engineering to proceed following City review of summary memorandum, receipt of cost estimate for detailed engineering, and direction by City to proceed with selected alternative.

Scope of Work

Change: Maintenance Building, Retention Building, Screen & Grit, and East Primary Building Roof Replacements

Task 20214

The Work associated with this task, was requested by the City, and includes the following:

- Preliminary inspection of Maintenance Building, Retention Building, Screen & Grit, and East Primary Building roofs.
- Review of existing roof drawings for each of the buildings.
- Preparation of construction cost estimate. Note; initial estimate to be revised to include Screen & Grit and East Primary Building roofs.
- Prepare memorandum with recommendations for each roof.
- Development of work change directive for replacement or repair of four roofs noted including drawings and specifications. Existing Contract details and specifications will be used as applicable.
- Meetings with the City and Contractor to review scope.
- Inspection of existing roof demolition and new roof construction.
- Negotiate Contractor's construction estimate.

Scope of Work Change:

Bid Phase Evaluation

Task 20215

Due to the apparent low bidder's estimate to construct to the Facilities Renovations Project, when compared to the other bidders and to the Engineer's estimate, the City of Ann Arbor requested that Arcadis conduct a bid evaluation of the three lowest bidders. This evaluation was a proactive measure taken by the City to ensure that a responsive bidder was selected as the contractor for the project. The Work associated with this task is summarized below.

- A detailed review of the bid documents submitted by the three (3) lowest bidders; Lakeshore Toltest Corporation, Granger Construction, and Walsh Construction.
- Contacting and documenting references provided by the three bidders.
- The development and distribution of a common list of questions requesting the three low bidders written responses.
- Responding to bidder's questions and preparing for a bid evaluation workshop with each of the three bidders individually.
- Conduct bid evaluation workshops with each of the three low bidders to interview their proposed project team using the questionnaire and their responses to the questions as the

agenda.

- Prepared a summary of the bid evaluation meetings for the City's review including detailed evaluations of each of the bidder's qualifications to be considered a responsible bidder.
- Submitted Arcadis' recommendation to award the most responsive bidder Walsh Construction.

Scope of Work

Change: East Plant Sample Piping Revisions and Storm Force Main Revisions in the Retention

Building Task 20216

The work associated with this task included the following:

- Revisions to the sample piping locations and size in the East Flow Splitting Structure, East Primary Building, and East Aeration Tanks.
- This change was required because the specified 6-inch diameter sampling pipe had several routing conflicts which would have resulted in a low section of pipe. A 4-inch pipe was evaluated and used and new routing was detailed to avoid conflicts with existing piping.
- This change was required to move the temporary sampler at the west flow splitter to the screen and grit area to sample only incoming influent.
- Revisions of drawings M00-15, M04-01, M04-03, M04-08, MOS-06, MOS-07, MOS-11, MOS-16, MOS-19, and MOS-21.
- Revisions of sampling lines due to the absence of an existing effluent sample pump. Plant determined this pipe was not needed and thus capping of this pipe was required.
- Additional piping and rearrangement of the pumps in the Sample Room to accommodate the spare sampler.
- Deletion of spare sample piping drain.
- Revision of sewage ejector discharge pipe and storm force main piping were required to avoid existing piping and to revise the location of the stormwater piping so that it enters the screw pump chamber and can be pumped to the head of the plant for treatment rather than sitting in Retention.
- Revisions of drawings C02-13, M08-01A, M08-01B, and M08-01C.
- Field verification and survey to access the best route for sample and storm piping.
- Coordination with Plant personnel for pipe routing and acceptable discharge locations.

Scope of Work

Change: Central Electrical Building Duct Bank Encasement

Task 20217

This change was required to protect several major buried electrical conduits located under the Central Electrical Building (CEB) that provide electricity to all Plant operations. The Contractor's electrical duct

bank layout on either end of the CEB, as approved by the Engineer, resulted in several of the major connecting conduits located under the CEB to be within the load bearing influence of the CEB foundations. Therefore, the electrical conduits had to be encased in concrete to protect them from the CEB foundation loads.

