



Purchasing Division

ADDENDUM NO. 3

DATE: January 12, 2021
FROM: City of Grand Junction Purchasing Division
TO: All Offerors
RE: Persigo Wastewater Treatment Plant – Small Repairs IFB-4860-21-DH

Offerors responding to the above referenced solicitation are hereby instructed that the requirements have been clarified, modified, superseded and supplemented as to this date as hereinafter described.

Please make note of the following clarifications:

1. Q. Would the City consider moving the construction schedule to allow for more favorable weather during construction?

A. The City has reviewed this request, and has determined that the Contractor may start the project at their discretion, upon receipt of Notice to Proceed, with the understanding that the project Final Completion shall be no later than June 11, 2021 **and** remain within a 56 Calendar Day window of the agreed upon start date of the Notice to Proceed.

2. Q. Is there a prevailing wage?

A. Prevailing wage does not apply to this project.

3. Q. Details state reinforcing steel which lost more than 10% shall be brought to the attention of the engineer. The provided details for welding new bars or lap splicing new bars to supplement if required. Will this be a change order or to be included?

A. Please make note of the following change to the Project Specifications, as identified with highlight in the attached revised Specifications:

For Aerobic Digester Repairs Only 03 21 00 Part 1.2-A-1 shall be replaced with:
Supply, fabrication, and installation of new reinforcement. An allowance of 275 linear feet of supplemental/replacement #5 reinforcing bars shall be included. It is anticipated that some bars will be spliced with existing using lap splices, other bars will require installation of a mechanical coupler/welded splice to connect existing and new reinforcing. An allowance of 30 mechanical coupler or welded splices (Contractor's option) shall also be included in the repair. Cost of lap splices shall be included with the overall cost of reinforcing. The cost of supplemental/replacement reinforcing and splicing shall be included in the total bid as a separate line item. Payment shall be for

actual reinforcing and splices installed based on extent of deterioration and direction provided by Engineer during Work.

4. Q. Please make note of the following change to the Project Specifications:

For Both Repairs 01 00 00 Part 1.5 added: Contractor to furnish and pay for all temporary facilities and controls listed below which are not explicitly designated as responsibility of Owner.

The original solicitation for the project noted above is amended as noted.

All other conditions of subject remain the same.

Respectfully,

A handwritten signature in black ink, appearing to read "Duane Hoff Jr.", written in a cursive style.

Duane Hoff Jr., Senior Buyer
City of Grand Junction, Colorado

01 00 00

GENERAL

PART 1 GENERAL

1.1 PROJECT SPECIFIC REQUIREMENTS

- A. The Standard Specifications for Road and Bridge Construction, as well as the Standard Specifications for Construction of Underground Utilities Water Lines, Sanitary Sewers, Storm Drains, Underdrains and Irrigation Systems do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.
- B. Standard Details for Construction of Streets, Trails, Storm Drains and Utilities do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.
- C. Project specific requirements shall take precedence over general conditions or standard documents.
- D. Warranty period for specific Work items are not intended to supplement the general Contractor's Warranty and Guarantee.

1.2 REFERENCES

- A. References to applicable standards shall be the latest edition of each unless otherwise noted.

1.3 DEFINITIONS

- A. The definitions here shall supplement, or replace, those found in the City of Grand Junction General Contract Conditions.
 - 1. As-Built Documents: See Project Record Documents.
 - 2. Owner: See City.
 - 3. Project Record Documents: Contract documents marked by the Contractor to identify changes that were made during construction.
 - 4. Request for Information (also known as RFI): A question or inquiry about the Work submitted by the Contractor for clarification by the Owner or Engineer.

1.4 ADMINISTRATIVE

- A. Requests for Information (RFI): Contractor shall submit RFIs to the Engineer for any condition which is believed to be at variance with the Construction Documents, or for situations where it is unclear what the Construction Documents are implementing. RFIs shall be submitted in writing to the Engineer and shall include a location, date requested, date required and indicate which repair item or item(s) are impacted by the request. Allow a minimum of 3 working days for review by Engineer.
- B. Maintain at least one copy of each referenced standard, this Project Manual (Specifications), Drawings and/or Figures at the job site. In addition, maintain copies of all site visit reports (SVR) and Sketches (SKs) issued by the Engineer during Construction.

- C. Provide a project superintendent at the Site a minimum of eight hours per day during the progress of the Work. The superintendent shall be literate and fluent in English.
- D. Photograph existing conditions that are important to the construction or that deviate substantially from the Contract Documents; significant conditions that will be concealed by the Work; finish surfaces that might be misconstrued as damage caused by removal or other Work operations; and immediate follow-up when on-site events result in construction damage or loss. Photographs shall be of sufficient quality as to depict the condition being photographed. Provide photographs to Owner or Engineer upon request, either during project or after completion.

