

## *ARBORIST REPORT-*

Tree Survey, Impact Assessment & Tree Protection Plan for:

150 Felker Street  
APN: 008-181-23  
Santa Cruz, CA  
November 15, 2021

Prepared for:

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## Table of Contents

<b>SUMMARY</b> .....	1
Background .....	1
Assignment .....	1
Limits of the Assignment.....	2
Purpose and use of the report .....	2
Resources .....	2
<b>OBSERVATIONS</b> .....	3-10
<b>DISCUSSION</b> .....	11
Species List.....	11
Tree Evaluation and Recording Methods .....	11
Condition Rating .....	12
Suitability for Preservation .....	12
Tree Protection Zone .....	13
Critical Root Zone .....	13
Root Disturbance Distance.....	14
Impacts to Subject Trees .....	15-18
Mitigation & Replacement Trees.....	19
Tree Protection Specifications .....	20
<b>CONCLUSION</b> .....	21
<b>RECOMMENDATIONS</b> .....	21

Attachments: Appendix A - G

Appendix A – Tree Assessment Chart

Appendix B – Criteria for Tree Assessment Chart

Appendix C - Tree Protection Plan

Appendix D – Glossary of Terms

Appendix E – Bibliography

Appendix F - Tree Protection Guidelines & Restrictions

- Protecting Trees During Construction
- Project Arborist Duties & Inspection Schedule
- Tree Protection Fencing
- Tree Protection Signs
- Monitoring
- Root Pruning
- Tree Work Standards & Qualifications
- City of Santa Cruz Protected Tree Definition

Appendix G - Assumptions & Limiting Conditions

## SUMMARY

This report provides the following information:

1. A summary of the health and structural condition of 18 trees.
  2. A preliminary evaluation of anticipated construction impacts to the trees.
  3. Recommendations for retention or removal of assessed trees based on their condition and anticipated construction impacts.
  4. Tree protection specifications to mitigate anticipated impacts to retained trees.
- The *Tree Assessment Chart*, Appendix A is the condensed reference guide to inform all tree management decisions for the trees evaluated.
  - An existing commercial building will be demolished and a new 4-story, 32-unit apartment building will be constructed at 150 Felker Street, Santa Cruz.
  - Eighteen trees on or near the property were surveyed, including ten “protected” trees.
  - Four “protected” trees are in good or fair condition and are suitable for incorporation into the project.
  - Six “protected” trees are in poor condition, or will be highly impacted, and their removal will be necessary.
  - “Protected” trees retained will be moderately impacted, and will require mitigation methods to reduce construction impacts, including tree protection fencing and other treatments.
  - If removals are permitted, replacement trees will be required.

## Background

Plans will be submitted to the City of Santa Cruz Planning Department, for construction of a new 4-story, 32-unit apartment building at 150 Felker Street, Santa Cruz. ABC Construction has requested my services, to assess the condition of eighteen trees on or near the applicant’s property, and the construction impacts that may affect them. Further, to provide a report with my findings and recommendations to meet City of Santa Cruz planning requirements.

## Assignment

Provide an arborist report that includes an assessment of the trees within the project area. The assessment is to include the species, size (trunk diameter, height and canopy spread), condition (health and structure), suitability for preservation ratings. Review preliminary development plans assess potential impacts to trees, provide recommendations for retention or removal, and specify tree protection mitigation treatments for impacted trees that will be retained. Provide valuations of impacted trees to calculate a tree security deposit.

To complete this assignment, the following services were performed:

- **Tree Resource Evaluation:** Inventory, evaluate and assign suitability for preservation ratings for subject trees.

- **Plan Review: Reviewed provided plans including:** *Plan Set* by William Kempf Architects, sheets A1-A8, dated 10/6/2021, and *Topographic & Boundary Map* by Hanagan Land Surveying, dated 5/10/2019.
- **Construction Impact Assessment:** Combine tree resource data with anticipated construction impacts, to provide recommendations for removal or retention of trees.
- **Tree Protection Plan:** Develop tree protection specifications to mitigate anticipated impacts to retained trees.
- **Mapping:** Tree locations were plotted onto: Site Plan, by William Kempf Architects, and a Tree Protection Plan, Sheet T1 was created.

## Limits of the Assignment

The information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection on November 8, 2021.

The inspection is limited to visual examination of accessible items without climbing, dissection, excavation, probing, or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the trees in questions may not arise in the future.

## Purpose and use of the report

The report is intended to identify all the trees within the plan area that could be affected by a project. The report is to be used by the developer, their agents, and the City of Santa Cruz as a reference for existing tree conditions and to help satisfy the City of Santa Cruz planning requirements.

## Resources

All information within this report is based on site plans as of the date of this report. Resources are as follows:

- *Plan Set* by William Kempf Architects, sheets A1-A8, dated 10/6/2021.
- Site Visit, Tree Inventory & Condition Evaluation at 150 Felker Street, Santa Cruz on 11/8/2021.
- City of Santa Cruz Municipal Code – Chapter 9.56 *Preservation of Heritage Trees* (applicable sections).

## OBSERVATIONS

A commercial building on a flat parcel is surrounded by landscape trees on the south and east sides. There are mature trees on the adjacent parcel that grow next to the building on the west side. I surveyed eighteen trees. Seven trees surveyed on the property are “protected” according to City of Santa Cruz ordinance. Three “protected” trees on an adjacent property with canopies that overhang the project limits were also surveyed. A “protected” tree in the City of Santa Cruz includes any species 14 inches in diameter or larger, measured at 4.5 feet above grade. Five different “protected” species were inventoried including three liquidambar growing in front of the building, (Image #1).



**Image #1 – Trees T1, T2 & T3, liquidambar, (left to right). Grow in front of building adjacent to Felker Street.**

The three liquidambar have trunk diameters between 16” and 24”. Trees T1 and T2 are in fair condition. The trees have normal canopy density and most branches appear well attached. Tree T3 is in poor condition. Several major scaffolds have failed, and deadwood and decay have formed at the limb tear out locations. The center of the canopy has no structural limbs and there is some tip dieback.

Tree T3 liquidambar showing deadwood and decay at several limb tear outs, (Image #2)



**Image #2 – Tree T3, liquidambar. Note broken scaffolds with deadwood and decay.**

The liquidambar is showing a pattern of limb failure progressing to decay and is in significant decline.

Three podocarpus grow in a row adjacent to the building, (Image #3)



**Image #3 – Trees T4, T5 & T6, (left to right), podocarpus.**

The podocarpus have trunk diameters between 15” and 24”. The three podocarpus grow in a landscape planter adjacent to the building. All three trees have developed a co-dominant trunk growth habit and are in fair condition.

The three podocarpus have dense canopies and grow over the existing breezeway entry, (Image #4).



Image #4 – Tree T4, T5 & T6, podocarpus. Grow over breezeway overhang.

Tree T7 is a maturing, 28" diameter cedar growing in a landscape planter adjacent to Felker Street, (Image #5).



Image #5 – Tree T7, Incense cedar, (circled).

The cedar is in good condition.

Two protected silver dollar gum (eucalyptus), grow on the adjacent property and have canopies that overhang the project limits, (Image #6).



**Image #6 – Trees T3-A and 4-A, silver dollar gum. The tree grows near the west corner of the property.**

Tree T3-A is a mature, 26” diameter silver dollar gum in poor condition. The gum has a thin canopy density, with tip and branch dieback in limbs up to 10-inches in diameter.

Tree T4-A is a mature 34” diameter silver dollar gum in fair to poor condition. There canopy is thin and there is some tip dieback. A few limbs and co-dominant stems have failed up to 10-inches in diameter.

Tree T3-A has multiple limb tear outs in branches up to 10-inches in diameter, (Image #7).



Image #7 – Tree T3-A, silver dollar gum. Note limb tear outs, (circled).

A mature blue gum eucalyptus grows adjacent to the northwest corner of the project boundary, (Image #8).



**Image #8 – Tree T6-A, blue gum eucalyptus. The trees upper canopy, not visible in this image overhangs the existing building.**

The eucalyptus is in fair condition and has a trunk diameter of 48-inches. The canopy overhangs the existing building by 8-feet.

The remainder of the trees inventoried on the property are “not protected” size and are in fair condition. They include four Carolina laurel cherry and a Colorado blue spruce.

Three “not protected” size coast live oak grow on an adjacent property. Since they have canopies overhanging the project limits, they were surveyed. The three oaks are in fair condition.

## DISCUSSION

### Species List

#### TOTAL SUBJECT TREES: 18

##### **Protected: 7 - (applicant)**

3	liquidambar	( <i>Liquidambar styraciflua</i> )
3	podocarpus	( <i>Afrocarpus falcatus</i> )
1	incense cedar	( <i>Calocedrus decurrens</i> )

##### **3 - (adjacent property)**

2	silver dollar gum	( <i>Eucalyptus polyanthemos</i> )
1	blue gum eucalyptus	( <i>Eucalyptus globulus</i> )

##### **Not Protected: 8**

There are 4 different “not protected” species. A complete species list can be found in the Tree Assessment Chart spreadsheet, Appendix A.

### Tree Evaluation and Recording Methods

Site evaluations were made on 11/8/2021. *The inventory included all trees on the property within the project limits.* The health and structural **condition** of each tree was assessed and recorded. Based on the trees health and structural condition, each trees **suitability for preservation** was rated and recorded.

The recorded data is included in the *Tree Assessment Chart, Appendix A*, of this report. Tree numbers were plotted on the attached *Tree Protection Plan sheet, T1*. **To correlate the data in the Tree Assessment Chart to the tree’s location on the site, refer to the Tree Protection Plan, sheet T1 - Appendix C.**

## Condition Rating (Protected Trees)

A trees condition is determined by an assessing both the **health** and **structure**, then combining the two factors to reach a *condition rating*. Tree condition is rated as poor, fair or good. The quantity of trees assigned for each category (good, fair or poor), is indicated below:

### Tree Condition Rating

- Good - 1
- Fair - 6
- Poor - 3

## Suitability for Preservation (Protected Trees)

A trees suitability for preservation is determined based on its health, structure, age, species characteristics and longevity using a scale of good, fair or poor. The quantity of trees assigned to each category (good, fair or poor), is listed below.

### Suitability Rating

- Good - 1
- Fair – 6
- Poor - 3

## Protected Trees Recommended for Removal Due to Poor Condition/Suitability for Preservation

One Tree – (on applicant property) -

T3, liquidambar

One Tree (on City of Santa Cruz property?) -

T3-A silver dollar gum

## Tree Protection Zone

The tree protection zone (TPZ), is a defined area within which certain activities are prohibited or restricted to minimize potential injury to designated trees during construction.

The size of the optimal TPZ can be determined by a formula based on: 1) trunk diameter 2) species tolerance to construction impacts, and 3) tree age (Matheny, N. and Clark, J 1998). In some instances, tree drip line is used as the TPZ. Development constraints can also influence the final size of the tree protection zone.

Fencing is installed to delineate the (TPZ), and to protect tree roots, trunk, and scaffold branches from construction equipment. *The fenced protection area may be smaller than the optimal or designated TPZ area in some circumstances.* Tree protection may also involve the armoring of the tree trunk and/or scaffold limbs with barriers to prevent mechanical damage from construction equipment. *See Tree Protection Guidelines & Restrictions – Appendix E.*

Once the TPZ is delineated and fenced (prior to any site work, equipment and materials move in), construction activities are only to be permitted within the TPZ if allowed for and specified by the project arborist.

Where tree protection fencing cannot be used, or as an additional protection from heavy equipment, tree wrap may be used. Wooden slats at least one inch thick are to be bound securely, edge to edge, around the trunk. A single layer or more of orange plastic construction fencing is to be wrapped and secured around the outside of the wooden slats. Major scaffold limbs may require protection as determined by the City arborist or Project arborist. Straw wattle may also be used as a trunk wrap and secured with orange plastic fencing.

Data has been entered in the *Tree Assessment Chart – Appendix A*, which indicates the optimal Tree Protection Zone for each tree.

Additional general tree protection guidelines are included in *Tree Protection Guidelines & Restrictions – Appendix G*.

## Critical Root Zone

Critical Root Zone (CRZ) is the area of soil around the trunk of a tree where roots are located that provide critical stability, uptake of water and nutrients required for a tree's survival. The CRZ is the minimum distance from the trunk that trenching that requires root cutting should occur and can be calculated as three to the five times the trunk Diameter at Breast Height (DBH). For example, if a tree is one foot in trunk diameter then the CRZ is three to five feet from the trunk location. We will often average this as four times the trunk diameter or 1ft. DBH = 4ft. CRZ (Smiley, E.T., Fraedrich, B. and Hendrickson, N. 2007).

## Root Disturbance Distance

No one can estimate and predict with absolute certainty what distance from a tree, a soil disturbance such as excavation for construction should be, to ensure it will not significantly affect tree stability or health. Or to what degree, (low, moderate or high), a tree might be impacted. There are simply too many variables involved that we cannot see or anticipate. However, three times the D.B.H. (diameter at breast height), is a widely accepted minimum used in the industry for root disturbance, *on one side of the trunk*, and is supported by several research studies including (Smiley, Fraedich & Hendrickson 2002, Bartlett Tree Research Laboratories). This distance is often used during the design and planning phases of a project in order to estimate root loss due to construction activities. This distance is a guideline only and should be increased for trees with significant leans, decay or other structural problems.

The ISA, International Society of Arboriculture- Root Management (2017) publication recommends, “cutting roots at a distance greater than six times the trunk diameter (DBH) minimizes the likelihood of affecting both health and stability. This recommendation is given further direction by the companion publication, A.N.S.I. (*American National Standard*) A300 (Part 8)- 2013 Root Management, when roots are cut in a *non-selective* manner, i.e. in a straight line on one side of a tree. It says, if the cutting is “within six times the trunk diameter (DBH), mitigation shall be recommended”. Further, A.N.S.I. recommends the “minimum distance from the trunk for root cutting should be adjusted according to trunk diameter, species tolerance to root loss, tree age, health and site condition”.

In general, root cutting that occurs at a distance less than six times the diameter of a tree should be undertaken by hand digging and hand (or Sawzall), root pruning. These methods help mitigate root loss impacts.

## Construction Impacts to Subject Trees

Four protected trees will be highly impacted by the new project and their removal will be necessary. This includes trees T1, liquidambar, and T4, T5, and T6 podocarpus, (Image #9).

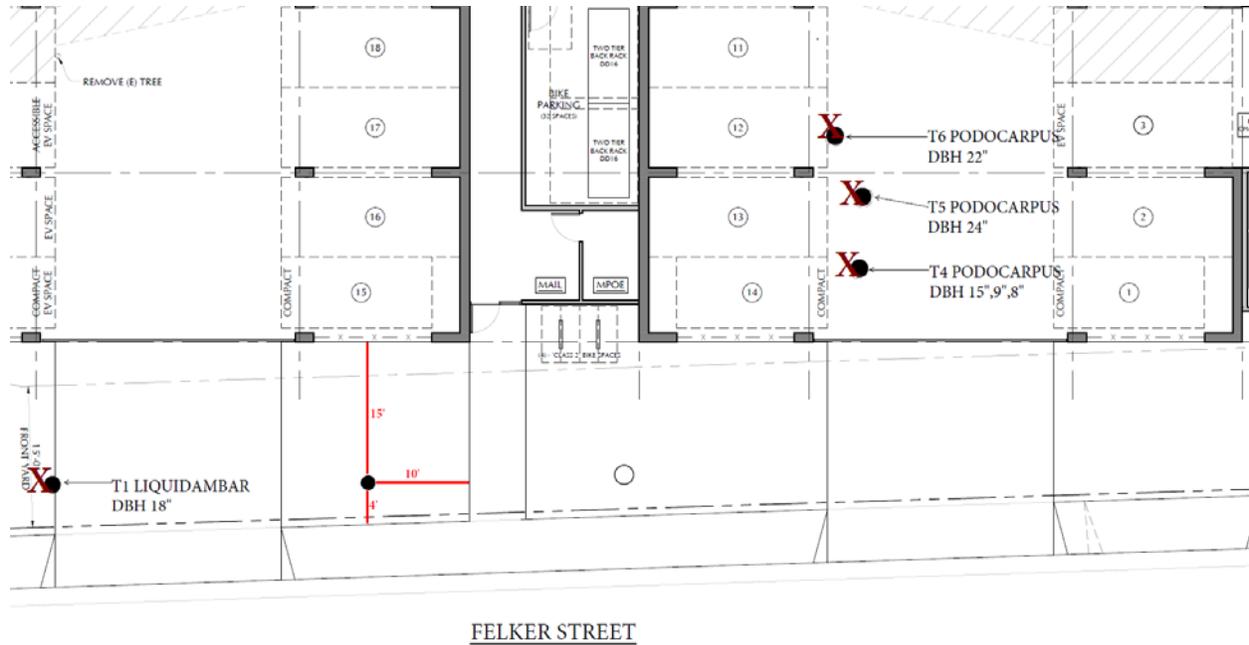


Image #9 – Tree T1, liquidambar and trees T4, T5 & T6, podocarpus, are within construction element footprint.

Tree T1 is within the driveway footprint and trees T4, T5, and T6 are within the building footprint.



## Construction Impacts to Subject Trees, Continued:

Tree T4-A, silver dollar gum will have moderate construction impacts, (Image #11).

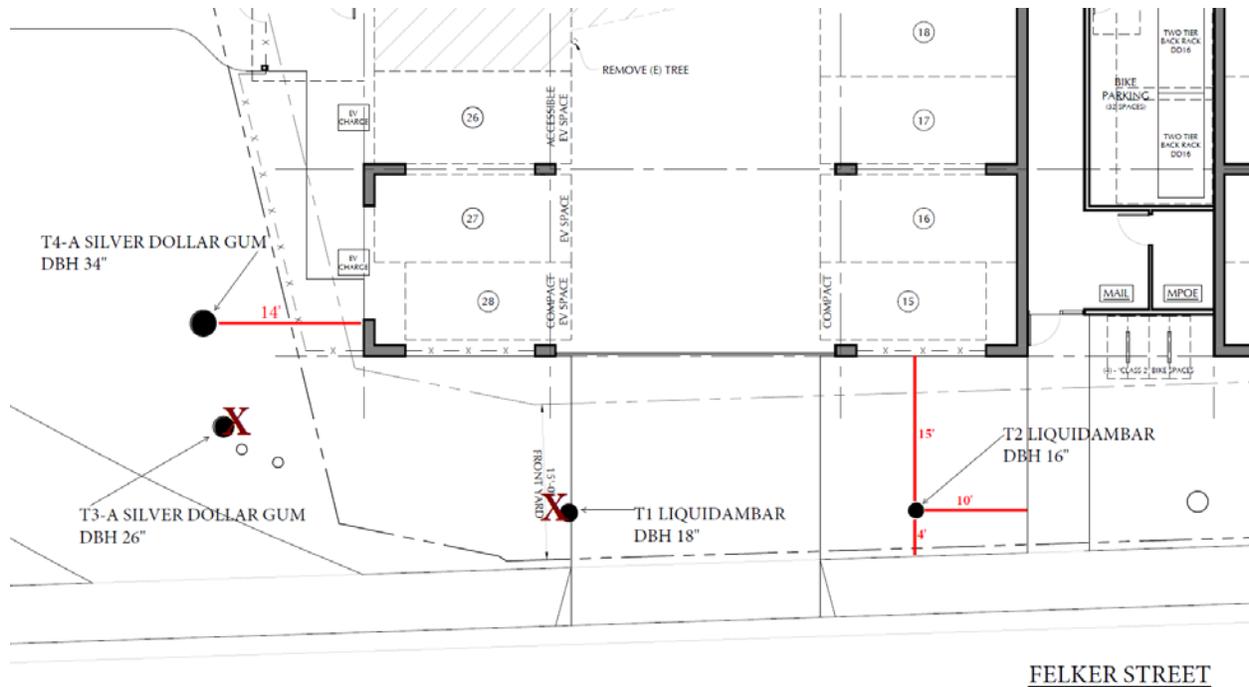


Image #11 – Tree T4-A, silver dollar gum, distance to new building.

Tree T4-A, a 34" silver dollar gum, will be within 14-feet of the new building. This is within the trees critical root zone. The tree will suffer some root loss, can tolerate the loss and will require tree protection measures, to reduce root loss impacts. Canopy clearance pruning will be necessary to allow space for construction of new building.

Tree T8-A, a 48" diameter blue gum eucalyptus, (not shown in image 11), will be 45-feet from the new building. This is outside the tree protection zone. Any root loss for this tree will be minor. The tree canopy overhangs the existing building by 8-feet. Construction of the new building will be about 8-feet from the tree canopy edge. No clearance pruning for construction of the new building should be necessary.

## Construction Impacts to Subject Trees, Continued:

Three multi-trunked Carolina laurel cherry trees grow in a row along the east fence line. The trees are in fair condition and are below protected size. The preliminary plan indicates the trees are to be preserved. Impacts to these trees cannot be evaluated until the final civil plans are completed. Possible construction elements affecting these trees include hardscape and storm drain lines. These elements would need to be a minimum of 4-feet from the trees if they are to be retained. Carolina laurel cherry T12, has an unbalanced canopy with a weight bias towards the new building and would need clearance pruning to allow building construction.

### Impact Level

Impact level rates the degree a tree may be impacted by construction activity and is primarily determined by how close the construction procedures occur to the tree. Construction impacts are rated as low, moderate, high. The quantity of trees assigned for each category (low, moderate, high), is indicated below:

#### Impact Rating (Protected Trees)

- Low - 3
- Moderate – 3
- High - 4

### Protected Trees Recommended for Removal Due to High Construction Impacts

Four Trees-

T1, liquidambar, T4, T5, & T6 podocarpus

## Mitigation Measures for Retained Trees

The trees retained on this project will require some or all the following methods to protect them from the impacts described above and to minimize root loss during the construction phases.

- Tree Protection Fencing
- Hand trenching.
- Supervised root pruning.

Tree protection specifications are included on the, **Tree Protection Plan, Sheet T1. *This plan sheet shall become an element of the final plan set.***

## Replacement Trees

As mitigation for trees removed, replacement trees will be required for the **four** protected trees recommended for removal. Based on the preliminary site plan, there is room to plant replacement trees throughout the new site plan.

One 24" box or three 15-gallon replacement tree is required for each "protected" tree removed. Replacement trees should be planted away from structures and where they have enough room to develop. Do not install trees where overhead wire exist. The trees must receive supplemental irrigation equal to their establishment requirements for the first two years.

- Applicants may elect to pay an in-lieu fee to the tree trust fund of \$150 for off- site mitigation. (Contribution to the Tree Trust Fund are used to purchase street trees, trees for projects, etc.)

## Protected Trees on Adjacent Property (City of Santa Cruz?)

**The following comments are to the attention of the Parks Urban Forester/ Arborist, at the City of Santa Cruz.**

Two protected silver dollar gum (T3-A & T4-A), grow on the adjacent property and have canopies that overhang the new project limits. Tree T3-A, a 26" diameter gum, is a mature tree in poor condition. Significant tip and branch dieback can be seen, and the tree is in decline. It has had several limb failures between 8" and 10" in diameter. Targets in the event of failures include frequent bike and pedestrian traffic. Once the new building is built, the grounds on the west edge of the property will be a target.

Tree T4-A, a 34" diameter gum with an even larger branching structure and canopy spread than T3-A, has also dropped several limbs, some recently. The tree is in fair health but also shows some tip dieback.

Because of its poor condition, pattern of limb breakage, and the frequency of use by bicyclists and pedestrians, I recommend the removal of tree T3-A. Consideration should also be given to the removal of tree T4-A, or risk reduction pruning performed, because of a pattern of limb breakage. However, this tree will provide a significant visual buffer from the new building.

## Tree Protection Specifications & Recommended Sequence

(These specifications are included on the Tree Protection Plan, sheet T1)

### Demolition Phase:

1. Clearance Pruning – Clearance pruning of tree T4-A, silver dollar gum to allow space for construction of new building shall be performed using industry standards of workmanship as established in the Best Management Practices of the International Society of Arboriculture (ISA), and the American National Standards Institute, Safety Requirements in Arboriculture Operations ANSI Z133-2017. Contractor licensing and insurance coverage shall be verified. *Pruning should be done to achieve a minimum of 5 feet clearance from the building.*
2. CMU Wall Removal -Removal of CMU wall adjacent to tree T7 cedar shall be by hand methods. A jack hammer may be used on footing. No use of machinery is permitted.
3. Tree Protection Fencing - Install Tree Protection Fencing, in location indicated on Tree Protection Plan Sheet T1, prior to beginning of demolition.

### Construction Phase:

1. Utilities / Gas, Sewer, Water or Electrical – Utilities shall be routed as far as feasible from the trunk of T2, liquidambar and T7 cedar. Any excavation for a utility line that is within the canopy dripline of tree T2, liquidambar or T7 cedar, shall be by hand methods. Any roots found less than 2” in diameter, shall be cleanly pruned with loppers, hand saw or Sawzall. If roots are encountered 2” in diameter or greater, the root shall be retained with the root “bridging” the trench, and the pipe shall be installed under or over the root.
2. New Building – Excavation for new foundation adjacent to tree T4-A, silver dollar gum, shall be by hand methods, (*see tree protection plan Sheet T1, for location*). Stake foundation location adjacent to tree T4-A. Hand trench and root prune. Any roots found less than 2” in diameter, shall be cleanly pruned with loppers, hand saw or Sawzall. If roots are encountered 2” in diameter or greater, they shall be pruned under supervision of the Project Arborist. Roots shall be pruned by methods indicated on Tree Protection Plan sheet T1, Pre-Construction Root Pruning. No use of machinery is permitted.
3. New Sidewalk, Driveway & Walkways - Excavation for the new sidewalk, driveway and walkway edges closest to trees T2, liquidambar, T7, cedar, and T4-A silver dollar gum, shall be accomplished by hand methods (*see tree protection plan Sheet T1, for location*). The depth of the trench shall equal the depth required for excavation of the new sidewalk or entry walkway. Any roots found less than 2” in diameter, shall be cleanly pruned with loppers, hand saw or Sawzall. If roots are encountered 2” in diameter or greater, they shall be pruned under supervision of the Project Arborist. Roots shall be pruned by methods indicated on Tree Protection Plan sheet T1, Pre-Construction Root Pruning.

## CONCLUSION

- The *Tree Assessment Chart*, Appendix A is the condensed reference guide to inform all tree management decisions for the trees evaluated.
- An existing commercial building will be demolished and a new 4-story, 32-unit apartment building will be constructed at 150 Felker Street, Santa Cruz.
- Eighteen trees on or near the property were surveyed, including ten “protected” trees.
- Four “protected” trees including T2, liquidambar, T7, cedar, T4-A, silver dollar gum and T6-A blue gum eucalyptus, are in either good or fair condition, and are suitable for incorporation into the project.
- Six “protected” trees including T1 & T3 liquidambar, T4, T5 & T6 podocarpus, and T3-A silver dollar gum are in poor condition, or will be highly impacted and their removal will be necessary.
- “Protected” trees retained will be moderately impacted, and will require mitigation methods to reduce construction impacts, including tree protection fencing and other treatments.
- If removals are permitted, replacement trees will be required.

## RECOMMENDATIONS

1. Obtain all necessary permits prior to removing or significantly altering any trees on site.
2. Follow tree protection specifications on Tree Protection Plan, sheets T1 and T2.

Respectfully submitted,

*Kurt Fouts*

Kurt Fouts ISA Certified Arborist WE0681A



## 150 Felker Street, Santa Cruz

### Tree Assessment Chart - Appendix A

#### Suitability for Preservation Ratings:

**Good:** Trees in good health and structural condition with potential for longevity on the site

**Fair:** Trees in fair health and/or with structural defects that may be reduced with treatment procedures

**Poor:** Trees in poor health and/or with poor structure that cannot be effectively abated with treatment

#### Retention or Removal Code:

**RT:** Retain Tree

**RI:** Remove Due to Construction Impacts

**I.M.** Impacts Can Be Mitigated With Pre-Construction Treatments

**R.C.:** Remove Due to Condition

**Protected Tree City of Santa Cruz** Any tree 14 inches or greater in diameter measured at 4.5 feet above grade. Street trees regardless of size.

Tree #	Species	Trunk Diameter @ 54 inches a.g.	Protected Tree	Crown Height & Spread	Health Rating	Structural Rating	Suitability for Preservation (Based Upon Condition)	Tree Protection Zone (in feet)	Construction Impacts (Rating & Description)	Retention or Removal Code	Comments
T1	liquidambar ( <i>Liquidambar styraciflua</i> )	18"	Yes	65'X25'	Fair	Fair	Fair	15'	High (Within driveway footprint)	R.I.	
T2	liquidambar	16"	Yes	65'X20'	Fair	Fair	Fair	15'	Moderate (Root loss, excavation)	R.T.,I.M.	
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## 150 Felker Street, Santa Cruz

### Tree Assessment Chart - Appendix A

Tree #	Species	Trunk Diameter @ 12 inches a.g.	Protected Tree	Crown Height & Spread	Health Rating	Structural Rating	Suitability for Preservation (Based Upon Condition)	Tree Protection Zone (in feet)	Construction Impacts (Rating & Description)	Retention or Removal Code	Comments
T3	liquidambar	24"	Yes	65'X25'	Fair-Poor	Poor	Poor	15'	N/A	R.C.	Four 6"-9" scaffolds broken with deadwood and decay.
T4	podocarpus <i>(Afrocarpus falcatus)</i>	15",9",8"	Yes	50'x15'	Fair	Fair	Fair	18'	High (Within building footprint)	R.I.	5 degree trunk lean. Co-dominant trunks with included bark.
T5	podocarpus	24"	Yes	65'X25'	Fair	Fair	Fair	18'	High (Within building footprint)	R.I.	Co-dominant trunks with included bark.
T6	podocarpus	22"	Yes	65'X25'	Fair	Fair	Fair	18'	High (Within building footprint)	R.I.	10 degree trunk lean. Co-dominant trunks with included bark.
T7	incense cedar <i>(Calocedrus decurrens)</i>	28"	Yes	65'X15'	Good	Good	Good	20'	Moderate (Root loss, excavation)	R.T.,I.M.	
T8	Carolina laurel cherry <i>(Prunus caroliniana)</i>	9",7",6",5"	No	20'X15'	Fair	Fair	Fair	10'	Moderate - High (Root loss, excavation)	R.T., I.M.	Co-dominant trunks at 4' above grade. Deadwood and decay in trunk and one scaffold.
 <p><b>Kurt Fouts</b> Arborist Consultant</p> <p>826 Monterey Avenue Capitola, CA 95010 831-359-3607 kurtfouts1@outlook.com</p>							Page 2 of 4			11/14/2021	

**150 Felker Street, Santa Cruz**  
**Tree Assessment Chart - Appendix A**

Tree #	Species	Trunk Diameter @ 4.5'	Protected Tree	Crown Height & Spread	Health Rating	Structural Rating	Suitability for Preservation (Based Upon Condition)	Tree Protection Zone (in feet)	Construction Impacts (Rating & Description)	Retention or Removal Code	Comments
T9	Carolina laurel cherry	10",9",8"	No	30'X15'	Fair	Fair	Fair	10'	Moderate - High (Root loss, excavation)	R.T., I.M.	Co-dominant trunks at 3' above grade. 8" limb tear out with deadwood and decay.
T10	Carolina laurel cherry	7",7",5",5"	No	30'X15'	Fair	Fair	Fair	10'	Moderate - High (Root loss, excavation)	R.T., I.M.	Co-dominant trunks at 2' above grade. If retained will need some canopy clearance pruning from new building.
T11	Colorado blue spruce ( <i>Picea pungens 'Glauca'</i> )	6"	No	30'X10'	Fair	Fair	Fair	10'	Moderate (Root loss, excavation)	R.T.	
T12	Carolina laurel cherry	12"	No	35'X20'	Fair	Fair	Fair	10'	High (Within building foundation)	R.I.	
Trees On Adjacent Property											
T1-A	coast live oak ( <i>Quercus agrifolia</i> )	13"	No	40'X10'	Fair	Fair	Fair	10'	Low	R.T.	Grows 2' from tree T2-A. Unbalanced canopy with weight bias towards street. Rough trunk a sign of sycamore borer.
T2-A	coast live oak	12"	No	40'X10'	Fair	Fair	Fair	10'	Low	R.T.	Grows 2' from tree T1-A. Unbalanced canopy with weight bias towards street.
 <p><b>Kurt Fouts</b> Arborist Consultant</p> <p>826 Monterey Avenue Capitola, CA 95010 831-359-3607 kurtfouts1@outlook.com</p>							Page 3 of 4			11/14/2021	

150 Felker Street, Santa Cruz

Tree Assessment Chart - Appendix A

Tree #	Species	Trunk Diameter @ 4.5'	Protected Tree	Crown Height & Spread	Health Rating	Structural Rating	Suitability for Preservation (Based Upon Condition)	Tree Protection Zone (in feet)	Construction Impacts (Rating & Description)	Retention or Removal Code	Comments
Trees On Adjacent Property											
T3-A	silver dollar gum ( <i>Eucalyptus polyanthemos</i> )	26"	Yes	55'X25'	Poor	Poor	Poor	18'	Low	R.C.	Thin canopy. Significant tip and branch dieback. 10" and 8" limb tear outs with deadwood. Canopy overhangs existing building 10'. If retained canopy clearance pruning (10'-12'), from new building will be necessary.
T4-A	silver dollar gum	34"	Yes	60'X35'	Fair - Poor	Poor	Poor	23'	Moderate (Root loss, excavation)	R.T.,I.M.	Thin canopy. Some tip and branch dieback. Multiple limb tear outs. Canopy overhangs existing building 10'. If retained canopy clearance pruning (10'-12'), from new building will be necessary.
T5-A	coast live oak	13"	No	30'X15'	Good	Fair	Good	10'	Low	R.T.	Missing bark lower trunk.
T6-A	blue gum eucalyptus ( <i>Eucalyptus globulus</i> )	48"	Yes	75'X40'	Fair	Fair	Fair	23'	Low	R.T.	Canopy overhangs existing building 8'.
 <p><b>Kurt Fouts</b> Arborist Consultant</p> <p>826 Monterey Avenue Capitola, CA 95010 831-359-3607 kurtfouts1@outlook.com</p>							Page 4 of 4			11/14/2021	

## APPENDIX B – CRITERIA FOR TREE ASSESSMENT CHART

Following is an explanation of the data used in the tree evaluations. The data is incorporated in the *Tree Assessment Chart, Appendix A*.

### Trunk Diameter and Number of Trunks:

Trunk diameter as measured at 4.5 feet above grade. The number of trunks refers to a single or multiple trunked tree. Multiple trunks are measured at 4.5 feet above grade.

### Health Ratings:

Good: A healthy, vigorous tree, reasonably free of signs and symptoms of disease

Fair: Moderate vigor, moderate twig and small branch dieback, crown may be thinning and leaf color may be poor

Poor: Tree in severe decline, dieback of scaffold branches and/or trunk, most of foliage from epicormics

### Structure Ratings:

Good: No significant structural defects. Growth habit and form typical of the species

Fair: Moderate structural defects that might be mitigated with regular care

Poor: Extensive structural defects that cannot be abated.

### Suitability for Preservation Ratings:

#### Rating factors:

Tree Health: Healthy vigorous trees are more tolerant of construction impacts such as root loss, grading and soil compaction, then are less vigorous specimens.

Structural integrity: Preserved trees should be structurally sound and absent of defects or have defects that can be effectively reduced, especially near structures or high use areas.

Tree Age: Over mature trees have a reduced ability to tolerate construction impacts, generate new tissue and adjust to an altered environment. Young to maturing specimens are better able to respond to change.

Species response: There is a wide variation in the tolerance of individual tree species to construction impacts.

**Rating Scale:**

Good: Trees in good health and structural condition with potential for longevity on the site

Fair: Trees in fair health and/or with structural defects that may be reduced with treatment procedures.

Poor: Trees in poor health and/or with poor structure that cannot be effectively abated with treatment. Trees can be expected to decline or fail regardless of construction impacts or management . The species or individual may possess characteristics that are incompatible or undesirable in landscape settings or unsuited for the intended use of the site.

**Construction Impacts:**

**Rating Scale:**

High: Development elements proposed that are located within the Tree Protection Zone that would severely impact the health and /or stability of the tree. The tree impacts cannot be mitigated without design changes. The tree may be located within the building footprint.

Moderate: Development elements proposed that are located within the Tree Protection Zone that will impact the health and/or stability of the tree and can be mitigated with tree protection treatments.

Low: Development elements proposed that are located within or near the Tree Protection Zone that will have a minor impact on the health of the tree and can be mitigated with tree protection treatments.

None: Development elements will have no impact on the health and stability of the Tree.

**Tree Protection Zone (TPZ):**

Defined area within which certain activities are prohibited or restricted to prevent or minimize potential injury to designated trees, particularly during construction or development.



NORTH

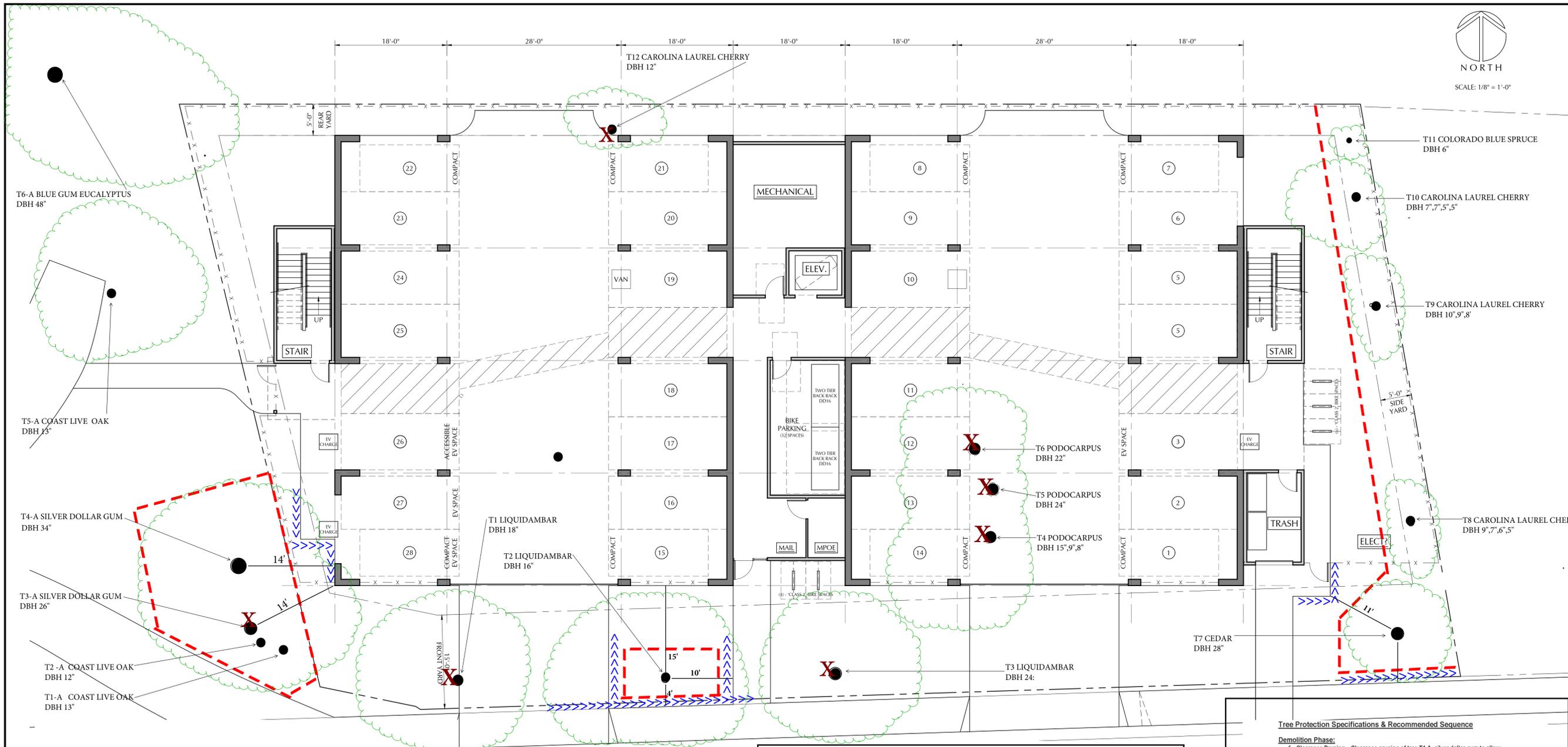
SCALE: 1/8" = 1'-0"

K.F.  
11/15/2021  
APN: 008-  
181-23

Sheet T1  
of 1 sheet

# Tree Protection Plan

## 150 Felker Street, Santa Cruz



### Legend

- Tree Location ●
- Tree Protection Fencing ---
- Tree Canopy Extents ☁
- Hand Trenching & Root Pruning >>>>>>
- Remove Tree X

FELKER STREET

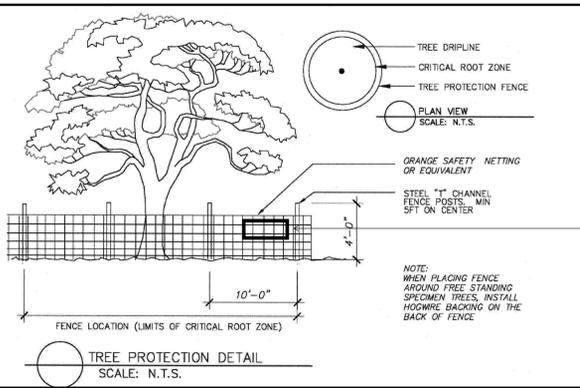
### PRE-CONSTRUCTION ROOT PRUNING

Excavation shall only occur within the TPZ (Tree Protection Zone), of retained trees, when designated by the Project Arborist. Excavations within (or outside of the TPZ, as designated), the Tree Protection Zone, will be performed by hand in order to preserve roots. Pruning of roots 2" in diameter or greater shall be conducted under the supervision of the Project Arborist. These activities will be documented, and a monitoring report will be provided to the City Arborist.

