PJC & Associates, Inc.
Consulting Engineers & Geologists

April 17, 2019 Job No. 3445.12

Manzana Products Co.
Attention: Mark Fitzgerald
9141 Green Valley Road
Graton, CA 95472
mfitzgerald@manzanaproductsco.com

Subject: Geotechnical Report Update
Proposed Overhead Utility Bridge
Manzana Products Company
9141 Green Valley Road
Graton, California

References: Report titled, "Geotechnical Investigation, Proposed Office Building, Manzana Products Company, 9141 Green Valley Road, Graton, California," prepared by PJC & Associates, Inc., dated May 12, 2014.

Report titled, "Geotechnical Report Update Proposed Cooling Tower Pipe Bridge, Manzana Products Company, 9141 Green Valley Road, Graton, California," prepared by PJC & Associates, Inc., latest revision November 1, 2018.

Report titled "Geotechnical Report Update, Proposed Electrical Service Pad, Manzana Products Company, 9141 Green Valley Road, Graton, California", prepared by PJC & Associates Inc., dated February 19, 2019.

Architectural Plans titled, "Manzana Products Co. Pipe Bridge Addition," Sheet A1.10, prepared by Ross Drulis Cusenbery Architecture, dated April 2019.

Dear Mark:

PJC & Associates, Inc. (PJC) is pleased to present this geotechnical investigation report update for the proposed overhead utility bridge addition located at 9141 Green Valley Road in Graton, California. The site corresponds to the geographic coordinates of 38.44°N and 122.87°W, according to Google Earth Imagery. Our work was completed in accordance with our agreement for geotechnical engineering services and your authorization to proceed with the work. The purpose of this letter was to review our previously completed geotechnical reports for application and use in design and construction of the proposed project.

1. PROJECT DESCRIPTION

Based on our review of the project plan referenced above, it is our understanding that the proposed project will consist of constructing a new overhead utility bridge at the subject

site. The bridge will span from the warehouse building 1 over the driveway and truck scale, through the apple processing canopy and south down the alley between the existing shop and cannery buildings. The bridge will consist of a steel frame structure supported on a combination of spread footings and drilled pier foundations. Vertical structural loads are assumed to be light which is typical for the type of structure proposed. We assume that the lateral loads will govern design.

2. PREVIOUSLY COMPLETED WORK

PJC previously performed a geotechnical investigation at the facility for an office building and presented the results of the investigation in a written report dated May 12, 2014. Construction of the office building was completed in 2015. More recently, supplemental work was performed for a cooling tower pipe bridge and electrical service pad dated November 1, 2018 and February 19, 2019, respectively. Those reports supplemented our work on the project.

3. CONCLUSIONS

Based on our review of the reports and the site conditions, we conclude that the information gathered during our original investigation is applicable for use in design and construction of the project. Drilled pier and spread footing recommendations and design criteria are presented in the following sections of this report.

4. FOUNDATIONS: DRILLED CAST-IN-PLACE CONCRETE PIERS

a. Vertical Loads. The overhead utility bridge structure should be supported on drilled, cast-in-place concrete piers with a minimum of 18 inches in diameter and spaced at least three pier diameters center to center. The piers will derive their support through peripheral friction. Piers should extend at least 10 feet below the existing ground surface, regardless of structural loads. The piers should be reinforced and designed by the project structural engineer.

   The portion of the piers extending at least three feet beneath the finished ground surface may be designed using an allowable dead plus live skin friction of 600 pounds per square foot (psf). This value may be increased by one-third for short duration wind and seismic loads. End bearing should be neglected because of the difficulty of cleaning out small diameter pier holes and the uncertainty of mobilizing end bearing and skin friction simultaneously. A value equal to one-half the vertical capacity of the pier should be used in the determination of uplift capacity.

b. Settlement. The maximum settlement for the piers is estimated to be small and within tolerable limits.

c. Lateral Loads. Lateral loads resulting from wind or earthquakes can be resisted by the piers through a combination of cantilever action and passive resistance of the soils surrounding the pier. A passive pressure of 300 pounds per square foot

per foot of depth acting on two pier diameters should be used. The upper three feet should be neglected for passive resistance.

d. Pier Drilling. If groundwater is encountered or collects in pier holes, it may be necessary to de-water the holes and/or place the concrete by the tremie method. Hard drilling may be necessary to achieve the required depths.