1.5 TEMPORARY FACILITIES AND CONTROLS

- A. Contractor to furnish and pay for all temporary facilities and controls listed below which are not explicitly designated as responsibility of Owner.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
 - 1. Comply with all security procedures.
- C. Project has special requirements for coordinating Work because of the following conditions:
 - 1. Owner will occupy premises outside of Work area during construction period.
 - a. Cooperate with Owner to minimize conflicts and facilitate Owner usage.
 - b. Perform Work to avoid interference with Owner's day-to-day operations. Notify Owner's Representative at least 72 hours in advance of activities that will affect Owner's operations.
 - c. Maintain vehicular, pedestrian, and emergency and normal access to portions of facility that are in use. Keep entrances and exits clear of stored materials and construction equipment.
 - d. Short interruptions in access may be permitted if approved in advance in writing by the Owner's Representative.
 - e. Schedule deliveries to minimize interruptions.
 - f. Do not disturb Site outside of Work area.
 - g. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted and then only after arranging to provide temporary utility services according to requirements indicated.
 - h. Notify Owner not less than 7 days in advance of proposed utility interruptions.
 - i. Do not proceed with utility interruptions without Owner's written permission.
 - 2. Residential nature of building and neighborhood.
 - 3. Office tenant needs.
- D. Staging:
 - 1. Staging areas must be coordinated with Owner prior to mobilization.
 - 2. Confine materials and equipment to the staging and work areas. Contractor assumes full responsibility for the protection and safekeeping of items stored on site.
 - 3. Do not unreasonably encumber Site with materials or equipment.
 - 4. Do not load Project structure with weight that will endanger Project structure.
- E. Parking: Construction personnel shall park on-site in areas designated by the Owner's Representative.
- F. Water Service: Use of Owner's existing water service will be permitted.
 - 1. Provide connections and extensions of service as required for construction operations.
 - 2. Provide additional water as necessary.

- G. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel at location designated by Owner's Representative.
1. Provide disposable supplies, including toilet tissue, paper towels, and paper cups. Maintain adequate supply. Provide covered waste containers for disposal of used material.
 2. Service toilets at least twice weekly.
 3. Provide wash facilities supplied with potable water at convenient locations for personnel who handle materials that require clean up. Supply cleaning compounds appropriate for each type of material handled. Dispose of drainage properly.
 - a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
 4. Comply with public authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- H. Electric Power Service: Use of Owner's existing electric 120V electric outlets will be permitted. Any power requirements above existing 120V outlets will need to be provided.
1. As necessary, provide additional electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Do not overload Owner's service.
 2. Comply with NECA 200 and NFPA 70.
 3. Maintain temporary service in safe condition and utilize in safe manner.
- I. Use of Existing Stairs and Elevators: Use of Owner's existing stairs and elevators will be permitted, as long as stairs and elevators are cleaned and maintained in condition acceptable to Owner's Representative.
1. Coordinate daily usage with Owner's Representative and with requirements for facility operations.
 2. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs, elevator cars, and entrance doors and frame, and to maintain means of egress.
 3. At Substantial Completion, restore stairs and elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
- J. Lighting: Owner will provide existing lighting at existing locations.
1. Provide additional lighting, as necessary, with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 2. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- K. Provide insulation or temporary heating as necessary for curing, drying, and protection of installed construction.
1. Select equipment that will not have harmful effect on completed installations or elements being installed.
 2. Maintain temporary heating on 24-hour basis until no longer needed.
 3. Unless noted otherwise, insulation is considered incidental to construction and will not be paid for separately.
 4. Unless otherwise specified, temporary heating will not be considered part of Work and will be paid as additional Work item. Notify Owner's Representative in advance of need for temporary heating and estimated added cost. Do not proceed with temporary heating until authorized in writing by Owner's Representative.
- L. Snow removal: The contractor shall be required to remove snow from the work area.
- M. Equipment:

1. Direct equipment exhaust away from occupied spaces and vent equipment operating within structure to outside.
 2. Operate equipment at noise levels conforming to requirements of city, state, and federal laws and codes, and Owner limitations.
- N. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of public authorities having jurisdiction. Construction debris shall be removed in a manner that avoids overloading adjacent structural members.
- O. Protection:
1. Limit access to work areas.
 2. Contractor shall provide protective barriers, fences, etc. to ensure the safety of pedestrians and vehicular traffic during the Work. All barriers and fences shall comply with local, state, and federal regulations and laws.
 3. Provide adequate signage to direct pedestrian and vehicular traffic around the area under construction.
 4. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, building, and other surfaces that could be harmed by such contact.
 5. Existing Drains:
 - a. Verify that drains in or near Work area are open and free flowing prior to start of Work.
 - b. Lawfully remove construction effluent from Site. Do not allow construction debris to flow into existing drains or sewer systems.
 - c. Rout or replace clogged drain lines at completion of Work.
 6. Confine dust, debris and fumes to Work area and prevent from entering areas outside of the Work area.
 7. Protect finished surfaces against damage. Minimize traffic on finished roof surfaces and do not use for material storage.
 8. Contractor shall be responsible for maintaining the water tightness of the areas of the structure being worked on during the course of the work. Providing temporary protection of the existing construction or structure from the weather until removed portions are completely replaced with new construction. The costs of damage and repairs shall be made at no cost to the Owner.
 9. Maintain all protection in operable condition for the full duration of the project.
- P. Temporary Fencing:
1. Tree and Plant Protection: Install temporary fencing located as indicated or outside drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
 2. Site Enclosure Fence: Before construction operations begin, provide Site enclosure fence in manner that will prevent people and animals from easily entering Site except by entrance gates.
- Q. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241. Coordinate with Owner's safety team.
1. Provide portable, UL-rated fire extinguishers with class and extinguishing agent as required by locations and classes of fire exposures.
 2. Prohibit smoking on Site.

3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of public authorities having jurisdiction.
4. Store combustible materials in approved safety containers and enclosures, away from building if possible.
5. Develop and supervise overall fire-prevention and -protection program for personnel at Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

PART 2 PRODUCTS

2.1 GENERAL

- A. The products specified are believed to have properties adequate for successful completion of the Work. If the Contractor has found these products to be unacceptable or has had difficulty using these materials, the Contractor shall notify the Architect/Engineer in writing, and provide a request for substitution of material for which the Contractor has had successful experience.
- B. No product substitutions will be allowed unless otherwise noted. Engineer's approval must be obtained for all substitutions prior to being awarded the project. Submit requested substitutions with bid form.