- Trenches for root pruning will be hand dug according to locations shown on Tree Protection Plan sheet:
- Trenches will be dug one foot behind staking on tree side of stakes.
  - The depth of the trench will equal the depth required for installation of the adjacent element.
  - Cleanly prune any roots encountered smaller than 2" in diameter. Use lopper, hand saw, or Sawzall. A sharp spade may be used for palm roots.
  - The pruned roots should be backfilled before the end of the day. If this is not feasible, the roots shall be covered with burlap layers or carpeting and kept moist until the trench is backfilled.
  - If roots are encountered 2" in diameter or greater, the Project Arborist shall be notified, and a determination shall be made to prune the root or retain it depending on site specific conditions.

### Tree Protection Specifications & Recommended Sequence

- Demolition Phase:**
1. **Clearance Pruning** - Clearance pruning of tree T4-A, silver dollar gum to allow space for construction of new building shall be performed using industry standards of workmanship as established in the Best Management Practices of the International Society of Arboriculture (ISA), and the American National Standards Institute, Safety Requirements in Arboriculture Operations ANSI Z133-2017. Contractor licensing and insurance coverage shall be verified. Pruning should be done to achieve a minimum of 5 feet clearance from the building.
  2. **CMU Wall Removal** - Removal of CMU wall adjacent to tree T7 cedar shall be by hand methods. A jack hammer may be used on footing. No use of machinery is permitted.
  3. **Tree Protection Fencing** - Install Tree Protection Fencing, in location indicated on Tree Protection Plan Sheet T1, prior to beginning of demolition.
- Construction Phase:**
1. **Utilities / Gas, Sewer, Water or Electrical** - Utilities shall be routed as far as feasible from the trunk of T2, liquidambar and T7 cedar. Any excavation for a utility line that is within the canopy dripline of tree T2, liquidambar or T7 cedar, shall be by hand methods. Any roots found less than 2" in diameter, shall be cleanly pruned with loppers, hand saw or Sawzall. If roots are encountered 2" in diameter or greater, the root shall be retained with the root "bridging" the trench, and the pipe shall be installed under or over the root.
  2. **New Building** - Excavation for new foundation adjacent to tree T4-A, silver dollar gum, shall be by hand methods, (see tree protection plan Sheet T1, for location). Stake foundation location adjacent to tree T4-A. Hand trench and root prune. Any roots found less than 2" in diameter, shall be cleanly pruned with loppers, hand saw or Sawzall. If roots are encountered 2" in diameter or greater, they shall be pruned under supervision of the Project Arborist. Roots shall be pruned by methods indicated on Tree Protection Plan sheet T1, **Pre-Construction Root Pruning**. No use of machinery is permitted.
  3. **New Sidewalk, Driveway & Walkways** - Excavation for the new sidewalk, driveway and walkway edges closest to trees T2, liquidambar, T7, cedar, and T4-A silver dollar gum, shall be accomplished by hand methods (see tree protection plan Sheet T1, for location). The depth of the trench shall equal the depth required for excavation of the new sidewalk or entry walkway. Any roots found less than 2" in diameter, shall be cleanly pruned with loppers, hand saw or Sawzall. If roots are encountered 2" in diameter or greater, they shall be pruned under supervision of the Project Arborist. Roots shall be pruned by methods indicated on Tree Protection Plan sheet T1, **Pre-Construction Root Pruning**.



## Warning Tree Protection Zone Keep Out

NOTICE: PROTECTIVE FENCING IS REQUIRED ON THIS JOB SITE.  
REMOVAL OR DAMAGE OF THIS FENCING MAY RESULT IN A FINE

This sign must be prominently displayed. Fencing may not be moved or removed without permission of the Project Arborist.  
During demolition and construction, all reasonable steps necessary to prevent damage, or the destruction of protected trees is required. Failure to comply with all precautions may result in a STOP WORK order being issued by the regulating agency.

No Entry without Project Arborist Authorization  
Kurt Fouts - Arborist Consultant - 831-359-3607

Additional tree protection information can be found in arborist report dated, 11/15/2021.

Base map provided by William Kempf Architects, Santa Cruz, CA



# Glossary of Terms

**Basal rot:** decay of the lower trunk, trunk flare, or buttress roots.

**Canker:** Localized diseased area on stems, roots and branches. Often sunken and discolored.

**Critical Root Zone (CRZ):** Area of soil around a tree where a minimum number of roots considered critical to the structural stability or health of the tree are located. CRZ determination is sometimes based on the drip line or a multiple of the DBH, but because root growth can be asymmetric due to site conditions, on-site investigation may be required.

**Codominant branches/stems:** Forked branches (or trunks), nearly the same size in diameter, arising from a common junction and lacking a normal branch union, may have included bark.

**Crown:** Upper part of a tree, measured from the lowest branch, including all branches and foliage.

**Defect:** An imperfection, weakness, or lack of something necessary. In trees defects are injuries, growth patterns, decay, or other conditions that reduce the tree's structural strength.

**Diameter at breast height (DBH):** Measurement of trunk diameter at 4.5 feet above grade.

**Frass:** Fecal material and/or wood shavings produced by insects.

**Included Bark Attachments (crotches):** Branch/limb or limb /trunk, or codominant trunks originating at acute angles from each other. Bark remains between such crotches, preventing the development of axillary wood. The inherent weakness of such attachments increases with time, through the pressure of opposing growth and increasing weight of wood and foliage, often resulting in failure.

**Live Crown Ratio (LCR):** Ratio of the the crown length (live foliage), to total tree height.

**Scaffold branches:** Permanent or structural branches that form the scaffold architecture or structure of a tree.

**Suppressed:** Trees that have been overtopped and occupy an understory position within a group or grove of trees. Suppressed trees often have poor structure.

**Tree Protection Zones (TPZ):** Defined area within which certain activities are prohibited or restricted to prevent or minimize potential injury to designated trees, especially during construction or development.

**Trunk flare:** Transition zone from trunk to roots where the trunk expands into the buttress or structural roots.

This Glossary of Terms was adapted from the *Glossary of Arboricultural Terms* (ISA, 2015)

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## Appendix F - TREE PROTECTION GUIDELINES AND RESTRICTIONS

### Protecting Trees During Construction:

- 1) Before the start of site work, equipment or materials move in, clearing, excavation, construction, or other work on the site, every tree to be retained shall be securely fenced- off as delineated in approved plans. Such fences shall remain continuously in place for the duration of the work undertaken in connection with the development.
- 2) If the proposed development, including any site work, will encroach upon the tree protection zone, special measures shall be utilized, as approved by the project arborist, to allow the roots to obtain necessary oxygen, water, and nutrients.
- 3) Underground trenching shall avoid the major support and absorbing tree roots of protected trees. If avoidance is impractical, hand excavation undertaken under the supervision of the project arborist may be required. Trenches shall be consolidated to service as many units as possible. Boring/tunneling under roots should be considered as an alternative to trenching.
- 4) Concrete or asphalt paving shall not be placed over the root zones of protected trees, unless otherwise permitted by the project arborist.
- 5) Artificial irrigation shall not occur within the root zone of native oaks, unless deemed appropriate on a temporary basis by the project arborist to improve tree vigor or mitigate root loss.
- 6) Compaction of the soil within the tree protection zone shall be avoided.
- 7) Any excavation, cutting, or filling of the existing ground surface within the tree protection zone shall be minimized and subject to such conditions as the project arborist may impose. Retaining walls shall likewise be designed, sited, and constructed to minimize their impact on protected trees.
- 8) Burning or use of equipment with an open flame near or within the tree protection zone shall be avoided. All brush, earth, and other debris shall be removed in a manner that prevents injury to the tree.
- 9) Oil, gas, chemicals, paints, cement, stucco or other substances that may be harmful to trees shall not be stored or dumped within the tree protection zone of any protected tree, or at any other location on the site from which such substances might enter the tree protection zone of a protected tree.
- 10) Construction materials shall not be stored within the tree protection zone of a protected tree.

## Project Arborist Duties and Inspection Schedule:

The project arborist is the person(s) responsible for carrying out technical tree inspections, assessment of tree health, structure and risk, arborist report preparation, consultation with designers and municipal planners, specifying tree protection measures, monitoring, progress reports and final inspection.

A qualified project arborist (or firm) should be designated and assigned to facilitate and insure tree preservation practices. He/she/they should perform the following inspections:

Inspection of site: Prior to equipment and materials move in, site work, demolition, landscape construction and tree removal: The project arborist will meet with the general contractor, architect / engineer, and owner or their representative to review tree preservation measures, designate tree removals, delineate the location of tree protection fencing, specify equipment access routes and materials storage areas, review the existing condition of trees and provide any necessary recommendations.

Inspection of site: During excavation or any activities that could affect trees: Inspect site during any activity within the Tree Protection Zones of preserved trees and any recommendations implemented. Assess any changes in the health of trees since last inspection.

Final Inspection of Site: Inspection of site following completion of construction. Inspect for tree health and make any necessary recommendations.

Kurt Fouts shall be the Project Arborist for this project. All scheduled inspections shall include a brief Tree Monitoring report, documenting activities and provided to the City Arborist.

## Tree Protection Fencing

Tree Protection fencing shall be installed prior to the arrival of construction equipment or materials. Fence shall be comprised of six-foot chain link fence mounted on eight-foot tall, 1 and 7/8-inch diameter galvanized posts, driven 24 inches into the ground and spaced on a minimum of 10-foot centers. Once established, the fence must remain undisturbed and be maintained throughout the construction process until final inspection.

A final inspection by the City Arborist at the end of the project will be required prior to removing any tree protection fencing.

## Tree Protection Signs

All sections of fencing should be clearly marked with signs stating that all areas within the fencing are Tree Protection Zones and that disturbance is prohibited.

## Monitoring

Any trenching, construction or demolition that is expected to damage or encounter tree roots should be monitored by the project arborist or a qualified ISA Certified Arborist and should be documented.

The site should be evaluated by the project arborist or a qualified ISA Certified Arborist after construction is complete, and any necessary remedial work that needs to be performed should be noted.

## Root Pruning

Root pruning shall be supervised by the project arborist. When roots over two inches in diameter are encountered they should be pruned by hand with loppers, handsaw, reciprocating saw, or chain saw rather than left crushed or torn. Roots should be cut beyond sinker roots or outside root branch junctions and be supervised by the project arborist. When completed, exposed roots should be kept moist with burlap or backfilled within one hour.

## Tree Work Standards and Qualifications

All tree work, removal, pruning, planting, shall be performed using industry standards of workmanship as established in the Best Management Practices of the International Society of Arboriculture (ISA) and the American National Standards Institute series, *Safety Requirements in Arboriculture Operations* ANSI Z133-2017,

Contractor licensing and insurance coverage shall be verified.

During tree removal and clearance, sections of the Tree Protection Fencing may need to be temporarily dismantled to complete removal and pruning specifications. After each section is completed, the fencing is to be re-installed.

Trees to be removed shall be cut into smaller manageable pieces consistent with safe arboricultural practices, and carefully removed so as not to damage any surrounding trees or structures. The trees shall be cut down as close to grade as possible. Tree removal is to be performed by a qualified contractor with valid City Business/ State Licenses and General Liability and Workman's Compensation insurance.

## Development Site Tree Health Care Measures

*RECOMMENDED TO PROVIDE OPTIMUM GROWING CONDITIONS, PHYSIOLOGICAL INVIGORATION AND STAMINA, FOR PROTECTION AND RECOVERY FROM CONSTRUCTION IMPACT.*

Establish and maintain TPZ fencing, trunk and scaffold limb barriers for protection from mechanical damage, and other tree protection requirements as specified in the arborist report.

Project arborist to specify site-specific soil surface coverings (wood chip mulch or other) for prevention of soil compaction and loss of root aeration capacity.

Soil, water and drainage management is to follow the ISA BMP for "Managing Trees During Construction" and the ANSI Standard A300(Part 2)- 2011 Soil Management (a. Modification, b. Fertilization, c. Drainage.)

Fertilizer / soil amendment product(s) amounts and method of application to be specified by certified arborist.

# City of Santa Cruz

## **9.56.040 HERITAGE TREE AND HERITAGE SHRUB DESIGNATION.**

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Any tree, grove of trees, shrub or group of shrubs, growing on public or private property within the city limits of the city of Santa Cruz which meet(s) the following criteria shall have the “heritage” designation:

- (a) Any tree which has a trunk with a circumference of forty-four inches (approximately fourteen inches in diameter or more), measured at fifty-four inches above existing grade;
- (b) Any tree, grove of trees, shrub or group of shrubs which have historical significance, including but not limited to those which were/are:
  - (1) Planted as a commemorative;
  - (2) Planted during a particularly significant historical era; or
  - (3) Marking the spot of an historical event.
- (c) Any tree, grove of trees, shrub or group of shrubs which have horticultural significance, including but not limited to those which are:
  - (1) Unusually beautiful or distinctive;
  - (2) Old (determined by comparing the age of the tree or shrub in question with other trees or shrubs of its species within the city);
  - (3) Distinctive specimen in size or structure for its species (determined by comparing the tree or shrub to average trees and shrubs of its species within the city);
  - (4) A rare or unusual species for the Santa Cruz area (to be determined by the number of similar trees of the same species within the city);
  - (5) Providing a valuable habitat; or
  - (6) Identified by the city council as having significant arboricultural value to the citizens of the city.

### ASSUMPTIONS AND LIMITING CONDITIONS

1. Any legal description provided by the appraiser/consultant is assumed to be correct. No responsibility is assumed for matters legal in character nor is any opinion rendered as the quality of any title.
2. The appraiser/consultant can neither guarantee nor be responsible for accuracy of information provided by others.
3. The appraiser/consultant shall not be required to give testimony or to attend court by reason of this appraisal unless subsequent written arrangements are made, including payment of an additional fee for services.
4. Loss or removal of any part of this report invalidates the entire appraisal/evaluation.
5. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person(s) to whom it is addressed without written consent of this appraiser/consultant.
6. This report and the values expressed herein represent the opinion of the appraiser/consultant, and the appraiser/consultant's fee is in no way contingent upon the reporting of a specified value nor upon any finding to be reported.
7. Sketches. Diagrams. Graphs. Photos. Etc., in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering reports or surveys.
8. This report has been made in conformity with acceptable appraisal/evaluation/diagnostic reporting techniques and procedures, as recommended by the International Society of Arboriculture.
9. When applying any pesticide, fungicide, or herbicide, always follow label instructions.
10. No tree described in this report was climbed, unless otherwise stated. We cannot take responsibility for any defects which could only have been discovered by climbing. A full root collar inspection, consisting of excavating around the tree to uncover the root collar and major buttress roots, was not performed, unless otherwise stated. We cannot take responsibility for any root defects which could only have been discovered by such an inspection.

### CONSULTING ARBORIST DISCLOSURE STATEMENT

Arborists are tree specialists who use their education, knowledge, training, and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce risk of living near trees, Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like medicine, cannot be guaranteed.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate all trees.





## City of Santa Cruz Bird-Safe Building Design Standards

### ***When do the standards apply?***

Bird-safe building design standards apply in all districts where new construction or exterior changes to the façade of buildings or structures requiring a Planning Permit and are located adjacent to or within 300 feet of a General Plan land use designation of CR, PR, NA, or AG; an open waterway mapped in the City-wide Creeks and Wetlands Management Plan; or any area within 300 feet of undeveloped property likely to provide significant bird habitat, as determined by the Zoning Administrator.

### ***Which architectural features require glazing treatment?***

Treatment is required for 90 percent of all glazing within 40 feet above grade, for portions of the buildings where glazing would have the potential to reflect vegetation or open water.

### ***Glazing treatment standards***

Glazing treatment shall follow the 2" x 4" rule: spaces of untreated glazing must have a maximum height of two inches and a maximum width of four inches. Birds cannot see untreated glazing and may attempt to fly through "openings" greater than these dimensions. 2" x 2" spacing is highly encouraged. Pattern elements should be at least 1/8" thick. Glazing treatment shall include at least one of the following:

- Bird safe glass approved for use by the American Bird Conservancy
- Fritted windows
- Patterned windows
- UV pattern film (not appropriate for all locations)
- Window nets
- Window screens
- Any American Bird Conservancy approved product: <https://abcbirds.org/glass-collisions/stop-birds-hitting-windows/>
- Other design measures identified by a qualified biologist with a background in ornithology as providing adequate bird protections and that do not conflict with required findings for a Planning Permit.

### ***Lighting standards***

Exterior lighting shall be downward cast only. Horizontal or upward cast lighting can attract or disorient birds and cause them to fly into windows. These lighting standards apply to any exterior lighting proposed by a project in an area where the standards apply.

### ***Exceptions***

The following may qualify for an exception to these requirements with approval of the Zoning Administrator:

- Projects on Historic buildings where meeting bird-safe glazing standards precludes the building from meeting Secretary of Interior's Standards or otherwise detracts from the design/historic character.
- Where an assessment completed by a qualified biologist with a background in ornithology and consistent with the Planning Department's Project Review Criteria for Bird-Safe Building Design Standards determines that the project as designed will not be detrimental to bird safety.
- First floor windows on buildings which require clear glazing due to the nature of the business or character of the area (e.g., retail uses).

EXHIBIT "A"

CONDITIONS OF APPROVAL FOR THE PROJECT ON PROPERTY AT

**Address & Application #**  
**Brief Description**

**Standard List of Conditions of Approval**  
**DESIGN PERMIT – Long Form**

1. If one or more of the following conditions is not met with respect to all its terms, then this approval may be revoked.
2. All plans for future construction which are not covered by this review shall be submitted to the City Planning and Community Development Department for review and approval.
3. This permit shall be exercised within three (3) years of the date of final approval or it shall become null and void. When a building permit is required, a zoning permit shall be considered exercised following the issuance of a valid building permit. When only an occupancy permit is required, a zoning permit shall be considered exercised when the occupancy permit is issued. **(FOR PROJECTS INVOLVING CODE ENFORCEMENT:** Should this application be the result of a code enforcement action, the timelines for compliance set forth in a Notice of Violation and/or a Notice & Order shall take precedence.)
4. The use shall meet the standards and shall be developed within limits established by Chapter 24.14 of the Santa Cruz Municipal Code as to the emission of noise, odor, smoke, dust, vibration, wastes, fumes or any public nuisance arising or occurring incidental to its establishment or operation.
5. The applicant shall be responsible for the completeness and accuracy of all forms and supporting material submitted in connection with any application. Any errors or discrepancies found therein may result in the revocation of any approval or permits issued in connection therewith.
6. All final working drawings shall be submitted to the Zoning Administrator for review and approval in conjunction with building permit application. The plans submitted for building permits shall have the same level of articulation, detailing, and dimensionality as shown in the approved plans. All approved exterior finishes and materials shall be clearly notated on the building permit plans.

**Prior to Building Permit Issuance:**

7. The applicant and contractor who obtains a building permit for the project shall be required to sign the following statement at the bottom of these conditions, which will become conditions of the building permit:

“I understand that the subject permit involves construction of a building (project) with an approved Design Permit. I intend to perform or supervise the performance of the work allowed by this permit in a manner which results in a finished building with the same level of detail, articulation, and dimensionality shown in the plans submitted for building permits. I hereby acknowledge that failure to construct the building as represented in the building permit plans, may result in delay of the inspections process and/or the mandatory reconstruction or alteration of any portion of the building that is not in substantial conformance with the approved plans, prior to continuation of inspections or the building final.”

---

Signature of Building Contractor

Date

8. Adequate provisions shall be made to supply water to each of the premises covered by this application. The design of water facilities shall be to standards of the Water Department, and plans therefore must be submitted to the Water Department Director for review and approval prior to the issuance of a building permit.
9. **[For multifamily projects of five or more units or new nonresidential structures]:** Plans submitted for building permit issuance shall include electric vehicle charging stations as required per Section 24.12.241 of the Zoning Ordinance.
10. Plans submitted for building permit issuance shall show all exterior site lighting locations and fixture details. All exterior building lighting shall be shielded and contained in a downward direction. No exterior lighting shall produce off-site glare. **(Add for commercial development):** Exterior site lighting shall be provided along pedestrian pathways and in the vehicle parking area. Security lighting shall be motion sensor only.
11. **[For commercial, industrial, and public projects requiring a building permit, for new single or two-unit projects on lots 10,000 square feet or greater, and for developer installed landscaping at new single or multi-family residential projects with a total irrigated area of 1,500 square feet or greater]:** Landscape and irrigation plans shall be submitted at the time of the building permit application and will be reviewed by both the Planning Department and Water Department. The landscape and irrigation plans shall demonstrate compliance with all requirements of the City’s Water-Efficient Landscaping Ordinance in Chapter 16.16 of the Santa Cruz Municipal Code prior to issuance of the building permit. Turf is not permitted in new non-residential landscape projects.
12. **[For single-family/duplex lots less than 10,000 square feet]:** New single family and two-unit residential development projects on a parcel of land less than 10,000 square feet shall be required to meet only provisions listed in Section 16.16.070(j) of the Santa Cruz Municipal Code. These provisions include specifications on plant type, turf limits, spray irrigation setbacks, irrigation equipment and mulching requirements.

Building plans shall contain references to these provisions showing that the conditions have been met.

13. All trees shall be a minimum 15-gallon size.
14. Prior to building permit issuance, the City Arborist must approve of the proposed street trees.
15. Plans submitted for building permit issuance shall include landscaping or other screening of the backflow preventor from public view for review and approval by the Planning Department and Water Department.
16. All utilities and transformer boxes shall be placed underground in accordance with the provisions of Section 24.12.700 through 24.12.740 of the Zoning Ordinance. **(Temporary Language) Subject to project planner approval, the applicant may place transformer boxes above ground if a) PG&E provides a letter to the Planning Department indicating that underground transformers are not feasible for the project due to supply chain issues and b) the above ground transformer is sufficiently screened from public view.**
17. Bike parking shall be provided in accordance with Sections 24.12.250-252 of the City's Zoning Ordinance. Specifically, all Class 2 bike parking shall be inverted "U" style racks.
18. A drainage plan shall be submitted in conjunction with application for building permits.
19. **[If recommended by Archaeological Report or Native American consultation]:** Prior to building or grading permit issuance or in any case any ground disturbance, including but not limited to grubbing, demolition, excavation, and utility-line trenching, the applicant shall submit a copy of a signed contract with a qualified archaeologist (based on the city's list of approved consultants or as previously authorized by the Planning Department) indicating that the archaeologist will be present on the site to observe and monitor all grading and subsurface excavations and that they will provide a follow-up letter to the Planning Department with the results of the monitoring.
20. The plan for erosion control approved as part of this application shall be submitted and plans submitted for building permit issuance shall note that all work will be installed by November 1.
21. Plans submitted for building permits shall demonstrate compliance with Stormwater Best Management Practice (BMP) and Low Impact Development (LID) requirements for single family residential dwelling projects contained in "Chapter 6 of the Best Management Practices Manual for the City's Storm Water Management Program" dated October 2011. At a minimum, downspouts shall be disconnected from underground pipes or prohibited from directly flowing onto impervious surfaces and instead be redirected to landscaping or bioswales. Pervious walkway surfaces and driveways shall be installed where possible. Show all implemented LID measures on the plans.

22. **[If project site is located along coastal bluff or on West Cliff Drive]:** Prior to issuance of a building permit, the property owner shall file with the county recorder a deed restriction stating that:
- a. Coastal Hazards Risk. By acceptance of the **[insert permit type]** Permit **[insert CP#]** issued on **[insert date]**, 2024 by the City of Santa Cruz, the Permittee acknowledges and agrees on behalf of themselves and all successors and assigns, to all of the following:
    - i. Coastal Hazards. That the site is subject to coastal hazards including but not limited to episodic and long-term shoreline retreat and coastal erosion, high seas, ocean waves, tsunamis, tidal scour, coastal flooding, landslides, bluff and geologic instability, bluff retreat, liquefaction and the interaction of same, many of which will worsen with future sea level rise.
    - ii. Assume Risks. To assume the risks to the Permittee and the property that is subject of this CDP of injury and damage from such coastal hazards in connection with this permitted development
    - iii. Waive Liability. To unconditionally waive any claim of damage or liability against the City, its officers, agents, and employees for injury or damage from such coastal hazards.
    - iv. Indemnification. To indemnify and hold harmless the City, its officers, agents, and employees with respect to the City's approval of the development against and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such coastal hazards.
    - v. Property Owners Responsible. That any adverse effects to the property caused by the permitted development shall be fully the responsibility of the property owners.
    - vi. Services and Access Not Guaranteed. That the City may, due to the nature of the coastal hazards or other related circumstances, cease to provide access or services to the subject property; that any costs related to the provision of new or relocated access or services to the property, should the City cease to provide access or services in the manner approved through the initial Planning, Building, and Public Works permits associated with the Coastal Development Permit approval referenced herein, shall be the responsibility of the Permittee or successors and assigns; and that the same risk, liability, and indemnification criteria outlined above shall apply to the City's cessation or relocation of access or services.
23. All new mechanical equipment and appurtenances, including gas and water meters, electrical boxes, roof vents, air conditioners, antennas, etc. visible from the public way and from adjacent properties, shall be screened with material compatible with the materials of the building and shall be subject to the approval of the Zoning

Administrator. Prior to issuance of a building permit, the applicant shall provide documentation confirming that all heat pumps comply with the City's noise standards.

24. Final colors shall be approved by the Zoning Administrator prior to building permit issuance.
25. The owner shall comply with the inclusionary housing requirements as outlined in Section 24.16.010 of the Zoning Ordinance. **[For projects with voluntary affordable housing units]:** Additionally, the applicant has volunteered to provide **[insert number of units]** units at the **[insert affordable level]** level which shall be reflected in an affordable housing development agreement. A Participation Agreement establishing compliance with inclusionary housing requirements shall be entered into prior to recordation of the final subdivision map or building permit issuance if no subdivision map is required, and recorded prior to final occupancy of the first unit. **[For projects that include a Density Bonus]:** In addition to complying with the City's inclusionary ordinance, which restricts affordability of units in perpetuity, the Participation Agreement shall also document and require the affordability restrictions associated with the granting of the applicant's density bonus request, as specified in the staff report.
26. **[For sites of one acre or larger or less than one acre but part of a larger common plan of development]:** Construction activity resulting in a land disturbance of one acre or more, or less than one acre but part of a larger common plan of development or sale must obtain the [Construction Activities Storm Water General Permit](#) (2009-0009-DWQ Permit). Construction activity includes clearing, grading, excavation, stockpiling, and reconstruction of existing facilities involving removal and replacement. Construction activity does not include routine maintenance such as, maintenance of original line and grade, hydraulic capacity, or original purpose of the facility.

The applicant shall be responsible for filing a Notice of Intent (NOI) with the State Regional Water Quality Control Board (RWQCB) and for developing a Storm Water Pollution Prevention Plan (SWPPP) prior to commencement of any soil disturbing activities at the site. Prior to issuance of a building permit, the applicant shall provide the City with proof of coverage under the state's Construction Activities Storm Water General Permit, including a copy of the letter of receipt and Waste Discharger Identification (WDID) number issued by the State Regional Water Quality Control Board (RWQCB) that acknowledges the property owner's submittal of a complete Notice of Intent (NOI) package.

27. Prior to the issuance of a building permit, the following fees shall be paid: **[For 100% affordable housing projects, impact fees in section below should be moved to Prior to Building Permit Final/Occupancy Section and note "Prior to temporary or final occupancy, the following fees shall be paid." Non-impact fees can be charged prior to BP Issuance unless requested to be deferred as an incentive/concession.]**

- a) **[Not an impact fee. For residential projects involving a subdivision]:** The applicant shall pay the Quimby park dedication fees pursuant to Chapter 23.28 of the City of Santa Cruz Municipal Code based on the final building permit plans.
- b) **[Not an impact fee. For residential projects not involving a subdivision]:** The applicant shall pay the Park and Recreation Facility Tax pursuant to Chapter 5.72 of the City of Santa Cruz Municipal Code based on the final building permit plans.
- c) **[Impact Fee. For residential, commercial, industrial, or hotel projects. 100% affordable projects and public projects are exempt.]:** The applicant shall pay Childcare Impact fees pursuant to Chapter 18.48 of the City of Santa Cruz Municipal Code based on the final building permit plans.
- d) **[Impact Fee. As required by DPW.]** The applicant shall pay Traffic Impact Fees (TIF) as required by the Public Works Department.
- e) **[Impact Fee. For residential, commercial, industrial, or hotel projects. 100% affordable projects and public projects are exempt.]:** The applicant shall pay Public Safety Impact fees pursuant to Chapter 18.49 of the City of Santa Cruz Municipal Code based on the final building permit plans.

28. **[For alterations to nonconforming structures]:** The contractor or builder who obtains a building permit for the project shall be required to sign the following statement which will become conditions of the building permit:

“I hereby acknowledge that the subject permit involves alterations to an existing nonconforming structure and the extent of demolition is limited to that which is approved on the associated **Planning permit #XX-XXXX**. I understand that if demolition exceeds the stated limits, it will result in the requirement to reconstruct the structure in accordance with the site development standards required in the current zoning ordinance, whether or not it was the intent to demolish the structure.

---

Signature of Building Contractor

Date

29. **[For alterations to nonconforming structures]:** Final building plans shall include calculations confirming that no more than 50% of the exterior walls will be demolished. The project is subject to the demolition limitations shown on the approved plans and described in the attached permit. The wall studs, existing window/door openings, existing window and door headers, and existing top and bottom wall plates shown on the wall areas to be retained shall be preserved in place and shall not be removed and reconstructed with the same or similar materials, or reinforced through techniques such as sistering, regardless of the state of decay or non-compliance with building code

requirements unless a modification to the permit is approved, which could result in the requirement to reconstruct the structure pursuant to current site development standards. The project contractor, builder, design professional, consultant, or property owner must discuss any perceived conflicts with the preservation of such walls prior to the start of construction and, if necessary, obtain approval of any permit modifications prior to the start of any construction activities at the site. The appropriate modification process shall be determined by the Planning Department, which may include the requirement to obtain a Residential Demolition Authorization Permit and elimination of any structural encroachments into a required setback.

30. **[For demolition of a single-family dwelling]:** Prior to issuance of the demolition permit, the applicant shall:
  - Obtain a building permit for the construction of the new single-family dwelling.
  - Schedule a Special Inspection with the Building Department to determine whether the existing residence proposed for demolition has potential for relocation off-site. If the Building Official determines that the building is capable of being moved without damage to significant trees and/or landscaping, the applicant shall be required to comply with the requirements of Section 24.10.190 of the Zoning Ordinance.
  
31. **[For projects on site adjacent to a creek that include tree removal and potential impacts to migratory bird nesting sites]:** A pre-construction nesting bird survey shall be conducted by a qualified biologist if construction, including tree removal, adjacent to the **[Insert watercourse name]** is scheduled to begin from February 1 to August 31 to determine if active nests are present in or near the construction sites. The survey shall be conducted no more than seven days before the start of any construction activities on the site (including tree removal, clearing, and excavation). If nesting bird species protected under the Migratory Bird Treaty Act and/or California Fish and Game Code (§3503) are found and the biologist determines that construction activities could result in the removal of an active nest or cause mortality of eggs or young, the biologist shall identify a suitable no-disturbance buffer around the nest in which no work would be allowed until after the biologist has determined the nest is no longer in use or the young have fledged. Alternatively, construction may be delayed until after the nesting season (i.e., September).
  
32. **[For projects on site not adjacent to a creek that includes tree removal and potential impacts to migratory bird nesting sites]:** If project site work occurs anytime between February 1 and August 31, the applicant shall submit documentation of a pre-construction nesting bird survey by a qualified biologist prior to the start of work. The survey shall be described in the biotic report prepared by **[insert name of biologist, date of report]**, if such a report was prepared, and shall be completed no more than seven days before the start of any project construction activities on the site (including tree removal, clearing, and excavation) and shall include observations of any nesting activities on the site. Site work may commence once the Planning Department has accepted the report and confirmed that there are no nesting birds on the site or that an appropriate buffer zone around any active nests has been recommended by the biologist and physically established on the site.

33. **[For projects with existing buildings to be demo'd or buildings that are already vacant]:** If there are any buildings approved for demolition that are currently vacant or that become vacant for longer than 3 months following entitlement, rodent control measures shall be required. Prior to demolition permit issuance, the applicant shall submit evidence of tenancy to confirm the vacancy of existing buildings. If subject to rodent control requirements as determined by the Zoning Administrator, the applicant shall submit evidence of a contract with a licensed pest control company and shall provide a letter or report prepared by the licensed pest control company detailing the measures that will be conducted on the site. The measures shall be reviewed and approved by the Planning Department and shall be conducted by a licensed pest control company immediately prior to demolition. Evidence of completion shall be provided to the Planning Department. Alternatively, a licensed pest control agency can provide a written attestation that rodents or other pests are not present and no actions are therefore needed.
34. **[For projects that include eviction of commercial tenants]:** The applicant shall send notices of demolition to all tenants of the buildings to be demolished at least six months prior to demolition or eviction. The notices shall include contact information for the Economic Development Department for tenants to use as a resource for relocation assistance. Proof of noticing shall be submitted to the Economic Development Department.
35. **[For projects with contamination where remediation is required by oversight agency]:** Initial environmental testing conducted by the applicant indicates that site **[Insert soils and/or soil vapor and/or groundwater]** are impacted. **[Insert oversight agency, e.g., State Department of Toxic Substances Control, State Regional Water Quality Control Board, County of Santa Cruz Department of Environmental Health, etc.]** requires additional testing prior to design of any remedial or mitigation activities. The applicant shall work with City staff, the necessary oversight agency, and responsible parties, if necessary, to address any site remediation or building design/construction requirements to ensure appropriate on-site improvements in accordance with the oversight agency standard practice; local, State, and Federal regulations; and City Code requirements. Design of remediation equipment, equipment placement, or remediation activities will need to be reviewed and may require approval by all parties. Prior to building permit issuance and site disturbance, the applicant shall either: (a) submit written proof of an approval from the oversight agency of remediation activity and that building and/or site design is deemed consistent with the remediation activity; or (b) provide written proof the work is not subject to approval from an oversight agency.
36. **[For Projects where Soil Management Plan is required]:** If deemed necessary by the oversight agency **[Insert oversight agency, e.g., State Department of Toxic Substances Control, State Regional Water Quality Control Board, County of Santa Cruz Department of Environmental Health, etc.]**, the applicant shall prepare an **[Insert plan, e.g. Environmental site and/or soil and/or groundwater**

**management plan]** for review and approval by the Santa Cruz County Department of Environmental Health. Proof of approval or actions for site work required shall be provided to the Planning Department prior to issuance of any demolition or building permits.

37. **[For projects on sites subject to bird safe policies]:** Plans submitted for building permit issuance shall comply with the City's Bird Safe Building Standards. **[For multifamily projects of 5 or more units]:** Adhesive film may not be used to meet fritting or glass standards.
38. **[For multifamily rental projects with common laundry rooms]:** All washing machines provided for common use among tenants shall be equipped with microplastic filters to reduce plastic pollution. See Operational Conditions for noticing and maintenance requirements.
39. **[For multifamily rental projects with in-unit laundry machines]:** All washing machines provided by the owner for private use by tenants shall be equipped with microplastic filters to reduce plastic pollution. See Operational Conditions for noticing and maintenance requirements.
40. **[Reproduce condition for all applicable reports.]** Plans submitted for building permit issuance shall comply with all recommendations of the **[Traffic Impact Analysis, Geotechnical Report, Geologic Report, Arborist Report, Biotic Report, etc.]**, prepared by **[Name of Preparer]** and dated **[XX/XX/XXXX]**.

**Prior to and During Construction:**

41. Prior to site grading or any disturbance all trees and/or tree stands indicated for preservation or approved plans shall be protected through fencing or other approved barricade. Such fencing shall protect vegetation during construction and shall be installed to the satisfaction of the Director of Planning and Community Development.
42. **[For alterations to nonconforming structures]:** A preconstruction meeting shall be held on the project site after building permit issuance and prior to the start of any construction activities. The project planner, building inspector, project contractor/builder, and property owner shall attend the preconstruction meeting to discuss the limits of the project. The project planner shall invite representatives from other departments if determined necessary.
43. All refuse and recycling activities during construction shall be done in accordance with Chapter 6.12 of the Santa Cruz Municipal Code. Be aware that private companies offering refuse or debris box services are not allowed to operate within the City limits, except under certain limited circumstances detailed in Chapter 6.12.160.
44. **[If recommended by Archaeological Report or Native American consultation]:** During all grading and subsurface excavations (including but not limited to grubbing,

demolition, excavation, and utility-line trenching) an archaeologist and a Native American observer, authorized by the Planning Department, shall be present to collect and catalog any material uncovered. The cost for this service shall be paid by the applicant.

45. Any person exercising a development permit or building permit who, at any time in the preparation for or process of excavating or otherwise disturbing earth, discovers any human remains of any age or any artifact or any other object which reasonably appears to be evidence of an archaeological/cultural resource or paleontological resource, shall:
  - a. Immediately cease all further excavation, disturbance, and work on the project site;
  - b. Cause staking to be placed completely around the area of discovery by visible stakes not more than ten feet apart forming a circle having a radius of not less than one hundred feet from the point of discovery; provided, that such staking need not take place on adjoining property unless the owner of the adjoining property authorizes such staking;
  - c. Notify the Santa Cruz County sheriff-coroner and the city of Santa Cruz planning director of the discovery unless no human remains have been discovered, in which case the property owner shall notify only the planning director;
  - d. Grant permission to all duly authorized representatives of the sheriff-coroner and the planning director to enter onto the property and to take all actions consistent with this section.
  
46. Grading shall be done during periods of dry weather and protective measures shall be incorporated during grading to prevent siltation from any grading project halted due to rain.
  
47. **[For projects that include demolition of a structure]:** The applicant and/or property owner shall be responsible for ensuring that any existing buildings approved for demolition or conversion remain occupied by a tenant or, if any buildings are vacant or become vacant prior to demolition or conversion, that these buildings are adequately secured to prevent break-ins and other vandalism. All windows, doors, and other openings into vacant buildings shall be completely covered and a six-foot tall chain link fence shall be installed around the perimeter of the property. Graffiti shall be removed or painted over within 72 hours. If a break-in occurs, the applicant and/or property owner shall, within 24 hours, clean the site of trash and debris, and re-secure the site and building(s). Additionally, following a break-in, the applicant/property owner shall provide the Planning Department, SCFD Fire Marshall and SCPD with a copy of a signed contract with a private security company to provide ongoing monitoring of the site. If a break-in or other public safety concern related to the vacant status of the property/space occurs at the vacant site/space that requires an emergency response, the applicant and/or property owner shall be responsible for paying the fully burdened hourly rates for Police, Fire, Code Compliance, or other City Staff to respond and follow up as abatement costs, civil penalties, and/or pursuant to all other rights and remedies

the City has. The City will not issue the certificate of occupancy/final permit until all fines, fees, civil penalties, and/or costs are paid.