The additional work included the following:

- Review and evaluation of the electrical duct bank layout under the Central Electrical Building to determine if building loads and expected settlement would impact the duct bank complex under the north end of the building.
- Structural analysis of different building foundation sizes to determine if building loads would negatively impact duct bank integrity.
- Determination that specified foundations were required and that the duct banks had to be encased in concrete.
- Inspection of sequenced concrete encasement operations.
- Preparation of work change directive and construction estimate.

Scope of Work

Change: Michigan Elevator Code Inspection

Task 20218

The work associated with this task included the following revisions to the elevator machine room in the Administration Building as a result of the elevator code inspection:

- Added wall in elevator room to isolate elevator machine room from sanitary sewer stack, access hatch to second floor, and potable water piping.
- Relocated elevator panel controller to revised elevator machine room.
- Provided J-boxes with terminal blocks and extended existing wiring to control box in isolated elevator room.
- Relocated smoke detector and phone outlet.
- Prepared work change directive and negotiated costs with contractor.
- Inspection of the room by electrical engineer.

Scope of Work

Change: Revisions to East Plant Waste Activated Sludge Piping

Task 20219

The work associated with this task included the following revisions to the East Plant Waste Activated Sludge Piping:

- The Plant requested that the waste activated sludge line, in the East Blower Building basement, be metered to monitor flow of sludge to the Solids Handling Building as well as

the Thickener Building. New piping and valves were designed and a work change directive was issued to the Contractor.

- Field investigate the existing waste activated sludge piping in the East Plant Blower Building basement and take measurements of existing piping.
- Meet with Plant staff to discuss options for additional piping and metering.
- Design new piping and accessories for metering waste activated sludge flow.
- Prepare work change directive and cost estimate for additional work.
- Review and negotiate contractor's proposed scope and costs.
- Inspect work being installed.

Scope of Work Change:

Handrail Revisions

Task 20221

The work associated with this task was requested by the City and included the following revisions:

- Review of scope of Contract required handrail work with City and Contractor.
- Inspected all existing plant structures that need handrail replacement for possible inclusion in a change order including Screen and Grit, Lift Station, West Plant Meter Vault, and miscellaneous handrail in the plant.
- Prepared estimates for different handrail materials (aluminum and galvanized) to assist in type of handrail to be considered for East Plant and other plant locations.
- Determined handrail quantities by field measurement.
- Met with Walsh to identify total handrail replacement scope.
- Prepared work change directive for revised scope.
- Negotiated Walsh handrail estimated costs.

Scope of Work

Change: Sludge Nuclear Density Gauge Removal

Task 20222

This work was a City requested change since the City no longer uses the sludge density gauge. The work associated with this task included the following:

- Inspect existing gauge location and determine extent of scope for removal of gauge.
- Prepare work change directive.
- Prepare estimate for removal of gauge.
- Negotiate Walsh cost estimate for removal of gauge.
- Obtain outside quotes for gauge removal due to high quote from Walsh Sub.

- Incorporate change into change order.

Scope of Work

Change: Maintenance Building Hot Water Return and Service Connections

Task 20223

This work was required to address an unforeseen existing condition at the Maintenance Building where the hot water service and return lines enter the building. The existing hot water service and return pipes were found to be approximately eight feet below the ground surface and adjacent to the bottom of the Maintenance Building foundation. It was determined to be beneficial to raise the new hot water and service lines and enter the Maintenance Building at a higher elevation rather than attempt the connection at the lower existing elevation.

The work associated with this task included the following revisions:

- Inspect existing connection location for hot water and return service to Maintenance Building.
- Direct test pits and inspect existing connection point on outside and inside of Maintenance Building.
- Provide work change directive to make new shallower connection rather than excavating to the deeper existing connection point below the Maintenance Building footing.
- Work change directive included saw cutting Maintenance Building slab, coring a hole through the building footing, connection details for the new hot water and return connection point, and providing details for slab repair and sealing the pipe penetration through the foundation wall.
- Estimated construction costs.
- Negotiated estimated costs with contractor.
- Meet with the City to discuss change scope and costs.