2.2 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, directions for storing, and complete manufacturer's written instructions.
- B. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which have been exposed to moisture to their detriment.
- C. Store and handle materials in accordance with manufacturer's written instructions, safety requirements, and all applicable laws and regulations. Remove from Site, and replace at no cost to Owner, any materials that are damaged or otherwise negatively affected by not being stored or handled in accordance with manufacturer's written instructions.
- D. Store materials in original, undamaged containers and packaging in clean, dry, location on raised platforms and protected from weather, within temperature range required by manufacturer. Protect stored materials from direct sunlight and sources of ignition. Manufacturer's standard packaging and covering alone is not considered adequate weather protection.
- E. Locate materials in a secure location approved by Owner's Representative
- F. Conspicuously mark damaged or opened containers, containers with contaminated materials, damaged materials, and materials that cannot be used within stated shelf life and remove from Site as soon as possible. Replace discarded materials in a timely manner at no cost to Owner.
- G. Limit stored materials on structures so as to preclude damage to materials and structures.
- H. Maintain copies of all applicable Safety Data Sheets (SDS) with materials in storage area, such that they are available for ready reference on Site.

PART 3 EXECUTION

3.1 DISCOVERY, FIELD VERIFICATION AND CHANGES IN WORK

- A. Contractor shall verify all quantities. Quantities shown are for estimating purposes only.
- B. Do not scale drawings. The Contractor shall field verify the existing dimensions and existing conditions prior to starting the work. Dimensions of the new construction shall be adjusted as necessary to fit the existing conditions. The Engineer shall be notified in writing of any significant deviations from the dimensions or conditions shown on these drawings.
- C. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials or mislocation of embedded elements such as reinforcing steel, which may interfere with proper execution of the Work. Promptly report to Engineer as a request for information any of these conditions.

3.2 EXAMINATION FOR MATERIAL COMPLIANCE

- A. Examine substrates and conditions with Installer and manufacturer's representative, where appropriate, for compliance with requirements and for other conditions affecting installation or performance of the material.
 - 1. Verify dimensions so that proper installation of material for optimal performance is maintained.
 - 2. Ensure that work done by other trades is complete.
 - 3. Verify that areas and conditions under which Work is to be performed permit proper and timely completion of Work.
 - 4. Notify Engineer in writing of conditions which may adversely affect installation or performance of the material and recommend corrections.
 - 5. Do not proceed with Work until adverse conditions have been corrected and reviewed by Engineer.
 - 6. Commencing Work constitutes acceptance of Work surfaces and conditions.

3.3 CLEANING

- A. Immediately clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- B. At the end of each workday, broom-clean Site and Work areas and place all items to be discarded in appropriate containers.
- C. After completing Work:
 - 1. Clean all materials resulting from Work that are not intended to be part of the finished Work using appropriate cleaning agents and procedures. Exercise care to avoid damaging surfaces.
 - 2. Repair at no cost to Owner all items damaged during the Work.
 - 3. Remove and legally dispose of debris and surplus materials from Site.

3.4 PROTECTION

- A. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property (including adjacent building elements, landscaping, and motor vehicles).
 - 1. Erect temporary protective canopies and walls, as necessary, at walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- B. Cover adjacent surfaces with materials that may be damaged.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- E. Limit access to Work areas.
- F. Comply with manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.
- G. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.
- H. Protect from damage, all elements of completed work and original construction to remain.
- I. Protect Work during and after completion from contact with contaminating substances and from damage, so materials are without deterioration or damage at time of Substantial Completion.

END OF SECTION

01 00 00

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 3. Provide adequate signage to direct pedestrian and vehicular traffic around the area under construction.
 4. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, building, and other surfaces that could be harmed by such contact.
 5. Existing Drains:
 - a. Verify that drains in or near Work area are open and free flowing prior to start of Work.
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 9. Maintain all protection in operable condition for the full duration of the project.
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1. Tree and Plant Protection: Install temporary fencing located as indicated or outside drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
 2. Site Enclosure Fence: Before construction operations begin, provide Site enclosure fence in manner that will prevent people and animals from easily entering Site except by entrance gates.
- Q. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241. Coordinate with Owner's safety team.
1. Provide portable, UL-rated fire extinguishers with class and extinguishing agent as required by locations and classes of fire exposures.
 2. Prohibit smoking on Site.

3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of public authorities having jurisdiction.
4. Store combustible materials in approved safety containers and enclosures, away from building if possible.
5. Develop and supervise overall fire-prevention and -protection program for personnel at Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

PART 2 PRODUCTS

2.1 GENERAL

- A. The products specified are believed to have properties adequate for successful completion of the Work. If the Contractor has found these products to be unacceptable or has had difficulty using these materials, the Contractor shall notify the Architect/Engineer in writing, and provide a request for substitution of material for which the Contractor has had successful experience.
- B. No product substitutions will be allowed unless otherwise noted. Engineer's approval must be obtained for all substitutions prior to being awarded the project. Submit requested substitutions with bid form.