48. **[For all multifamily, mixed-use, and commercial/industrial projects with an anticipated construction timeframe of six months or longer, and/or that are located within the proximity of sensitive receptors, such as schools, senior living facilities, or residential neighborhoods]:** All diesel-fueled off-road construction equipment greater than 75 horsepower shall be zero-emissions or equipped with California Air Resources Board (CARB) Tier 4 Final or Interim compliant engines. Alternatively, CARB Tier 2 or 3 compliant engines may be used if CARB Level 3 Verified Diesel Emissions Control Strategy (VDECS) filters are added to each piece of off-road diesel-fueled equipment.

**Prior to Final Building Permit/Occupancy:**

49. The development of the site shall be in substantial accordance with the approved plans submitted and on file in the Department of Planning and Community Development of the City of Santa Cruz. All aspects of construction must be completed prior to occupancy. Major modifications to plans or exceptions to completion may be granted only by the City authority which approved the project.
50. All requirements of the **[insert departments]** shall be completed prior to occupancy and continuously maintained thereafter.
51. All landscaping shall be installed prior to final utility release or issuance of occupancy permits.
52. Subsequent to occupancy of the premises, all landscaping shall be permanently maintained. **[For multifamily, mixed-use, or commercial/industrial projects]:** Such maintenance shall be secured through an 18-month bond prior to occupancy.
53. **[If recommended by Archaeological Report or Native American consultation]:** Prior to building permit final, the approved archaeologist shall provide a follow-up letter to the Planning Department confirming that they were present on the site to monitor all grading and subsurface excavations and the results of the monitoring. If the property owner fails to comply with the full extent of on-site monitoring requirements, the property owner shall be subject to the Archaeological Monitoring Non-compliance Guidelines which includes supplemental archaeological investigation and monetary administrative civil penalties which could delay final inspections and occupancy.
54. **[For multifamily projects]:** Prior to final inspection of a Building Permit, all rental units in the project shall be enrolled in the City of Santa Cruz Residential Rental Inspection Program. The units are exempt from inspections and annual registration fees for the first five years of occupancy (based on the date of building permit's final inspection) and will be activated automatically after five years. If the project consists

of ownership units, each individual property owner is responsible for enrolling in the Rental Inspection Program prior to renting their unit(s).

55. **[For projects with contamination where remediation is required by oversight agency]:** All final inspections required by **[insert oversight agency]** shall be completed prior to final or temporary Certificate of Occupancy.

### **Operational Conditions**

56. If, upon exercise of this permit, this use is at any time determined by the Planning Commission to be incompatible with the surrounding neighborhood, revocation of, or amendment to, this permit by the Planning Commission could occur.
57. A review of this permit shall be conducted in **[insert timeframe]** to ensure conformity with conditions of approval.
58. Future uses shall submit a disclosure statement for Zoning Administrator review prior to issuance of any occupancy permit regarding materials and chemicals to be used and disposed of from the site.
59. All new signage shall be reviewed by the planning department prior to installation to determine if a Sign Permit is required. **[For mixed-use and commercial and industrial projects]:** Approval of a Master Sign Permit is required prior to the installation any signage on the site.
60. Prior to commercial/business use of a building or site, owners or tenants shall obtain a Zoning Clearance/Occupancy Permit from the City Planning Department and a Business License from the City Finance Department.
61. **[For multifamily rental projects with common laundry rooms]:** Building owners shall ensure that the microplastic filters on washing machines in common laundry rooms are regularly cleaned in accordance with the manufacturer's specifications for the selected filter. Filtered microplastics shall not be disposed of in drains. Rather, they shall be disposed of in the solid waste trash containers, unless municipal facilities become equipped for and readily able to recycle said microplastic materials in the future, in which case the captured plastic shall be recycled through the municipal system.
62. **[For multifamily rental projects with in-unit laundry machines]:** Building owners shall be responsible for alerting tenants as part of the lease or rental agreement, with affirmative recognition by tenants through required initialing on the lease or agreement, that the microplastic filters require regular cleaning per the manufacturer's specifications, which must be provided by the property owner, and that the filter contents shall not be disposed of in drains but rather in trash cans (or in recycling, should municipal facilities become equipped for and readily available to recycle such materials in the future). Building owners/managers shall also provide

and keep record of written reminders to tenants of the filter cleaning need and waste disposal direction no less than once every other month.

63. Applicant's/Property Owner's Duty to Defend, Indemnify, and Hold Harmless.
- a. Applicant and Property Owner agree to defend, indemnify, and hold harmless the City, its officials, officers, employees, attorneys, and agents (the "City Parties") from and against all liabilities, losses, liens, damages, judgments, costs, and expenses, including, without limitation, reasonable attorney's fees ("Losses"), arising in any way related to this Project.
  - b. Applicant and Property Owner agree to defend, indemnify, and hold harmless City, its officials, officers, employees, attorneys, and agents ("City Parties") from and against any and all claims, demands, actions, and proceedings (collectively, "Actions") brought against the City, its officials, officers, employees, attorneys, or agents to attack, set aside, void, or otherwise modify the decision on the Project, permit decision, or environmental review related to the Project; or Actions alleging failure to comply with the requirements of any federal, state, or local laws, including, but not limited to, CEQA, general plan, or zoning requirements related to the Project. The defense and indemnification obligation includes reimbursing the City for any and all costs incurred in connection with such Actions, including but not limited to, costs of suit, expenses, payment of attorney's fees, City staff costs, court costs, damages, liabilities, judgments, and settlement costs.
  - c. Applicant and Property Owner shall also defend, indemnify and hold harmless City Parties for all costs incurred in additional investigation of or study of, or for supplementing, redrafting, revising, or amending any document (such as an EIR, negative declaration, specific plan, general plan amendment, or ordinance) if made necessary by said Actions and if the Applicant or Property Owner seeks to pursue securing such approvals and/or clearances, after initiation of the Actions, which are conditioned on the approval of these documents.
  - d. City shall notify Applicant and Property Owner of any such Actions and City agrees to cooperate in the defense of the Actions. Upon receipt of such notification, Applicant and/or Property Owner shall assume the defense of the Actions, including the employment of counsel reasonably satisfactory to the City. In the event of a conflict of interest, City may employ separate counsel to represent the City; and Applicant and/or Property Owner agrees to pay for the reasonable attorneys' fees and costs of the City's separate counsel.
  - e. Applicant and Property Owner agree that City may, at its sole discretion, participate in the defense of such Actions; but such participation shall not relieve Applicant or Property Owner of any of the obligations herein to defend, hold harmless, and indemnify the City Parties. If the City Attorney's Office

participates in the defense, all of the City Attorney's Office fees and costs, and City staff costs, shall be paid by the Applicant and/or Property Owner.

- f. In the event that Applicant and/or Property Owner is required to defend City in connection with any Actions, City shall retain the right to reasonably approve: the counsel to so defend City; all significant decisions concerning the manner in which the defense is conducted; and any and all settlements, which approval shall not be unreasonably withheld but which is contingent on the approval of the City council.
- g. Applicant and Property Owner agree to reimburse and indemnify the City for all of City's costs, fees, including attorney's fees and costs, staff costs, and damages incurred in enforcing these provisions to defend, hold harmless, and indemnify the City Parties.
- h. Applicant's and Property Owner's duty to indemnify and hold harmless shall not apply to the extent such Actions or Losses are caused by the gross negligence or willful misconduct of the City Parties. Applicant's and Property Owner's obligation to defend shall arise regardless of any claim or assertion that City Parties caused or contributed to the Losses.
- i. The obligations of Applicant and Property to defend, indemnify, and hold harmless the City Parties, are joint and several.
- j. [The obligations in this section shall survive the expiration or termination of this \_\_\_\_\_ (e.g. Conditions of Approval; Agreement etc)].



U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
WASHINGTON, DC 20410-1000

This Worksheet was designed to be used by those “Partners” (including Public Housing Authorities, consultants, contractors, and nonprofits) who assist Responsible Entities and HUD in preparing environmental reviews, but legally cannot take full responsibilities for these reviews themselves. Responsible Entities and HUD should use the RE/HUD version of the Worksheet.

## Endangered Species Act (CEST and EA) – PARTNER

<https://www.hudexchange.info/environmental-review/endangered-species>

### 1. Does the project involve any activities that have the potential to affect species or habitats?

No, the project will have No Effect due to the nature of the activities involved in the project.

→ If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination.

No, the project will have No Effect based on a letter of understanding, memorandum of agreement, programmatic agreement, or checklist provided by local HUD office.

**Explain your determination:**

[Click here to enter text.](#)

→ If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination.

Yes, the activities involved in the project have the potential to affect species and/or habitats. → Continue to Question 2.

### 2. Are federally listed species or designated critical habitats present in the action area?

Obtain a list of protected species from the Services. This information is available on the [FWS Website](#).

No, the project will have No Effect due to the absence of federally listed species and designated critical habitat.

→ If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination. Documentation may include letters from the Services, species lists from the Services’ websites, surveys or other documents and analysis showing that there are no species in the action area.

Yes, there are federally listed species or designated critical habitats present in the action area. → Continue to Question 3.

**3. Recommend one of the following effects that the project will have on federally listed species or designated critical habitat:**

No Effect: Based on the specifics of both the project and any federally listed species in the action area, you have determined that the project will have absolutely no effect on listed species or critical habitat.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination. Documentation should include a species list and explanation of your conclusion, and may require maps, photographs, and surveys as appropriate.*

May Affect, Not Likely to Adversely Affect: Any effects that the project may have on federally listed species or critical habitats would be beneficial, discountable, or insignificant.

→ Partner entities should not contact the Services directly. *If the RE/HUD agrees with this recommendation, they will have to complete Informal Consultation. Provide the RE/HUD with a biological evaluation or equivalent document. They may request additional information, including surveys and professional analysis, to complete their consultation.*

Likely to Adversely Affect: The project may have negative effects on one or more listed species or critical habitat.

→ Partner entities should not contact the Services directly. *If the RE/HUD agrees with this recommendation, they will have to complete Formal Consultation. Provide the RE/HUD with a biological evaluation or equivalent document. They may request additional information, including surveys and professional analysis, to complete their consultation.*

**Worksheet Summary**

Provide a full description of your determination and a synopsis of the information that it was based on, such as:

- Map panel numbers and dates
- Names of all consulted parties and relevant consultation dates
- Names of plans or reports and relevant page numbers
- Any additional requirements specific to your program or region

**Include all documentation supporting your findings in your submission to HUD.**

The project is a small infrastructure project replacing underground storm drains located under Front Street, a fully paved roadway with no habitat of any type.

***- The project will not affect Federally listed or proposed threatened and endangered species, nor designated or proposed critical habitat.***

- The project is a demolition and reconstruction project in an urban area on a site that is mostly built out with structures and hardscape. The project will remove mature trees/vegetation around the site.

Conditions 31 and 32 of the City of Santa Cruz standard conditions of approval require nesting bird surveys for projects that propose tree removal during the nesting period.

- The USFW IPac tool identified no critical habitat on or near the site. - A search of the iPac website created a list of 21 species; however, the site does not provide suitable habitats for any species on the list.

In addition, the City of Santa Cruz will apply standard conditions to this project as applicable, such as the City of Santa Cruz Bird-Safe Design Standards.

Any tree removal that coincides with the nesting season must comply with the Migratory Bird Act.

# Northwestern Pond Turtle (*Actinemys marmorata*)



Photo Credit: Keith Kohl

## Range and Distribution

The range of the northwestern pond turtle is primarily west of the Sierra Nevada and Cascade Mountains, stretching from Puget Sound, Washington to Baja California, at elevations ranging from sea level to about 5,000 ft. There are small populations that persist in watersheds east of the Sierra Nevada and Cascade Mountains.

In Oregon, they primarily are found west of the Cascades at elevations lower than 6,000 feet. The largest populations are located in the drainages of the Willamette, Umpqua, Rogue, and Klamath Rivers, but smaller populations are scattered throughout lowland aquatic habitats of western Oregon and the east Cascades.

## Habitat Characteristics

Northwestern pond turtles are closely associated with aquatic habitat with muddy bottoms and available basking sites. They are most common in still or slow-moving water, particularly around dense vegetation, which provides a high density of invertebrate prey. Submergent and emergent aquatic vegetation are important habitat components that provide safe nursery habitat for young turtles with plenty of food and cover. Underwater refugia such as submerged logs and cut banks provide protection from underwater predators.

Overwintering sites are along stream banks, and nesting sites are typically within 200 yards of water in areas with little vegetation and plenty of sunlight. Nesting sites are in sparse vegetation with sandy, silt, or gravel soils, and good solar exposure.

**OREGON  
CONSERVATION**

Oregon Department of Fish and Wildlife

## Species Description

The northwestern pond turtle is a mid-sized, semi-aquatic freshwater turtle and is one of Oregon's two native turtle species. They have a smooth, broad carapace (upper shell) that is drab brown to olive in color and low in profile. The plastron (lower shell) is typically light yellow in color, sometimes with a variable number of darker blotches. Their head and limbs are variable in color, typically gray to black with yellow speckling. Males have a lighter colored chin and throat than females, and a longer, thicker tail than females. Adults may grow up to ten inches in length. They are usually seen basking on rocks or floating logs or vegetation in slow-moving bodies of water.

Similar species in Oregon are the western painted turtle and the red-eared slider (a non-native species). All three species can sometimes be found in the same bodies of water, or even on the same log. From a distance, all three species can look similar. Red-eared sliders and western painted turtles are more vibrantly marked than northwestern pond turtles. It may be difficult to distinguish between native northwestern pond turtles and older red-eared sliders whose red markings have faded. A key characteristic to focus on is the shape of marginal scutes (plates that make up the shell); red-eared sliders have serrated marginal scutes above their tail, while northwestern pond turtles' are smooth.



## Diet and Foraging

Northwestern pond turtles are omnivores and dietary generalists, with a variable diet that consists mainly of aquatic invertebrates and larvae, as well as some plants, small fish, frogs, and carrion. They are opportunistic feeders, and forage exclusively in water. They have sharp ridges on their jaws that help them tear their food.

## Life History and Ecology

Northwestern pond turtles are a long-lived species that mature slowly. Individuals have been recorded living over 40 years. They have a low reproductive rate and delayed sexual maturity. Male northwestern pond turtles typically reach reproductive maturity at five to nine years, while females reach reproductive maturity after seven to ten years.

In Oregon, the nesting season occurs from May through mid-July. Breeding takes place underwater and occurs from late spring to mid-summer. When female turtles are ready to lay their eggs, they fill their bladder with water and emerge from the water to find a suitable nesting spot. Suitable sites are found near their aquatic habitat in areas with sparse vegetation and good solar exposure. Once they select a site, they empty their bladder on the soil and dig with their back legs to create a shallow nesting cavity where they will deposit their eggs. Clutches have been recorded with one to thirteen eggs, with an average of six eggs per clutch. Multiple clutches can be laid in a season. After depositing their eggs, they use the moist soil to create a nest plug which they use to seal their eggs into the chamber for incubation. Eggs receive no parental care, and nests are vulnerable to predation. After the eggs hatch in fall, the young may overwinter in the safety of the nests.

Northwestern pond turtles bask on floating logs, vegetation, or on muddy stream banks to maintain body temperature. Like most reptiles, they rely on the environment to maintain their body temperature (they are ectothermic, or “cold-blooded”). During the winter when it is cool and their metabolism slows down, they become semi-dormant and will overwinter in moist terrestrial and aquatic habitats. They bury themselves in mud, under stream banks, or in leaf litter. In warm weather, they will come out to bask or move to different locations.

They are primarily aquatic, but may move overland when ephemeral waterbodies dry up, to find nesting habitat, and to seek out sites for overwintering. They are not territorial, and often are found sharing basking surfaces with turtles from the same species as well as other species. Home range size for individuals is highly variable, and depends on the size of the aquatic system. They are capable of long distance seasonal movements between aquatic and terrestrial habitats, and long distance dispersal. Overland distance between aquatic and terrestrial habitat can be more than one mile.

Predators of northwestern pond turtles include raccoons, otters, ospreys, coyotes. Hatchlings are eaten by a variety of predators, including corvids, American bullfrogs, weasels, and large fish.

## *Fun Facts*

- If they run out of basking sites on logs or rocks, northwestern pond turtles sometimes conserve warmth by stacking on top of one another.
- Hatchlings are only about the size of a quarter, making them very vulnerable to predators for the first few years of their lives.
- Similar to a fingerprint, turtles have a unique pattern on their plastron that can be used to identify unique individuals.
- At the first sign of danger, basking turtles will dive for cover under water. When threatened, pond turtles can retract their head and legs into the protection of their hard shell

## Conservation

Northwestern pond turtles are an Oregon Conservation Strategy Species (Species of Greatest Conservation Need), a state Sensitive Species, and a Federal Species of Concern. Factors influencing northwestern pond turtle populations include loss or alteration of habitat, increased predation of nests and hatchlings from historical levels, invasive species, and road mortality. Introduced species, including bullfrogs and smallmouth bass, predate young turtles. Released pet turtles are a threat to native species because they compete for limited resources and can transmit diseases.

During the breeding season, be on the lookout for turtles crossing the road. If you choose to help a turtle cross the road, be sure to bring it in the direction of travel and leave it on the side of the road; females are driven to get to nesting habitat and deposit their eggs, and they know where they want to go! Wash your hands after you handle any turtles. Otherwise, don't disturb turtles when you see them.

Many of Oregon's northwestern pond turtle populations occur on private land. If you have northwestern pond turtles or their habitat in your backyard, you can take simple steps to enhance the habitat to encourage more turtles to make their home there. You can create basking habitat in waterbodies by putting out logs or branches, remove invasive plants around ponds, and create sunny places.

For more information about the conservation status of northwestern pond turtles including special needs, limiting factors, data gaps, and conservation actions, refer to the Oregon Conservation Strategy.

**Legend**

- Final Polygon Features
- Final Linear Features
- Proposed Polygon Features
- Proposed Linear Features

**Search result**

150 Felker St, Santa Cruz, California, 95060

[Add to Map Notes](#)

## Explosive and Flammable Hazards (CEST and EA)

General requirements	Legislation	Regulation
HUD-assisted projects must meet Acceptable Separation Distance (ASD) requirements to protect them from explosive and flammable hazards.	N/A	24 CFR Part 51 Subpart C
<b>Reference</b>		
<a href="https://www.hudexchange.info/environmental-review/explosive-and-flammable-facilities">https://www.hudexchange.info/environmental-review/explosive-and-flammable-facilities</a>		

**1. Does the proposed HUD-assisted project include a hazardous facility (a facility that mainly stores, handles or processes flammable or combustible chemicals such as bulk fuel storage facilities and refineries)?**

No

→ *Continue to Question 2.*

Yes

**Explain:**

→ *Continue to Question 5.*

**2. Does this project include any of the following activities: development, construction, rehabilitation that will increase residential densities, or conversion?**

No

→ *Based on the response, the review is in compliance with this section. Continue to the Worksheet Summary below.*

Yes

→ *Continue to Question 3.*

**3. Within 1 mile of the project site, are there any current *or planned* stationary aboveground storage containers:**

- Of more than 100 gallon capacity, containing common liquid industrial fuels OR
- Of any capacity, containing hazardous liquids or gases that are not common liquid industrial fuels?

No

→ *Based on the response, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide all documents used to make your determination.*

Yes

→ Continue to Question 4.

**4. Is the Separation Distance from the project acceptable based on standards in the Regulation?**

Please visit HUD's website for information on calculating Acceptable Separation Distance.

Yes

→ Based on the response, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide map(s) showing the location of the project site relative to any tanks and your separation distance calculations. If the map identifies more than one tank, please identify the tank you have chosen as the "assessed tank."

No

→ Provide map(s) showing the location of the project site relative to any tanks and your separation distance calculations. If the map identifies more than one tank, please identify the tank you have chosen as the "assessed tank."  
Continue to Question 6.

**5. Is the hazardous facility located at an acceptable separation distance from residences and any other facility or area where people may congregate or be present?**

Please visit HUD's website for information on calculating Acceptable Separation Distance.

Yes

→ Based on the response, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide map(s) showing the location of the project site relative to residences and any other facility or area where people congregate or are present and your separation distance calculations.

No

→ Provide map(s) showing the location of the project site relative to residences and any other facility or area where people congregate or are present and your separation distance calculations.  
Continue to Question 6.

**6. For the project to be brought into compliance with this section, all adverse impacts must be mitigated. Explain in detail the exact measures that must be implemented to make the Separation Distance acceptable, including the timeline for implementation. If negative effects cannot be mitigated, cancel the project at this location.**

Note that only licensed professional engineers should design and implement blast barriers. If a barrier will be used or the project will be modified to compensate for an unacceptable separation distance, provide approval from a licensed professional engineer.

**Worksheet Summary**

**Compliance Determination**

Provide a clear description of your determination and a synopsis of the information that it was based on, such as:

- Map panel numbers and dates
- Names of all consulted parties and relevant consultation dates
- Names of plans or reports and relevant page numbers
- Any additional requirements specific to your region

***The project will not expose people or buildings to above-ground explosive or flammable fuels or chemical container hazards.***

This demolition and construction project includes new housing construction, increasing the area's residential densities.

According to the CalEPA database, five aboveground storage tanks that store flammable or combustible materials are located within one mile of the site. The nearest AST is located .33 miles, or 1,765 feet from the project site; however, all the ASTs are separated from the site by the adjacent freeway, which is constructed approximately 15 feet above the grade of the site. In addition, even in the most extreme case of an AST storing 59,999 gallons of explosive/flammable materials, the acceptable separation distance per HUD ASD tool would be 1,523 feet, approximately 200 feet nearer to the site than the closest occurrence. The project complies with this factor.

**Are formal compliance steps or mitigation required?**

- Yes  
 No

<b>El_ID</b>	<b>SiteName</b>	<b>Address</b>
10001749	Caltrans-Santa Cruz	195 CAPITOLA ROAD EXT
10132006	Jiffy Lube Store #02334	1705 SOQUEL AVENUE
10192570	NORTH BAY FORD	1999 SOQUEL AVE
10193854	SANTA CRUZ METRO TRANSIT DIST	1200 RIVER ST B
10192222	EMELINE COMPLEX - GSD	1110 EMELINE ST
10192228	LAS ANIMAS CONCRETE INC	146 ENCINAL ST
10193227	PAMF Santa Cruz Main Clinic	2025 SOQUEL AVE
10154073	BAYSIDE OIL II INC	210 ENCINAL ST
10192279	S C METRO TRANSIT DIST - 138 GOLF	138 GOLF CLUB DR





150 Felker St, Santa Cruz, CA, 95060, USA

Show search results for 150 Felker St, ...



Search result

150 Felker St, Santa Cruz, CA, 95060, USA

[Zoom to](#)

Legend

California Important Farmland: Most Recent

Most Recent

Polygon Type

- Prime Farmland
- Farmland of Statewide Importance
- Unique Farmland
- Grazing Land
- Farmland of Local Importance
- Farmland of Local Potential
- Other Land
- Confined Animal Agriculture
- Nonagricultural or Natural Vegetation
- Vacant or Disturbed Land
- Rural Residential Land
- Semi-agricultural and Rural Commercial Land
- Urban and Built-Up Land
- Water Area
- Irrigated Farmland
- Nonirrigated Farmland

600ft

-122.022 36.990 Degrees

Watsonville loam, thick surface, 15 to 30 percent slope s (180)

### ▲ Map Unit Composition

85% - **Watsonville**

Geomorphic Position: *marine terraces / Toeslope*

4% - **Tierra**

Horizon data n/a

3% - **Watsonville**

Geomorphic Position: *marine terraces / Toeslope*

Horizon data n/a | [View Similar Data](#)

2% - **Bonnydoon**

Horizon data n/a

1% - **Fagan**

Horizon data n/a

1% - **Los Osos**

Horizon data n/a | [View Similar Data](#)

1% - **Elkhorn**

Horizon data n/a | [View Similar Data](#)

### ▲ Map Unit Data

Map Unit Key: 455956 | [\[Graphical Summary\]](#)

National Map Unit Symbol: h9g8

Order of Mapping: [?](#)

Map Unit Type: *Consociation* [?](#)

Farmland Class: *Not prime farmland*

Available Water Storage (0-100cm): 9 cm

Flood Frequency (Dominant Condition): *None*

Flood Frequency (Maximum): *None*

Ponding Frequency: 0

Drainage Class (Dominant Condition): *Somewhat poorly drained* [?](#)

Drainage Class (Wettest Component): *Somewhat poorly drained* [?](#)

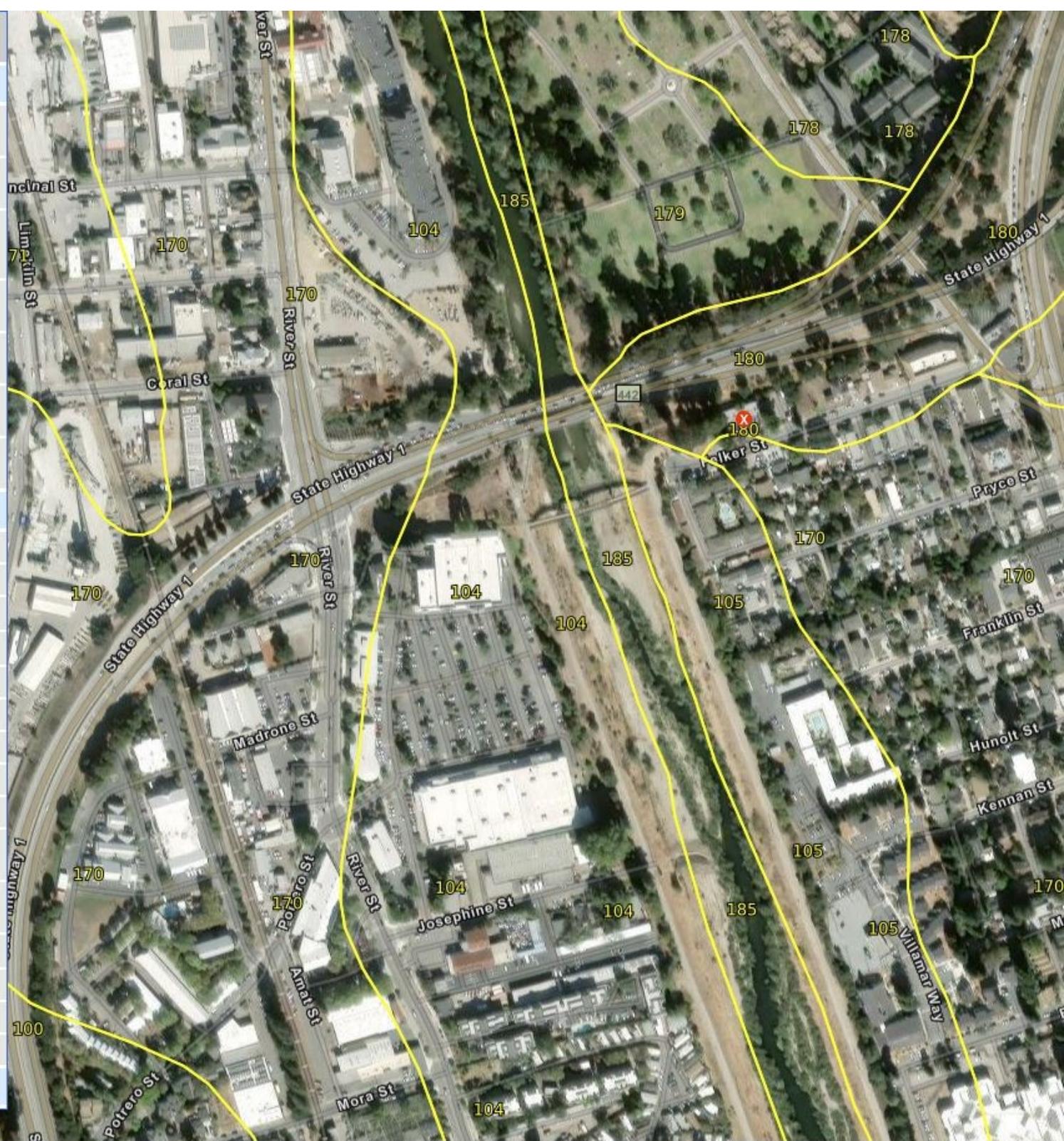
Proportion of Hydric Soils: 88% [?](#)

Min. Water Table Depth (Annual): *n/a*

Min. Water Table Depth (April-June): *n/a*

Min. Bedrock Depth: *n/a*

### ▼ Survey Metadata





U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
WASHINGTON, DC 20410-1000

This Worksheet was designed to be used by those “Partners” (including Public Housing Authorities, consultants, contractors, and nonprofits) who assist Responsible Entities and HUD in preparing environmental reviews, but legally cannot take full responsibilities for these reviews themselves. Responsible Entities and HUD should use the RE/HUD version of the Worksheet.

## Farmlands Protection (CEST and EA) - PARTNER

<https://www.hudexchange.info/environmental-review/farmlands-protection>

**1. Does your project include any activities, including new construction, acquisition of undeveloped land or conversion, that could convert agricultural land to a non-agricultural use?**

Yes → *Continue to Question 2.*

No

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

**2. Does “important farmland,” including prime farmland, unique farmland, or farmland of statewide or local importance regulated under the Farmland Protection Policy Act, occur on the project site?**

You may use the links below to determine important farmland occurs on the project site:

- Utilize USDA Natural Resources Conservation Service’s (NRCS) Web Soil Survey <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>
- Check with your city or county’s planning department and ask them to document if the project is on land regulated by the FPPA (zoning important farmland as non-agricultural does not exempt it from FPPA requirements)
- Contact NRCS at the local USDA service center <http://offices.sc.egov.usda.gov/locator/app?agency=nrcs> or your NRCS state soil scientist [http://soils.usda.gov/contact/state\\_offices/](http://soils.usda.gov/contact/state_offices/) for assistance

No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide any documents used to make your determination.*

Yes → *Continue to Question 3.*

**3. Consider alternatives to completing the project on important farmland and means of avoiding impacts to important farmland.**

- Complete form [AD-1006, “Farmland Conversion Impact Rating”](#) and contact the state soil scientist before sending it to the local NRCS District Conservationist.
- Work with NRCS to minimize the impact of the project on the protected farmland. When you have finished with your analysis, return a copy of form AD-1006 to the USDA-NRCS State Soil Scientist or his/her designee informing them of your determination.

**Work with the RE/HUD to determine how the project will proceed. Document the conclusion:**

Project will proceed with mitigation.

**Explain in detail the proposed measures that must be implemented to mitigate for the impact or effect, including the timeline for implementation.**

[Click here to enter text.](#)

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide form AD-1006 and all other documents used to make your determination.*

Project will proceed without mitigation.

**Explain why mitigation will not be made here:**

[Click here to enter text.](#)

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide form AD-1006 and all other documents used to make your determination.*

### **Worksheet Summary**

Provide a full description of your determination and a synopsis of the information that it was based on, such as:

- Map panel numbers and dates
- Names of all consulted parties and relevant consultation dates
- Names of plans or reports and relevant page numbers
- Any additional requirements specific to your program or region

**Include all documentation supporting your findings in your submission to HUD.**

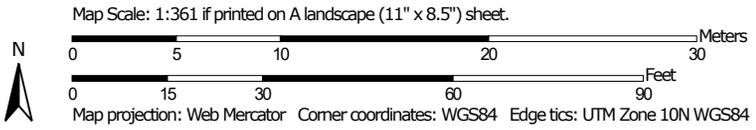
*The project site does not contain Prime or Unique Farmland or other Farmland of Statewide or Local Importance as identified by the USDA and NRCS.*

Approximately 90% of the project site is classified as “Not Prime Farmland” and approximately 10% of the site is classified as “Prime Farmland if Irrigated.”

The California Department of Conservation categorizes the project site as “Urban and Built-up Land.”

Additionally, the project is an urban infill project in a developed area of the City and is, therefore, exempt.

Farmland Classification—Santa Cruz County, California



### MAP LEGEND

**Area of Interest (AOI)**

 Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

-  Prime farmland if subsoiled, completely removing the root inhibiting soil layer
-  Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
-  Prime farmland if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance
-  Farmland of statewide importance, if drained
-  Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if irrigated

-  Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if irrigated and drained
-  Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
-  Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

-  Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if warm enough
-  Farmland of statewide importance, if thawed
-  Farmland of local importance
-  Farmland of local importance, if irrigated

-  Farmland of unique importance
-  Not rated or not available

**Soil Rating Lines**

-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Farmland Classification—Santa Cruz County, California

	Prime farmland if subsoiled, completely removing the root inhibiting soil layer		Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium		Farmland of unique importance		Prime farmland if subsoiled, completely removing the root inhibiting soil layer
	Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60		Farmland of statewide importance, if irrigated and drained		Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season		Not rated or not available		Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
	Prime farmland if irrigated and reclaimed of excess salts and sodium		Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season		<b>Soil Rating Points</b>		Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
	Farmland of statewide importance		Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if warm enough		Prime farmland if drained		Prime farmland if irrigated and reclaimed of excess salts and sodium
	Farmland of statewide importance, if drained		Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer		Farmland of statewide importance, if thawed		Prime farmland if protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance
	Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60		Farmland of local importance		Prime farmland if irrigated		Farmland of statewide importance, if drained
	Farmland of statewide importance, if irrigated				Farmland of local importance, if irrigated		Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
							Prime farmland if irrigated and drained		Farmland of statewide importance, if irrigated
							Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season		

Farmland Classification—Santa Cruz County, California

<ul style="list-style-type: none"> <li> Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season</li> <li> Farmland of statewide importance, if irrigated and drained</li> <li> Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season</li> <li> Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer</li> <li> Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60</li> </ul>	<ul style="list-style-type: none"> <li> Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium</li> <li> Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season</li> <li> Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season</li> <li> Farmland of statewide importance, if warm enough</li> <li> Farmland of statewide importance, if thawed</li> <li> Farmland of local importance</li> <li> Farmland of local importance, if irrigated</li> </ul>	<ul style="list-style-type: none"> <li> Farmland of unique importance</li> <li> Not rated or not available</li> </ul> <p><b>Water Features</b></p> <ul style="list-style-type: none"> <li> Streams and Canals</li> </ul> <p><b>Transportation</b></p> <ul style="list-style-type: none"> <li> Rails</li> <li> Interstate Highways</li> <li> US Routes</li> <li> Major Roads</li> <li> Local Roads</li> </ul> <p><b>Background</b></p> <ul style="list-style-type: none"> <li> Aerial Photography</li> </ul>	<p>The soil surveys that comprise your AOI were mapped at 1:24,000.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Warning: Soil Map may not be valid at this scale.</p> <p>Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.</p> </div> <p>Please rely on the bar scale on each map sheet for map measurements.</p> <p>Source of Map: Natural Resources Conservation Service          Web Soil Survey URL:          Coordinate System: Web Mercator (EPSG:3857)</p> <p>Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.</p> <p>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</p> <p>Soil Survey Area: Santa Cruz County, California          Survey Area Data: Version 18, Sep 8, 2024</p> <p>Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.</p> <p>Date(s) aerial images were photographed: Mar 11, 2022—May 29, 2022</p> <p>The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</p>
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## Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
170	Soquel loam, 0 to 2 percent slopes	Prime farmland if irrigated	0.0	10.1%
180	Watsonville loam, thick surface, 15 to 30 percent slopes	Not prime farmland	0.3	89.9%
<b>Totals for Area of Interest</b>			<b>0.3</b>	<b>100.0%</b>

### Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

### Rating Options

*Aggregation Method:* No Aggregation Necessary

*Tie-break Rule:* Lower

CULTURAL RESOURCE EVALUATION OF  
THE PROJECT AT 150 FELKER STREET  
IN THE CITY OF SANTA CRUZ

FOR

ATTN: MS. MISON COOPER  
ABC CONSTRUCTION, LLC  
4100 MOORPARK AVENUE, SUITE 205  
SAN JOSE, CA 95117  
NWIC# 21-0698

BY

*Archaeological Resource Management*

*Dr. Robert Cartier, Principal Investigator*

*496 North Fifth Street*

*San Jose, CA 95112*

*Phone: (408) 295-1373*

*FAX: (408) 286-2040*

*Email: armcartier@netscape.net*

NOVEMBER 23, 2021

## ADMONITION

Certain information contained in this report is not intended for general public distribution. Portions of this report locate significant archaeological sites in the region of the project area, and indiscriminate distribution of these data could result in the desecration and destruction of invaluable cultural resources. In order to ensure the security of the critical data in this report, certain maps and passages may be deleted in copies not delivered directly into the hands of environmental personnel and qualified archaeologists.

THE PRINCIPAL INVESTIGATOR

## **ABSTRACT**

This cultural resource evaluation was conducted for the proposed project at 150 Felker Street in the City of Santa Cruz. Research included an archival search in the State records and a surface survey of the proposed project area. The archival research revealed that there are no previously recorded archaeological resources within the proposed project area. In addition, no previously recorded archaeological resources are located within a one-quarter mile radius of the proposed project area. No significant cultural materials, prehistoric or historic, were noted during surface reconnaissance. Therefore, it is concluded that the proposed project will have no impact on cultural resources. In the event, however, that prehistoric traces (human remains, artifacts, concentrations of shell/bone/rock/ash) are encountered, all construction within a fifty meter radius of the find should be stopped, the Planning Department notified, and an archaeologist retained to examine the find and make appropriate recommendations.

## **REQUEST FOR CULTURAL RESOURCE EVALUATION**

This cultural resource evaluation was carried out to determine the presence or absence of any significant cultural resources. Cultural resource services were requested in October of 2021 in order to provide an evaluation that would investigate the possible presence of cultural materials within the proposed project area. This study meets the requirements of CEQA (California Environmental Quality Act).

## **QUALIFICATIONS OF ARCHAEOLOGICAL RESOURCE MANAGEMENT**

Archaeological Resource Management has been specifically engaged in cultural resource management projects in central California since 1977. The firm is owned and supervised by Dr. Robert Cartier, the Principal Investigator. Dr. Cartier is certified by the Register of Professional Archaeologists (RPA) for conducting cultural resource investigations as well as other specialized work in archaeology and history. He also fulfills the standards set forth by the Secretary of the Interior for inclusion as a historian and architectural historian and is certified as such on the State of California referral lists.

## **LOCATION AND DESCRIPTION OF THE SUBJECT AREA**

The subject area consists of the property at 150 Felker Street in the City of Santa Cruz. On the USGS 7.5 minute quadrangle of Santa Cruz, the Universal Transverse Mercator Grid (UTMG) center point of the proposed project area is 10S 5 86 671mE/40 93 652mN. The elevation is approximately 60 feet MSL. The nearest source of fresh water is the San Lorenzo River, which runs approximately 150 feet west of the proposed project area.

The proposed project consists of the demolition of the existing commercial structure and construction of a four story, 32 unit apartment building on the property. This project will involve the necessary grading, excavation, and other earth moving activities.

## **METHODOLOGY**

This investigation consisted of an archival search, a surface reconnaissance, and a written report of the findings with appropriate recommendations. The archival research is conducted by transferring the study location to a state archaeological office which maintains all records of archaeological investigations. This is done in order to learn if any archaeological sites or surveys have been recorded within a half mile of the subject area. Each archival search with the state is given a file number for verification. The purpose of the surface reconnaissance is to determine whether there are traces of prehistoric or historic materials within the study area. The survey is conducted by an archaeologist, who examines exposed soils for early ceramics, Native American cooking debris, and artifacts made of stone, bone, and shell. Older structures, distinctive architecture, and subsurface historic trash deposits of potentially significant antiquity are also taken into consideration. A report is written containing the archival information, record search number, survey findings, and appropriate recommendations. A copy of this evaluation is sent to the state archaeological office in compliance with state procedure.

A cultural resource is considered "significant" if it qualifies as eligible for listing in the California Register of Historic Resources (CRHR). Properties that are eligible for listing in the CRHR must meet one or more of the following criteria:

1. Association with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the United States;
2. Association with the lives of persons important to local, California, or national history;
3. Embodying the distinctive characteristics of a type, period, region, or method of construction, or representing the work of a master, or possessing high artistic values; or
4. Has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

Most Native American prehistoric sites are eligible due to their age, scientific potential, and/or burial remains.

The CRHR interprets the integrity of a cultural resource as its physical authenticity. An historic cultural resource must retain its historic character or appearance and thus be recognizable as an historic resource. Integrity is evaluated by examining the subject's location, design, setting, materials, workmanship, feeling, and association. If the subject has retained these qualities, it may be said to have integrity. It is possible that a cultural resource may not retain sufficient integrity to be listed in the National Register of Historic Places yet still be eligible for listing in the CRHR. If a cultural resource retains the potential to convey significant historical/scientific data, it may be said to retain sufficient integrity for potential listing in the CRHR.