We should be retained to review the pier drilling operations, to review the actual soil conditions exposed, and provide modifications in the field, if necessary. The drilling subcontractor should review this report so he may choose suitable drill rigs to accomplish drilling, and determine the need for casing and de-watering.

5. FOUNDATIONS: SPREAD FOOTINGS

a. Vertical Loads. Where required, spread footing foundations may be used to support the structure. The footings should extend a minimum of 18 inches into the underlying firm soil as determined by the geotechnical engineer in the field during construction. The depth to firm soil may vary. Footing deoths up to 36 inches may be necessary to achieve 18 inches into firm soils. Footing excavations should be observed and approved by the geotechnical engineer before reinforcing steel is placed. All footings should be reinforced. Because actual footing depths will vary, we suggest that the contract contain provisions to cover increased (or decreased) costs resulting from added (or reduced) footing depths. The recommended bearing pressures, depth of minimum embedment and minimum widths of footings are presented in Table 1. The bearing values provided have been calculated assuming that all footings uniformly bear on bedrock.

TABLE 1
FOUNDATION DESIGN CRITERIA

Footing Type	Bearing Pressure (psf)*	Minimum Embedment (in)**	Minimum Width (in)
Continuous wall	2,000	18	12
Isolated Column	2,500	18	18

* Dead plus live load.
**Into firm soil.

The allowable bearing pressures are net values. The weight of the foundation and backfill over the foundation may be neglected when computing dead loads. Allowable bearing pressures may be increased by one-third for transient applications such as wind and seismic loads.

b. Lateral Loads. Resistance to lateral forces may be computed by using friction and passive pressure. A friction factor of 0.30 is considered appropriate between the bottom of the concrete structures and the bearing materials. A passive pressure of 300 pounds per square foot per foot of depth (psf/ft) is recommended. Unless restrained at the surface, the top six inches should be neglected for passive resistance.

Footing concrete should be placed neatly against the excavation face. Footing excavations should not be allowed to dry before placing concrete. If shrinkage cracks appear in the footing excavations, the soil should be thoroughly moistened prior to concrete placement.

c. Settlement. Total settlement of individual foundations will vary depending on the width of the foundation and the actual load supported. Foundation settlements have been estimated based on the foundation loads and bearing values provided. Maximum settlements of shallow foundations designed and constructed in accordance with the preceding recommendations are estimated to be less than one-half of one inch. Differential settlement between similarly loaded, adjacent footings is expected to be less than one-quarter inch. The majority of the settlement is expected to occur during construction and placement of dead loads.

We should be retained to review the spread footing excavations, to review the actual soil conditions exposed, and provide modifications in the field, if necessary.

6. ADDITIONAL SERVICES

Upon completion of the project plans and structural calculations, they should be reviewed by our firm to determine that the design is consistent with the recommendations of this report. During the course of this investigation, several assumptions were made regarding development concepts. Should our assumptions differ significantly from the final intent of the project designers, our office should be notified of the changes to assess any potential need for revised recommendations. Observation and testing services should also be provided by PJC to verify that the intent of the plans and specifications are carried out during construction; these services should include observing grading and earthwork and observing foundation excavation.

These services will be performed only if PJC is provided with sufficient notice to perform the work. PJC does not accept responsibility for items we are not notified to observe.

We trust that this is the information you require at this time. If you have any questions concerning the content of this report, please feel free to call.

Sincerely,

PJC & ASSOCIATES, INC.

Patrick J. Conway
Geotechnical Engineer
GE 2303, California

PJC:bc

cc: Edwin Wilson (ewilson@rdcarchitecture.com)
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