2.2 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, directions for storing, and complete manufacturer's written instructions.
- B. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which have been exposed to moisture to their detriment.
- C. Store and handle materials in accordance with manufacturer's written instructions, safety requirements, and all applicable laws and regulations. Remove from Site, and replace at no cost to Owner, any materials that are damaged or otherwise negatively affected by not being stored or handled in accordance with manufacturer's written instructions.
- D. Store materials in original, undamaged containers and packaging in clean, dry, location on raised platforms and protected from weather, within temperature range required by manufacturer. Protect stored materials from direct sunlight and sources of ignition. Manufacturer's standard packaging and covering alone is not considered adequate weather protection.
- E. Locate materials in a secure location approved by Owner's Representative
- F. Conspicuously mark damaged or opened containers, containers with contaminated materials, damaged materials, and materials that cannot be used within stated shelf life and remove from Site as soon as possible. Replace discarded materials in a timely manner at no cost to Owner.
- G. Limit stored materials on structures so as to preclude damage to materials and structures.
- H. Maintain copies of all applicable Safety Data Sheets (SDS) with materials in storage area, such that they are available for ready reference on Site.

PART 3 EXECUTION

3.1 DISCOVERY, FIELD VERIFICATION AND CHANGES IN WORK

- A. Contractor shall verify all quantities. Quantities shown are for estimating purposes only.
- B. Do not scale drawings. The Contractor shall field verify the existing dimensions and existing conditions prior to starting the work. Dimensions of the new construction shall be adjusted as necessary to fit the existing conditions. The Engineer shall be notified in writing of any significant deviations from the dimensions or conditions shown on these drawings.
- C. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials or mislocation of embedded elements such as reinforcing steel, which may interfere with proper execution of the Work. Promptly report to Engineer as a request for information any of these conditions.

3.2 EXAMINATION FOR MATERIAL COMPLIANCE

- A. Examine substrates and conditions with Installer and manufacturer's representative, where appropriate, for compliance with requirements and for other conditions affecting installation or performance of the material.
 - 1. Verify dimensions so that proper installation of material for optimal performance is maintained.
 - 2. Ensure that work done by other trades is complete.
 - 3. Verify that areas and conditions under which Work is to be performed permit proper and timely completion of Work.
 - 4. Notify Engineer in writing of conditions which may adversely affect installation or performance of the material and recommend corrections.
 - 5. Do not proceed with Work until adverse conditions have been corrected and reviewed by Engineer.
 - 6. Commencing Work constitutes acceptance of Work surfaces and conditions.

3.3 CLEANING

- A. Immediately clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- B. At the end of each workday, broom-clean Site and Work areas and place all items to be discarded in appropriate containers.
- C. After completing Work:
 - 1. Clean all materials resulting from Work that are not intended to be part of the finished Work using appropriate cleaning agents and procedures. Exercise care to avoid damaging surfaces.
 - 2. Repair at no cost to Owner all items damaged during the Work.
 - 3. Remove and legally dispose of debris and surplus materials from Site.

3.4 PROTECTION

- A. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property (including adjacent building elements, landscaping, and motor vehicles).
 - 1. Erect temporary protective canopies and walls, as necessary, at walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- B. Cover adjacent surfaces with materials that may be damaged.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- E. Limit access to Work areas.
- F. Comply with manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.
- G. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.
- H. Protect from damage, all elements of completed work and original construction to remain.
- I. Protect Work during and after completion from contact with contaminating substances and from damage, so materials are without deterioration or damage at time of Substantial Completion.

END OF SECTION

SECTION 03 01 34

CONCRETE REPAIRS - PREPACKAGED MATERIALS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Supply and placement of prepackaged concrete repair materials, including formwork, batching procedures, placement procedures, finishes, curing and protection.

1.2 PRICES

- A. Where identified as such on the Bid Form, perform Work on unit price basis. Unit prices below include concrete removal, surface preparation of steel and concrete surfaces, and installation of supplemental reinforcing, prior to placement:
 - 1. ~~Overhead surface repair, partial depth. Payment based on surface area of removal area from one surface and average depth of 4 inches.~~
 - 2. Supply, fabrication, and installation of new reinforcement. An allowance of 275 linear feet of supplemental/replacement #5 reinforcing bars shall be included. It is anticipated that some bars will be spliced with existing using lap splices, other bars will require installation of a mechanical coupler/welded splice to connect existing and new reinforcing. An allowance of 30 mechanical coupler or welded splices (Contractor's option) shall also be included in the repair. Cost of lap splices shall be included with the overall cost of reinforcing. The cost of supplemental/replacement reinforcing and splicing shall be included in the total bid as a separate line item. Payment shall be for actual reinforcing and splices installed based on extent of deterioration and direction provided by Engineer during Work.
- B. In no case shall the cost of repair exceed the full-depth unit cost.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of fly ash, silica fume, and other pozzolans, or slag cement.
- B. Testing Agency: Third party testing agency qualified to perform the testing specified. Refer to Specification Section 01 40 00 for additional requirements.
- C. Batch: Either of the following:
 - 1. A quantity of material mixed at one time or in one continuous process;
 - 2. To weigh or volumetrically measure and introduce into the mixer the ingredients for a quantity of material.
- D. Mixture: The assembled, blended comingled ingredients of the concrete repair material or the proportions of its assembly.