## **ARCHIVAL BACKGROUND**

Prior to surface reconnaissance of the project area, a study of the maps and records at the Northwest Information Center of the California Archaeological Site Inventory was conducted and given the file number NWIC #21-698. This research into the records at the Information Center, along with in-house material at Archaeological Resource Management, was done to determine if any known archaeological resources were reported in or around the subject area. Archival research revealed that there are no previously recorded archaeological resources within the proposed project area. In addition, no previously recorded archaeological resources are located within a one-quarter mile radius of the proposed project area.

One previously recorded historic resource is located within a one-quarter mile radius of the proposed project area: P-44-401. This historic resource, recorded by J. Berg and S. Mikesell in 1999 is a recordation of the route of Highway 9 within Santa Cruz County.

One previous study has been carried out which included the current proposed project area within its scope, S-17775. Carried out by D. G. Brittin and A. Hope in 1993, this study is entitled "Historic Property Survey Report for the Proposed Improvements to the Route 1 & 17 Interchange in the City and County of Santa Cruz, 4-SCR-1/17, Post Miles: Hwy. 1 - 15.8/17.6; Hwy. 17 - 0.0/0.7, 4283-129080." The entirety of the current subject area was included within the scope of this large study.

## **SURFACE RECONNAISSANCE**

A "general surface reconnaissance" was conducted by a qualified archaeologist on all visible open land surfaces in the project area. A "controlled intuitive reconnaissance" was performed in places where burrowing animals, exposed banks and inclines, and other activities had revealed subsurface stratigraphy and soil contents. The boundaries of the subject area were well established in the field by project maps and fence lines. Accessibility to the property was good; all areas were available for a walking survey. Soil visibility was fair; although the majority of the surface area was obscured by the existing structure and hardtop surfaces, small exposures were present in landscaping areas. Where native soils were exposed, a tan to light brown sandy loam was observed. Rock types noted included small amounts of imported gravel as well as native metamorphic gravel. No traces of significant cultural material, prehistoric or historic, were noted during surface reconnaissance.

## **CONCLUSION AND RECOMMENDATIONS**

The archival research revealed that there are no previously recorded archaeological resources within the proposed project area. In addition, no previously recorded archaeological resources are located within a one-quarter mile radius of the proposed project area. No significant cultural materials, prehistoric or historic, were noted during surface reconnaissance. Therefore, it is concluded that the proposed project will have no impact on cultural resources. In the event, however, that prehistoric traces (human remains, artifacts, concentrations of shell/bone/rock/ash) are encountered, all construction

within a fifty meter radius of the find should be stopped, the Planning Department notified, and an archaeologist retained to examine the find and make appropriate recommendations.

## **LITERATURE CITED AND CONSULTED**

Berg, J. and S. Mikesell

1999 Site record for P-44-401. On file at the Northwest Information Center, Department of Anthropology, Sonoma State University, Rohnert Park.

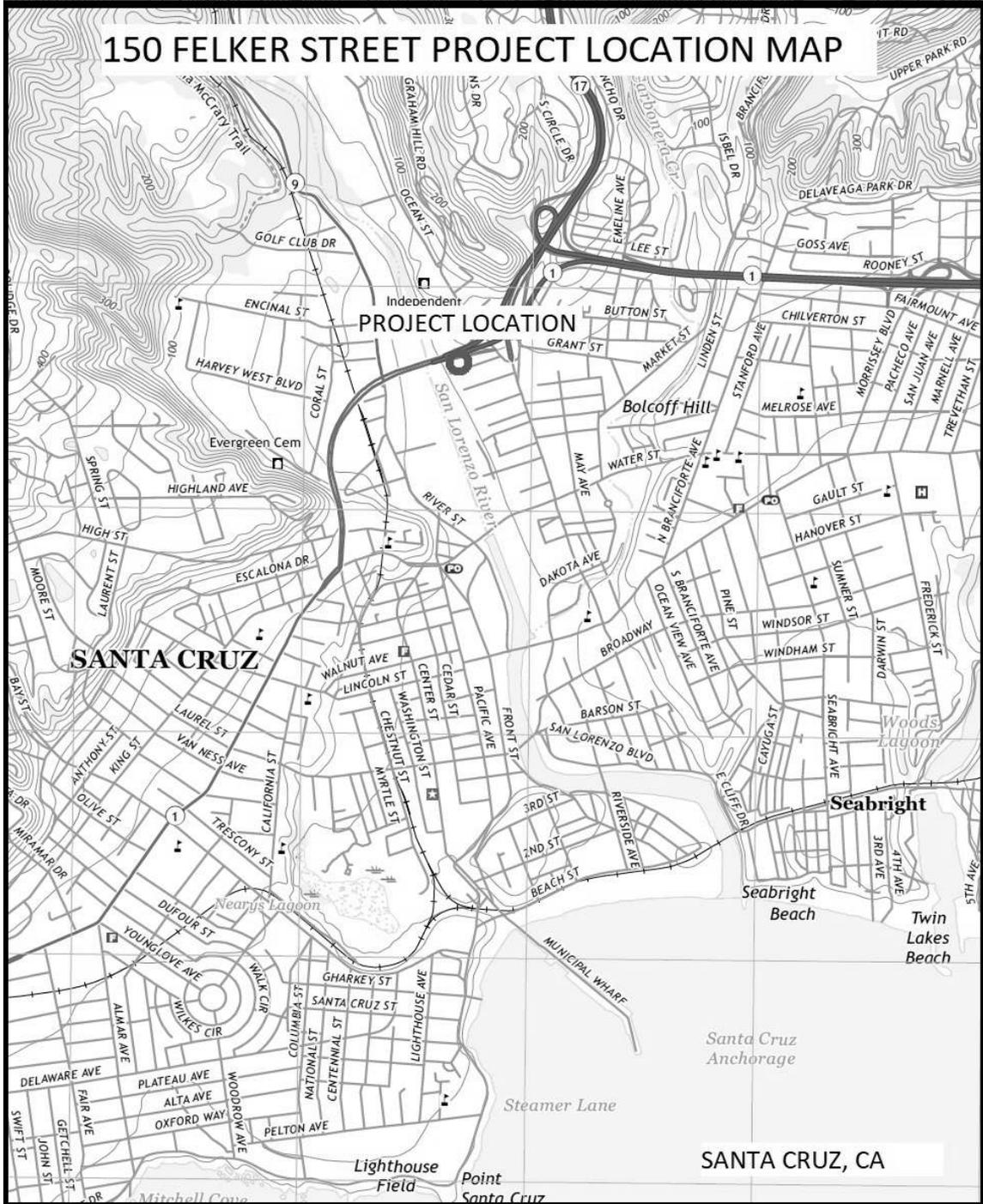
Brittin, D. G. and A. Hope

1993 Historic Property Survey Report for the Proposed Improvements to the Route 1 & 17 Interchange in the City and County of Santa Cruz, 4-SCR-1/17, Post Miles: Hwy. 1 - 15.8/17.6; Hwy. 17 - 0.0/0.7, 4283-129080. On file at the Northwest Information Center, Department of Anthropology, Sonoma State University, Rohnert Park.

California Historical Resources Information System

2021 Archival search number NWIC #21-698 on file at the Northwest Information Center, Department of Anthropology, Sonoma State University, Rohnert Park.

# 150 FELKER STREET PROJECT LOCATION MAP



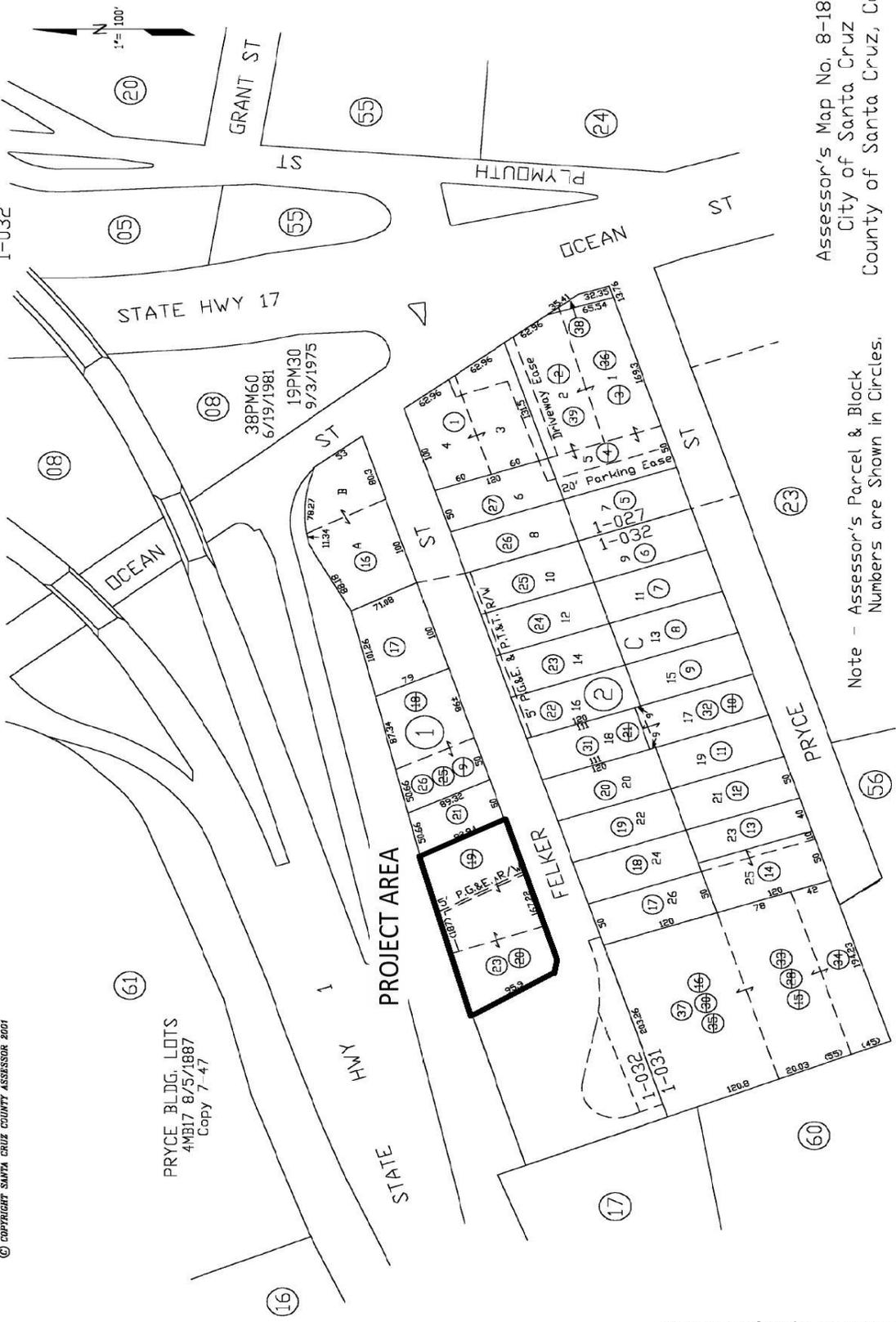
# 150 FELKER STREET PROJECT AREA MAP

FOR TAX PURPOSES ONLY  
 THE ASSESSOR MAKES NO GUARANTEE AS TO MAP ACCURACY NOR ASSUMES ANY LIABILITY FOR OTHER USES. NOT TO BE REPRODUCED. ALL RIGHTS RESERVED.  
 © COPYRIGHT SANTA CRUZ COUNTY ASSESSOR 2001

CITY OF SANTA CRUZ

Tax Area Code  
 1-027 1-031  
 1-032

8-18



Assessor's Map No. 8-18  
 City of Santa Cruz  
 County of Santa Cruz, Calif.

Note - Assessor's Parcel & Block Numbers are Shown in Circles.

Electronically repositioned 8/9/01 KSA  
 Rev. Santa Cruz City Realignment 8/9/01 KSA



**U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT**  
WASHINGTON, DC 20410-1000

This Worksheet was designed to be used by those “Partners” (including Public Housing Authorities, consultants, contractors, and nonprofits) who assist Responsible Entities and HUD in preparing environmental reviews, but legally cannot take full responsibilities for these reviews themselves. Responsible Entities and HUD should use the RE/HUD version of the Worksheet.

## Historic Preservation (CEST and EA) – PARTNER

<https://www.hudexchange.info/environmental-review/historic-preservation>

### Threshold

#### Is Section 106 review required for your project?

- No, because a Programmatic Agreement states that all activities included in this project are exempt. (See the [PA Database](#) to find applicable PAs.)

**Either provide the PA itself or a link to it here. Mark the applicable exemptions or include the text here:**

Click here to enter text.

→ *Continue to the Worksheet Summary.*

- No, because the project consists solely of activities included in a No Potential to Cause Effects memo or other determination [36 CFR 800.3(a)(1)].

**Either provide the memo itself or a link to it here. Explain and justify the other determination here:**

Click here to enter text.

→ *Continue to the Worksheet Summary.*

- Yes, because the project includes activities with potential to cause effects (direct or indirect). → *Continue to Step 1.*

#### **The Section 106 Process**

After determining the need to do a Section 106 review, HUD or the RE will initiate consultation with regulatory and other interested parties, identify and evaluate historic properties, assess effects of the project on properties listed on or eligible for the National Register of Historic Places, and resolve any adverse effects through project design modifications or mitigation.

Step 1: Initiate consultation

Step 2: Identify and evaluate historic properties

Step 3: Assess effects of the project on historic properties

Step 4: Resolve any adverse effects

Only RE or HUD staff may initiate the Section 106 consultation process. Partner entities may gather information, including from SHPO records, identify and evaluate historic properties, and make initial assessments of effects of the project on properties listed in or eligible for the National Register of Historic Place. Partners should then provide their RE or HUD with all of their analysis and documentation so that they may initiate consultation.

## Step 1 - Initiate Consultation

The following parties are entitled to participate in Section 106 reviews: Advisory Council on Historic Preservation; State Historic Preservation Officers (SHPOs); federally recognized Indian tribes/Tribal Historic Preservation Officers (THPOs); Native Hawaiian Organizations (NHOs); local governments; and project grantees. The general public and individuals and organizations with a demonstrated interest in a project may participate as consulting parties at the discretion of the RE or HUD official. Participation varies with the nature and scope of a project. Refer to HUD's website for guidance on consultation, including the required timeframes for response. Consultation should begin early to enable full consideration of preservation options.

Use the [When To Consult With Tribes checklist](#) within [Notice CPD-12-006: Process for Tribal Consultation](#) to determine if the RE or HUD should invite tribes to consult on a particular project. Use the [Tribal Directory Assessment Tool \(TDAT\)](#) to identify tribes that may have an interest in the area where the project is located. Note that only HUD or the RE may initiate consultation with Tribes. Partner entities may prepare a draft letter for the RE or HUD to use to initiate consultation with tribes, but may not send the letter themselves.

**List all organizations and individuals that you believe may have an interest in the project here:**

[Click here to enter text.](#)

→ *Continue to Step 2.*

## Step 2 - Identify and Evaluate Historic Properties

**Provide a preliminary definition of the Area of Potential Effect (APE), either by entering the address(es) or providing a map depicting the APE.** Attach an additional page if necessary.

[Click here to enter text.](#)

Gather information about known historic properties in the APE. Historic buildings, districts and archeological sites may have been identified in local, state, and national surveys and registers, local historic districts, municipal plans, town and county histories, and local history websites. If not already listed on the National Register of Historic Places, identified properties are then evaluated to see if they are eligible for the National Register. Refer to HUD's website for guidance on identifying and evaluating historic properties.

**In the space below, list historic properties identified and evaluated in the APE.**

Every historic property that may be affected by the project should be listed. For each historic property or district, include the National Register status, whether the SHPO has concurred with the finding, and whether information on the site is sensitive. Attach an additional page if necessary.

[Click here to enter text.](#)

*Provide the documentation (survey forms, Register nominations, concurrence(s) and/or objection(s), notes, and photos) that justify your National Register Status determination.*

**Was a survey of historic buildings and/or archeological sites done as part of the project?**

If the APE contains previously unsurveyed buildings or structures over 50 years old, or there is a likely presence of previously unsurveyed archeological sites, a survey may be necessary. For Archeological surveys, refer to HP Fact Sheet #6, [Guidance on Archeological Investigations in HUD Projects](#).

Yes → *Provide survey(s) and report(s) and continue to Step 3.*

Additional notes:

[Click here to enter text.](#)

No → *Continue to Step 3.*

### Step 3 - Assess Effects of the Project on Historic Properties

Only properties that are listed on or eligible for the National Register of Historic Places receive further consideration under Section 106. Assess the effect(s) of the project by applying the Criteria of Adverse Effect. ([36 CFR 800.5](#)) Consider direct and indirect effects as applicable as per HUD guidance.

**Choose one of the findings below to recommend to the RE or HUD.**

**Please note: this is a recommendation only. It is **not** the official finding, which will be made by the RE or HUD, but only your suggestion as a Partner entity.**

No Historic Properties Affected

**Document reason for finding:**

No historic properties present.

Historic properties present, but project will have no effect upon them.

No Adverse Effect

**Document reason for finding and provide any comments below.**

Comments may include recommendations for mitigation, monitoring, a plan for unanticipated discoveries, etc.

[Click here to enter text.](#)

Adverse Effect

**Document reason for finding:**

Copy and paste applicable Criteria into text box with summary and justification.

Criteria of Adverse Effect: [36 CFR 800.5](#)]

[Click here to enter text.](#)

**Provide any comments below:**

Comments may include recommendations for avoidance, minimization, and/or mitigation.

[Click here to enter text.](#)

***Remember to provide all documentation that justifies your National Register Status determination and recommendations along with this worksheet.***

February XX, 2025

Ms. Julianne Polanco  
State Historic Preservation Officer  
Office of Historic Preservation  
1725 23<sup>rd</sup> Street, Suite 100  
Sacramento, CA 95816

RE: 150 Felker Street Apartments  
150 Felker Street, Santa Cruz, CA 95060  
USGS Santa Cruz Quad – T11S R1W Section 12  
APN: 008-181-23

Trigger: Receipt of HUD Funds

Dear Ms. Polanco,

The purpose of this letter is to complete the SHPO consulting requirements pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations found at 36 CFR Part 800 prior to the above-referenced project receiving HUD funds to support the proposed 150 Felker Street Apartments, located at 150 Felker Street, Santa Cruz, CA. This demolition and construction project intends to remove an existing one-story commercial structure and replace it with a larger 44-unit, five-story residential structure. The project will be built on a .41-acre parcel in Santa Cruz, California. The use of federal funds in the project requires that a NEPA environmental review be conducted on the project site, which includes Section 106 consultation with the SHPO.

### **Conclusion**

The City of Santa Cruz has concluded that the proposed project will not cause any significant impact on archaeological or historic resources in the project area and, therefore, has made a finding of “*No Historic Properties Affected*” per CFR 36 Part 800.4 (d)(1) and that no additional studies or mitigations need to be undertaken. HCD requests your concurrence in this Finding.

### **Proposed Project**

The demolition and new construction project in Santa Cruz at 150 Felker Street is near the intersection of Ocean Street and Highway 1 and adjacent to the Santa Cruz Riverwalk.

The project will consist of one five-story, elevator-served building containing 44 one- and two-bedroom units. The building will be of wood frame construction on a concrete podium slab containing a one-story parking garage encompassing 21 parking stalls and 54 bicycle parking spaces. The first floor of the building will have space for the lobby, leasing/management office, and a shop area with a janitor's sink. The second floor will contain a community room with kitchen space, a computer room, staff services offices with private meeting rooms, and a shared laundry room.

All of the units will be LIHTC-restricted to households earning at or below the 30, 40, 50 and 60 percent AMI levels, with the exception of one employee unit. Twenty-two (22) one-bedroom units at 30 and 40 percent AMI will be set aside for homeless veterans and have Veterans Affairs Supportive Housing (VASH) Project Based Vouchers (PBV). Additionally, two other one-bedroom units at 30 percent AMI will have PBVs. All vouchers will be from the Housing Authority of the County of Santa Cruz (HACSC) and assist tenants with rent and utility costs.

Supportive services for the project will be managed through collaboration between the VA and HUD. HUD provides Section 8 Housing Choice Vouchers, and the VA provides case management services. The HUD-VASH case management team of social workers, psychologists, Substance Use Disorder (SUD) Specialists, Peer Support, Housing Specialists, Recreational Therapists, and Occupational Therapists use a housing-first approach to case management delivery. HUD-VASH case managers are independently licensed social workers, as well as social workers working under the supervision of licensed clinicians. Case managers assist Veterans with program entrance and orientation, completing a psychosocial assessment and client-centered goals plan, obtaining housing, stabilization of physical and mental health, as well as providing access to VA and community-based income, employment, legal support, and all other resources necessary to stabilize permanent housing.

### **Area of Potential Effect (APE)**

The project site and APE are shown in the attachments to this letter.

### **California Historical Resources Information System**

Per the November 15, 2024 response from CHRIS, “*Review of this information indicates that there has been one larger cultural resource study that includes the 150 Felker Street Apartments project area (Brittin and Hope 1993: S-17775). This 150 Felker Street Apartments project area contains no recorded archaeological resources. The State Office of Historic Preservation Built Environment Resources Directory (OHP BERD), which includes listings of the California Register of Historical Resources, California State Historical Landmarks, California State Points of Historical Interest, and the National Register of Historic Places, lists no recorded buildings or structures within or adjacent to the proposed 150 Felker Street Apartments project area. In addition to these inventories, the NWIC base maps show no recorded buildings or structures within the proposed 150 Felker Street Apartments project area,*” and “*Based on an evaluation of the environmental setting and features associated with known sites, Native American resources in this part of Santa Cruz County have been found in areas marginal Monterey Bay and inland near intermittent and perennial watercourses ... Given the similarity of these environmental factors, and the ethnographic sensitivity of the area, there is a moderate to high potential for unrecorded Native American resources to be within the proposed 150 Felker Street Apartments project area.*”

### **Cultural Resource Evaluation**

A Cultural Resource Evaluation of the project site was prepared by Archaeological Resource Management (ARM), dated November 23, 2021. ARM prepared the following Abstract as part of the report:

“This cultural resource evaluation was conducted for the proposed project at 150 Felker Street in the City of Santa Cruz. Research included an archival search in the State records and a surface survey of the proposed project area. The archival research revealed that there are no previously recorded archaeological resources within the proposed project area. In addition, no previously recorded archaeological resources are located within a one-quarter mile radius of the proposed project area. *No significant cultural materials, prehistoric or historic, were noted during surface reconnaissance. Therefore, it is concluded that the proposed project will have no impact on cultural resources.* In the event, however, that prehistoric traces (human remains, artifacts, concentrations of shell/bone/rock/ash) are encountered, all construction within a fifty meter radius of the find should be stopped, the Planning Department notified, and an archaeologist retained to examine the find and make appropriate recommendations.” (emphasis added)

### **Native American Heritage Commission (NAHC)**

A consultation request was sent to NAHC on November 4, 2024. A response was received on January 13, 2025, that stated, “*A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above-referenced project. The results were negative.*” Tribal consultation letters were sent to all contacts on the attached list on Wednesday, January XX, 2025. No objections have been received as of the date of this letter.

## Consultation Responses

The City of Santa Cruz has not received a consultation request as of this letter's date.

## National Register of Historic Places

An internet search of the National Register of Historic Places found one result for registered historic sites within one-half mile (0.5 miles) of the project site. The nearest registered site is the Mission Hill Area Historic District, located approximately .36 miles southwest of the project site and separated by several properties and the San Lorenzo River.

I hope this information is helpful to you. Please feel free to contact me with any questions or comments about this project.

Sincerely,

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Jessica de Wit  
City of Santa Cruz

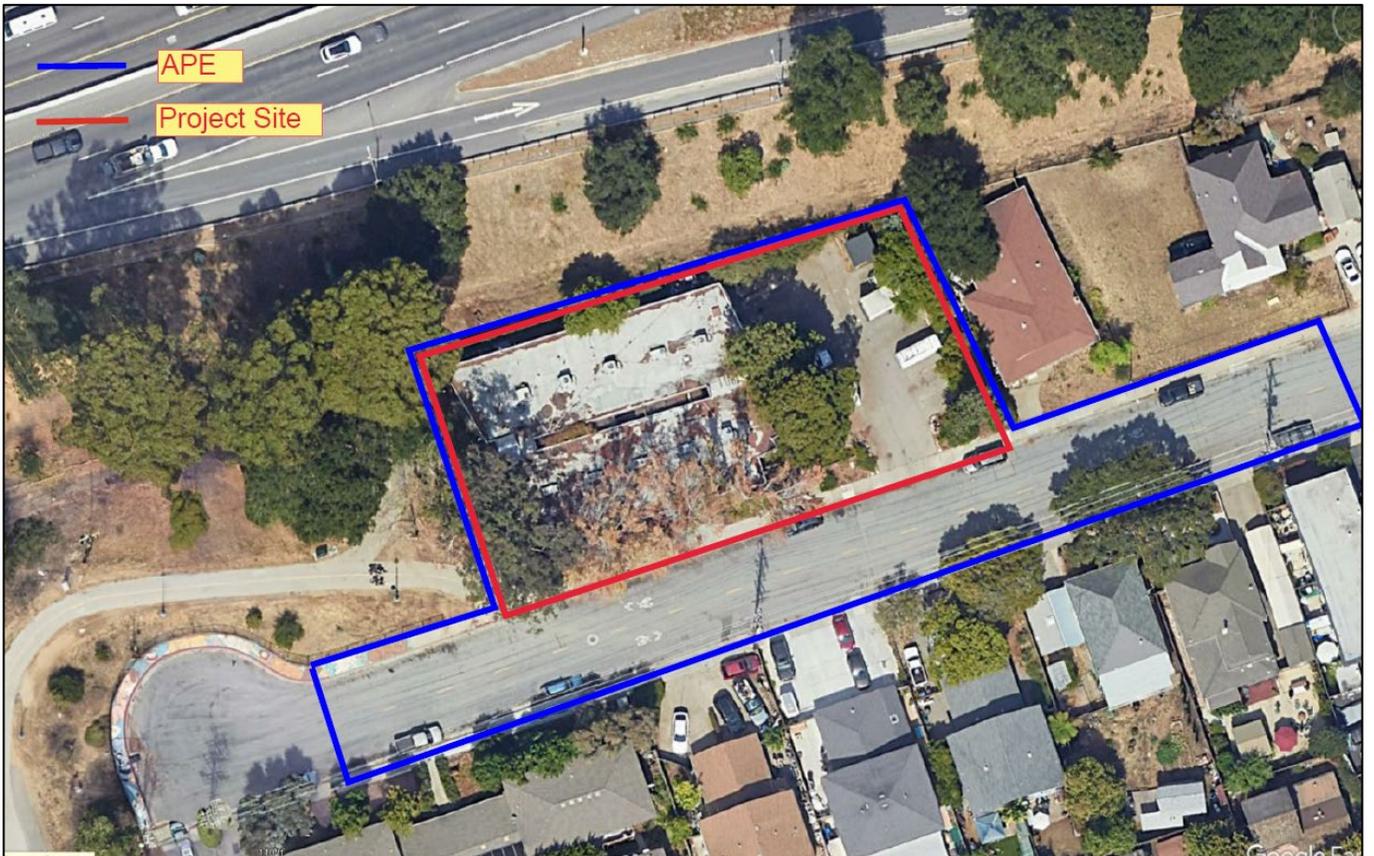
cc: R. L. Hastings & Associates, LLC  
P.O. Box 552  
Placerville, CA 95667

Enclosures:

USGS Topographic Map  
Aerial of Site – Area of Potential Effects (APE)  
CHRIS response letter, dated, 11.15.2024  
Cultural Resource Evaluation  
NAHC Native American Contacts List, dated 1.13.25  
Tribal Consultation letters, mailed 2.16.25  
NRHP Internet Search Results

**USGS Topographic Map**



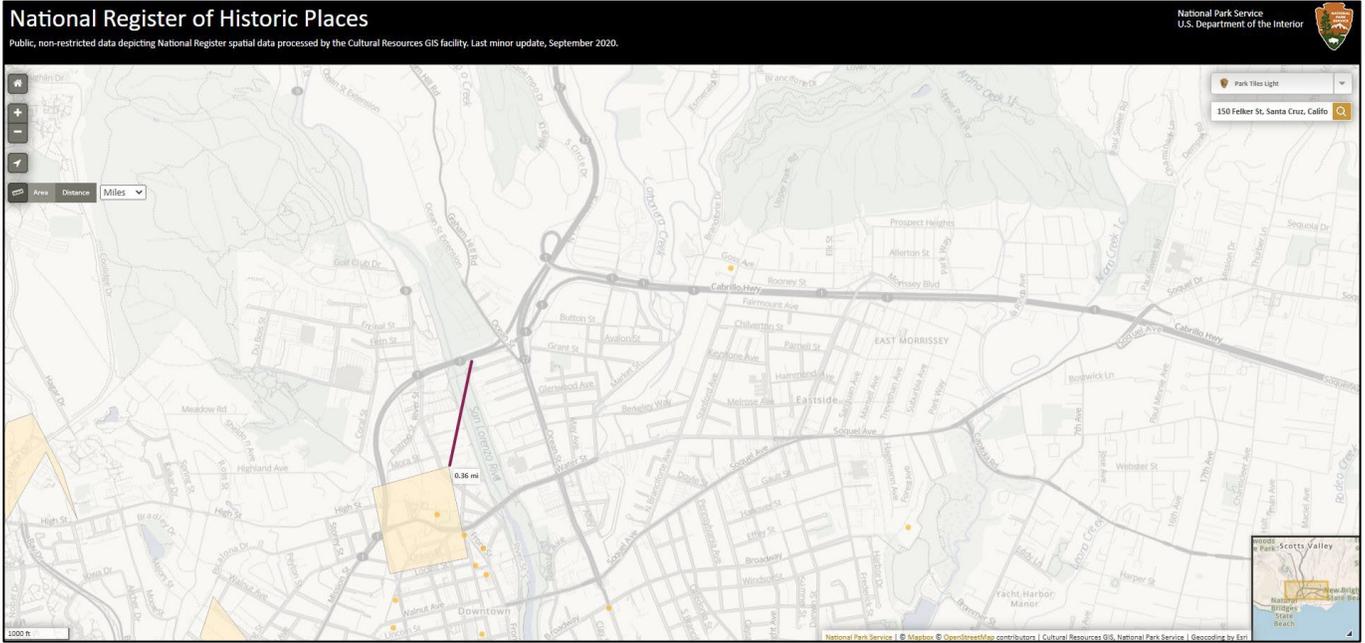


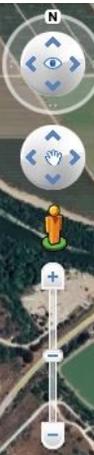
## **CHRIS Response Letter**

## **NAHC Response Letter**

**Tribal Consultation letters, mailed 2.2.25**

# NRHP Internet Search Results





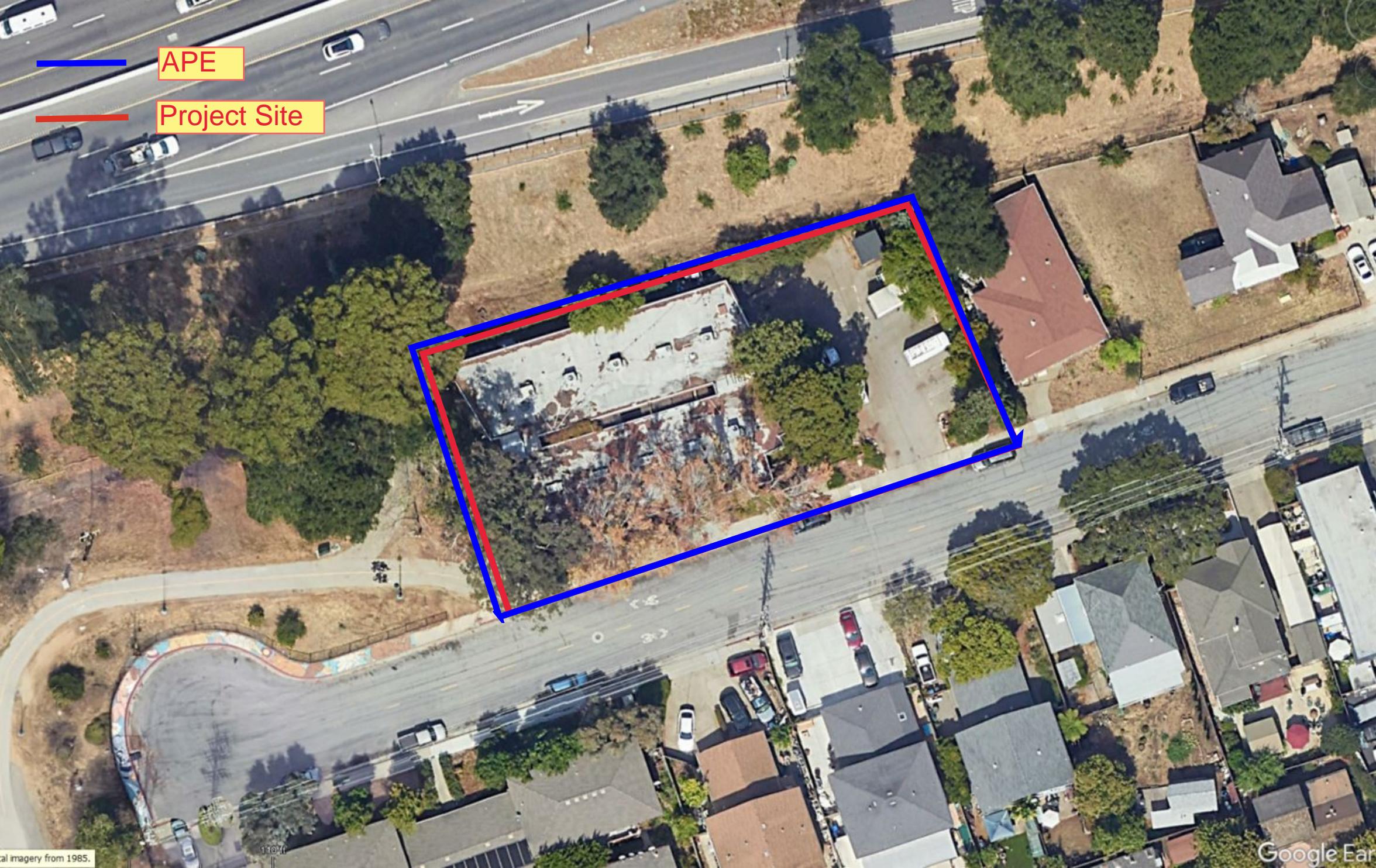
3490 ft

Image © 2024 Airbus

1985

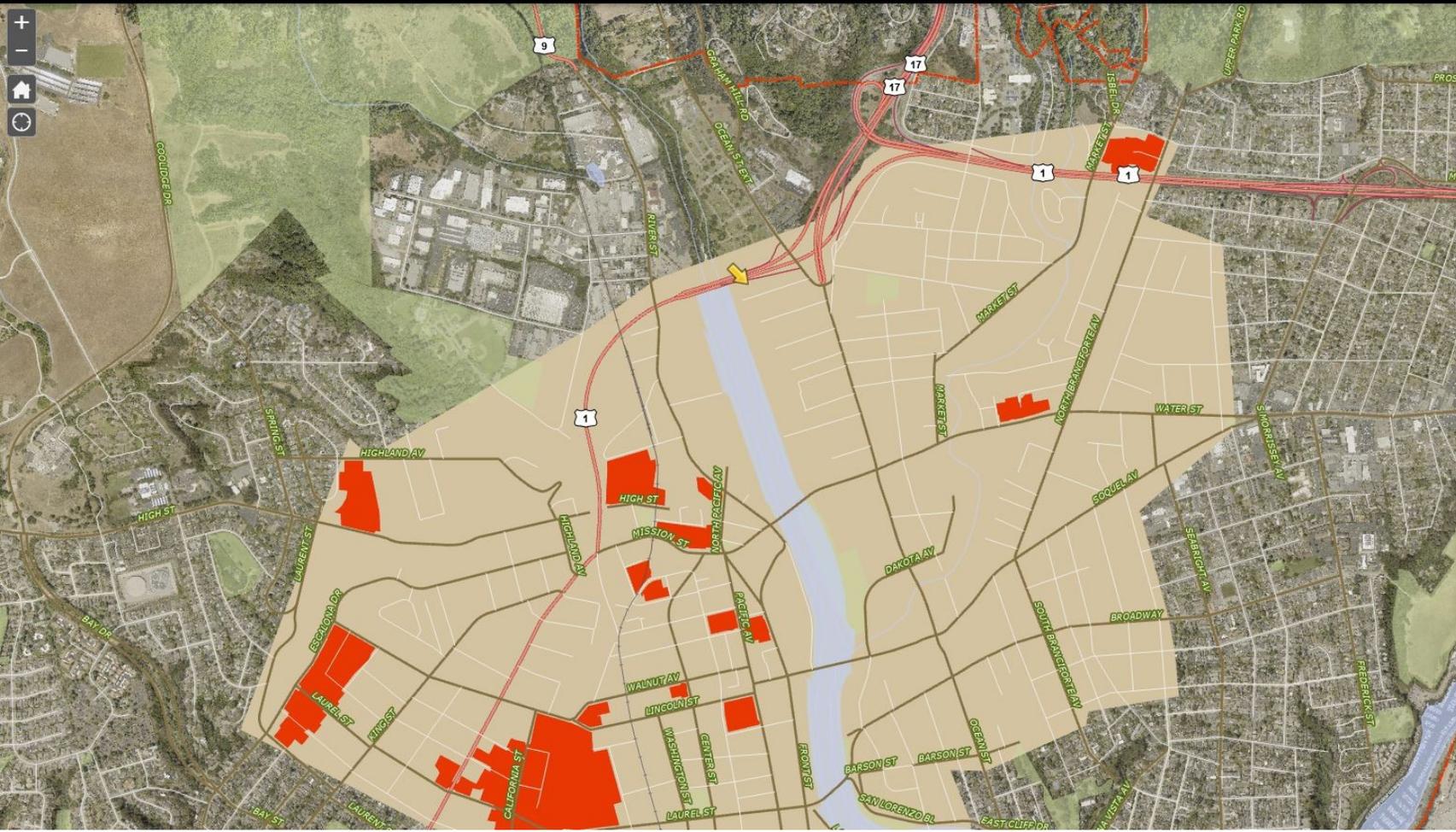
Imagery Date: 7/9/2023 36°40'12.04" N 121°46'40.14" W elev 157 ft eye alt 15154 ft

Google Earth



APE

Project Site



### Layer List

Layers

- Points
- Sewer Infrastructure
- Storm Infrastructure
- Pavement Management
- Zone/Even Evacuation Zones
- Basemap
- Planning
  - 2030 Archaeological Areas Update
  - 2030 Archaeological Areas
  - Historical Archaeological Sensitivity
    - Highly Sensitive
    - Sensitive - Exemption May Apply
  - Coastal Zone (Grouped)
  - Code Enforcement Target Areas
  - Contours
  - Creeks Plan (grouped)
  - Downtown Parking District
  - Downtown Plan (Grouped)
  - FEMA Flood Hazard
  - 2030 Fire
  - 2030 General Plan



**DEPARTMENT OF PARKS AND RECREATION  
OFFICE OF HISTORIC PRESERVATION**

Armando Quintero, Director

Julianne Polanco, State Historic Preservation Officer

1725 23rd Street, Suite 100, Sacramento, CA 95816-7100

Telephone: (916) 445-7000 FAX: (916) 445-7053

calshpo.ohp@parks.ca.gov [www.ohp.parks.ca.gov](http://www.ohp.parks.ca.gov)

March 12, 2025

Refer to HUD\_2025\_0205\_001

Jessie Bristow  
City of Santa Cruz, Economic Development & Housing Division  
337 Locust Street  
Santa Cruz, CA 95060

Re: Request for Section 106 Review of HUD project: Demolition of Existing Building and New Construction of 150 Felker Street Apartments, Santa Cruz, CA.

Dear Jessie Bristow:

The California State Historic Preservation Officer (SHPO) received the consultation submittal for the above referenced undertaking for our review and comment pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations found at 36 CFR Part 800. The regulations and advisory materials are located at [www.achp.gov](http://www.achp.gov).