Scope of Work

Change: Solids Handling Building Retaining Wall

Task 20224

The Plant requested a retaining wall be designed and constructed on the west side of the Solids Handling Building to protect staff from exiting the Solids Handling Building west door directly into potential on-coming traffic. The work associated with this task included the following revisions:

- A Survey of the existing area of the walkway and steps was conducted so that a stairway and retaining wall could be designed and constructed.
- Design details were developed for the construction of the walkway and wall.
- A work change directive was prepared to direct Walsh to do the work.
- An Engineer's cost estimate was prepared.
- Arcadis negotiated with Walsh and incorporated the change and costs into a change order.

Scope of Work

Change: Influent Splitter Sample Line Revision

Task 20225

The work associated with this task included the following revisions:

- The Plant requested that the sample line located in the West Plant splitter had to be relocated west of the splitter box so that recycle flow would not impact the samples.
- New sample pipe routing and connection location west of the splitter box was provided to Walsh.
- A work change directive was issued and costs were negotiated.
- A change order was prepared and issued

Scope of Work

Change: Pavement Change at Screen and Grit

Task 20226

The Plant requested that the bituminous pavement specified at the Screen and Grit Building be changed to reinforced concrete. This revision was requested because reinforced concrete pavement is structurally more appropriate than asphalt given the heavy truck loads this pavement will experience.

The work associated with this task included the following revisions:

- Reinforced concrete slab was designed and a concrete pavement detail was provided to the Contractor including concrete mix, subbase requirements, and steel reinforcement sizes.
- A plan showing limits of work, control joint locations, and pavement grades were also developed and provided to the contractor.
- Costs were tracked by Arcadis on a time and material basis.
- Incorporation of this change into a work change directive and change order.

Scope of Work

Change: Additional Document Management

Task 20227

The work associated with this task included the following revisions:

- This task is for addressing changes during the Project that were outside the original scope of work. These changes were initiated by the City, Arcadis and/or Walsh Construction for a variety of reasons including additions to the Project, enhancements to the original Contract requirements, and improvements to the Contract schedule.
 - o Meetings to discuss these changes.

- o Development of these changes with the City and the Contractor.
- o Maintaining electronic and hard copies of documents associated with the changes.
- o Creation of logs, submittals, requests for information, issues, work change directives, correspondence, progress photographs, meeting minutes, testing reports and schedule submittals.
- o Additional Project Management.

Scope of Work

Change: Revisions to the Sampler Room located in the East Blower Building

Task 20230

The City requested the following revisions to the Sampler Room including:

HVAC and Plumbing:

- Review status of existing design o
 - o HV unit
 - o ATC/Controls
 - o Ductwork
 - o Coordinate with existing equipment/installers
- Air conditioning design sizing calculations
- Select new equipment (new cooling coil, new indoor air handler, 2 air cooled condensers)
- Prepare demo of existing design features as required
- Prepare new revised equipment schedules
- Prepare new design details (cooling coil, hanging indoor air handler)
- Prepare new revised design plans
- Prepare new revised schematics
- Prepare new equipment specs if not in current set
- Revise existing specs as required for use
- Prepare new sequences of operations for new equipment
- Prepare construction cost estimate.

Structural and Architectural:

- Effort to add exterior window to sample room
- Vertical Load
 - o Perform analysis on vertical loads
 - o Design window header
 - o Detail window header
- Lateral Load
 - o Currently the exterior wall is a shear wall which restrains the building's lateral load (wind load and seismic load). By cutting an opening, we are reducing the lateral capacity of the shear wall. As required by the Building Code, if a lateral load resisting member's capacity is reduced, the lateral restraint of the building needs to be confirmed.

- Perform calculation to confirm lateral loads of the building
- Perform calculation to confirm lateral capacity of the shear wall with new opening
- Provide design strengthening if needed

- Effort to add interior window to sample room
- Vertical Load
 - o Perform analysis on vertical loads
 - o Design window header
 - o Detail window header and jamb

- Effort to insulate
 - o Provide details to fur, jib, and insulate walls
 - o Provide details to insulate ceiling

- Prepare construction cost estimate

Electrical and I&C:

- Review electrical components of SampleRoom design
- Evaluate required electrical loads
- Incorporate required electrical into existing design of Sampler Room
- Incorporate AC units into automatic temperature control panel