1.4 QUALITY ASSURANCE

- A. Contractor Qualifications: Experienced firm that has successfully completed concrete repair work similar in material, design, and extent to that indicated for the Project. Must have successful construction with specified materials in local area in use for minimum of five years.
1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond the control of Contractor; inform Owner and Engineer in advance of any changes.
- B. Mockups: Construct mockups to demonstrate construction procedures, quality of Work, and aesthetic effects.
1. Mockup and Quality Testing shall be completed in full prior to proceeding with Work. If the Contractor wishes to proceed with Work prior to completion, they may proceed at their own risk. Any revisions or additional Work as a result of proceeding shall be the sole responsibility of the Contractor and no other party.
 2. Construct mockups with at least:
 - a. Overhead-surface (soffit): 5 square feet
 3. Mockup locations will be selected by Engineer after schedule and work sequence is submitted by contractor.
 4. Use personnel, equipment, materials, and procedures proposed for use on Project.
 5. Construct mockups on existing members under same weather conditions expected during Work.
 6. Provide access to mockup locations during work and after to allow for completion of observations and testing.
 7. Engineer will observe the following conditions prior to the Contractors work proceeding on mockup (hold points). Provide Owner and Engineer with a schedule for mockup activities at least one week prior to start of mockup work. Clearly define sequence of work including required Engineer hold point observations. **Mockup shall be coordinated and staffed to allow for hold point observations to be completed during back to back work days, afternoon of one day to morning of next.** Group all mockups such that visits for different repair types are prepared and ready for review during the same visits. Additional visits to review hold points may be charged to the Contractor, or withheld from payment. Allow Engineer 24 hours to observe work at each hold point, complete all work indicated prior to Engineer Visit.
 - a. Engineer Hold Point Visit 1:
 - 1) Concrete and steel surface preparation work.
 - 2) Prepared and cleaned concrete removal areas including prepared concrete and steel surfaces (prior to coating)
 - 3) Steel coating application.
 - b. Engineer Hold Point Visit 2:
 - 1) Completed concrete and steel surface preparation, including completed steel coating installation.
 - 2) Installation of concrete repair material
 - a) Batching
 - b) Testing
 - c) Finishing
 - 3) Installation of curing and protection measures
 8. Coordinate performance of, or perform, quality control measures and testing as required by this section; including, but not limited to (see Quality Control for Responsible Entity):
 - a. Reinforcing inspections

- b. Fresh or plastic concrete repair material testing
- c. Compressive strength testing
- d. Pull-off testing.
 - 1) Testing shall be at one location for overhead mockup type in conformance with the requirements of this section.
 - 2) Testing shall include one test site in mock-up repair area and an additional test site immediately adjacent to mock-up in sound, undisturbed original substrate concrete (control test). The control test area shall have the top surface prepared to remove the top 1/8 to 1/4-inch concrete paste and prepare the surface for epoxy.
- 9. If Engineer or Owner determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved. Remove and replace mockups that are not approved.
- 10. Approved mockups shall be maintained in undisturbed condition throughout Project as basis for acceptance of completed work and may become part of completed Work if undisturbed at time of Substantial Completion.
- 11. Do not proceed with repair Work until mockups have been approved by Engineer and Owner.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Form Panels: Plywood, lumber, metal, plastic, or another material capable of producing final product as specified here-in.
 - 1. Use panels that will provide continuous, true, and smooth repair surfaces.
 - 2. Furnish panels in largest practicable sizes to minimize number of joints.
 - 3. Do not use rust-stained, steel, form-facing material.
 - 4. Use form-facing material capable of producing smooth, uniform texture on concrete. Do not use form-facing materials with raised grain, torn surfaces, worn edges, dents, or other defects that will impair texture of concrete surface.
- B. Accessories:
 - 1. Chamfer Strips: Wood, metal, PVC, or rubber strips.
 - 2. Form-Release Agent: Commercially-formulated form-release agent that will not bond with, stain, or adversely affect the concrete repair surface and will not impair subsequent treatments of the surface. Form-release agent shall have a rust inhibitor for steel form-facing materials.

2.2 PREPACKAGED CONCRETE REPAIR MATERIALS

- A. **Formed Vertical and Overhead Repairs**
 - 1. Pour or pump pre-blended aggregate and mortar or neat mortar extended with aggregate per manufacturer's recommendations during batching: Use product specifically intended for this application, for which the Contractor has had proven successful experience installing. Use one of the following, or approved equal:
 - a. MasterEmaco S 440 manufactured by BASF Construction Chemicals, LLC.
 - b. Sikacrete 211 SCC Plus manufactured by Sika Corporation.
 - 2. Pump with pre-placed aggregate (neat mortar pumped): Use product specifically intended for this application, for which the Contractor has had proven successful experience installing. Use one of the following, or approved equal:

- a. SikaQuick FNP manufactured by Sika Corporation.
- B. Do not use materials that contain added gypsum.
- C. Provide all like materials with the same manufacturers lot number.
- D. Aggregates for replacement:
 - 1. From single source with documented record of at least ten years of satisfactory service using similar aggregates and cementitious materials in similar applications and service conditions.
 - 2. Coarse aggregate should be clean crushed stone or natural gravel, free of surface dust and fines.
 - 3. Conform to ASTM C33, Class 4S, except for grading.
 - 4. Grading shall be in accordance with the table below.

Sieve Size (in)	1 1/2	1	3/4	1/2	3/8
Percent Passing	95 to 100	40 to 80	25 to 40	0 to 10	0 to 2

Source: ACI 304.1R-92, Table 2.1, Grade 1 for 1/2-inch minimum size coarse aggregate.

- E. Testing of concrete repair material(s), in final batched project condition, shall confirm the following properties:
 - 1. 28-day Compressive Strength (ASTM C39).
 - a. 4,000 pounds per square inch, minimum. This strength shall be considered the minimum specified compressive strength, regardless of the proprietary repair material manufacturers published compressive strength data.
 - 2. Bond Strength (Per ASTM C1583): 175 pounds per square inch, minimum. This strength shall be considered the minimum specified bond strength, regardless of the proprietary repair material manufacturers published strength data.