Undertaking

The proposed undertaking is to demolish an existing commercial building and construct a new five-story, 44-unit affordable housing building with a parking garage and other amenities.

Area of Potential Effects (APE)

The City of Santa Cruz did not delineate the area of the APE, nor did it provide a vertical aspect of the APE. The City provided a map that included the APE.

- Please specifically delineate the APE in area and provide a vertical aspect for the below ground surface construction activities planned for this undertaking in your letter to the SHPO.

Identification of Historic Properties

The City's efforts to identify historic properties included a records search, a pedestrian archaeological survey, and Tribal Consultation. The CHRIS search received November 15, 2024 indicated that while sites have been previously identified in the vicinity of the project area, no sites have been previously recorded within the project's APE. However, the CHRIS report also noted some likelihood of encountering Native American cultural properties given the sensitivity of the area. A cultural resources pedestrian survey did not identify any potential historic properties.

The City stated that the developer plans to demolish a commercial building at the project site before constructing the new residential building. The City provided no age, description, nor National Register of Historic Places (NRHP) eligibility determination for this building (if the building was constructed 45 or more years ago) to the SHPO.

- Please provide to the SHPO a photo, description, age, historic status, and NRHP evaluation of the commercial building (if appropriate) at the site.

### Tribal Consultation

The City of Santa Cruz received a Sacred Lands File Search report from the Native American Heritage Commission (NAHC) on January 13, 2025 which was negative. The City initiated consultation with Native American Tribes identified by the NAHC on January 27, 2025. The City stated it had received no substantive responses or requests to consult further from Tribes.

### Finding of Effect

The City of Santa Cruz proposed a finding of No Historic Properties Affected for this undertaking. Pursuant to 36 CFR § 800.11, the SHPO cannot comment on a finding of effect at this time, pending receipt of the information requested above.

Please provide the requested information in a new letter to the SHPO, under file name HUD\_2025\_0205\_001, emailed to [calshpo.hud@parks.ca.gov](mailto:calshpo.hud@parks.ca.gov).

We appreciate the City of Santa Cruz's efforts to comply with Section 106 of the National Historic Preservation Act and look forward to continuing this consultation. If you have questions please contact Susan Negrete, State Historian II, with the Local Government & Environmental Compliance Unit at [susan.negrete@parks.ca.gov](mailto:susan.negrete@parks.ca.gov).

Sincerely,

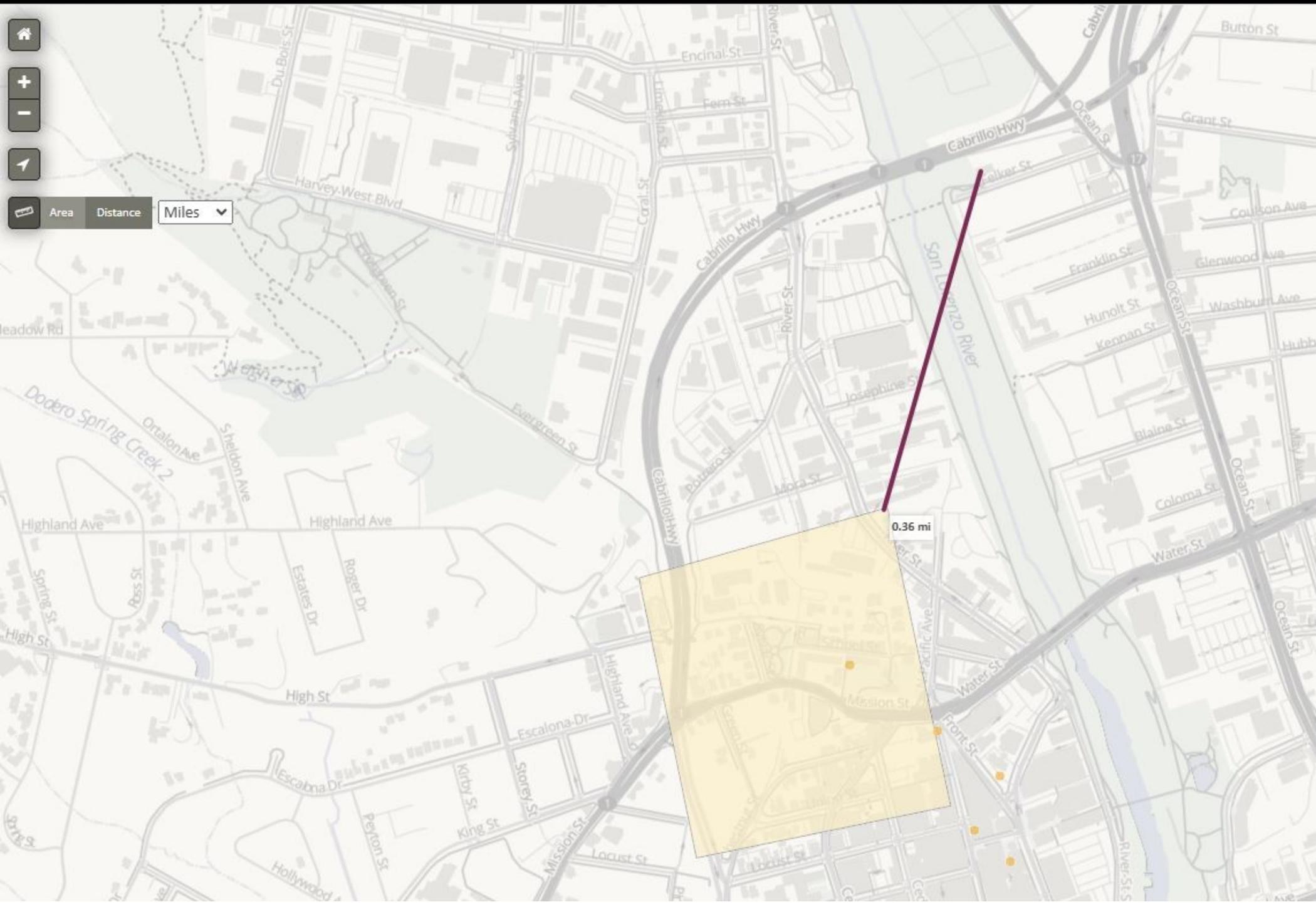
A handwritten signature in blue ink, appearing to be 'Julianne Polanco', with a long horizontal line extending to the right.

Julianne Polanco  
State Historic Preservation Officer

Cc: Jessie Bristow, [jbristow@santacruzca.gov](mailto:jbristow@santacruzca.gov)

# National Register of Historic Places

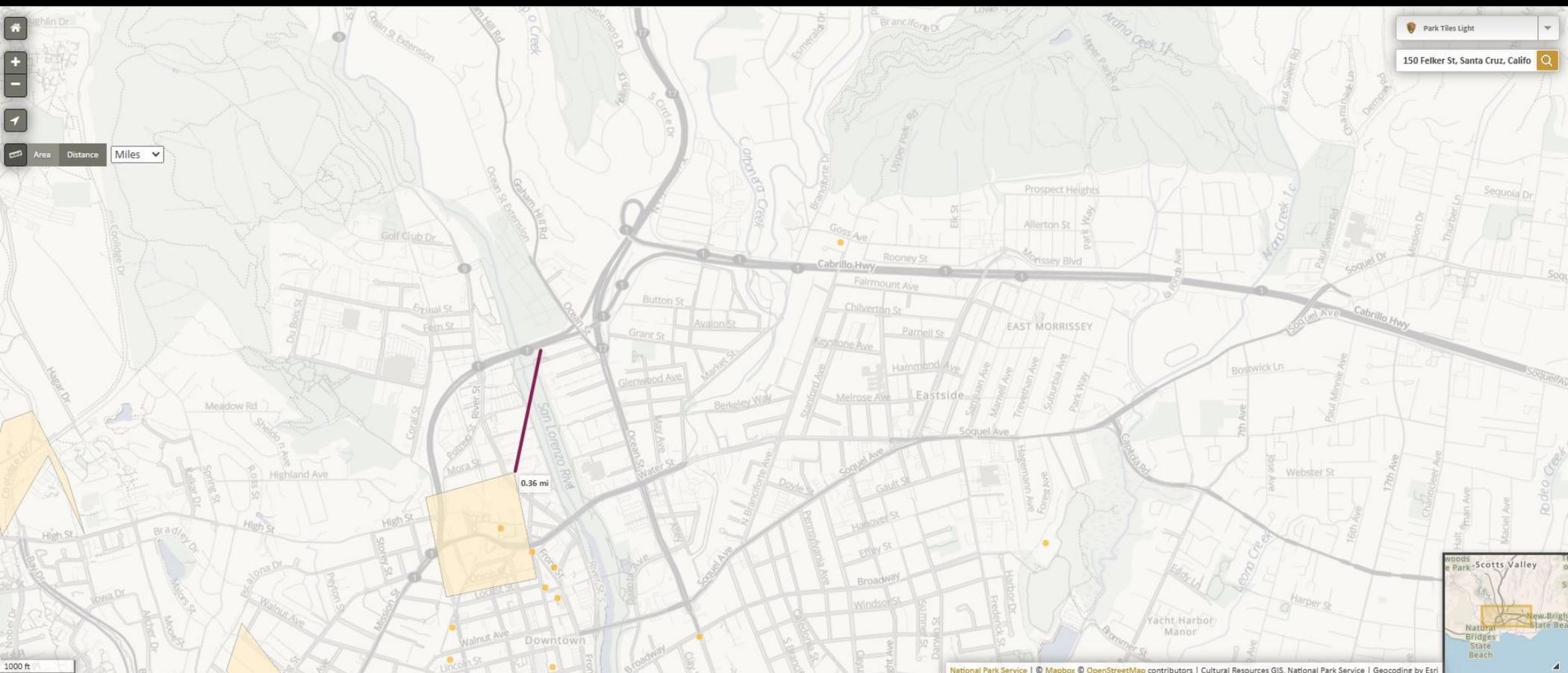
Public, non-restricted data depicting National Register spatial data processed by the Cultural Resources GIS facility. Last minor update, September 2020.

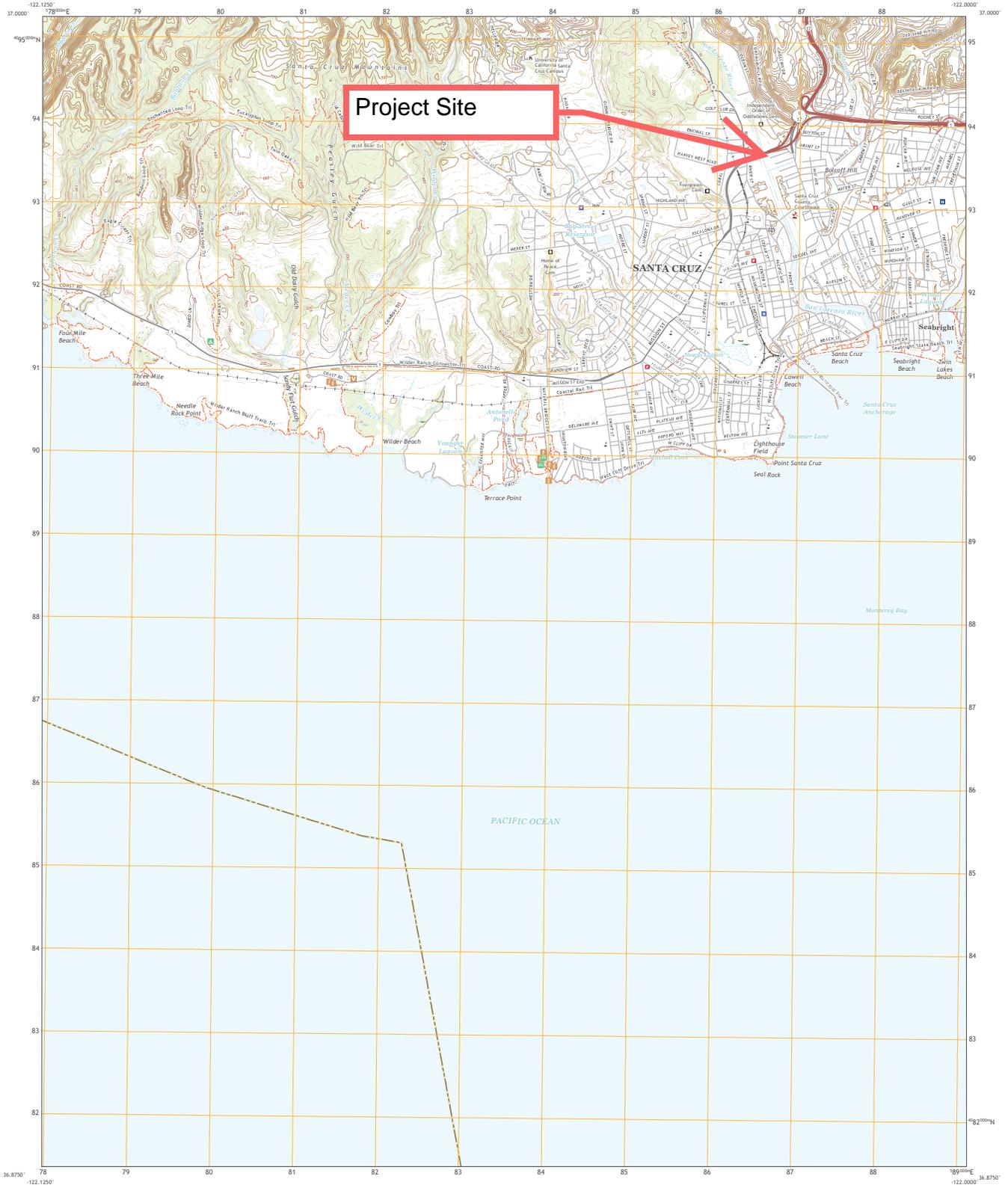


# National Register of Historic Places

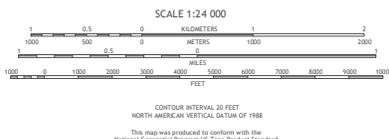
Public, non-restricted data depicting National Register spatial data processed by the Cultural Resources GIS facility. Last minor update, September 2020.

National Park Service  
U.S. Department of the Interior





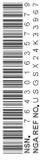
Produced by the United States Geological Survey  
North American Datum of 1983 (NAD83)  
World Geodetic System of 1984 (WGS84) Projection and  
1 000-meter grid (Universal Transverse Mercator, Zone 10S)  
This map is not a legal document. Boundaries may be  
generalized for this map scale. Private lands within government  
reservations may not be shown. Obtain permission before  
entering private lands.



ALLIANCE QUADRANGLES

1	2	3
4	5	

1 Davenport  
2 Felton  
3 Loma Prieta  
4 Santa Cruz DE W  
5 Siskiyou





## ACCESS AGREEMENT SHORT FORM

File Number:

I, the the undersigned, have been granted access to historical resources information on file at the Northwest Information Center of the California Historical Resources Information System.

I understand that any CHRIS Confidential Information I receive shall not be disclosed to individuals who do not qualify for access to such information, as specified in Section III(A-E) of the CHRIS Information Center Rules of Operation Manual, or in publicly distributed documents without written consent of the Information Center Coordinator.

I agree to submit historical Resource Records and Reports based in part on the CHRIS information released under this Access Agreement to the Information Center within sixty (60) calendar days of completion.

I agree to pay for CHRIS services provided under this Access Agreement within sixty (60) calendar days of receipt of billing.

I understand that failure to comply with this Access Agreement shall be grounds for denial of access to CHRIS Information.

Print Name:  Date:

Signature:

Affiliation:

Address:  City/State/ZIP:

Billing Address (if different from above):

Special Billing Information

Telephone:  Email:

Purpose of Access:

Reference (project name or number, title of study, and street address if applicable):

County:  USGS 7.5' Quad:



November 15, 2024

NWIC File No.: 24-0658

Roy Hastings  
R.L. Hastings & Associates, LLC  
P.O. Box 552  
Placerville, CA 95667

Re: Record search results for the proposed 150 Felker Street Apartments

Dear Mr. Roy Hastings:

Per your request received by our office on the 4<sup>th</sup> of November, 2024, a rapid response records search was conducted for the above referenced project by reviewing pertinent Northwest Information Center (NWIC) base maps that reference cultural resources records and reports, historic-period maps, and literature for Santa Cruz County. An Area of Potential Effects (APE) was provided, as well as the location of the 150 Felker Street Apartments project area and will be used to conduct this records search. Please note that use of the term cultural resources includes both archaeological resources and historical buildings and/or structures.

The 150 Felker Street Affordable Housing project is receiving federal funds to partially fund the construction of a 44-unit affordable housing project to be located at 150 Felker Street, Santa Cruz, Santa Cruz County, CA. 150 Felker Street Apartments proposes a 44-unit affordable housing project in Santa Cruz. The project will demolish the existing office complex, remove six heritage trees, and construct a five-story residential apartment building. All units will be Low-Income Housing Tax Credit (LIHTC)-restricted to households earning at or below the 30, 40, 50 and 60 percent Area Median Income (AMI) levels, with one employee unit. 22 one-bedroom units at 30 and 40 percent AMI will be set aside for homeless veterans and have VASH Project Based Vouchers (PBV). Two other one-bedroom units at 30 percent AMI will have PBV. The project includes ground floor vehicle and bike parking, laundry facilities, support offices, and a community room with kitchen space, a computer room, staff services offices with private meeting rooms, and a shared laundry room. The APE is the project site itself.

Review of this information indicates that there has been one larger cultural resource study that includes the 150 Felker Street Apartments project area (Brittin and Hope 1993: S-17775). This 150 Felker Street Apartments project area contains no recorded archaeological resources. The State Office of Historic Preservation Built Environment Resources Directory (OHP BERD), which includes listings of the California Register of Historical Resources, California State Historical Landmarks, California State Points of Historical Interest, and the National Register of Historic Places, lists no recorded buildings or structures within or adjacent to the proposed 150 Felker Street Apartments project area. In addition to these inventories, the NWIC base maps show no recorded buildings or structures within the proposed 150 Felker Street Apartments project area.

At the time of Euroamerican contact, the Native Americans that lived in the area were speakers of the Awaswas language, part of the Costanoan/Ohlone language family (Levy 1978:485). There are Native American resources in the general area of the proposed 150 Felker Street Apartments project area referenced in the ethnographic literature (Levy 1976, Milliken 1995:259).

Based on an evaluation of the environmental setting and features associated with known sites, Native American resources in this part of Santa Cruz County have been found in areas marginal Monterey Bay and inland near intermittent and perennial watercourses. The 150 Felker Street Apartments project area is located in the County and City of Santa Cruz, approximately 110 meters from the eastern bank of the San Lorenzo River approximately two miles north of Santa Cruz Beach. The project area is on the north side of Felker Street, just south of Highway 1 at its Ocean Street Exit. Aerial maps indicate buildings, a paved parking area, and several mature trees. Given the similarity of these environmental factors, and the ethnographic sensitivity of the area, there is a moderate to high potential for unrecorded Native American resources to be within the proposed 150 Felker Street Apartments project area.

Review of historical literature and maps indicated historic-period activity within the 150 Felker Street Apartments project area. Early Sanborn Fire Insurance maps indicated one or more buildings within the project area (1905:39). With this in mind, there is a moderate to high potential for unrecorded historic-period archaeological resources to be within the proposed 150 Felker Street Apartments project area.

The 1954 photo revised 1981 Santa Cruz USGS 7.5-minute topographic quadrangle depicts an urban area, indicating one or more buildings or structures within the 150 Felker Street Apartments project area. If present, any unrecorded buildings or structures may meet the Office of Historic Preservation's minimum age standard that buildings, structures, and objects 45 years or older may be of historical value.

## **RECOMMENDATIONS:**

1) There is a moderate to high potential for Native American archaeological resources and a moderate to high potential for historic-period archaeological resources to be within the 150 Felker Street Apartments project area. Due to the passage of time since the previous survey (Brittin and Hope 1993) and the changes in archaeological theory and method since that time, we recommend a qualified archaeologist conduct further archival and field study for the entire project area to identify cultural resources. In addition, the proposed project area has been highly developed and is presently covered with asphalt, buildings, and/or fill that obscures the visibility of original surface soils, which negates the feasibility of an adequate surface inspection.

Therefore, prior to demolition or other ground disturbance, we recommend a qualified archaeologist conduct further archival and field study to identify archaeological resources, including a good faith effort to identify archaeological deposits that may show no indications on the surface.

Field study may include, but is not limited to, hand auger sampling, shovel test units, or geoarchaeological analyses as well as other common methods used to identify the presence of buried archaeological resources. Please refer to the list of consultants who meet the Secretary of Interior's Standards at <http://www.chrisinfo.org>. Please refer to the list of consultants who meet the Secretary of Interior's Standards at <http://www.chrisinfo.org>.

2) No resources were located in either the 150 Felker Street Apartments project area or its APE that are included in the OHP BERD. If, in a later process, buildings or structures are identified that meet the minimum age requirement, we recommend that the agency responsible for Section 106 compliance consult with the Office of Historic Preservation regarding potential impacts to these buildings or structures:

Project Review and Compliance Unit  
Office of Historic Preservation  
1725 23rd Street, Suite 100  
Sacramento, CA 95816  
(916) 445-7000

3) Review for possible historic-period buildings or structures has included only those sources listed in the attached bibliography and should not be considered comprehensive.

4) We recommend the lead agency contact the local Native American tribes regarding traditional, cultural, and religious heritage values. For a complete listing of tribes in the vicinity of the project, please contact the Native American Heritage Commission at (916)373-3710.

5) If archaeological resources are encountered **during construction**, work should be temporarily halted in the vicinity of the discovered materials and workers should avoid altering the materials and their context until a qualified professional archaeologist has evaluated the situation and provided appropriate recommendations. Project personnel should not collect cultural resources. Native American resources include chert or obsidian flakes, projectile points, mortars, and pestles; and dark friable soil containing shell and bone dietary debris, heat-affected rock, or human burials. Historic-period resources include stone or adobe foundations or walls; structures and remains with square nails; and refuse deposits or bottle dumps, often located in old wells or privies.

6) It is recommended that any identified cultural resources be recorded on DPR 523 historic resource recordation forms, available online from the Office of Historic Preservation's website: [https://ohp.parks.ca.gov/?page\\_id=28351](https://ohp.parks.ca.gov/?page_id=28351)

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the California Historical Resources Information System (CHRIS) Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

The California Office of Historic Preservation (OHP) contracts with the California Historical Resources Information System's (CHRIS) regional Information Centers (ICs) to maintain information in the CHRIS inventory and make it available to local, state, and federal agencies, cultural resource professionals, Native American tribes, researchers, and the public. Recommendations made by IC coordinators or their staff regarding the interpretation and application of this information are advisory only. Such recommendations do not necessarily represent the evaluation or opinion of the State Historic Preservation Officer in carrying out the OHP's regulatory authority under federal and state law.

Thank you for using our services. Please contact this office if you have any questions,  
(707) 588-8455.

Sincerely,

A handwritten signature in cursive script that reads "Jillian Guldenbrein".

Jillian Guldenbrein  
Researcher

## LITERATURE REVIEWED

In addition to archaeological maps and site records on file at the Northwest Information Center of the Historical Resource File System, the following literature was reviewed:

Barrows, Henry D., and Luther A. Ingersoll

2005 *Memorial and Biographical History of the Coast Counties of Central California*. Three Rocks Research, Santa Cruz (Digital Reproduction of The Lewis Publishing Company, Chicago: 1893.)

Bowman, Roy H. and David C. Estrada

1980 *Soils Survey of Santa Cruz County, California*. United States Department of Agriculture, Soil Conservation Service, in cooperation with the University of California Agricultural Experiment Station. n.p.

Chase, John

1979 *The Sidewalk Companion to Santa Cruz Architecture*. Revised Edition. Paper Vision Press, Santa Cruz.

City Planning Department, Santa Cruz, California

1974 *Historic Preservation Plan, Santa Cruz, California*. City Planning Department, Santa Cruz, CA.

Clark, Donald Thomas

1986 *Santa Cruz County Place Names*. Santa Cruz Historical Society, Santa Cruz.

Department of Planning and Community Development, City of Santa Cruz

1989 *Santa Cruz Historic Building Survey – Vol. II*.

General Land Office

1874 Survey Plat for Township 11 South/Range 2 West.

Gudde, Erwin G.

1969 *California Place Names: The Origin and Etymology of Current Geographical Names*. Third Edition. University of California Press, Berkeley and Los Angeles.

Hamman, Rick

1980 *California Central Coast Railways*. Pruett Publishing Company, Boulder, CO.

Hart, James D.

1987 *A Companion to California*. University of California Press, Berkeley and Los Angeles.

Heizer, Robert F., editor

1974 *Local History Studies*, Vol. 18., "The Costanoan Indians." California History Center, DeAnza College, Cupertino, CA.

Hoover, Mildred Brooke, Hero Eugene Rensch, and Ethel Rensch, revised by William N. Abeloe

1966 *Historic Spots in California*. Third Edition. Stanford University Press, Stanford, CA.

Hoover, Mildred Brooke, Hero Eugene Rensch, and Ethel Rensch, William N. Abeloe, revised by Douglas E. Kyle

1990 *Historic Spots in California*. Fourth Edition. Stanford University Press, Stanford, CA.

Hope, Andrew

2005 *Caltrans Statewide Historic Bridge Inventory Update*. Caltrans, Division of Environmental Analysis, Sacramento, CA.

Jenkins, Olaf P.

1951 *Bulletin 154*. "Geologic Guidebook of the San Francisco Bay Counties: History, Landscape, Geology, Fossils, Minerals, Industry, and Routes to Travel." State of California Division of Mines, Sacramento.

Kroeber, A.L.

1925 *Handbook of the Indians of California*. Bureau of American Ethnology, Bulletin 78, Smithsonian Institution, Washington, D.C. (Reprint by Dover Publications, Inc., New York, 1976)

Levy, Richard

1978 Costanoan. In *California*, edited by Robert F. Heizer, pp. 485-495. Handbook of North American Indians, vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Lydon, Sandy

1985 *Chinese Gold: The Chinese in the Monterey Bay Region*. Capitola Book Company, Capitola, CA.

Milliken, Randall

1995 *A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area 1769-1810*. Ballena Press Anthropological Papers No. 43, Menlo Park.

Page, Charles Hall

1976 *Santa Cruz Historic Building Survey*. Moore's Graphic Art Service, Santa Cruz, CA.

Page, Charles Hall

1976 *Santa Cruz Renovation Manual, A Homeowner's Handbook*. Charles Hall Page & Associates, Inc. Santa Cruz, CA.

Roberts, George, and Jan Roberts

1988 *Discover Historic California*. Gem Guides Book Co., Pico Rivera, CA.

State of California Department of Parks and Recreation

1976 *California Inventory of Historic Resources*. State of California Department of Parks and Recreation, Sacramento.

State of California Department of Parks and Recreation and Office of Historic Preservation

1988 *Five Views: An Ethnic Sites Survey for California*. State of California Department of Parks and Recreation and Office of Historic Preservation, Sacramento.

State of California Office of Historic Preservation \*\*

2022 *Built Environment Resources Directory*. Listing by City (through September 23, 2022). State of California Office of Historic Preservation, Sacramento.

Thornton, Mark V.

1993 *An Inventory and Historical Significance Evaluation of CDF Fire Lookout Stations*. CDF Archaeological Reports No. 12.

Williams, James C.

1997 *Energy and the Making of Modern California*. The University of Akron Press, Akron OH.

Woodbridge, Sally B.

1988 *California Architecture: Historic American Buildings Survey*. Chronicle Books, San Francisco, CA.

Works Progress Administration

1984 *The WPA Guide to California*. Reprint by Pantheon Books, New York. (Originally published as *California: A Guide to the Golden State in 1939* by Books, Inc., distributed by Hastings House Publishers, New York.)

**\*\*Note that the Office of Historic Preservation's *Historic Properties Directory* includes National Register, State Registered Landmarks, California Points of Historical Interest, and the California Register of Historical Resources as well as Certified Local Government surveys that have undergone Section 106 review.**

## Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation
S-017775	Caltrans - 4274-129080	1993	David G. Brittin and Andrew Hope	Historic Property Survey Report for the Proposed Improvements to the Route 1 & 17 Interchange in the City and County of Santa Cruz, 4-SCR-1/17, Post Miles: Hwy. 1 - 15.8/17.6; Hwy. 17 - 0.0/0.7, 4283-129080	California Department of Transportation, District 04
S-017775a		1993	David G. Brittin and Deborah M. DiPasqua	Negative Archaeological Survey Report, modifications to interchange of Route 1 and Highway 17, 04-SCR-1/17 P.M. 15.8/17.6 & 0.0/0.7, 4274-129080	California Department of Transportation, District 04
S-017775b		1993	Andrew Hope	Historic Architecture Survey Report for the Proposed Improvements to the Route 1 & 17 Interchange in the City and County of Santa Cruz, 4-SCR-1/17, Post Miles: Hwy. 1 - 15.8/17.6; HWY. 17 - 0.0/0.7, 4283-129080	California Department of Transportation, District 4

<b>County</b>	<b>Tribe Name</b>	<b>Fed (F) Non-Fed (N)</b>	<b>Contact Person</b>
Santa Cruz	Amah Mutsun Tribal Band	N	Valentin Lopez, Chairperson
	Amah Mutsun Tribal Band	N	Ed Ketchum, Vice-Chairperson
	Amah Mutsun Tribal Band of Mission San Juan Bautista	N	Michelle Zimmer, Senior Cultural Monitor & Consultant
	Amah Mutsun Tribal Band of Mission San Juan Bautista	N	Garry Zimmer, Senior Cultural Monitor & Consultant
	Amah Mutsun Tribal Band of Mission San Juan Bautista	N	Christopher Zimmer, Senior Cultural Monitor & Consultant, Councilman
	Amah Mutsun Tribal Band of Mission San Juan Bautista	N	Shelby Brown, Senior Cultural Monitor & Consultant, Councilwoman
	Amah Mutsun Tribal Band of Mission San Juan Bautista	N	Irene Zwielerin, Chairperson
	Costanoan Ohlone Rumsen-Mutsen Tribe	N	Patrick Orozco, Chairman
	Costanoan Rumsen Carmel Tribe	N	Samuel Rodriguez, Cultural Resource Officer

Costanoan Rumsen Carmel Tribe	N	Carla Munoz, Tribal Council
Costanoan Rumsen Carmel Tribe	N	Henry Muñoz, Cultural Resource Officer
Indian Canyon Mutsun Band of Costanoan	N	Kanyon Sayers-Roods, MLD Contact
Indian Canyon Mutsun Band of Costanoan	N	Ann Marie Sayers, Chairperson
Wuksachi Indian Tribe/Eshom Valley Band	N	Kenneth Woodrow, Chairperson

This list is current only as of the date of this document. Distribution of this list does not relieve any person of stat

This list is only applicable for contacting local Native American

**Native American Heritage Commission  
Native American Contact List  
Santa Cruz County  
1/13/2025**

<b>Contact Address</b>	<b>Phone #</b>	<b>Fax #</b>	<b>Email Address</b>
P.O. Box 5272 Galt, CA, 95632	(916) 743-5833		vjltestingcenter@aol.com
	(530) 578-3864		aerieways@aol.com
PO Box 214211, 2929 Fulton Ave Unit 19 Sacramento, CA, 95821	(916) 730-9468		michellezimmer1966@gmail.com
PO Box 214211, 2929 Fulton Ave Unit 19 Sacramento, CA, 95821	(408) 771-8901		garryzimmer@gmail.com
PO Box 214211, 2929 Fulton Ave Unit 19 Sacramento, CA, 95821	(650) 520-8418		cdzimmer93@gmail.com
2451 Tyrolean Way Sacramento, CA, 95821	(916) 276-8380		shelbyzimmer1997@gmail.com
3030 Soda Bay Road Lakeport, CA, 95453	(916) 730-9468		amahmutsuntribalcommunications@gmail.com
644 Peartree Drive Watsonville, CA, 95076	(831) 728-8471		yanapvoic97@gmail.com
29539 Oakbridge Dr Menifee, CA, 92586	(760) 681-6860		crct.crd@gmail.com

**Native American Heritage Commission  
Native American Contact List  
Santa Cruz County  
1/13/2025**

	(415) 690-3110		crct.crd@gmail.com
108 South Acacia Rialto, CA, 92376	(909) 254-1610		crct.crd@gmail.com
1615 Pearson Court San Jose, CA, 95122	(408) 673-0626		kanyon@kanyonconsulting.com
P.O. Box 28 Hollister, CA, 95024	(831) 637-4238		
1179 Rock Haven Ct. Salinas, CA, 93906	(831) 443-9702		kwood8934@aol.com

tutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources C  
s with regard to cultural resources assessment for the proposed 150 Felker Street Affordable Housing Project, Santa Cruz (

<b>Cultural Affiliation</b>	<b>Counties</b>	<b>Last Updated</b>
Costanoan Northern Valley Yokut	Alameda, Calaveras, Contra Costa, Fresno, Madera, Mariposa, Merced, Monte rey, San Benito, San Francisco, San	7/20/2023
Costanoan Northern Valley Yokut	Alameda, Calaveras, Contra Costa, Fresno, Madera, Mariposa, Merced, Monte	7/20/2023
Costanoan	Alameda, Contra Costa, Merced, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Stanislaus	10/8/2024
Costanoan	Alameda, Contra Costa, Merced, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Stanislaus	10/8/2024
Costanoan	Alameda, Contra Costa, Merced, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Stanislaus	10/8/2024
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Costanoan	Alameda, Contra Costa, Merced, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Stanislaus	10/8/2024
Ohlone	Monterey, San Benito, Santa Cruz	4/4/2024
Costanoan	Alameda, Contra Costa, Merced, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Stanislaus	7/17/2024

Costanoan	Alameda, Contra Costa, Merced, Monterey, San Benito, San Francisco, San Mateo, Santa	7/17/2024
Costanoan	Alameda, Contra Costa, Merced, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Stanislaus	7/17/2024
Costanoan	Alameda, Contra Costa, Merced, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Stanislaus	3/15/2024
Costanoan	Alameda, Contra Costa, Merced, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Stanislaus	3/15/2024
Foothill Yokut Mono	Alameda, Calaveras, Contra Costa, Fresno, Inyo, Kings, Madera, Marin, Mariposa, Merced, Mono, Monterey, San Benito, San	6/19/2023

Code and Section 5097.98 of the Public Resources Code.

County.

Record: PROJ-2025-000184  
 Report Type: List of Tribes  
 Counties: Santa Cruz  
 NAHC Group: All

# Local Government Tribal Consultation List Request

## Native American Heritage Commission

1550 Harbor Blvd, Suite 100  
West Sacramento, CA 95691  
916-373-3710  
916-373-5471 – Fax  
[nahc@nahc.ca.gov](mailto:nahc@nahc.ca.gov)

### Type of List Requested

CEQA Tribal Consultation List (AB 52) – *Per Public Resources Code § 21080.3.1, subs. (b), (d), (e) and 21080.3.2*

General Plan (SB 18) - *Per Government Code § 65352.3.*

#### Local Action Type:

\_\_\_ General Plan \_\_\_ General Plan Element \_\_\_ General Plan Amendment

\_\_\_ Specific Plan \_\_\_ Specific Plan Amendment \_\_\_ Pre-planning Outreach Activity

### Required Information

Project Title: \_\_\_\_\_

Local Government/Lead Agency: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_

#### Specific Area Subject to Proposed Action

County: \_\_\_\_\_ City/Community: \_\_\_\_\_

#### Project Description:

### Additional Request

Sacred Lands File Search - *Required Information:*

USGS Quadrangle Name(s): \_\_\_\_\_

Township: \_\_\_\_\_ Range: \_\_\_\_\_ Section(s): \_\_\_\_\_

## NATIVE AMERICAN HERITAGE COMMISSION

January 13, 2025

Roy Hastings  
R. L. Hastings & Associates, LLC

**Via Email to: [roy@rlhastings.com](mailto:roy@rlhastings.com)**

**Re: 150 Felker Street Affordable Housing Project, Santa Cruz County**

To Whom It May Concern:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. However, the absence of specific site information in the SLF does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: [Mathew.Lin@nahc.ca.gov](mailto:Mathew.Lin@nahc.ca.gov)

Sincerely,

*Mathew Lin*

Mathew Lin  
Cultural Resources Analyst

Attachment



CHAIRPERSON  
**Reginald Pagaling**  
Chumash

VICE-CHAIRPERSON  
**Buffy McQuillen**  
Yokayo Pomo, Yuki,  
Nomlaki

SECRETARY  
**Sara Dutschke**  
Miwok

PARLIAMENTARIAN  
**Wayne Nelson**  
Luiseño

COMMISSIONER  
**Isaac Bojorquez**  
Ohlone-Costanoan

COMMISSIONER  
**Stanley Rodriguez**  
Kumeyaay

COMMISSIONER  
**Laurena Bolden**  
Serrano

COMMISSIONER  
**Reid Milanovich**  
Cahuilla

COMMISSIONER  
**Bennae Calac**  
Pauma-Yuima Band of  
Luiseño Indians

ACTING EXECUTIVE  
SECRETARY  
**STEVEN QUINN**

**NAHC HEADQUARTERS**  
1550 Harbor Boulevard  
Suite 100  
West Sacramento,  
California 95691  
(916) 373-3710  
[nahc@nahc.ca.gov](mailto:nahc@nahc.ca.gov)

<b>Tribe Name</b>	<b>Fed (F) Non-Fed (N)</b>	<b>Contact Person</b>
Amah Mutsun Tribal Band	N	Ed Ketchum, Vice-Chairperson
Amah Mutsun Tribal Band	N	Valentin Lopez, Chairperson
Amah Mutsun Tribal Band of Mission San Juan Bautista	N	Irene Zwielerin, Chairperson
Costanoan Ohlone Rumsen-Mutsen Tribe	N	Patrick Orozco, Chairman
Costanoan Rumsen Carmel Tribe	N	Henry Muñoz, Cultural Resource Officer
Costanoan Rumsen Carmel Tribe	N	Carla Munoz, Tribal Council
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Indian Canyon Mutsun Band of Costanoan	N	Kanyon Sayers-Roods, MLD Contact
Wuksachi Indian Tribe/Eshom Valley Band	N	Kenneth Woodrow, Chairperson

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Native American Contact List  
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9/30/2024**

<b>Contact Address</b>	<b>Phone #</b>	<b>Fax #</b>	<b>Email Address</b>
	(530) 578-3864		aerieways@aol.com
P.O. Box 5272 Galt, CA, 95632	(916) 743-5833		vjltestingcenter@aol.com
3030 Soda Bay Road Lakeport, CA, 95453	(650) 851-7489	(650) 332-1526	amahmutsuntribal@gmail.com
644 Peartree Drive Watsonville, CA, 95076	(831) 728-8471		yanapvoic97@gmail.com
108 South Acacia Rialto, CA, 92376	(909) 254-1610		crct.crd@gmail.com
	(415) 690-3110		crct.crd@gmail.com
29539 Oakbridge Dr Menifee, CA, 92586	(760) 681-6860		crct.crd@gmail.com
P.O. Box 28 Hollister, CA, 95024	(831) 637-4238		ams@indiancanyons.org
1615 Pearson Court San Jose, CA, 95122	(408) 673-0626		kanyon@kanyonconsulting.com
1179 Rock Haven Ct. Salinas, CA, 93906	(831) 443-9702		kwood8934@aol.com

**Native American Heritage Commission  
Native American Contact List  
Santa Cruz County  
9/30/2024**

any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code.

Native Americans with regard to cultural resources assessment for the proposed River Street Affordable Housing Project, Santa Cruz County.

Cultural Affiliation	Counties	Last Updated
Costanoan Northern Valley Yokut	Alameda, Calaveras, Contra Costa, Fresno, Madera, Mariposa, Merced, Monter	7/20/2023
Costanoan Northern Valley Yokut	Alameda, Calaveras, Contra Costa, Fresno, Madera, Mariposa, Merced, Monter ey, San Benito, San Francisco, San Joaquin, San	7/20/2023
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Public Resources Code and Section 5097.98 of the Public

Cruz County.

