

Project No.
8602.001.000

July 10, 2018

Mr. Charles Anderson
Schaaf & Wheeler Consulting Civil Engineers
1171 Homestead Road, Suite 255
Santa Clara, CA 95050

Subject: Foster City Levee Improvement Project
Foster City, California

SUPPLEMENTAL GEOTECHNICAL RECOMMENDATIONS STATION 49+70 THROUGH STATION 95+25

Dear Mr. Anderson:

This letter discusses geotechnical design and construction recommendations related to the proposed levee improvement project. In particular, this letter presents supplemental recommendations for portions of the levee improvement project that will be constructed adjacent to existing seasonal wetlands on the landside of the levee. Based on review of the 90 percent progress plan set (Reference 2), we anticipate this condition from Station 49+70 through Station 95+25.

GEOTECHNICAL DESIGN RECOMMENDATIONS

We provide the following geotechnical recommendation options for design of the landside levee improvements within the subject portions of the project alignment. The primary geotechnical concerns associated with the project improvements are consolidation settlement of Young Bay Mud (YBM) and slope stability.

Conventional Structural Wall with Cellular Concrete Backfill

A conventional structural cantilevered concrete retaining wall supported on continuous spread footing foundation may be considered on the landside of the levee improvements. For this option, we recommend lightweight fill (such as cellular concrete) be used as fill to raise site grades and limit consolidation settlement. Where settlement will be detrimental to the existing or planned improvements (such as adjacent to existing East 3rd Avenue), existing heavier onsite soil can be overexcavated and replaced with cellular concrete such that there is no increase in load, resulting in negligible future settlement.

We anticipate this option is feasible from Station 49+75 through Station 95+25 (i.e., along all subject portions of the levee alignment). As a minimum, we recommend it be used from Station 64+00 through Station 70+00 adjacent to East 3rd Avenue and several existing underground utilities, where we anticipate settlement will be detrimental to the existing improvements.

In addition to resulting in reduced or negligible settlement, using cellular concrete as fill in lieu of soil fill will improve potential slope stability concerns. It will also result in reduced lateral earth pressures on structural retaining walls.

Mechanically Stabilized Earth Retaining Wall

As an alternative to a conventional retaining wall, a mechanically stabilized earth (MSE) retaining wall with geogrid reinforcement may also be considered on the landside of the levee improvements. We anticipate this option is feasible at all subject locations with exception to Station 64+00 through Station 70+00 where we recommend lightweight fill (cellular concrete) be utilized as fill. In general, MSE walls can typically tolerate relatively larger vertical and lateral displacements, as compared to conventional structural walls.

If possible, where this alternative is used, we recommend the levee improvements be shifted toward the waterside such that the bottom of the MSE retaining wall is located as high as possible on the existing landside slope. We anticipate this would reduce potential unstable subgrade conditions, as well as total and differential settlement.

For MSE wall construction at the subject project locations, we recommend a phased construction schedule be implemented for earthwork activities to reduce potential differential and post-construction settlement. Recommendations are provided in the earthwork recommendations section below.

Graded Fill Slope

A graded fill slope may be considered where right-of-way conditions allow for this design option. We anticipate this option is feasible from Station 49+75 through Station 64+00. Earthen improvements such as graded slopes are less sensitive to settlement than structural improvements such as retaining walls.

At this portion of the levee alignment, graded fill slopes should be constructed at a maximum gradient of 2:1 (horizontal:vertical), and should be designed to a maximum height of 10 feet. We also recommend the slopes be designed as reinforced soil slopes (RSS), incorporating geogrid reinforcement in the fill slope. We recommend a minimum geogrid length of 10 feet and vertical spacing of 16 inches for geogrid reinforcement.

If right-of-way conditions limit the use of a graded fill slope, this option can be combined with an MSE retaining wall.

For graded slope construction at the subject project locations, we recommend a phased construction schedule be implemented for earthwork activities to reduce potential differential and post-construction settlement. Recommendations are provided in the earthwork recommendations section below.

EARTHWORK RECOMMENDATIONS

We provide the following earthwork recommendations for construction of the landside levee improvements within the subject portions of the project alignment.

Subgrade Stabilization

The subject construction activities on the landside of the levee will require excavations that may extend below groundwater levels and into saturated loose fill or soft compressible Young Bay Mud, which will complicate construction. We anticipate unstable subgrade conditions will be encountered.

In general, we anticipate subgrade stabilization can be achieved with aggregate, geotextile stabilization fabric, or both, depending on conditions. We recommend we consult further with you, the city, and the contractor to determine baseline recommendations for budgeting purposes. Subgrade conditions should be approved by ENGEO during construction.

Construction Phasing

For MSE retaining wall and graded slope construction at the subject portions of the project alignment, we recommend a phased construction schedule be implemented for earthwork activities to reduce potential differential and post-construction settlement. We recommend the following schedule be implemented.

1. Construct landside improvements to Elevation 12 feet (NAVD88 datum). Wait and monitor for a minimum of 3 months.
2. Construct landside improvements to Elevation 15 feet. Wait and monitor for a minimum of 3 months, or longer.
3. Construct pavement section toward end of overall project schedule.

CLOSING

We look forward to continuing to work with you and the team on this exciting project. If you have any questions regarding this letter, please do not hesitate to contact us.

Sincerely,

ENGEO Incorporated

Andrew H. Firmin, GE
ahf/jjt/jf

Josef J. Tootle, GE

Attachment: List of Selected References

SELECTED REFERENCES

1. ENGEO; FEMA 65.10 (b) Levee Evaluation (DRAFT), Foster City Levee Improvement Project, Foster City, California; November 17, 2017.
2. Schaaf & Wheeler Consulting Civil Engineers, Foster City Levee Improvements, CIP 301-657, 90 Percent Progress Set, City of Foster City, March 2018.

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