2.3 CURING MATERIALS

- A. Membrane-Forming Curing Compound (**vertical and overhead repairs only**): ASTM C309, Type 2; VOCs less than legal limits. Silicate materials shall not be used.
- B. Water: Potable.

PART 3 EXECUTION

3.1 GENERAL

- A. Follow the requirements of these specifications and the prepackaged repair material manufacturer's written instructions, whichever is more stringent as determined by the Engineer. If a conflict is identified between these specifications and the manufacturer's written instructions, notify the Engineer prior to performing Work and Engineer will determine which requirements apply.

3.2 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork to support vertical, lateral, static, dynamic, and construction loads that might be applied prior concrete repair reaching 75 percent of their specified minimum compressive strength. For form and pump applications formwork should be capable of supporting a pumped material pressure of at least 15 psi.

- B. Construct formwork so concrete repairs are of size, shape, alignment, elevation, and position indicated and tight enough to prevent loss of material.
 - 1. Ensure flatness and smoothness as required for finish type per Section 3.7.
 - 2. Chamfer exterior corners and edges of permanently exposed concrete to match existing, if chamfered.
- C. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
- D. Provide temporary openings for cleanouts, venting, and inspection ports (witness holes) where the interior area of the formwork is inaccessible. Close openings with panels or dowels tightly fitted to forms and securely braced to prevent loss of material.

3.3 BATCHING AND MIXING

- A. Ensure that all materials have been stored and pre-conditioned to proper temperatures as required by the prepackaged repair material manufacturer.
- B. Batch materials by weight on basis of whole bags of prepackaged repair material, NEVER USE PARTIAL BAGS.
- C. Mix materials in appropriate mixer (drum or paddle type) as specifically required by the prepackaged repair material manufacturer. Provide sufficient number or size of mixer(s) so that placement operations will proceed uninterrupted at each placement location.
- D. Ensure that all mixer elements are cleaned of all materials from previous batch, and mixer components have been pre-wetted or charged prior to batching.
- E. Mix ingredients to uniform consistency with mixing times per the manufacturer's recommendations or instructions.
- F. Compile a Batch Log for each batch of material. A sample batch log containing the minimum information required is attached to this Section.
- G. Cold-Weather: Protect material from physical damage or reduced strength due to frost, freezing, or low temperatures.
 - 1. When the air temperature has fallen or is expected to fall below 40 degrees F, uniformly heat water, aggregates, and cement (prepackaged materials) before mixing to obtain a mixture temperature of not less than 50 degrees F and not more than 80 degrees F at the point of placement; no single component shall be less than 40 degrees F or more than 90 degrees F prior to mixing. Mix water and aggregates together before adding cement. Do not add cement if the temperature of the water/aggregate mixture exceeds 70 degrees F.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

3.4 PLACEMENT (GENERAL)

- A. For repair areas where material will be cast against, and bonded to, existing concrete surfaces, wet existing surface to saturated surface-dry condition at least 1 hour prior to placement. Maintain surfaces at this condition until placement. If forms are filled with water prior to placement to

achieve this condition, ensure that standing or flowing water is removed and surfaces are allowed to dry to saturated, surface-dry condition.

- B. Do not allow material to fall a vertical distance greater than 4 feet from the point of discharge to final position.
- C. Do not allow material to disturb or displace reinforcing bars or other embedded items.
- D. Place material at a rate so that the material is plastic and flows readily into corners of forms or openings and into spaces fully around reinforcing bars.
- E. Place material continuously until the repair volume or section is completed, with no cold or construction joints unless explicitly approved in writing by Engineer prior to placement.
- F. Dispose of material that has partially set prior to placement or that has been contaminated by foreign material.
- G. Cold-Weather Placement: Protect material from physical damage or reduced strength due to frost, freezing, or low temperatures.
- H. Hot-Weather Placement: Protect material from physical damage or reduced strength due to rapid evaporation or overheating of concrete. Do not allow the temperature of the material at the time of placement to exceed 90 degrees F, or as required by the concrete repair material manufacturer. When hot-weather conditions exist, use one or more of the following procedures:
 - 1. Place material at night or early in morning when ambient air temperatures are lower.
 - 2. Cool ingredients before mixing to maintain the material temperature below required at the time of placement. Chilled mixing water or chopped ice may be used to control the temperature; include the water equivalent of the ice in the mixing water quantity.
 - 3. Cover repair areas with water-soaked burlap so the formwork, concrete substrate and steel temperature does not exceed the ambient air temperature.
 - 4. Provide windbreaks or sunshades, or both.

3.5 FORM AND POUR PLACEMENT

- A. Place material as near as possible to its final position to avoid segregation due to re-handling or flowing.
- B. If conventional repair materials are used (non-SCC), consolidate material with mechanical vibrating equipment, so that the material is thoroughly worked around reinforcement and other embedded items and into corners.
 - 1. Use internal vibrators with a minimum speed of 7,000 vibrations per minute and that are sufficiently narrow to fit into spaces between reinforcing bars, formwork, and existing concrete. Have extra vibrators at the Site in case a vibrator does not work.
 - 2. Do not use vibrators to transport repair material.
 - 3. Insert and withdraw vibrators vertically at uniformly spaced locations no farther apart than the visible effectiveness of the vibrator.
 - 4. At each insertion, limit the duration of the vibration to the time necessary to consolidate the material without causing constituents to segregate.
- C. For core and pour applications on vertical and overhead surfaces:
 - 1. Ensure sufficient placement holes to adequately fill and consolidate repair area. A grid pattern may facilitate complete filling.