Record: PROJ-2024-005041  
Report Type: List of Tribes  
Counties: Santa Cruz  
NAHC Group: All

Amah Mutsun Tribal Band  
Ed Ketchum, Vice-Chairperson  
(530) 578-3864  
aerieways@aol.com

Amah Mutsun Tribal Band  
Valentin Lopez, Chairperson  
P.O. Box 5272  
Galt, CA, 95632  
(916) 743-5833  
vjtestingcenter@aol.com

Amah Mutsun Tribal Band of Mission  
San Juan Bautista  
Irene Zwielerlein, Chairperson  
3030 Soda Bay Road  
Lakeport, CA, 95453  
(650) 851-7489  
amahmutsuntribal@gmail.com

Costanoan Ohlone Rumsen-Mutsen  
Tribe  
Patrick Orozco, Chairman  
644 Peartree Drive  
Watsonville, CA, 95076  
(831) 728-8471  
yanapvoic97@gmail.com

Costanoan Rumsen Carmel  
Tribe  
Henry Muñoz, Cultural  
Resource Officer  
108 South Acacia  
Rialto, CA, 92376  
(909) 254-1610  
crct.crd@gmail.com

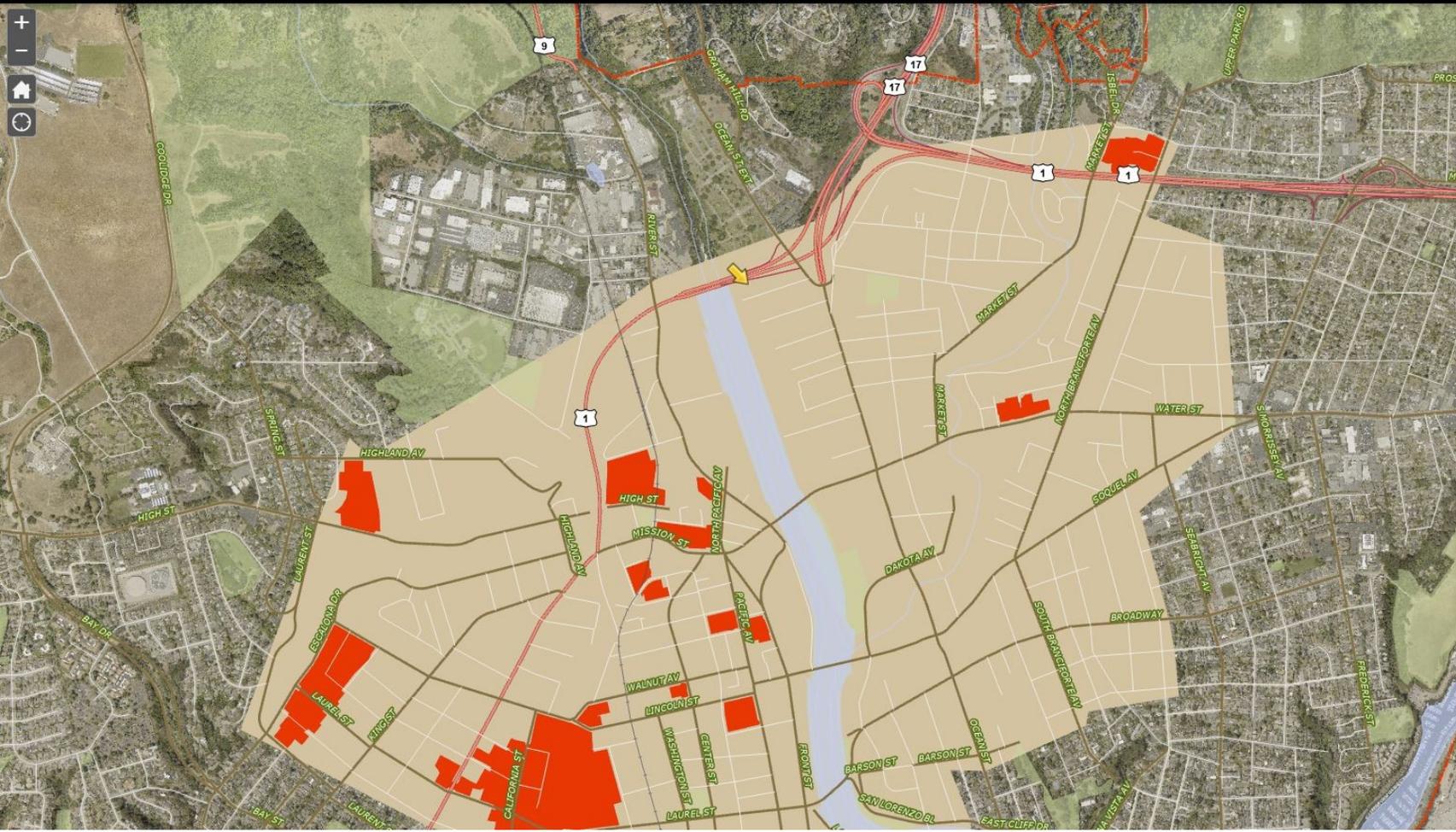
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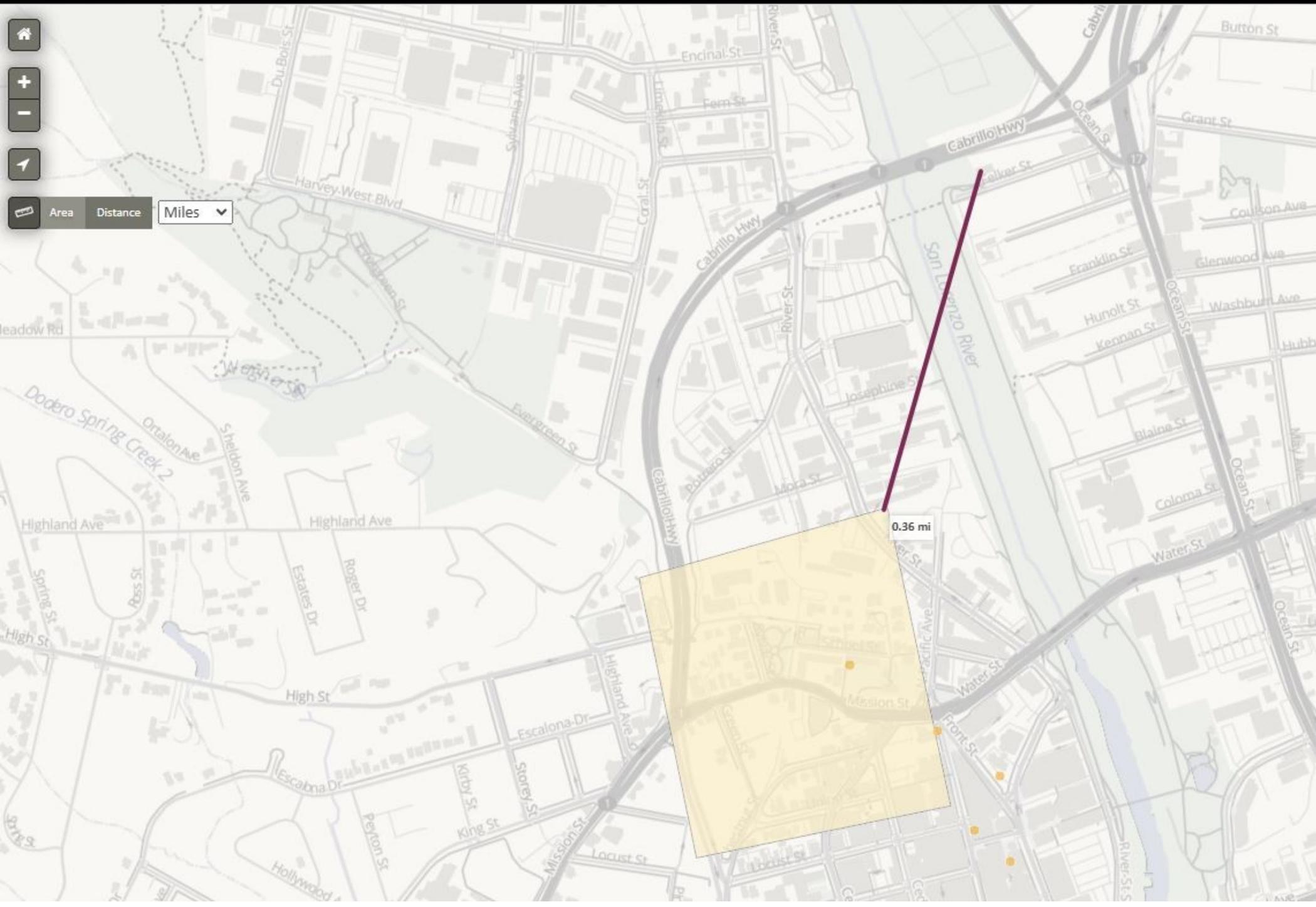
### Layer List

Layers

- Points
- Sewer Infrastructure
- Storm Infrastructure
- Pavement Management
- Zoneaven Evacuation Zones
- Basemap
- Planning
  - 2030 Archaeological Areas Update
  - 2030 Archaeological Areas
  - Historical Archaeological Sensitivity
    - Highly Sensitive
    - Sensitive - Exemption May Apply
  - Coastal Zone (Grouped)
  - Code Enforcement Target Areas
  - Contours
  - Creeks Plan (grouped)
  - Downtown Parking District
  - Downtown Plan (Grouped)
  - FEMA Flood Hazard
  - 2030 Fire
  - 2030 General Plan

# National Register of Historic Places

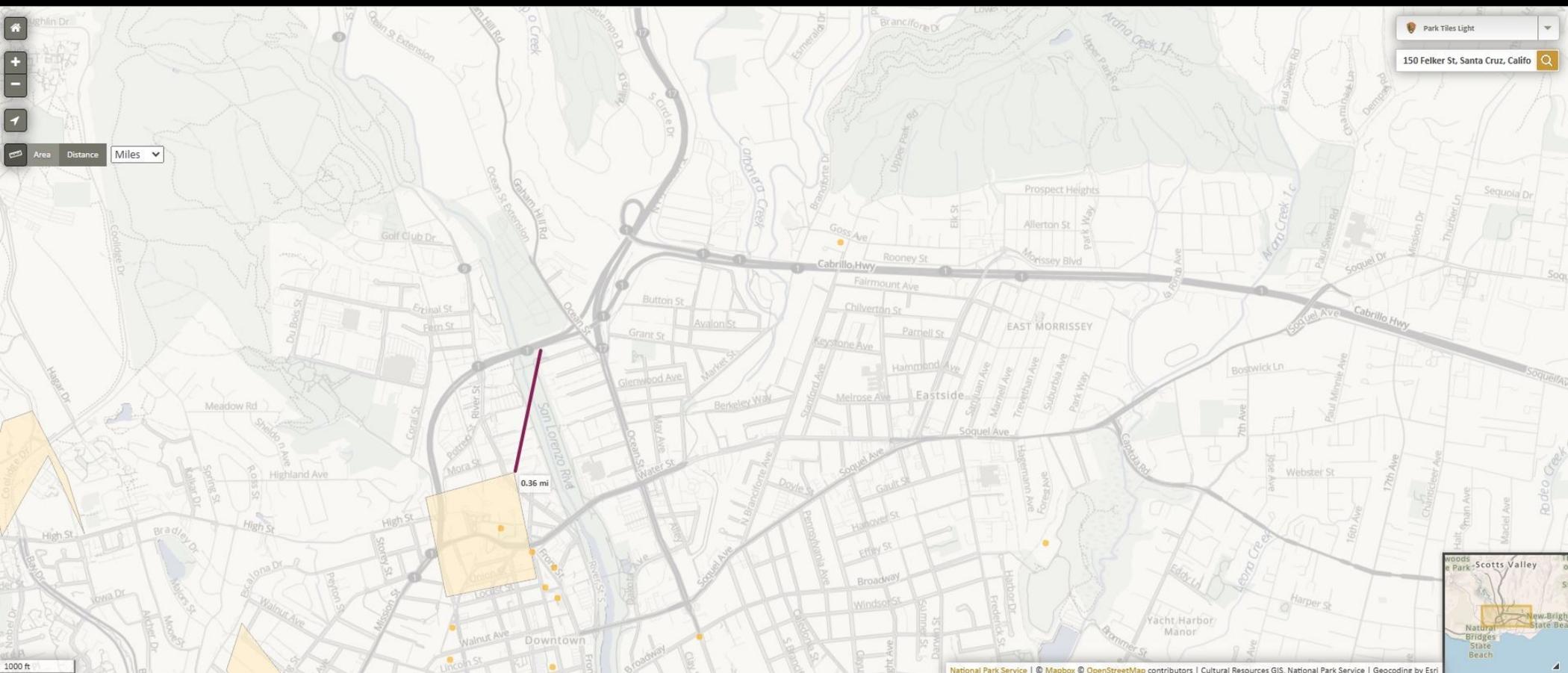
Public, non-restricted data depicting National Register spatial data processed by the Cultural Resources GIS facility. Last minor update, September 2020.



# National Register of Historic Places

Public, non-restricted data depicting National Register spatial data processed by the Cultural Resources GIS facility. Last minor update, September 2020.

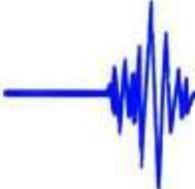
National Park Service  
U.S. Department of the Interior



Traffic count data is from a number of sources but primarily from Caltrans. Highway counts from Caltrans may include projections based on earlier counts.



Average Daily Traffic  
Santa Cruz/Live Oak Map



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December 1, 2021  
Project No. 53-054

Ms. Mison Cooper  
ABC Construction, LLC  
4100 Moorpark Avenue  
San Jose, CA 95117

Subject: Noise Assessment Study for the Planned Multi-Family Development,  
150 Felker Street, Santa Cruz

Dear Ms. Cooper:

This report presents the results of a noise assessment study for the planned supportive housing development at 150 Felker Street in Santa Cruz, as shown on the Site Plan, Ref. (a). The noise exposures at the site were evaluated against the standards of the City of Santa Cruz Noise Element, Ref. (b), and the State of California Code of Regulations, Title 24, Ref. (c), which applies to all new multi-family housing in California. Project-generated noise from roof-top mechanical equipment was evaluated against the standards of the City of Santa Cruz Noise Ordinance, Ref. (e). Also included in this study is an analysis of the impacts due to demolition and construction noise and vibration to the nearby residences. The analysis of the on-site sound level measurements indicates that the existing noise environment is due primarily to vehicular traffic sources on Highway 1. The results of the study indicate that the exterior noise exposures are in compliance with the standards for the rear yard areas. However, the interior noise exposures will exceed the City of Santa Cruz Noise Element and Title 24 standards. Noise from the roof-top mechanical equipment will be in compliance with the standards of the Noise Ordinance at the nearest common property line.

Sections I and II of this report contains a summary of our findings and recommendations, respectively. Subsequent sections contain the site, traffic and project descriptions, analyses, evaluations, a construction noise and vibration analysis and controls. Attached hereto are Appendices A, B and C, which include the list of references, descriptions of the applicable standards, definitions of the terminology, descriptions of the acoustical instrumentation used for the field survey, ventilation requirements, general building shell controls, the on-site noise measurement data and calculation tables.

**I. Summary of Findings**

**City of Santa Cruz Noise Element of the General Plan**

The noise assessment results presented in the findings were evaluated against the standards of the City of Santa Cruz Noise Element, which utilize the Day-Night Level (DNL) descriptor. The Noise Element standards specify an exterior limit of 65 decibels (dB) DNL for multi-family exterior spaces. The noise standards are typically not applied to small, limited use areas such as balconies. Interior noise exposures are limited to 45 dB DNL.

**State of California Code of Regulations, Title 24**

The Title 24 standards also use the DNL descriptor and are applicable to all new multi-family developments. Title 24 specifies an interior noise exposure limit of 45 dB DNL from exterior noise sources.

The Title 24 standards also specify minimum noise insulation ratings for common partitions separating different dwelling units and dwelling units from interior common spaces. The standards specify that common walls and floor/ceiling assemblies must have a design Sound Transmission Class (STC) rating of 50 or higher. In addition, common floor/ceiling assemblies must have a design Impact Insulation Class (IIC) rating of 50 or higher. As design details for the interior partitions of the project were not available at the time of this study, an evaluation of the interior partitions has not been made.

### **City of Santa Cruz Noise Ordinance**

Section 24.14.260 of the City of Santa Cruz Noise Ordinance states that no person shall produce, suffer or allow to be produced by any machine, animal or device, or any combination of the same, on residential property, a noise level more than five dBA above the local ambient. The local ambient shall establish the maximum noise limit. More stringent noise limits may be established for specific uses through the conditions of a use permit. Statistically, over a one-hour period the ambient noise level is quantified using the L<sub>90</sub> noise descriptor. The L<sub>90</sub> value is the level of noise exceeded for 90% of the time period.

By definition in Section 24.22.488, the local ambient shall be no lower than 40 dBA.

The lowest ambient noise level at the site was measured to be 39 dBA. Thus, 40 dBA is considered the lowest ambient noise level at the property line and neighboring building setbacks. Therefore, the noise limit for the project mechanical equipment is 45 dBA.

The noise exposures shown below are without the application of mitigation measures and represent the noise environment for existing and project site conditions.

#### **A. Exterior Noise Exposures**

- The existing exterior noise exposure in the most impacted ground level rear yards along the north side of the building is 58 dB DNL. Under future traffic conditions, the noise exposure is expected to remain at 58 dB DNL. Thus, the noise exposures are within the 65 dB DNL limit of the City of Santa Cruz Noise Element standard.

- The exterior noise exposure at the most impacted planned building setback from Highway 1, 137 ft. from the centerline of the road, is 67 dB DNL. Under future traffic conditions, the noise exposure is expected to remain at 67 dB DNL.

**B. Interior Noise Exposures**

- The interior noise exposures in the most impacted living spaces closest to Highway 1 will be up 52 dB DNL under existing and future traffic conditions. Thus, the noise exposures will be up to 7 dB in excess of the City of Santa Cruz Noise Element and Title 24 standards.

**C. Project-Generated Noise from Mechanical Equipment**

Precise mechanical equipment has not been specified. Therefore, an assumed typical roof-top mechanical equipment scenario was developed. This study assumes that 32 air-conditioning condensers or heat pumps will be located on the roof in a line directly above the fourth floor central corridor. The AC units will be either 1.5 ton or 2-ton units as the dwelling unit floor areas range from 612 to 737 sq. ft. A typical Carrier 1.5 or 2 ton condensing unit will generate an A-weighted sound power level (L<sub>wa</sub>) of 76 dB.

Table I on page 5 provides the analysis for 32 roof-top air-conditioners. Note that the distance from the source to the receiver is the angled distance from the roof-top to the ground level elevation of 5 ft. The Sound Level @ 5 ft. represents the AC unit at a distance of 5 ft. which is the conversion of sound power to sound pressure. The total sound level of all mechanical units in operation is shown in the black cell at the bottom of the chart.

TABLE I								
Mechanical Equipment Analysis, dBA Leq								
Limit = 45 dBA Single-Family to East	Lwa	Distance AC to Parapet	Dist Parapet to Rec.	Dist AC to PL (5')	Sound Level @ 5 ft.	Sound Level @ Receiver	Barrier Reduction	Final Sound Level
1	76	5	27	51	65	45	10	35
2	76	9	27	54	65	44	11	33
3	76	13	27	57	65	44	13	31
4	76	17	27	59	65	43	13	30
5	76	21	27	62	65	43	14	29
6	76	25	27	66	65	43	14	28
7	76	29	27	69	65	42	15	28
8	76	33	27	72	65	42	15	27
9	76	37	27	75	65	41	15	26
10	76	41	27	79	65	41	16	26
11	76	45	27	82	65	41	16	25
12	76	49	27	86	65	40	16	24
13	76	53	27	89	65	40	16	24
14	76	57	27	93	65	40	16	23
15	76	61	27	97	65	39	16	23
16	76	65	27	100	65	39	16	23
17	76	69	27	104	65	39	17	22
18	76	73	27	108	65	38	17	22
19	76	77	27	111	65	38	17	21
20	76	81	27	115	65	38	17	21
21	76	85	27	119	65	37	17	21
22	76	89	27	123	65	37	17	20
23	76	93	27	126	65	37	17	20
24	76	97	27	130	65	37	17	20
25	76	101	27	134	65	36	17	19
26	76	105	27	138	65	36	17	19
27	76	109	27	142	65	36	17	19
28	76	113	27	146	65	36	17	19
29	76	117	27	149	65	35	17	18
30	76	121	27	153	65	35	17	18
31	76	125	27	157	65	35	17	18
32	76	129	27	161	65	35	17	18
							<b>TOTAL</b>	<b>41</b>

As shown above, the exterior noise exposures will be within the limits of the standards as significant acoustical shielding occurs from the shoulder of the slope from the elevated roadway. Noise mitigation measures for the exterior areas will not be required. However, the interior noise exposures will exceed the limits of the standards. Noise mitigation measures will be required for the noise impacted living spaces. The recommended measures are described in Section II, below. The mechanical equipment noise levels will be within the 45 dBA limit of the City of Santa Cruz Noise Ordinance standards. Noise mitigation measures for the mechanical equipment will not be required.

## **II. Recommendations**

### **A. Interior Noise Controls**

To achieve compliance with the 45 dB DNL standards of the City of Santa Cruz Noise Element and Title 24, the following noise control measures will be required. In addition, general construction measures affecting the building shell are also recommended, as described in Appendix B.

- Maintain closed at all times all windows and glass doors of living spaces of the project with a direct or side view of Highway 1, i.e., facing west, north or east. Install windows and glass doors rated minimum Sound Transmission Class (STC) 32 at these units.
- Provide some type of mechanical ventilation for all living spaces with a closed window condition.

Please see Figure 1 for the locations and STC ratings of the noise impacted windows.

When windows and glass doors are maintained closed for noise control, some type of mechanical ventilation to assure a habitable environment must be provided. The windows specified to be maintained closed are to be operable, as the requirement does not imply a “fixed” condition. All other windows and glass doors of the project and all bathroom windows may have any type of glazing and may be kept opened as desired unless the bathroom is an integral part of a living space without a closeable door.

The windows and doors shall be installed in an acoustically-effective manner. To achieve an acoustically-effective window construction, the sliding window panels must form an air-tight seal when in the closed position and the window frames must be caulked to the wall opening around their entire perimeter with a non-hardening caulking compound to prevent sound infiltration. Exterior doors must seal air-tight around the full perimeter when in the closed position.

Please be aware that many dual-pane window assemblies have inherent noise reduction problems in the traffic noise frequency spectrum due to resonance that occurs within the air space between the window lites, and the noise reduction capabilities vary from manufacturer to manufacturer. Therefore, the acoustical test report of all sound rated windows and doors should be reviewed by a qualified acoustician to ensure that the chosen windows and doors will adequately reduce traffic noise to acceptable levels.

The implementation of the above recommended measures will reduce excess noise exposures to achieve compliance with the 45 dB DNL interior standards of the City of Santa Cruz Noise Element and Title 24.

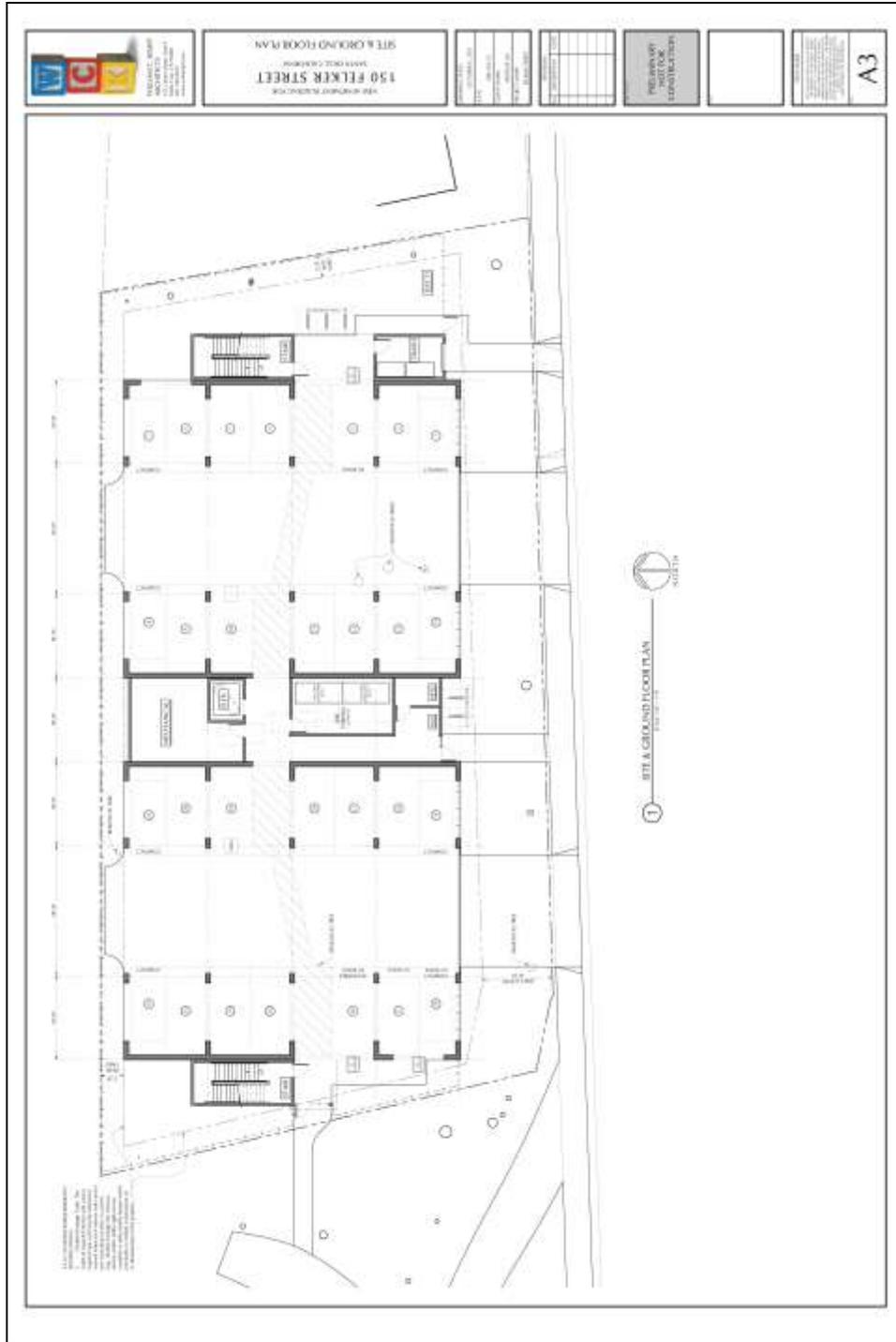


### **III. Site, Traffic and Project Descriptions**

The planned development site is located at 150 Felker Street along the south side of Highway 1 in Santa Cruz. The site currently contains a single-story office building. The site slopes up slightly from west to east and is at-grade with Felker Street and the surrounding land uses. Highway 1 slopes up from west to east and ranges from 14 ft. to 21 ft. above the site. Surrounding land uses include a vacant parcel adjacent to the west, Highway 1 adjacent to the north, and single-family residential adjacent to the east and across Felker Street to the south.

The on-site noise environment is controlled primarily by vehicle traffic sources on Highway 1, which carries an existing traffic volume of 49,500 vehicles ADT, Ref. (d).

The planned project includes the construction of 4-story building with 32 apartment units on the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> floors. Parking and building services will be located on the 1<sup>st</sup> floor. A narrow rear yard area will be located at the ground level along the north side of the building. Ingress and egress to the project will be by way of project driveways off of Felker Street. The Site Plan is shown on Figure 2 on the following page.

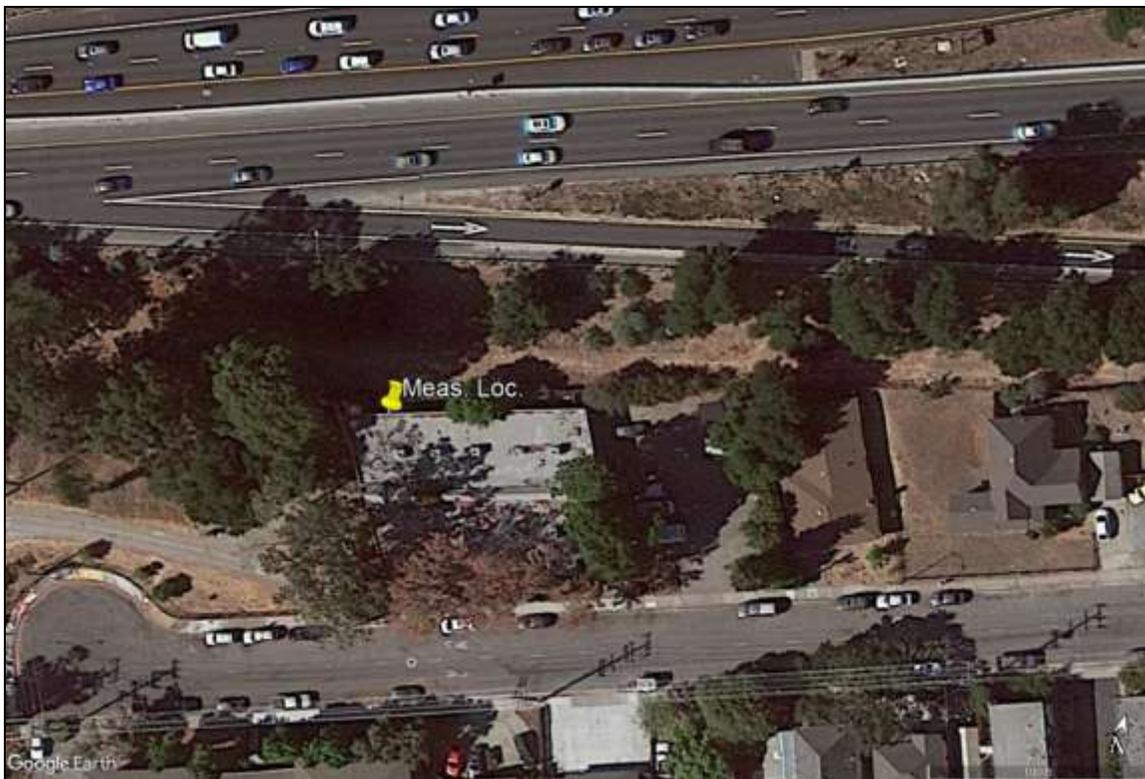


**FIGURE 2 – Site Plan**

#### IV. Analysis of the Noise Levels

##### A. Existing Noise Levels

To determine the existing noise environment at the site, continuous recordings of the sound levels were made on November May 20-21, 2020 on the roof of the existing building on the site. The roof elevation is 14 ft. above sea level. The sound meter was placed on a mast 8 ft. above the roof elevation at 22 ft. above sea level and along the northerly edge of the roof. The measurement location was 143 ft. from the centerline of Highway 1. The measurement location is shown on Figure 3, below.



**FIGURE 3 – Noise Measurement Locations**

The sound levels were recorded and processed using a Larson-Davis Model 812 Precision Integrating Sound Level Meter. The meter yields, by direct readout, a series of descriptors of the sound levels versus time, as described in Appendix B. The measured descriptors include the  $L_1$ ,  $L_{10}$ ,  $L_{50}$ , and  $L_{90}$ , i.e., those levels exceeded for 1%, 10%, 50%, and 90% of the time. Also measured were the maximum and minimum levels and the continuous equivalent-energy levels ( $L_{eq}$ ), which are used to calculate the DNL. The measurements were made for a continuous period of 24 hours and included representative hours of the daytime and nighttime periods of the DNL index. The results of the measurements are shown in the data tables in Appendix C.

As shown in the data tables, the  $L_{eq}$ 's at the measurement location 143 ft. from the centerline of Highway 1 and with a direct view of the road ranged from 62.6 to 66.7 dBA during the daytime and from 51.8 to 63.5 dBA at night.

Vehicular traffic noise dissipate at the rate of 3 to 6 dB for each doubling of distance from the source and contains a wide spectrum of frequency components (from 100 to 10,000 Hz), which are associated with engine, tire, drive-train, exhaust and other sources. These frequency components are centered primarily in the 250 and 500 Hz octave bands and were used in determining the noise control measures for this project.

## **B. Future Noise Levels**

Future traffic volume projections for Highway 1 were not available from CalTrans. To make an estimate of future volume, reference was made to the reported 1997 volume of 59,000 vehicles ADT, Ref. (e). The 2020 volume was reported to be 49,500 vehicles ADT. Even though the traffic volumes have decreased over the past 23 years, we estimate that the future traffic volume will be similar to current levels over a 20 year horizon resulting in no substantial change in the traffic noise environment at the site.

#### **IV. Evaluations of the Noise Exposures**

##### **A. Exterior Noise Exposures**

To evaluate the on-site noise exposures against the City of Santa Cruz standards, the DNL for the survey location was calculated by decibel averaging of the  $L_{eq}$ 's as they apply to the daily time periods of the DNL index. The DNL is a 24-hour noise descriptor that uses the measured  $L_{eq}$  values to calculate a 24-hour time-weighted average noise exposure with a 10 decibel factor added to nighttime noise to account for the increased human sensitivity to noise at night. Adjustments were also made to the measured noise levels to account for differences in distance between the measurement location and the building setback and receiver locations using methods established by the Highway Research Board, Ref. (f). The formula used to calculate the DNL is described in Appendix B.

The results of the calculations indicate that the exterior noise exposure at the measurement location 100 ft. from the centerline of Highway 1 and with a direct view of the road is 67 dB DNL. Under future traffic conditions, the noise exposure is expected to remain at 67 dB DNL.

At the planned minimum building setback of 137 ft. from the centerline of Highway 1 the noise exposures will also be 67 dB DNL under existing and future traffic conditions.

At the ground floor exterior rear yard area along the north side of the building, the noise exposures were calculated to be 58 dB DNL under existing and future traffic conditions. This includes a 13 dB noise reduction due to the shoulder of the slope of the elevated roadway. Thus, the noise exposures in the rear yards will be within the 65 dB DNL limit of the City of Santa Cruz Noise Element standards.

**B. Interior Noise Exposures**

To evaluate the interior noise exposures in project living spaces against the standards of City of Santa Cruz Noise Element and Title 24, a 15 dB reduction factor was applied to the exterior noise exposures at the building setbacks to represent the attenuation provided by the building shell under an *annual-average* condition. The *annual-average* window condition assumes that windows will have standard dual-pane thermal insulating glass and are kept open up to 50% of the time for natural ventilation.

The interior noise exposures in the most impacted living spaces closest to Highway 1 will be up to 52 dB DNL under existing and future traffic conditions. Thus, the noise exposures will be up to 7 dB in excess of the City of Santa Cruz Noise Element and Title 24 standards.

As shown by the above evaluations, the exterior noise exposures within the common areas will be within the limits of the City of Santa Cruz Noise Element standards. Noise mitigation measures for these areas will not be required.

The interior noise exposures will exceed the limits of the standards. Mitigation measures for the interior living spaces will be required. The recommended measures are described in Section II of this report.

## V. Construction Noise and Vibration Analysis

Short-term noise impacts may be created during clearing of the site and the construction of the project. Demolition equipment will consist primarily of hand power tools, a small crane and excavators. Construction equipment will consist of small bulldozers, loaders, backhoes, excavators, graders, cranes, forklifts, generators and air compressors. Demolition/construction equipment noise levels range from 76 to 88 dBA at a 50 ft. distance from the source, and has a potential to disturb residences adjacent to the west, north and across Delaware Street to the south. Very high noise level equipment, such as pile drivers and rock drills are not expected to be used on this project.

A table of construction equipment (mostly earthwork equipment, which is usually the noisiest, taken from the Federal Transit Administration Noise and Vibration Impact Assessment is provided on page 16. The noise levels for each item of equipment, not all of which will be used on this project, are reported for a standard distance of 50 ft. None of the construction equipment used for this project will generate noise levels higher than 90 dBA at 50 ft. No extreme noise generators, such as pile driving, will be used on this project. Noise from construction equipment dissipates at the rate of 6 dB per doubling of the distance from the source to the receiver.

Since construction is carried out in several reasonably discrete phases, each will have its own mix of equipment and consequently, its own noise characteristics. Generally, the site preparation requires the use of heavy equipment such as bulldozers, loaders, graders, concrete trucks and diesel trucks. Construction of the building includes haul trucks, cranes, forklifts, pumps, air compressors and powered and manual hand tools (saws, nail guns, sprayers). Once the shells of the buildings are completed with the windows installed, much of the construction noise will be contained inside the buildings.

**Table 7-1 Construction Equipment Noise Emission Levels \***

Equipment	Typical Noise Level 50 ft. from Source, dBA
Air Compressor	80
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	82
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	80
Paver	85
Pile-driver (Impact)	101
Pile-driver (Sonic)	95
Pneumatic Tool	85
Pump	77
Rail Saw	90
Rock Drill	95
Roller	85
Saw	76
Scarifier	83
Scraper	85
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	84

\*\*This Table is copied from the FTA Transit Noise and Vibration Impact Assessment Manual, pg. 176.

Construction activities can produce varying amounts of ground-borne vibration, which depend on the type of equipment used and various methods. Vibration is produced by the equipment operation and the vibrational waves travel through the ground/soil that diminish over distance. It is rare that construction vibration is intense enough to cause damage to existing structures. However, due to the close proximity of the light framed building to the west and the masonry building to the north, a qualitative analysis of vibration is warranted.

Ground-borne vibration is typically reported in terms of “peak particle velocity” or PPV, and sometimes reported in terms of decibels of vibration, notated as VdB, which is a level of vibration ( $L_v$ ). The use of PPV is more common for construction equipment and methods. Table II, below, provides building damage criteria from construction vibration established by the Federal Transit Administration, Ref. (h).

<b>TABLE II</b>		
<b>Construction Vibration Damage Criteria</b>		
Building Category	PPV (in/sec)	Approx. $L_v$ (VdB)
I. Reinforced-concrete, steel or timber (no plaster)	0.50	102
II. Engineered concrete and masonry (no plaster)	0.30	98
III. Non-engineered timber and masonry buildings	0.20	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

\*\* RMS velocity in decibels (VdB) re: 1 micro-inch/second

The adjacent residential building to the east is a standard wood-framed, wood-sided structure. The type of foundation is unknown, but is likely concrete. This structure falls into Building Category III where the vibration limit is 0.20 in/sec PPV.

The contractors used for the demolition of the site and construction of the project have not yet been selected, nor has a construction schedule and list of equipment been developed. Table III, below, provides a list of typical construction equipment, their vibration levels at 25 ft. reference distances, the vibration levels at the building setbacks of the very near residential buildings to the west and north. Also shown are the distances each item of equipment must stay away from the respective adjacent structures to limit the vibration levels to no more than 0.20 in/sec PPV at the residential building to the east. As shown in Table III, nearly all of the equipment will generate ground-borne vibration levels in excess of the 0.20 in/sec. residential criterion due to the very close proximities of this building to the construction site. Due to the small size of the site, most of the vibration inducing equipment will be on the smaller size.

<b>TABLE III</b>			
<b>Construction Equipment Vibration Levels, in/sec PPV</b>			
<b>Dist. to Res. To East, ft.</b>	<b>5</b>		
<b>EQUIPMENT</b>	<b>Reference Vibration at d, ft.</b>	<b>Vibration Level</b>	<b>Dist for</b>
<b>d =</b>	<b>25</b>	<b>@ Res. To East</b>	<b>0.2 PPV limit</b>
Excavator	0.089	<b>1.0</b>	15
Vibratory Roller	0.210	<b>2.3</b>	26
Hoe Ram	0.089	<b>1.0</b>	15
Large Bulldozer	0.089	<b>1.0</b>	15
Loaded Trucks	0.076	<b>0.8</b>	13
Jackhammer	0.035	<b>0.4</b>	8
Small Bulldozer	0.003	0.0	2
Backhoe	0.088	<b>1.0</b>	14
Compactor	0.240	<b>2.7</b>	28
concrete Mixer	0.080	<b>0.9</b>	14
Concrete Pump	0.080	<b>0.9</b>	14
Crane	0.008	0.1	3
Dump Truck	0.080	<b>0.9</b>	14
Front End Loader	0.088	<b>1.0</b>	14
Grader	0.088	<b>1.0</b>	14
Hydra Break Ram*	0.040	<b>0.4</b>	9
Soil Sampling Rig	0.088	<b>1.0</b>	14
Paver	0.080	<b>0.9</b>	14
Pickup Truck	0.080	<b>0.9</b>	14
Slurry Trenching	0.016	0.2	5
Tractor	0.080	<b>0.9</b>	14
Vibratory Roller (lge)	0.477	<b>5.3</b>	45
Vibratory Roller (sm)	0.176	<b>2.0</b>	23
Clam Shovel*	0.208	<b>2.3</b>	26
Rock Drill	0.088	<b>1.0</b>	14
* Transient vibration levels			

## **VI. Construction Noise and Vibration Reduction**

Mitigation of the demolition/construction phase noise at the site can be accomplished by using quiet or "new technology" equipment. The greatest potential for noise abatement of current equipment should be the quieting of exhaust noises by use of improved mufflers. It is recommended that all internal combustion engines used at the project site be equipped with a type of muffler recommended by the vehicle manufacturer. In addition, all equipment should be in good mechanical condition so as to minimize noise created by faulty or poorly maintained engine, drive-train and other components. Demolition and construction noise can also be mitigated by the following measures.