2. Provide adequate internal and external vibration to ensure adequate consolidation.
3. Place vent pipes or holes and observation tubes to ensure complete filling of repair area.

3.6 FORM AND PUMP PLACEMENT

- A. Install bulkheads as necessary to facilitate placement in large repair areas to ensure manageable placement volumes.
- B. Place inlet pipes, vent pipes and observation tubes to ensure complete filling of repair area and that material is deposited as close as possible to its final position. A grid pattern may facilitate complete filling.
- C. Start placement at low points for vertical repairs and work to high points with appropriate venting provided. Ensure port-to-port travel is achieved.
- D. Once complete filling is achieved, maintain light pressure (on the order of 10psi) on the formwork from the pump for 5 minutes to prevent sagging and to displace water and air from repair.
- E. For preplaced aggregate installations:
 1. Do not drop aggregate more than 5-feet into forms.
 2. Externally vibrate forms as necessary to aid in consolidation as necessary.

3.7 FINISHING FORMED SURFACES

- A. Provide surface finish 2.0 (SF-2.0) unless otherwise specified, at concrete surfaces exposed to public view.
- B. Edge of repair shall be flush with adjacent concrete surface with 1/8-inch tolerance.
- C. Do not apply a rubbed finish.
- D. Surface Finish Type Definitions:
 1. Surface Finish-2.0 (SF-2.0): Repair voids larger than 3/4-inch wide or 1/2-inch deep. Repair or patch all form tie holes and similar construction related blemishes. Limit abrupt (over 1-inch or less) or gradual (5-foot straight edge) concrete repair surface irregularities to 1/4-inch (ACI 117 Class B).

3.8 CURING AND PROTECTION

- A. General:
 1. Curing method shall be applied within 30 minutes of material finishing.
 2. Curing period shall be seven days. Maintain material in a moist condition for at least seven days after placing.
 3. Curing method shall be as noted below:
 - a. Unformed Vertical and Overhead Surfaces: Curing compound
 - b. Formed surfaces: Formwork, as specified in Section 2.1, shall meet requirements of curing for these elements. If formwork is removed prior to full curing period, install curing compound within 30 minutes of removing formwork.
- B. Curing Methods:
 1. Curing compound
 - a. Apply curing compound uniformly in a continuous operation by power spray or roller according to manufacturer's written instructions and recommended coverage rate.

- b. Recoat areas subjected to heavy rainfall within three hours after initial application.
 - c. Maintain continuity of compound and repair damage during curing period.
- C. Cold Weather Protection: Provide protection such as blankets, heated blankets, insulation, enclosures, and/or heaters to keep concrete protected from cold temperatures and frost.
- 1. Protection methods shall be installed immediately following installation of curing method.
 - 2. Maintain concrete repair material above 55 degrees F until it has reached 3,500 psi based on field cured concrete cylinders, manufacturer's test data (if testing is for cubes, value shall be 4,250 psi), or seven days, whichever is less.

3.9 REMOVAL OF FORMWORK

- A. Structural Elements: Leave formwork for beam soffits, joists, slabs, and other structural elements that support the weight of concrete in place for seven days, or until concrete repair material has achieved at least 75 percent of specified 28-day compressive strength based on field cured cylinders. Remove forms only if shoring has been arranged to permit removal of forms without loosening or disturbing shoring.

3.10 QUALITY CONTROL

- A. Sampling and testing of fresh repair material shall be performed by the Testing Agency retained by the Owner according to the following requirements:
- 1. Take test sample from point of discharge onto final structure according to ASTM C172. Take additional samples at other locations only if directed by Engineer.
 - 2. Fresh repair material tests shall include:
 - a. Unit weight (ASTM C138)
 - b. Slump (ASTM C143) or Spread (ASTM C1611)
 - c. Temperature (ASTM C1064)
 - d. Fabrication of compressive strength specimens (as defined below)
 - 3. Fabrication of compressive strength specimens shall be cubes or 4 by 8-inch cylinders based on the following
 - a. Cubes shall be fabricated for repairs consisting of entirely neat mortars, those which do not contain coarse aggregate, in their final installed condition. Repair materials used for pre-placed aggregate shall not be cubes. Fabrication of cubes shall be modified per ASTM C1107 when using materials with fluid consistency.
 - b. Cylinders shall be fabricated for aggregate extended mortars, or concrete, and repair locations which include the use of pre-placed aggregate. Pre-placed aggregate samples shall be fabricated in a manner similar to the concrete repair placement.
- B. Material Compressive Strength Testing.
- 1. Testing shall be performed by Testing Agency retained by Owner.
 - 2. A strength test shall be considered three 4 by 8-inch cylinders or three cubes.
 - 3. Compressive strength sample fabrication shall include adequate numbers of samples such that testing can be performed as noted blow.

Compressive Strength Testing Ages and Quantity

Curing Method	Standard Cured	Field Cured	TOTAL
Strength Test Age(s)	28 days	3 days	
Total Number of Cylinders or Cubes to be cast and tested	3	3	6

- a. Additional strength tests at earlier ages may be performed at the Contractors option.