As additional noise reduction benefits can be achieved by appropriate selection of equipment utilized for various operations, subject to equipment availability and cost considerations, the following recommendations for minimizing impacts on the surrounding area are offered:

### **OPERATIONAL AND SITUATIONAL CONTROLS**

- No material deliveries are allowed on Sundays or Federal Holidays.
- Minimize material movement along the east side of the site.
- Locate stockpiles adjacent to residential neighbors as much as possible to help shield residences from on-site noise generation.
- Keep mobile equipment (haul trucks, concrete trucks, etc.) off of local streets near residences as much as possible.
- Utilize temporary power service from the utility company in lieu of generators wherever possible.

- Keep vehicle paths graded smooth as rough roads and paths can cause significant noise and vibration from trucks (particularly empty trucks) rolling over rough surfaces. Loud bangs and ground-borne vibration can occur.
- All work within 10 ft. of the property lines common with residential uses or noise sensitive uses should be performed by hand.

### **INTERIOR WORK**

- For interior work, the windows of the interior spaces facing neighboring residences where work is being performed shall be kept closed while work is proceeding.
- Noise generating equipment indoors should be located within the building to utilize building elements as noise screens.

### **EQUIPMENT**

- Use the lowest vibration inducing equipment when within the distance limits shown in Table III. Small grading and earth moving equipment, such as “Bobcat” size equipment should be used.
- Place long-term stationary equipment as far away from the residential area as possible.
- Circular saws, miter or chop saws and radial arm saws shall be used no closer than 50 ft. from any residential property line unless the saw is screened from view by any and all residences using an air-tight screen material of at least 2.0 lbs./sq. ft. surface weight, such as 3/4” plywood.
- Music shall not be audible off site.

- Earth Removal: Use scrapers as much as possible for earth removal, rather than the noisier loaders and hauling trucks.
- Building Construction: Power saws should be shielded or enclosed where practical to decrease noise emissions. Nail guns should be used where possible as they are less noisy than manual hammering.
- Generators and Compressors: Use generators and compressor that are housed in acoustical enclosures rather than weather enclosures or none at all.
- Backfilling: Use a backhoe for backfilling, as it is less costly and quieter than either dozers or loaders.
- Ground Preparation: Use a motor grader rather than a bulldozer for final grading. Wheeled heavy equipment is less noisy than track equipment. Utilize wheeled equipment rather than steel track equipment whenever possible, with the exception of work within the vibration distances shown in Table III. The soil conditions at the site indicate that wheeled equipment may generate higher levels of ground vibration than tracked equipment. Small, rubber tracked equipment, such as skid steers, would produce the lowest levels of noise and vibration.
- Use electrically powered tools rather than pneumatic tools whenever possible.
- The greatest potential for noise abatement of current equipment should be the quieting of exhaust noises by use of improved mufflers.
- It is recommended that all internal combustion engines used at the project site be equipped with a type of muffler recommended by the vehicle manufacturer.

- All equipment should be in good mechanical condition so as to minimize noise created by faulty or poorly maintained engines, drive-trains and other components. Worn, loose or unbalanced parts or components shall be maintained or replaced to minimize noise and vibration.

## **NOISE COMPLAINT MANAGEMENT**

- Designate a noise complaint officer. The officer shall be available at all times during construction hours via both telephone and email. Signs shall be posted at site entries. A sample is shown below.

<p style="text-align: center;"><b>NOISE COMPLAINTS</b></p> <p style="text-align: center;">FOR CONCERNS REGARDING CONSTRUCTION NOISE PLEASE CONTACT:</p> <p style="text-align: center;">John Doe <a href="mailto:JohnDoe@ConstructionCo.com">JohnDoe@ConstructionCo.com</a> OPERATIONS MANAGEMENT ENGINEER CALL CENTER: (111) 111-1111</p>
---

- Notify, in writing, all residents within 300 ft. of the project perimeter and adjacent commercial uses of construction. The notification shall contain the name, phone number and email address of the noise complaint officer. A flyer may be placed at the doors of the residences.
- A log of all complaints shall be maintained. The logs shall contain the name and address of the complainant, the date and time of the complaint, the nature/description of the noise source, a description of the remediation attempt or the reason remediation could not be attempted.

This report presents the results of a noise assessment study for the planned multi-family development at 150 Felker Street in Santa Cruz. The study findings for current conditions are based on field measurements and other data and are correct to the best of our knowledge. Future noise level predictions and the recommendations were based on information provided by CalTrans and estimates made by Edward L. Pack Associates, Inc. However, significant changes in the future traffic volumes, speed limits, motor vehicle technology, noise regulations, or other changes beyond our control may produce long range noise results different from our estimates. If you have any questions or would like an elaboration on this report, please call me.

Sincerely,

EDWARD L. PACK ASSOC., INC.

A handwritten signature in blue ink, reading "Jeffrey K. Pack", is written over a horizontal line.

Jeffrey K. Pack  
President

Attachment: Appendices A, B and C

## APPENDIX A

### References

- (a) Site Plan, New Apartment Building for 150 Felker Street, by William C. Kempf Architects, October 6, 2021
- (b) City of Santa General Plan 2030, Chapter 8, “Hazards, Safety and Noise”, Adopted, June 26, 2012
- (c) California Code of Regulations, Title 24, Volume 1, , Part 2 Section 1206 “Sound Transmission”, Subsection 1206.4 (Allowable Interior Noise Levels), Revised 2019
- (d) City of Santa Cruz Municipal Code, Zoning Ordinance, Part 2 – Performance Standards, Section 24.14.260 Noise, 24.22.488 Local Ambient, 1985
- (e) State of California Department of Transportation, Division of Traffic Operations, <http://www.dot.ca.gov/trafficops/census>, 2020-AADT.xlsx
- (f) 1997 Traffic Volumes on California State Highways, State of California Department of Transportation, Division of Traffic Operations, June 1998
- (g) Highway Research Board, “Highway Noise-A Design Guide for Highway Engineers”, Report 117, 197
- (h) Federal Transit Administration, “Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123 Prepared by John A. Volpe National Transportation Systems Center, September 2018

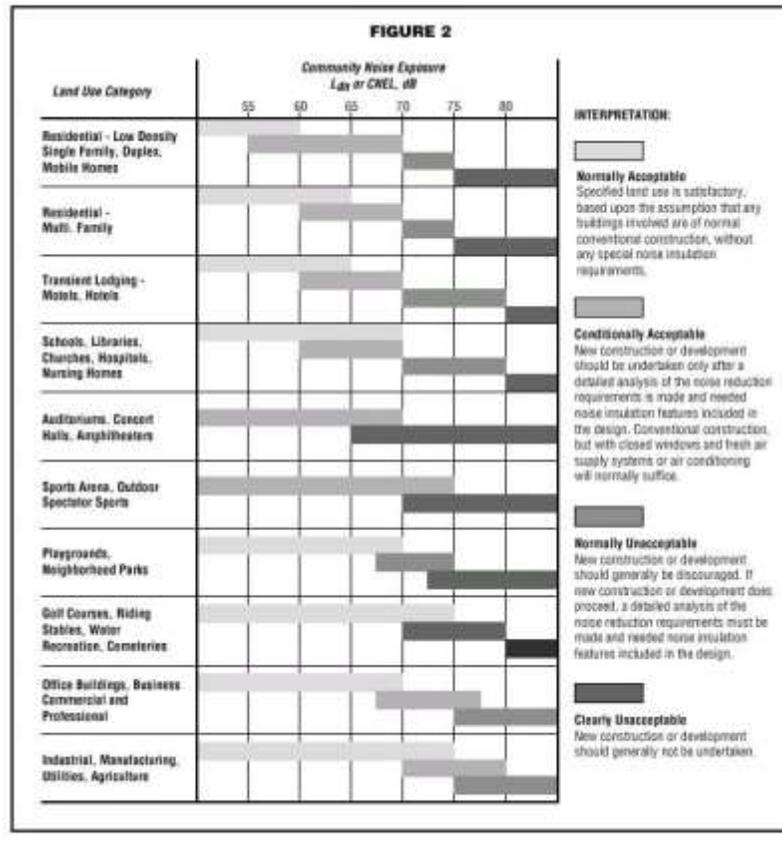
## APPENDIX B

### Noise Standards, Terminology, Instrumentation, Ventilation Requirements and Building Shell Controls

#### 1. Noise Standards

##### A. City of Santa Cruz Noise Element Standards

The City of Santa Cruz General Plan 2030, adopted June 26, 2012, references the Land Use Compatibility chart of the State of California General Plan Guidelines. The Noise Element provides a series of noise goals for various occupancies and uses. The noise exposures are in terms of dB Day-Night Level (DNL or  $L_{dn}$ ).



### **Goal HZ3 Noise levels compatible with occupancy and use**

HZ3.1 Maintain or reduce existing noise levels and control excessive noise.

HZ3.1.1 Require land uses to operate at noise levels that do not significantly increase surrounding ambient noise.

HZ3.1.2 Use site planning and design approaches to minimize noise impacts from new development on surrounding land uses.

HZ3.1.3 Ensure that construction activities are managed to minimize overall noise impacts on surrounding land uses.

HZ3.1.4 Minimize the impacts of intermittent urban noise on residents.

HZ3.1.5 Develop a system to monitor construction noise impacts on surrounding land uses.

HZ3.1.6 Require evaluation of noise mitigation measures for projects that would substantially increase noise.

HZ3.1.7 Protect residential areas from excessive noise from traffic and from road projects.

HZ3.1.8 Require environmental review and mitigation of roadway projects that may significantly increase the average day/night noise levels.

HZ3.1.9 Limit truck traffic in residential and commercial areas to designated truck routes.

HZ3.1.10 Where noise reduction would be beneficial, consider installing quiet pavement surfaces as part of repaving projects.

HZ3.1.11 Require soundwalls, earth berms, setbacks, and other noise reduction techniques for new development when appropriate and necessary as conditions of approval.

HZ3.2 Ensure that noise standards are met in the siting of noise-sensitive uses.

HZ3.2.1 Apply noise and land use compatibility table and standards to all new residential, commercial, and mixed-use proposals, including condominium conversions, in accordance with standards set forth in the Land Use-Noise Compatibility Standards Figure 2.

HZ3.2.2 Establish DNL noise level targets of 65 dB for outdoor activity areas in new multifamily residential developments.

HZ3.2.3 Require that interior noise in all new multifamily housing not exceed a DNL of 45 dB with the windows and doors closed (State of California Noise Insulation Standards) and extend the requirement to single-family homes.

**B. Title 24 Noise Standards**

**2019 California Building Code, Volume 1, Part 2**

**SECTION 1206 – SOUND TRANSMISSION**

**1206.1 Scope.** This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent dwelling units and sleeping units or between dwelling units and sleeping units and adjacent public areas such as halls, corridors, stairways or service areas.

**1206.2 Air-borne sound.** Walls, partitions and floor/ceiling assemblies separating dwelling units and sleeping units from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for air-borne noise when tested in accordance to ASTM E-90. Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures in ASTM E90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed lined, insulated or otherwise treated to maintain the required ratings. The requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.

**1206.3 Structure-borne sound.** Floor/ceiling assemblies between dwelling units and sleeping units or between a dwelling unit or sleeping unit and a public or service area with the structure shall have an impact insulation class rating of not less than 50, or not less than 45 if field tested, when tested in accordance with ASTM E-492. Alternatively, the impact insulation class of floor-ceiling assemblies shall be established by engineering analysis based on a comparison of floor-ceiling assemblies having impact insulation class ratings as determined by the test procedures in ASTM E492.

***Exception:** Impact sound insulation is not required for floor/ceiling assemblies over non-habitable rooms or spaces not designed to be occupied, such as garages, mechanical rooms or storage areas.*

**1206.4 Allowable interior noise levels.** *Interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric shall be either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), consistent with the noise element of the local general plan.*

**1206.5 Acoustical control. [BSC-CG]** *See California Green Building Standards code, Chapter 5, Division 5.5 for additional sound transmission requirements.*

## 2. Terminology

### A. Statistical Noise Levels

Due to the fluctuating character of urban traffic noise, statistical procedures are needed to provide an adequate description of the environment. A series of statistical descriptors have been developed which represent the noise levels exceeded a given percentage of the time. These descriptors are obtained by direct readout of the sound measuring instruments. Some of the statistical levels used to describe community noise are defined as follows:

- L<sub>1</sub> - A noise level exceeded for 1% of the time.
- L<sub>10</sub> - A noise level exceeded for 10% of the time, considered to be an "intrusive" level.
- L<sub>50</sub> - The noise level exceeded 50% of the time representing an "average" sound level.
- L<sub>90</sub> - The noise level exceeded 90 % of the time, designated as a "background" noise level.
- L<sub>eq</sub> - The continuous equivalent-energy level is that level of a steady noise having the same sound energy as a given time-varying noise. The L<sub>eq</sub> represents the decibel level of the time-averaged value of sound energy or sound pressure squared and is the descriptor used to calculate the DNL and CNEL.

**B. Day-Night Level (DNL)**

Noise levels utilized in the standards are described in terms of the Day-Night Level (DNL). The DNL rating is determined by the cumulative noise exposures occurring over a 24-hour day in terms of A-Weighted sound energy. The 24-hour day is divided into two subperiods for the DNL index, i.e., the daytime period from 7:00 a.m. to 10:00 p.m. and the nighttime period from 10:00 p.m. to 7:00 a.m. A weighting factor of 10 dBA is applied (added) to the noise levels occurring during the nighttime period to account for the greater sensitivity of people to noise during these hours. The DNL is calculated from the measured  $L_{eq}$  in accordance with the following mathematical formula:

$$DNL = \left[ \left[ (10 \log_{10}(10^{\sum L_{eq}(7-10)})) \times 15 \right] + \left[ \left( (10 \log_{10}(10^{\sum L_{eq}(10-7)}) + 10) \right) \times 9 \right] \right] / 24$$

**C. A-Weighted Sound Level**

The decibel measure of the sound level utilizing the "A" weighted network of a sound level meter is referred to as "dBA". The "A" weighting is the accepted standard weighting system used when noise is measured and recorded for the purpose of determining total noise levels and conducting statistical analyses of the environment so that the output correlates well with the response of the human ear.

### **3. Instrumentation**

The on-site field measurement data were acquired by the use of one of the instruments specified below, which provides a direct readout of the L exceedance statistical levels including the equivalent-energy level ( $L_{eq}$ ). Input to the instrument was provided by a microphone extended to a height of 5 ft. above the ground on using a tripod or mast. The "A" weighting network and the "Fast" response setting of the instruments were used in conformance with the applicable standards. The instruments conform to American National Standards Institute (ANSI) standard S1.4 for Type I instruments, and all instrumentation was acoustically calibrated before and after field tests to assure accuracy.

Instruments used for field surveys:

Larson-Davis Model 812 Integrating Sound Level Meter

Larson-Davis 2900 Real Time Analyzer

Bruel & Kjaer Model 2231 Precision Sound Level Meter

Larson-Davis Model 831 Integrating Sound Level Meter

### **4. Mechanical Ventilation Requirements**

California Mechanical Code Chapter 4- Ventilation Air

402.3 Mechanical Ventilation

Where natural ventilation is not permitted by this section or the building code, mechanical ventilation systems shall be designed, constructed, and installed to provide a method of supply air and exhaust air. Mechanical ventilation systems shall include controls, manual or automatic, that enable the fan system to operate wherever the spaces served are occupied. The system shall be designed to maintain minimum outdoor airflow as required by Section 403.0 under any load conditions.

## 5. **Building Shell Controls**

The following additional precautionary measures are required to assure the greatest potential for exterior-to-interior noise attenuation by the recommended mitigation measures. These measures apply at those units where closed windows are required:

- Unshielded entry doors having a direct or side orientation toward the primary noise source must be 1-5/8" or 1-3/4" thick, insulated metal or solid-core wood construction with effective weather seals around the full perimeter. Mail slots should not be used in these doors or in the wall of a living space, as a significant noise leakage can occur through them.
- If any penetrations in the building shell are required for vents, piping, conduit, etc., sound leakage around these penetrations can be controlled by sealing all cracks and clearance spaces with a non-hardening caulking compound.
- Ventilation openings shall not compromise the acoustical integrity of the building shell.
- Spray-in or expandable foams are not acceptable acoustical sealants. However, they may be used to fill a large void between a rough frame and a window or door frame provided that an appropriate caulking bead is inserted over the foam filler to provide an air-tight seal.

**APPENDIX C**

**On-Site Noise Measurement Data and Calculation Tables**

## DNL CALCULATIONS

CLIENT: ABC CONSTRUCTION, LLC  
 FILE: 53-054  
 PROJECT: 150 FELKER ST.  
 DATE: 11/17-18/2021  
 SOURCE: HIGHWAY 1

LOCATION 1	Highway 1		
Dist. To Source	143 ft.		
TIME	Leq	$10^{Leq/10}$	
7:00 AM	65.1	3235936.6	
8:00 AM	65.0	3162277.7	
9:00 AM	64.5	2818382.9	
10:00 AM	65.3	3388441.6	
11:00 AM	64.8	3019951.7	
12:00 PM	65.7	3715352.3	
1:00 PM	65.2	3311311.2	
2:00 PM	65.2	3311311.2	
3:00 PM	65.8	3801894.0	
4:00 PM	66.7	4677351.4	
5:00 PM	65.1	3235936.6	
6:00 PM	65.0	3162277.7	
7:00 PM	63.9	2454708.9	
8:00 PM	63.8	2398832.9	
9:00 PM	62.6	1819700.9	SUM= 47513667
10:00 PM	60.0	1000000.0	Ld= 76.8
11:00 PM	57.3	537031.8	
12:00 AM	54.7	295120.9	
1:00 AM	54.1	257039.6	
2:00 AM	51.8	151356.1	
3:00 AM	54.8	301995.2	
4:00 AM	57.1	512861.4	
5:00 AM	60.3	1071519.3	
6:00 AM	63.5	2238721.1	SUM= 6365645
		1.0 Ln=	68.0
	Daytime Level=	76.8	
	Nighttime Level=	78.0	
	<b>DNL=</b>	<b>67</b>	
	24-Hour Leq=	63.5	

## Noise (EA Level Reviews)

General requirements	Legislation	Regulation
HUD's noise regulations protect residential properties from excessive noise exposure. HUD encourages mitigation as appropriate.	Noise Control Act of 1972  General Services Administration Federal Management Circular 75-2: "Compatible Land Uses at Federal Airfields"	Title 24 CFR 51 Subpart B
References		
<a href="https://www.hudexchange.info/programs/environmental-review/noise-abatement-and-control">https://www.hudexchange.info/programs/environmental-review/noise-abatement-and-control</a>		

### 1. What activities does your project involve? Check all that apply:

- New construction for residential use

NOTE: HUD assistance to new construction projects is generally prohibited if they are located in an Unacceptable zone, and HUD discourages assistance for new construction projects in Normally Unacceptable zones. See 24 CFR 51.101(a)(3) for further details.

→ *Continue to Question 2.*

- Rehabilitation of an existing residential property

NOTE: For major or substantial rehabilitation in Normally Unacceptable zones, HUD encourages mitigation to reduce levels to acceptable compliance standards. For major rehabilitation in Unacceptable zones, HUD strongly encourages mitigation to reduce levels to acceptable compliance standards. See 24 CFR 51 Subpart B for further details.

→ *Continue to Question 2.*

- A research demonstration project which does not result in new construction or reconstruction, interstate, land sales registration, or any timely emergency assistance under disaster assistance provisions or appropriations which are provided to save lives, protect property, protect public health and safety, remove debris and wreckage, or assistance that has the effect of restoring facilities substantially as they existed prior to the disaster

→ *Based on the response, the review is in compliance with this section. Continue to the Worksheet Summary below.*

- None of the above

→ *Based on the response, the review is in compliance with this section. Continue to the Worksheet Summary below.*

**2. Complete the Preliminary Screening to identify potential noise generators in the vicinity (1000' from a major road, 3000' from a railroad, or 15 miles from an airport).**

**Indicate the findings of the Preliminary Screening below:**

There are no noise generators found within the threshold distances above.

→ *Based on the response, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide a map showing the location of the project relative to any noise generators.*

Noise generators were found within the threshold distances.

→ *Continue to Question 3.*

**3. Complete the Noise Assessment Guidelines to quantify the noise exposure. Indicate the findings of the Noise Assessment below:**

Acceptable: (65 decibels or less; the ceiling may be shifted to 70 decibels in circumstances described in §24 CFR 51.105(a))

**Indicate noise level here:**

→ *Based on the response, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide noise analysis, including noise level and data used to complete the analysis.*

Normally Unacceptable: (Above 65 decibels but not exceeding 75 decibels; the floor may be shifted to 70 decibels in circumstances described in 24 CFR 51.105(a))

**Indicate noise level here:**

If project is rehabilitation:

→ *Continue to Question 4. Provide noise analysis, including noise level and data used to complete the analysis.*

If project is new construction:

**Is the project in a largely undeveloped area<sup>1</sup>?**

No

→ *Continue to Question 4. Provide noise analysis, including noise level and data used to complete the analysis, and any other relevant information.*

---

<sup>1</sup> A largely undeveloped area means the area within 2 miles of the project site is less than 50 percent developed with urban uses and does not have water and sewer capacity to serve the project.

Yes

→ Your project requires completion of an Environmental Impact Statement (EIS) pursuant to 51.104(b)(1)(i). Elevate this review to an EIS-level review.

Unacceptable: (Above 75 decibels)

Indicate noise level here:

If project is rehabilitation:

HUD strongly encourages conversion of noise-exposed sites to land uses compatible with high noise levels. Consider converting this property to a non-residential use compatible with high noise levels.

→ Continue to Question 4. Provide noise analysis, including noise level and data used to complete the analysis, and any other relevant information.

If project is new construction:

**Your project requires completion of an Environmental Impact Statement (EIS) pursuant to 51.104(b)(1)(i). You may either complete an EIS or provide a waiver signed by the appropriate authority. Indicate your choice:**

Convert to an EIS

→ Provide noise analysis, including noise level and data used to complete the analysis.

Continue to Question 4.

Provide waiver

→ Provide an Environmental Impact Statement waiver from the Certifying Officer or the Assistant Secretary for Community Planning and Development per 24 CFR 51.104(b)(2) and noise analysis, including noise level and data used to complete the analysis.

Continue to Question 4.

- 4. HUD strongly encourages mitigation be used to eliminate adverse noise impacts. Explain in detail the exact measures that must be implemented to mitigate for the impact or effect, including the timeline for implementation. This information will be automatically included in the Mitigation summary for the environmental review.**

Mitigation as follows will be implemented:

The following noise control measures will be required to achieve compliance with the 45 dB DNL standards of the City of Santa Cruz Noise Element and Title 24.

- Maintain closed at all times all windows and glass doors of living spaces of the project with a direct or side view of Highway 1, i.e., facing west, north or east. Install windows and glass doors rated minimum Sound Transmission Class (STC) 32 at these units.
- The windows specified to be maintained closed are to be operable, as the requirement does not imply a “fixed” condition. All other windows and glass doors of the project and all bathroom windows may have any type of glazing and may be kept open as desired unless the bathroom is an integral part of a living space without a closeable door.
- The windows and doors shall be installed in an acoustically-effective manner. To achieve an acoustically-effective window construction, the sliding window panels must form an air-tight seal when in the closed position and the window frames must be caulked to the wall opening around their entire perimeter with a non-hardening caulking compound to prevent sound infiltration. Exterior doors must seal air-tight around the full perimeter when in the closed position.
- A qualified acoustician should review the acoustical test report of all sound-rated windows and doors to ensure that the chosen windows and doors will adequately reduce traffic noise to acceptable levels.
- Provide some type of mechanical ventilation for all living spaces with a closed window condition.

→ Provide drawings, specifications, and other materials as needed to describe the project’s noise mitigation measures. Continue to the Worksheet Summary.

No mitigation is necessary.

**Explain why mitigation will not be made here:**

→ Continue to the Worksheet Summary.

### **Worksheet Summary**

#### **Compliance Determination**

Provide a clear description of your determination and a synopsis of the information that it was based on, such as:

- Map panel numbers and dates
- Names of all consulted parties and relevant consultation dates
- Names of plans or reports and relevant page numbers

- Any additional requirements specific to your region

*The project involves the development of noise sensitive uses and is located within 1,000' of and within line-of-sight of an arterial or greater roadway but is not located within line-of-sight of an active railroad line.*

- The project site is an urban site located in the city center and is located within 1,000' of an arterial roadway. The project site is located on Felker Street, adjacent to Highway 1, and approximately 550 feet west of Ocean Street, which is an arterial roadway.

- There are no active railroad lines within the project site's line of sight.

The project site is approximately 13.1 miles northwest of the nearest municipal airport in Watsonville. According to the attached Santa Cruz Airport Noise Contours Map, it is outside of all airport noise contours.

Edward L. Pack Associates conducted a noise assessment for this project, which found, *"the existing exterior noise exposure in the most impacted ground level rear yards along the north side of the building is 58 dB DNL. Under future traffic conditions, the noise exposure is expected to remain at 58 dB DNL. Thus, the noise exposures are within the 65 dB DNL limit of the City of Santa Cruz Noise Element standard."* And, *"the exterior noise exposure at the most impacted planned building setback from Highway 1, 137 ft. from the centerline of the road, is 67 dB DNL. Under future traffic conditions, the noise exposure is expected to remain at 67 dB DNL."*

Regarding interior noise levels, the study found, *"The interior noise exposures in the most impacted living spaces closest to Highway 1 will be up to 52 dB DNL under existing and future traffic conditions. Thus, the noise exposures will be up to 7 dB in excess of the City of Santa Cruz Noise Element and Title 24 standards."*

*Noise mitigation measures for the exterior areas will not be required. However, the interior noise exposures will exceed the limits of the standards. Noise mitigation measures will be required for the noise-impacted living spaces."*

The following noise control measures will be required to achieve compliance with the 45 dB DNL standards of the City of Santa Cruz Noise Element and Title 24.

- Maintain closed at all times all windows and glass doors of living spaces of the project with a direct or side view of Highway 1, i.e., facing west, north or east. Install windows and glass doors rated minimum Sound Transmission Class (STC) 32 at these units.
- The windows specified to be maintained closed are to be operable, as the requirement does not imply a "fixed" condition. All other windows and glass doors of the project and all bathroom windows may have any type of glazing and may be kept open as desired unless the bathroom is an integral part of a living space without a closeable door.
- The windows and doors shall be installed in an acoustically-effective manner. To achieve an acoustically-effective window construction, the sliding window panels must form an air-tight seal when in the closed position and the window frames must be caulked to the wall opening around their entire perimeter with a non-hardening caulking compound to prevent sound infiltration. Exterior doors must seal air-tight around the full perimeter when in the closed position.
- A qualified acoustician should review the acoustical test report of all sound-rated windows and doors to ensure that the chosen windows and doors will adequately reduce traffic noise to acceptable levels.

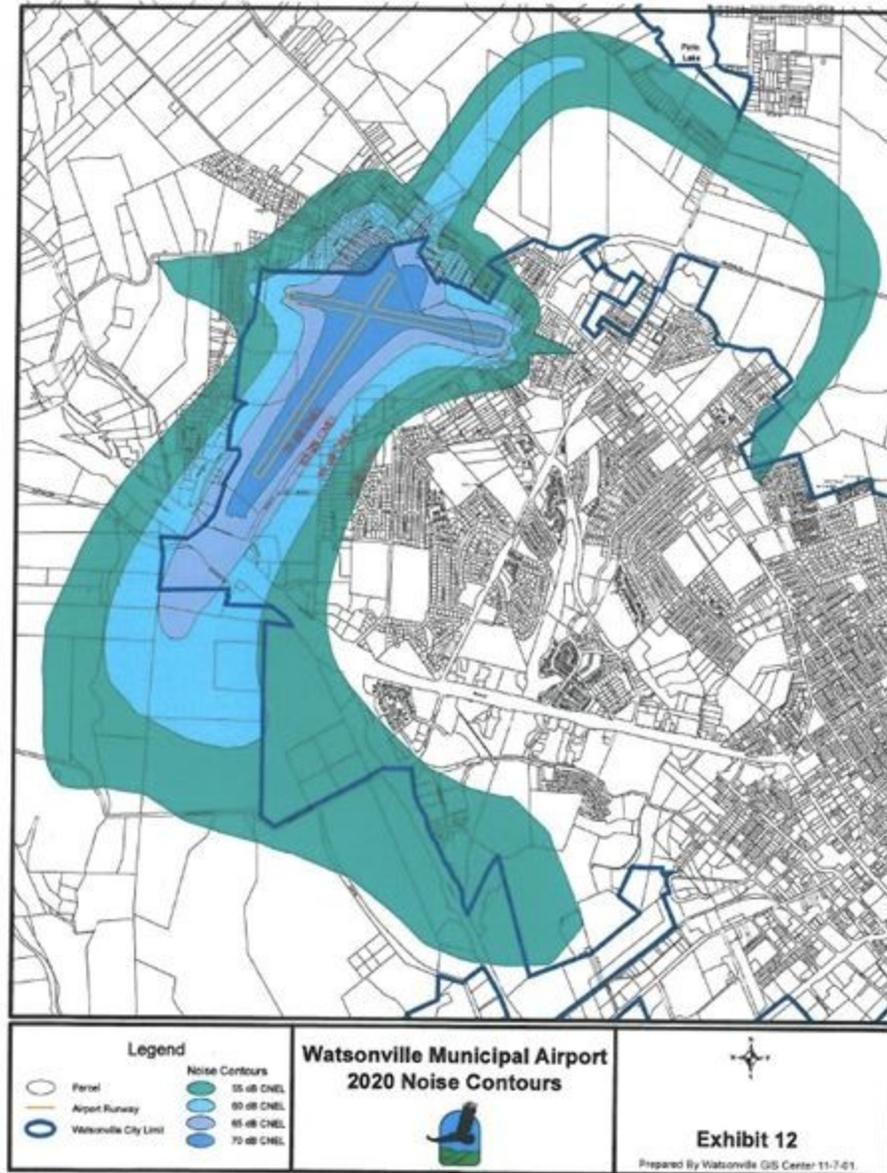
**Are formal compliance steps or mitigation required?**

Yes

No



Figure H-2: Watsonville Municipal Airport 2020 Airport Noise Contours

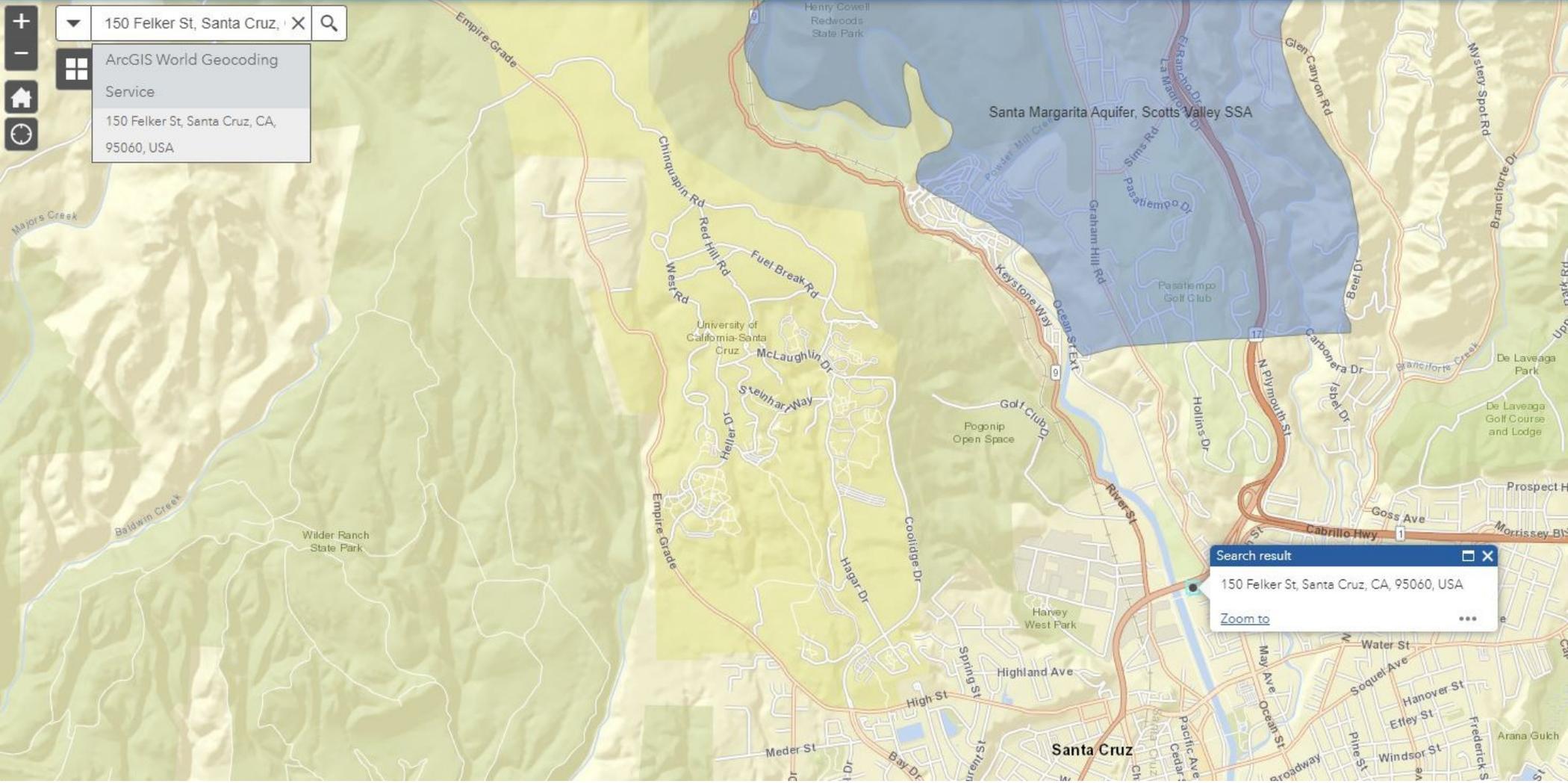


# Sole Source Aquifers

150 Felker St, Santa Cruz, X

ArcGIS World Geocoding Service

150 Felker St, Santa Cruz, CA, 95060, USA



Search result

150 Felker St, Santa Cruz, CA, 95060, USA

[Zoom to](#)



**U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT**  
WASHINGTON, DC 20410-1000

This Worksheet was designed to be used by those “Partners” (including Public Housing Authorities, consultants, contractors, and nonprofits) who assist Responsible Entities and HUD in preparing environmental reviews, but legally cannot take full responsibilities for these reviews themselves. Responsible Entities and HUD should use the RE/HUD version of the Worksheet.

## **Sole Source Aquifers (CEST and EA) - PARTNER**

<https://www.hudexchange.info/environmental-review/sole-source-aquifers>

### **1. Is the project located on a sole source aquifer (SSA)<sup>1</sup>?**

No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide documentation used to make your determination, such as a map of your project or jurisdiction in relation to the nearest SSA.*

Yes → *Continue to Question 2.*

### **2. Does the project consist solely of acquisition, leasing, or rehabilitation of an existing building(s)?**

Yes → *The review is in compliance with this section. Continue to the Worksheet Summary below.*

No → *Continue to Question 3.*

### **3. Does your region have a memorandum of understanding (MOU) or other working agreement with EPA for HUD projects impacting a sole source aquifer?**

Contact your Field or Regional Environmental Officer or visit the HUD webpage at the link above to determine if an MOU or agreement exists in your area.

Yes → *Continue to Question 4.*

No → *Continue to Question 5.*

### **4. Does your MOU or working agreement exclude your project from further review?**

Yes → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide documentation used to make your determination and document where your project fits within the MOU or agreement.*

No → *Continue to Question 5.*

### **5. Will the proposed project contaminate the aquifer and create a significant hazard to public health?**

Consult with your Regional EPA Office. Your consultation request should include detailed information about your proposed project and its relationship to the aquifer and associated streamflow source area.

---

<sup>1</sup> A sole source aquifer is defined as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. This includes streamflow source areas, which are upstream areas of losing streams that flow into the recharge area.

EPA will also want to know about water, storm water and waste water at the proposed project. Follow your MOU or working agreement or contact your Regional EPA office for specific information you may need to provide. EPA may request additional information if impacts to the aquifer are questionable after this information is submitted for review.

No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide your correspondence with the EPA and all documents used to make your determination.*

Yes → *The RE/HUD will work with EPA to develop mitigation measures. If mitigation measures are approved, attach correspondence with EPA and include the mitigation measures in your environmental review documents and project contracts. If EPA determines that the project continues to pose a significant risk to the aquifer, federal financial assistance must be denied. Continue to Question 6.*

### **Worksheet Summary**

Provide a full description of your determination and a synopsis of the information that it was based on, such as:

- Map panel numbers and dates
- Names of all consulted parties and relevant consultation dates
- Names of plans or reports and relevant page numbers
- Any additional requirements specific to your program or region

### **Include all documentation supporting your findings in your submission to HUD.**

The project is not located within an area designated by the EPA as being supported by a sole-source aquifer.

Verified by sole source aquifer map downloaded from:

<https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356>  
b on 11.24.24

- See Attach L: Sole Source Aquifers

- BASEMAPS** >
- MAP LAYERS** >
- Wetlands
  - Riparian
  - Riparian Mapping Areas
  - Data Source
    - Source Type
    - Image Scale
    - Image Year
  - Areas of Interest
  - FWS Managed Lands



+ Measure  
- Feet (US)  
Measurement Result  
302.5 Feet (US)

LEGEND

**Wetlands**

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent/Shrub Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

**Riparian**

- Forested/Shrub
- Herbaceous

**Riparian Mapping Areas**

- Riparian Mapping Areas



**U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT**  
WASHINGTON, DC 20410-1000

This Worksheet was designed to be used by those “Partners” (including Public Housing Authorities, consultants, contractors, and nonprofits) who assist Responsible Entities and HUD in preparing environmental reviews, but legally cannot take full responsibilities for these reviews themselves. Responsible Entities and HUD should use the RE/HUD version of the Worksheet.

## Wetlands (CEST and EA) – Partner

<https://www.hudexchange.info/environmental-review/wetlands-protection>

**1. Does this project involve new construction as defined in Executive Order 11990, expansion of a building’s footprint, or ground disturbance?**

The term "new construction" includes draining, dredging, channelizing, filling, diking, impounding, and related activities and construction of any any structures or facilities.

No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below.*

Yes → *Continue to Question 2.*

**2. Will the new construction or other ground disturbance impact a wetland as defined in E.O. 11990?**

No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to the Worksheet Summary below. Provide a map or any other relevant documentation to explain your determination.*

Yes → *Work with HUD or the RE to assist with the 8-Step Process.* *Continue to Question 3.*

**3. Does Section 55.12 state that the 8-Step Process is not required?**

No, the 8-Step Process applies.

This project will require mitigation and may require elevating structure or structures. See the link to the HUD Exchange above for information on HUD’s elevation requirements.

→ *Work with the RE/HUD to assist with the 8-Step Process. Continue to Worksheet Summary.*

5-Step Process is applicable per 55.12(a).

**Provide the applicable citation at 24 CFR 55.12(a) here.**

[Click here to enter text.](#)

→ *Work with the RE/HUD to assist with the 5-Step Process. This project may require mitigation or alternations. Continue to Worksheet Summary.*

8-Step Process is inapplicable per 55.12(b).

**Provide the applicable citation at 24 CFR 55.12(b) here.**

[Click here to enter text.](#)

→ If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to Worksheet Summary.

8-Step Process is inapplicable per 55.12(c).

**Provide the applicable citation at 24 CFR 55.12(c) here.**

[Click here to enter text.](#)

→ If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Continue to Worksheet Summary.