- b. All confirmations of in-situ strength for stripping of forms or removal of shoring shall be based on field-cured specimens cast at the Contractors discretion/option and shall be in addition to those minimums shown.
 - c. Standard-cured (lab-cured):
 - 1) Store specimens at the Site for at least 16 hours at a temperature of 60 to 80 degrees F. Provide a temperature-controlled box or other enclosure if necessary.
 - 2) After at least 16 hours, but not more than 30 hours, transport the specimens to the laboratory and air cure at 73 degrees F and 100 percent relative humidity.
 - d. Field-cured: Cure in the vicinity of the area that they represent and in the same manner as the repair material.
4. Conformance Requirements: Material testing is satisfactory if the average of the 28-day standard-cured compressive-strength tests equals, or exceeds, the specified 28-day compressive strength and no test value is more than 500 pounds per square inch less than the specified 28-day strength. Strength tests confirming 28-day strength are acceptable at earlier ages.
- a. If the Contractor has elected to reduce lap lengths based on using a higher compressive strength material, test results shall be provided confirming that the strength meets the strength shown for lap lengths used. i.e. if lap lengths for 8,000 psi material are used, strength tests must confirm that 8,000 psi is achieved for the material

C. Pull-off Strength Testing:

- 1. Testing shall be performed by the Testing Agency retained by the Owner or Engineer in general conformance with ASTM C1583. Assistance shall be provide by the Contractor for select activities as noted below.
- 2. Each test site shall consist of 3 cored pull-off tests.
- 3. Contractor is responsible for providing surface preparation, including, but not limited to grinding surface prior to coring, coring, and drying/cleaning at each of the pull-off test site(s). Contact Engineer for specific requirements.
- 4. Contractor is responsible for repairing all test sites after completion of testing, regardless of results.
- 5. Conformance Requirements: Test is satisfactory if average of pull-off strength meets the minimum requirement, and no individual test value is less than 75 percent of the minimum requirement. The following additional requirements shall be considered for a satisfactory result:
 - a. Required minimum pull-off strength may be reduced based on control testing of parent material. If 90 percent of the control test strength result ($0.9 \times \text{control strength}$) is less than the specified strength minimum, the minimum specified strength shall be reduced to 90 percent of the control test strength result (new project minimum = $0.9 \times \text{control strength}$).
 - b. Test shall be considered a pass, regardless of the strength value, if the failure plane represented by the test is deep in the parent material, and, no evidence of improper or inadequate surface preparation is present, such as microfracturing or bruising of the parent material.
 - c. If evidence of poor consolidation of repair material, microfracturing or bruising of parent material, improper or inadequate cleaning of parent material, or other items indicating placement of repair material or surface preparation does not conform with the requirements of the Construction Documents are observed, the test location may be considered non-satisfactory, or evidence of non-conforming Work/Materials. Review for these conditions shall be made visually at each test location. If initial visual review indicates these issues are likely to be present, further review using limited petrography on partial or full-depth concrete core samples may be

recommended. If recommended, and the Contractor does not wish to pay for extraction of core samples and a limited petrographic review, the test result in question shall be treated as non-satisfactory, or non-conforming Work.

- D. The Contractor shall visually review, and mechanically sound using a chain or hammer, each repair area for defects after curing and protection. In addition to the requirements of this document, the following additional items shall constitute non-conformance of the repair Work or material:
1. Delaminations.
 2. Voids, spalls, air bubbles, honeycomb, rock pockets, and form-tie voids, more than 2 percent of the repair surface area, or those which compromise strength.
 3. Cracking and cracks in excess of 0.010 inch wide, and any that penetrate to the depth of reinforcement or completely through section. Notify Engineer immediately of cracks that penetrate completely through the cross section.
 4. Latent defects or those not on exposed surfaces that affect concrete's durability and structural performance as determined by Engineer.
 5. Surface finish meets specified requirements.
 6. Offsets at perimeter exceeding those specified.

3.11 NON-CONFORMING WORK OR MATERIALS:

- A. If tests or observations indicate that the material, or Work, is not in conformance with the Construction Documents, at no cost to Owner, or Engineer, either:
1. Perform additional testing acceptable to Engineer to verify conformance with the Construction Documents.
 2. Remove and replace material or Work.
 3. Repair or replace non-conforming Work or materials using alternate repair approved by Owner and Engineer.
 4. Provide an extended warranty for the repairs as deemed acceptable to the Owner and Engineer.
- B. Perform additional inspection and testing, at no cost to the Owner, to determine compliance of replaced, or additional corrective Work.
- C. Additional time and expenses for Engineer resulting from non-conforming Work or material may be back-charged to the Contractor, or withheld from payment to the Contractor at the Owners option.

END OF SECTION

Bid Schedule: Persigo WWTP Small Repairs (Addendum 3)

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
1	1-1	Corner Post Concrete Repair	42.	EA	\$ _____	\$ _____
2	1-2	Center Post Concrete Repair	21.	EA	\$ _____	\$ _____
3	2-1	Partial Depth Concrete Repair at Soffit	98.	SF	\$ _____	\$ _____
4	2-2	New Sealant Joint	47.	LF	\$ _____	\$ _____
5	2-3	Temporary Shoring	Lump sum		---	\$ _____
6		Sanitary Facility	1.	EA	\$ _____	\$ _____
7		Mobilization	Lump sum		---	\$ _____
8		General Conditions (Protection, Access, Temporary Removal and Reset of Utilities)	Lump sum		---	\$ _____
9		Reinforcement repairs/replacement at Aerobic Digester Stairs (Includes materials, fabrication and installation of new reinforcement)	Lump sum		---	\$ _____
MCR		Minor Contract Revisions	---	---	---	\$ 15,000.00
Bid Amount:						\$ _____

Bid Amount:

dollars