### **Worksheet Summary**

Provide a full description of your determination and a synopsis of the information that it was based on, such as:

- Map panel numbers and dates
- Names of all consulted parties and relevant consultation dates
- Names of plans or reports and relevant page numbers
- Any additional requirements specific to your program or region

**Include all documentation supporting your findings in your submission to HUD.**

***The project does not involve new construction within or adjacent to a wetland(s) habitat.***

- There are no wetlands located on the project site. The Riverine System of the San Lorenzo River is located approximately 302 feet west of the site. The project will be required to comply with all MS4/stormwater quality standards; therefore, the project will have no effect on the habitat.

# Nationwide Rivers Inventory



## Nationwide Rivers Inventory

A listing of free-flowing river segments in the U.S. believed to possess one or more "outstandingly remarkable" values



Search by River Name, Federal Management Entities, Management Area, or State



### Legend

NPS Nationwide Rivers Inventory Official



National Wild and Scenic River System



### Add Data to Map



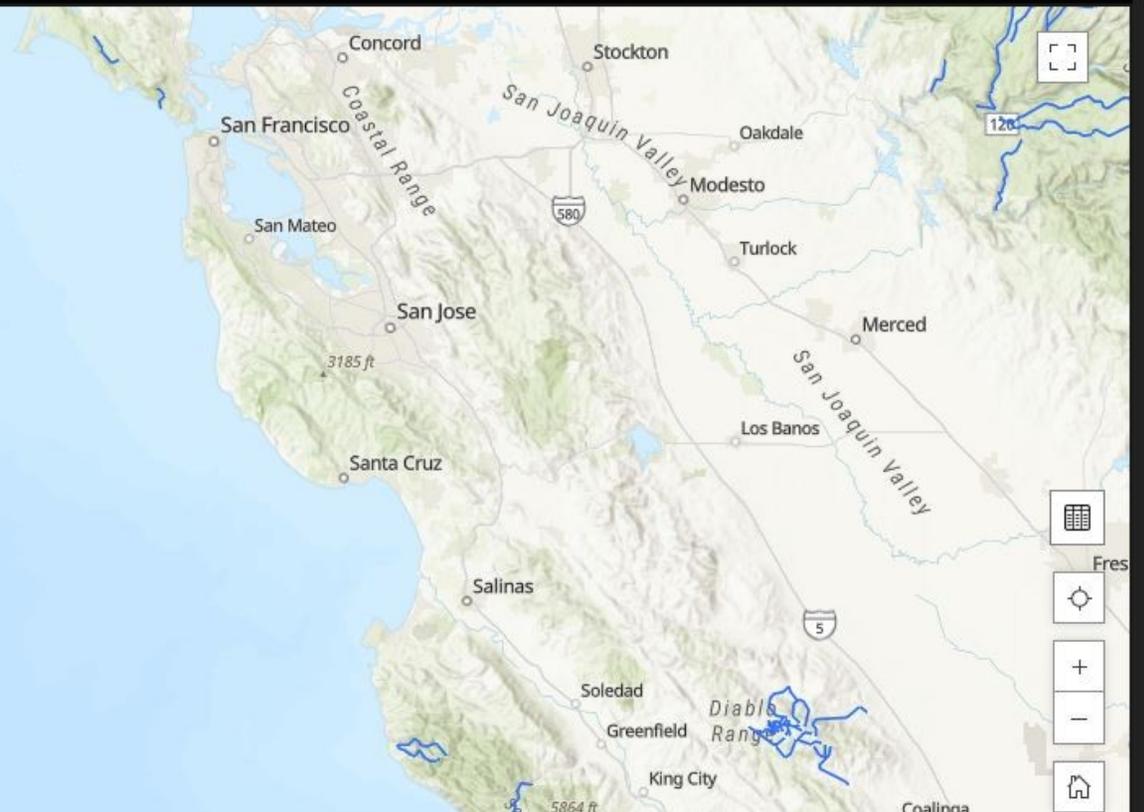
There is currently no added data.

+ Click to add data

Download NRI Data



20 mi



Esri, USGS | County of Santa Clara, California State Parks, Esri, TomTom, Garmi... Powered by Esri





U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
WASHINGTON, DC 20410-1000

This Worksheet was designed to be used by those “Partners” (including Public Housing Authorities, consultants, contractors, and nonprofits) who assist Responsible Entities and HUD in preparing environmental reviews, but legally cannot take full responsibilities for these reviews themselves. Responsible Entities and HUD should use the RE/HUD version of the Worksheet.

## Wild and Scenic Rivers (CEST and EA) – PARTNER

<https://www.hudexchange.info/environmental-review/wild-and-scenic-rivers>

### 1. Is your project within proximity of a Wild and Scenic River, Study River, or Nationwide Rivers Inventory River?

No → *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Provide documentation used to make your determination.*

Yes → *Continue to Question 2.*

### 2. Could the project do *any* of the following?

- Have a direct and adverse effect within Wild and Scenic River Boundaries,
- Invade the area or unreasonably diminish the river outside Wild and Scenic River Boundaries, or
- Have an adverse effect on the natural, cultural, and/or recreational values of a NRI segment.

Consult with the appropriate federal/state/local/tribal Managing Agency(s), pursuant to Section 7 of the Act, to determine if the proposed project may have an adverse effect on a Wild & Scenic River or a Study River and, if so, to determine the appropriate avoidance or mitigation measures.

#### Select one:

The Managing Agency has concurred that the proposed project will not alter, directly, or indirectly, any of the characteristics that qualifies or potentially qualifies the river for inclusion in the NWSRS.

→ *If the RE/HUD agrees with this recommendation, the review is in compliance with this section. Provide documentation of the consultation (including the Managing Agency’s concurrence) and any other documentation used to make your determination.*

The Managing Agency was consulted and the proposed project may alter, directly, or indirectly, any of the characteristics that qualifies or potentially qualifies the river for inclusion in the NWSRS.

→ *The RE/HUD must work with the Managing Agency to identify mitigation measures to mitigate the impact or effect of the project on the river.*

## Worksheet Summary

Provide a full description of your determination and a synopsis of the information that it was based on, such as:

- Map panel numbers and dates
- Names of all consulted parties and relevant consultation dates
- Names of plans or reports and relevant page numbers
- Any additional requirements specific to your program or region

**Include all documentation supporting your findings in your submission to HUD.**

***The project is not within one mile of a listed section of a Wild and Scenic River.***

- The proposed project site is not located within one mile of any listed section of any Wild and Scenic River. There are no Wild & Scenic Rivers in Santa Cruz County.

- There are no National Rivers Inventory (NRI) rivers located in Santa Cruz County and, therefore, none within one mile of the project site.

Verified at:

<https://www.rivers.gov/river-app/index.html?state=CA>

<https://www.nps.gov/subjects/rivers/nationwide-rivers-inventory.htm>

- See Attach N: Wild and Scenic Rivers

## Environmental Justice (CEST and EA)

General requirements	Legislation	Regulation
Determine if the project creates adverse environmental impacts upon a low-income or minority community. If it does, engage the community in meaningful participation about mitigating the impacts or move the project.	Executive Order 12898	
<b>References</b>		
<a href="https://www.hudexchange.info/environmental-review/environmental-justice">https://www.hudexchange.info/environmental-review/environmental-justice</a>		

**HUD strongly encourages starting the Environmental Justice analysis only after all other laws and authorities, including Environmental Assessment factors if necessary, have been completed.**

**1. Were any adverse environmental impacts identified in any other compliance review portion of this project's total environmental review?**

Yes → *Continue to Question 2.*

No → *Based on the response, the review is in compliance with this section. Continue to the Worksheet Summary below.*

**2. Were these adverse environmental impacts disproportionately high for low-income and/or minority communities?**

Yes

**Explain:**

→ *Continue to Question 3. Provide any supporting documentation.*

No

**Explain:**

Noise exceeds HUD standards but will be mitigated to at or below HUD standards.

→ *Continue to the Worksheet Summary and provide any supporting documentation.*

3. All adverse impacts should be mitigated. Explain in detail the proposed measures that must be implemented to mitigate for the impact or effect, including the timeline for implementation.

Mitigation as follows will be implemented:

→ Continue to Question 4.

No mitigation is necessary.

**Explain why mitigation will not be made here:**

→ Continue to Question 4.

4. Describe how the affected low-income or minority community was engaged or meaningfully involved in the decision on what mitigation actions, if any, will be taken.

→ Continue to the Worksheet Summary and provide any supporting documentation.

## **Worksheet Summary**

### **Compliance Determination**

Provide a clear description of your determination and a synopsis of the information that it was based on, such as:

- Map panel numbers and dates
- Names of all consulted parties and relevant consultation dates
- Names of plans or reports and relevant page numbers
- Any additional requirements specific to your region

***The project site is suitable for its proposed use and won't be adversely affected by a pre-existing environmental condition. All environmental factors can and will be mitigated.***

- Structures to be demolished will be tested for ACM and LBP prior to demolition. If LBP or ACM are found to be present, all local, state, and federal requirements for handling, removal, and worker protection must be adhered to, including permits, chain-of-custody, and disposal in a location approved for said materials.

-The project environment exterior noise levels are anticipated to be 67 dBA. The interior noise exposures in the most impacted living spaces closest to Highway 1 will be up to 52 dB DNL under existing and future traffic conditions. Thus, the noise exposures will be up to 7 dB in excess of the City of Santa Cruz Noise Element and Title 24 standards.

Noise mitigation measures for the exterior areas will not be required. However, they will be required for the noise-impacted living spaces, as detailed in the noise reports above in the Noise Abatement and Control Factor.

As all issues will be mitigated, they will not present environmental issues for future residents. There are no other issues identified in the Environmental Assessment that would have an adverse effect on project residents and, therefore, there are no factors that will have environmental impacts disproportionately high for low-income and/or minority residents.

- Regardless of population group served, the population will not be affected disproportionately by environmental issues.

- Additionally, the project will benefit the minority and low-income populations by bringing much needed affordable housing units to the neighborhood and community.

### **Are formal compliance steps or mitigation required?**

Yes

No

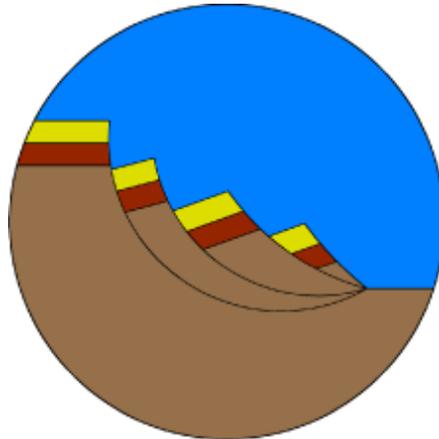
# **GEOTECHNICAL INVESTIGATION**

**150 Felker Street  
Santa Cruz, Santa Cruz County, California**

Submitted to:

AEST Realty  
4100 Moorpark Avenue, Suite 205  
San Jose, California 95117

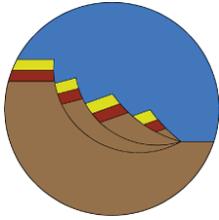
ATTN: Arthur Lin



Prepared by:

**CMAG ENGINEERING, INC.**

Project No. 21-116-SC  
September 13, 2021



# CMAG ENGINEERING, INC.

P.O. BOX 640 APTOS, CALIFORNIA 95001

PHONE: 831.475.1411

WWW.CMAGENGINEERING.COM

September 13, 2021  
Project No. 21-116-SC

AEST Realty  
4100 Moorpark Avenue, Suite 205  
San Jose, California 95117

ATTN: Arthur Lin

**SUBJECT: GEOTECHNICAL INVESTIGATION**  
Proposed Apartment Building  
150 Felker Street, Santa Cruz, Santa Cruz County, California  
APN 008-181-23

Dear Mr. Lin:

In accordance with your authorization, we have completed a geotechnical investigation for the subject project. This report summarizes the findings, conclusions, and recommendations from our field exploration, laboratory testing, and engineering analysis. It is a pleasure being associated with you on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office.

Sincerely,

**CMAG ENGINEERING, INC.**

Reviewed by:



Shannon Chome', PE  
Senior Engineer  
C 68398  
Expires 9/30/23



Adrian L. Garner, PE, GE  
Principal Engineer  
C 66087, GE 2814  
Expires 6/30/22

Distribution: Addressee (4 Hard Copies; Electronic Copy)

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Terms of Reference.....	1
1.2	Site Location.....	1
1.3	Surface Conditions .....	1
<b>2.0</b>	<b>PROJECT DESCRIPTION .....</b>	<b>1</b>
<b>3.0</b>	<b>FIELD EXPLORATION AND LABORATORY TESTING PROGRAMS.....</b>	<b>2</b>
<b>4.0</b>	<b>SUBSURFACE CONDITIONS AND EARTH MATERIALS .....</b>	<b>2</b>
4.1	General .....	2
4.2	Artificial Fill - af.....	2
4.3	Alluvial Deposits - Qal.....	3
4.4	Santa Margarita Sandstone - Tsm .....	3
4.5	Groundwater.....	3
<b>5.0</b>	<b>GEOTECHNICAL HAZARDS.....</b>	<b>3</b>
5.1	General .....	3
5.2	Seismic Shaking .....	3
5.3	Collateral Seismic Hazards .....	4
5.3.1	Seismically Induced Liquefaction .....	4
<b>6.0</b>	<b>DISCUSSIONS AND CONCLUSIONS.....</b>	<b>6</b>
<b>7.0</b>	<b>RECOMMENDATIONS .....</b>	<b>6</b>
7.1	General .....	6
7.2	Site Grading.....	7
7.2.1	Site Clearing.....	7
7.2.2	Preparation of On-Site Soils.....	7
7.2.3	Cut and Fill Slopes .....	9
7.2.4	Utility Trenches .....	9
7.2.5	Vibration During Compaction .....	10
7.2.6	Excavating Conditions.....	10
7.2.7	Surface Drainage.....	10
7.2.8	Subsurface Drainage .....	11
7.3	Foundations.....	11
7.3.1	Mat Foundations .....	11
7.3.2	Settlements.....	12
7.4	Plan Review.....	13
7.5	Observation and Testing.....	13
<b>8.0</b>	<b>LIMITATIONS .....</b>	<b>14</b>
	<b>REFERENCES.....</b>	<b>15</b>

**TABLES**

Table 1. Seismic Design Parameters - 2019 CBC..... 4

**FIGURES AND STANDARD DETAILS**

Figure 1: Typical Subdrain Detail

**APPENDICES**

**APPENDIX A**

Field Exploration Program

**APPENDIX B**

Laboratory Testing Program

## **1.0 INTRODUCTION**

This report presents the results of our geotechnical investigation for the proposed apartment building and associated improvements located at 150 Felker Street in Santa Cruz, Santa Cruz County, California.

The purpose of our investigation was to provide information regarding the surface and subsurface soil and bedrock conditions, and based on our findings, provide geotechnical recommendations for the design and construction of the proposed project. Conclusions and recommendations related to geotechnical hazards, site grading, drainage, foundations, and driveway areas are presented herein.

### **1.1 Terms of Reference**

CMAG Engineering, Inc.'s (CMAG) scope of work for this phase of the project included site reconnaissance, subsurface exploration, soil and bedrock sampling, laboratory testing, engineering analyses, and preparation of this report.

The work was undertaken in accordance with CMAG's *Proposal for Geotechnical Services* dated April 9, 2021.

The recommendations contained in this report are subject to the limitations presented in Section 8.0 of this report.

### **1.2 Site Location**

The project site is located on the north side of Felker Street just west of its intersection with Ocean Street in Santa Cruz, Santa Cruz County, California. The site location is shown on the Site Location Map, Figure A-1, in Appendix A.

### **1.3 Surface Conditions**

The parcel is approximately 0.4 acres, relatively flat, and occupied by a commercial building and attendant parking lot. The property is bounded by the Highway 1 right-of-way to the north, a residential property to the east, and an undeveloped area to the west which slopes gently to the San Lorenzo River. A moderately steep ascending slope, approximately 16 feet tall, is situated between the northern property line and Highway 1. The property is landscaped with some mature trees and shrubs.

## **2.0 PROJECT DESCRIPTION**

Based on our review of the preliminary plans (William C. Kempf Architects, 2021), it is our understanding that the project consists of the demolition of the existing commercial building, and the construction of a new four story apartment building and associated

improvements. The ground floor will consist of parking and the upper three stories living space. Anticipated construction consists of wood/steel frame walls, floors, and roof with a concrete slab-on-grade ground floor.

### **3.0 FIELD EXPLORATION AND LABORATORY TESTING PROGRAMS**

Our field exploration program included drilling, logging, and interval sampling of 4 borings on June 24, 2021. The borings were advanced to depths between 30.5± feet and 36± feet below the existing grades. Details of the field exploration program, including the Boring Logs, Figures A-4.0 through A-7.1, are presented in Appendix A.

Representative samples obtained during the field investigation were taken to the laboratory for testing to determine physical and engineering properties. Details of the laboratory testing program are presented in Appendix B. Test results are presented on the Boring Logs and in Appendix B.

### **4.0 SUBSURFACE CONDITIONS AND EARTH MATERIALS**

#### **4.1 General**

The geologic map of Santa Cruz County (Brabb, 1989) depicts the subject property as underlain by Alluvial Deposits (Qal; Holocene) described as consisting of unconsolidated, heterogenous, moderately sorted silt and sand containing discontinuous lenses of clay and silty clay. Santa Margarita Sandstone (Tsm, Upper Miocene) described as consisting of very thick bedded to massive and thickly crossbedded yellowish gray to white, friable, granular, medium to fine grained arkosic sandstone is depicted to the north and east of the site.

Four borings were advanced in the area of the proposed apartment building. The subsurface profile encountered in our field exploration consisted of alluvial deposits overlying Santa Margarita Sandstone within the depths explored. A thin veneer of artificial fill was also encountered in Boring B-2 overlying the alluvium. Complete subsurface profiles are presented on the Boring Logs, Figures A-4.0 through A-7.1, in Appendix A. The boring locations are shown on the Boring Location Plan, Figure A-2.

#### **4.2 Artificial Fill - af**

Artificial fill was encountered in Boring B-2 from the surface to a depth of 1.5± feet below the existing grade. The fill generally consisted of moist, slightly plastic sandy silt.

#### **4.3 Alluvial Deposits - Qal**

Alluvial deposits were encountered from the surface in Borings B-1, B-3, and B-4 and underlying the artificial fill in Boring B-2 to depths between 23± and 28± feet below the existing grades. The near-surface deposits within the upper 5± to 8± feet generally consisted of soft to very stiff, moist, slightly plastic sandy silt. The surficial material was underlain by stiff to hard, moist, plastic sandy lean clay (Borings B-1 through B-3) and very stiff to hard, moist, slightly plastic sandy silt (Boring B-4) to depths between 8± and 12± feet below the existing grades. The clay and silt was underlain by medium dense to very dense, moist to wet, non plastic silty sand, silty sand with gravel, and well graded sand with silt and gravel. Intermittent gravel and cobble layers were encountered during drilling within the alluvium at depths greater than 12± feet below the existing grades. Based on our field exploration and laboratory testing, the near-surface sandy silt is considered moderately to highly compressible and has a low expansion potential.

#### **4.4 Santa Margarita Sandstone - Tsm**

Santa Margarita Sandstone was encountered underlying the alluvial deposits in all four borings at depths between 23± and 28± feet below the existing grades. The bedrock generally consisted of very dense, wet, weakly cemented sandstone.

#### **4.5 Groundwater**

Groundwater was encountered in Borings B-1 through B-3 at a depth of 17± feet below the existing grades, and in Boring B-4 at a depth of 24± feet below the existing grade, during our field exploration. It should be noted that groundwater conditions, perched or regional, may vary with location and may fluctuate with variations in rainfall, runoff, irrigation, and other changes to the conditions existing at the time our field investigation was performed.

### **5.0 GEOTECHNICAL HAZARDS**

#### **5.1 General**

In our opinion, the geotechnical hazards that could potentially affect the proposed project are:

- Seismic shaking
- Collateral seismic hazards

#### **5.2 Seismic Shaking**

The hazard due to seismic shaking in California is high in many areas, indicative of

the number of large earthquakes that have occurred historically. Intense seismic shaking may occur at the site during the design lifetime of the proposed structure from an earthquake along one of the local fault systems. Generally, the intensity of shaking will increase the closer the site is to the epicenter of an earthquake, however, seismic shaking is a complex phenomenon and may be modified by local topography and soil conditions. The transmission of earthquake vibrations from the ground into the structure may cause structural damage.

The City of Santa Cruz has adopted the seismic provisions set forth in the 2019 California Building Code (2019 CBC) to address seismic shaking. The seismic provisions in the 2019 CBC are minimum load requirements for the seismic design for the proposed structure. The provisions set forth in the 2019 CBC will not prevent structural and nonstructural damage from direct fault ground surface rupture, coseismic ground cracking, liquefaction and lateral spreading, seismically induced differential compaction, or seismically induced landsliding.

Table 1 has been constructed based on the 2019 CBC requirements for the seismic design of the proposed structure. The Site Class has been determined based on our field investigation and laboratory testing.

**Table 1. Seismic Design Parameters - 2019 CBC**

$S_s$	$S_1$	Site Class	$F_a$	$F_v$	$S_{MS}$	$S_{M1}$	$S_{DS}$	$S_{D1}$	$PGA_M$
1.667g	0.640g	D	1.0	Null*	1.667g	Null*	1.111g	Null*	0.770g

Note: \*Refer to Section 11.4.8 in ASCE 7-16.

### **5.3 Collateral Seismic Hazards**

In addition to seismic shaking, other seismic hazards that may have an adverse affect to the site and/or the structure are: fault ground surface rupture, coseismic ground cracking, seismically induced liquefaction and lateral spreading, seismically induced differential compaction, and seismically induced landsliding. It is our opinion that the potential for collateral seismic hazards to affect the site, and to damage the proposed structure is low with the exception of seismically induced liquefaction. See Subsection 5.3.1 for more information.

#### **5.3.1 Seismically Induced Liquefaction**

Seismically induced liquefaction tends to occur in loose, unconsolidated, noncohesive soils beneath the groundwater table. Liquefaction may cause the soil to settle uniformly or differentially. The magnitude of the liquefaction is a function of the severity of the seismic shaking, the relative density of the soil, the elevation of the groundwater table, and the thickness of the liquefiable soils. The alluvial soils

which underlie the site potentially meet this criteria and we therefore performed a quantitative liquefaction analysis.

For our analysis, we assumed a groundwater table at 8 feet below the existing grades and the subsurface profiles encountered in Borings B-2 and B-3. The groundwater elevation used in our analysis was based on our experience in the vicinity and subsurface data obtained during the rainy season from nearby parcels. The ground shaking parameter used for our analysis was determined using the *2014 National Seismic Hazard Maps* published by the U.S. Geological Survey (USGS) and *ASCE 7-16 Minimum Design Loads for Buildings and Other Structures* (2016) published by the American Society of Civil Engineers. A Maximum Considered Geometric Mean Peak Ground Acceleration ( $PGA_M$ ), adjusted for Site Class effects, of 0.770g was determined based on the national maps and Section 11.8.3 of ASCE 7-16. A magnitude of 7.9 on the San Andreas Fault Zone was also used in our analysis.

Particle size analyses and liquid/plastic limit tests were performed on samples considered representative of the potentially liquefiable soils encountered. Results of our particle size analyses and liquid/plastic limit tests are presented in Appendix B.

The results of our laboratory testing indicate that the clayey soils (sandy lean clay) encountered between 4± feet and 8± feet have a Plasticity Index greater than 7. Based on the recommendations as outlined in the Monograph *Soil Liquefaction During Earthquakes* (I.M. Idriss and R.W. Boulanger 2008), the clayey soils encountered in the potentially liquefiable zone are considered to fall outside of the range of soils susceptible to “classic” cyclically induced liquefaction (Plasticity Index  $\leq 7$ ).

A quantitative liquefaction analysis was performed using empirical predictions of earthquake-induced liquefaction potential. The analysis is based on a comparison of the in situ cyclic stress ratio (CSR) with that historically present in areas experiencing liquefaction for a given earthquake magnitude and recorded soil grain size distribution and penetration resistance (as expressed by SPT blows/ft). The analysis is based on the method presented by Seed et al. (2003).

Under the conditions anticipated during the design seismic event, our liquefaction analyses determined that a portion of the alluvial soils are potentially liquefiable. Based on the recommended volumetric reconsolidation strains produced by Cetin et. al (2009), a settlement of approximately 1.5 inches should be anticipated beneath the proposed apartment building. Differential settlement of approximately 1 inch should be anticipated across the least dimension of the structure.

## **6.0 DISCUSSIONS AND CONCLUSIONS**

The subsurface profile across the site consists of alluvial deposits overlying Santa Margarita Sandstone within the depths explored. A thin veneer of artificial fill was also encountered in the southeastern corner of the property. The near-surface deposits within the upper 5± to 8± feet generally consisted of soft to very stiff sandy silt. Based on our field exploration and laboratory testing, this material is considered moderately to highly compressible and has a low expansion potential.

Groundwater was encountered in our borings at depths between 17± feet and 24± feet below the existing grades during our field exploration. However, based on our experience in the vicinity, the groundwater elevation is expected to rise significantly during the rainy season.

The results of our liquefaction analysis indicates that a portion of the alluvial deposits have a high potential for seismically induced liquefaction under the conditions anticipated during the design seismic event. Reconsolidation settlements, of approximately 1.5 inches, should be anticipated beneath the proposed apartment building. Differential settlement of approximately 1 inch should be anticipated across the least dimension of the structure.

## **7.0 RECOMMENDATIONS**

### **7.1 General**

Based on the results of our field investigation, laboratory testing, and engineering analysis, it is our opinion, from the geotechnical standpoint, the subject site will be suitable for the proposed development provided the recommendations presented herein are implemented during grading and construction.

We recommend that the proposed apartment building be supported on a mat foundation system founded on a mechanically stabilized engineered fill pad. The recommended foundation system will help prevent damage caused by liquefaction induced differential settlement. Recommendations for the mechanically stabilized engineered fill pad are presented in Subsection 7.2.2. Recommendations for mat foundations including anticipated differential settlements are presented in 7.3.

Due to the poor engineering qualities of the on-site soils, imported, non-expansive granular material will be required for use as engineered fill within the mechanically stabilized engineered fill pad.

It is our understanding that the subject project is in the early planning stages and the structural design of the proposed apartment building has not commenced. When foundation loads become available, it may be feasible to consider a deep foundation system embedded into the underlying sandstone bedrock. Alternative

recommendations for a deep foundation system may be supplied upon request.

In order to mitigate the potential for the compressible near-surface soils to adversely affect driveway sections, removal and recompaction of these soils will be required. Refer to Subsection 7.2.2 for details.

The site is relatively flat and site drainage is an important aspect of the project design. Site drainage should be designed to collect and direct surface water away from the proposed apartment building to approved drainage facilities per Subsection 7.2.7.

A perimeter subdrain should be constructed to help prevent groundwater migration beneath the proposed apartment building. Subdrain recommendations are presented in Subsection 7.2.8.

## **7.2 Site Grading**

### **7.2.1 Site Clearing**

Prior to grading, the areas to be developed for structures, pavements and other improvements, should be stripped of any vegetation and cleared of any surface or subsurface obstructions, including any existing foundations, utility lines, basements, septic tanks, pavements, stockpiled fills, and miscellaneous debris.

Surface vegetation and organically contaminated topsoil should be removed from areas to be graded. The required depth of stripping will vary with the time of year the work is done and should be observed by the Geotechnical Engineer. It is generally anticipated that the required depth of stripping will be 4 to 8 inches.

Holes resulting from the removal of buried obstructions that extend below finished site grades should be backfilled with compacted engineered fill compacted to the requirements of Subsection 7.2.2.

### **7.2.2 Preparation of On-Site Soils**

**Mechanically Stabilized Engineered Fill Pad** - Beneath mat foundations, the native soil should be overexcavated a minimum of 4 feet below the lowest foundation elements, or 6 feet below finished exterior grades, whichever is greater. The exposed surface should be scarified, moisture conditioned, and compacted and geogrid consisting of Tensar TriAx TX140 (or approved equivalent) should be placed at the base of the overexcavation. Imported, non-expansive granular material should then be placed as engineered fill compacted to a minimum of 90 percent relative compaction to finished subgrade. Two additional layers of geogrid, (Tensar TriAx TX140 or approved equivalent) should be installed in the engineered fill at 15 inches and 30 inches from the base of the overexcavation. The zone of the

mechanically stabilized engineered fill should extend a minimum of 5 feet beyond the building footprint.

The geogrid should be installed per the manufacturer's recommendations. Geogrid should be free of wrinkles and may be temporarily secured in-place with staples, pins, or backfill. Adjacent rolls of geogrid should have a minimum overlap of 18 inches. A minimum fill thickness of 8 inches is required prior to the operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent damage. Any geogrid damaged during installation shall be replaced. The manufacturers of the geogrid supply additional installation recommendations not outlined in this report. All manufacturer's installation recommendations should be adhered to.

**Driveway Areas** - In driveway areas (including concrete, asphalt, and non-permeable pavers), the native soil should be overexcavated to a minimum of 2 feet below the bottom of the aggregate base course, or 2.5 feet below existing grades, whichever is greater. The exposed surface should be scarified, moisture conditioned, and compacted. The native soil, or imported, non-expansive granular material should then be placed as engineered fill compacted to a minimum of 90 percent relative compaction. The upper 6 inches of subgrade and all aggregate base and subbase in driveway areas shall be compacted to a minimum of 95 percent relative compaction. This zone of reworking should extend laterally a minimum of 3 feet beyond the driveway.

**Although the on-site soils are not recommended for use as engineered fill within the mechanically stabilized fill pad, they may be considered within driveway areas. Note: If this work is done during or soon after the rainy season, or in the spring, the soil may require significant drying prior to use as engineered fill.** Regardless of the time of year, moisture conditioning the native soils to achieve moisture requirements should be anticipated. Moisture conditioning may include adding water or drying back the soil to achieve the required moisture. It is the contractors responsibility to adequately process the soil to achieve uniform moisture conditions of the material to be used as engineered fill. The soil should be verified by a representative of CMAG in the field during grading operations. All soils, both existing on-site and imported, to be used as fill, should contain less than 3 percent organics and be free of debris and gravel over 2.5 inches in maximum dimension.

Imported fill material should be approved by a representative of CMAG prior to importing. Soils having a significant expansion potential should not be used as imported fill. **The Geotechnical Engineer should be notified not less than 5 working days in advance of placing any fill or base course material proposed for import.** Each proposed source of import material should be sampled, tested, and approved by the Geotechnical Engineer prior to delivery of any soils imported for use on the site.

All fill should be compacted with heavy vibratory equipment. Fill should be compacted by mechanical means in uniform horizontal loose lifts not exceeding 8 inches in thickness. The relative compaction and required moisture content shall be based on the maximum dry density and optimum moisture content obtained in accordance with ASTM D1557. **The Geotechnical Engineer should observe the overexcavations, and placement of engineered fill.**

Any surface or subsurface obstruction, or questionable material encountered during grading, should be brought immediately to the attention of the Geotechnical Engineer for proper processing as required.

### 7.2.3 Cut and Fill Slopes

**Cut and Fill slopes are not anticipated for the project at this time.** Cut and fill slopes may affect the stability of the site, and should be analyzed for overall stability and suitability by the Geotechnical Engineer if project requirements change.

### 7.2.4 Utility Trenches

Bedding material should consist of sand with SE not less than 30 which may then be jetted.

**The on-site soils may be utilized for trench backfill outside of the mechanically stabilized engineered fill pad only.** See Subsection 7.2.2 for additional information regarding the use of the native soil for engineered fill. Imported fill should be free of organic material and gravel over 2.5 inches in diameter. Backfill of all exterior and interior trenches should be placed in thin lifts and mechanically compacted to achieve a relative compaction of not less than 95 percent in paved areas and 90 percent in other areas per ASTM D1557. Care should be taken not to damage utility lines.

Utility trenches that are parallel to the sides of a building should be placed so that they do not extend below a line sloping down and away at an inclination of 2:1 H:V (horizontal to vertical) from the bottom outside edge of foundation elements.

A 3 foot concrete plug should be placed in each trench where it passes under the exterior footings. Anti-seep collars (trench dams) should also be placed in utility trenches on steep slopes to prevent migration of water and sand.

Trenches should be capped with 1.5± feet of impermeable material. Import material should be approved by the Geotechnical Engineer prior to its use.

Trenches must be shored as required by the local regulatory agency, the State Of California Division of Industrial Safety Construction Safety Orders, and Federal

OSHA requirements.

#### 7.2.5 Vibration During Compaction

The neighboring parcels are within close proximity to the proposed apartment building. The contractor should take all precautionary measures to minimize vibration on the site during grading operations. This may require that the engineered fill be placed in thin lifts using a static roller or hand operated equipment. It is the contractor's responsibility to ensure that the process in which the engineered fill is placed does not adversely affect the neighboring parcels.

#### 7.2.6 Excavating Conditions

We anticipate that excavation of the on-site soils may be accomplished with standard earthmoving and trenching equipment.

If grading commences during, or shortly after the rainy season, difficult construction due to saturated soil conditions should be anticipated. The bottom of excavations may require stabilization measures, in order to construct the graded building pads.

#### 7.2.7 Surface Drainage

Pad drainage should be designed to collect and direct surface water away from structures to approved drainage facilities. A minimum gradient of 2± percent should be maintained and drainage should be directed toward approved swales or drainage facilities. Concentrations of surface water runoff should be handled by providing the necessary structures, paved ditches, catch basins, etc.

All roof eaves should be guttered with the outlets from the downspouts provided with adequate capacity to carry the storm water away from structures to reduce the possibility of soil saturation and erosion.

Drainage patterns approved at the time of construction should be maintained throughout the life of the structure. The building and surface drainage facilities must not be altered nor any grading, filling, or excavation conducted in the area without prior review by the Geotechnical Engineer.

Irrigation activities at the site should be controlled and reasonable. Planter areas should not be sited adjacent to walls without implementing approved measures to contain irrigation water and prevent it from seeping into walls and under foundations and slabs-on-grade.

The finished ground surface should be planted with erosion resistant landscaping and ground cover and continually maintained to minimize surface erosion.

### 7.2.8 Subsurface Drainage

To help reduce the potential for groundwater to adversely affect the proposed apartment building, we recommend constructing a subdrain. The subdrain should wrap around the perimeter of the building pad and extend a minimum of 1 foot below the lowest foundation elements of the proposed apartment building.

Subdrains should be placed a minimum of 3 feet away from foundations and should not extend below a line sloping down and away at an inclination of 2:1 H:V (horizontal to vertical) from the bottom outside edge of foundations.

Subdrains should consist of 4 inch diameter SDR 35 PVC perforated pipe or equivalent, embedded in Caltrans Class 2 permeable drain rock. The drain should be a minimum of 18 inches in width and should extend to within 8 inches from the surface. The upper 8 inches should be capped with native soils. Mirafi 180N filter fabric or approved equivalent should be placed between the surface cap and the drain rock. The pipe should be 4± inches above the trench bottom; a gradient of 2± percent being provided to the pipe and trench bottom; discharging into suitably protected outlets. Refer to the Typical Subdrain Detail, Figure 1, for recommendations.

Perforations in subdrains are recommended as follows: ½ inch diameter, in 2 rows at the ends of a 120 degree arc, at 5 inch centers in each row, staggered between rows, placed downward.

**Subdrains should be observed by the Geotechnical Engineer after placement of bedding and pipe and prior to the placement of clean crushed gravel.**

## 7.3 Foundations

### 7.3.1 Mat Foundations

Mat foundations should be founded on a mechanically stabilized engineered fill pad per Subsection 7.2.2. The subgrade should be proof-rolled just prior to construction to provide a firm, relatively unyielding surface, especially if the surface has been loosened by the passage of construction traffic.

For mat foundations designed with the flexible method, a unit coefficient of subgrade reaction,  $k_{v1} = 200$  kcf, may be assumed for design purposes. This value is for a 1 foot wide footing and should be reduced for the effective width. For the recommended imported engineered fill soils:

$$k_s = k_{v1} ((B + 1) / 2B)^2$$

where:

$k_s$  = coefficient of subgrade reaction (kcf)

$k_{v1}$  = unit coefficient of subgrade reaction (kcf)

B = effective footing width (feet)

The design values recommended above are based on the assumption that the mat foundations are founded on the recommended mechanically stabilized engineered fill pad consisting of compacted imported, non-expansive granular material. If material other than that recommended in Subsection 7.2.2 is used, the above values will need to be revised.

The subgrade reaction value may be increased by a factor of four for seismic loading.

Mat foundations should be designed to tolerate a differential settlement of 1 inch, across the least dimension of the structure, during the design seismic event. Mat foundations should be combined with flexible utility connections, sleeves, or flexible cushions in order to prevent breakage.

A friction coefficient of 0.35, between the engineered fill and rough concrete may be assumed for design purposes.

The mat foundations should be underlain by a minimum 4 inch thick capillary break of clean crushed rock. It is recommended that neither Class II baserock nor sand be employed as the capillary break material. Where moisture sensitive floor coverings are anticipated or vapor transmission may be a problem, a vapor retarder should be placed between the granular layer and the floor slab in order to reduce moisture condensation under the floor coverings. The vapor retarder should be specified by the slab designer. It should be noted that conventional slab-on-grade construction is not waterproof. Under-slab construction consisting of a capillary break and vapor retarder will not prevent moisture transmission through the slab-on-grade. CMAG does not practice in the field of moisture vapor transmission evaluation or mitigation. Where moisture sensitive floor coverings are to be installed, a waterproofing expert should be consulted for their recommended moisture and vapor protection measures.

**The foundation excavations should be observed by the Geotechnical Engineer before steel reinforcement is placed and concrete is poured.**

### 7.3.2 Settlements

Total and differential **static** settlements beneath mat foundations are expected to be within tolerable limits. Vertical movements are not expected to exceed 1 inch. Differential movements are expected to be within the normal range ( $\frac{1}{2}$  inch) for the

anticipated loads and spacings. These preliminary estimates should be reviewed by the Geotechnical Engineer when foundation plans for the proposed structure become available.

#### **7.4 Plan Review**

The recommendations presented in this report are based on preliminary design information for the proposed project and on the findings of our geotechnical investigation. When completed, the Grading Plans, Foundation Plans and design loads should be reviewed by CMAG prior to submitting the plans and contract bidding. Additional field exploration and laboratory testing may be required upon review of the final project design plans.

#### **7.5 Observation and Testing**

Field observation and testing must be provided by a representative of CMAG to enable them to form an opinion regarding the adequacy of the site preparation, the adequacy of fill materials, and the extent to which the earthwork is performed in accordance with the geotechnical conditions present, the requirements of the regulating agencies, the project specifications, and the recommendations presented in this report. Any earthwork performed in connection with the subject project without the full knowledge of, and not under the direct observation of CMAG will render the recommendations of this report invalid.

CMAG should be notified **at least 5 working days** prior to any site clearing or other earthwork operations on the subject project in order to observe the stripping and disposal of unsuitable materials and to ensure coordination with the grading contractor. During this period, a preconstruction meeting should be held on the site to discuss project specifications, observation and testing requirements and responsibilities, and scheduling.

## **8.0 LIMITATIONS**

The recommendations contained in this report are based on our field explorations, laboratory testing, and our understanding of the proposed construction. The subsurface data used in the preparation of this report was obtained from the borings drilled during our field investigation. Variation in soil, geologic, and groundwater conditions can vary significantly between sample locations. As in most projects, conditions revealed during construction excavation may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by the Project Geotechnical Engineer and the Geologist, and revised recommendations be provided as required. In addition, if the scope of the proposed construction changes from the described in this report, our firm should also be notified.

Our investigation was performed in accordance with the usual and current standards of the profession, as they relate to this and similar localities. No other warranty, expressed or implied, is provided as to the conclusions and professional advice presented in this report.

This report is issued with the understanding that it is the responsibility of the Owner, or of his Representative, to ensure that the information and recommendations contained herein are brought to the attention of the Architect and Engineer for the project and incorporated into the plans, and that it is ensured that the Contractor and Subcontractors implement such recommendations in the field. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

This firm does not practice or consult in the field of safety engineering. We do not direct the Contractor's operations, and we are not responsible for other than our own personnel on the site; therefore, the safety of others is the responsibility of the Contractor. The Contractor should notify the Owner if he considers any of the recommended actions presented herein to be unsafe.

The findings of this report are considered valid as of the present date. However, changes in the conditions of a site can occur with the passage of time, whether they be due to natural events or to human activities on this or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, this report may become invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

The scope of our services mutually agreed upon did not include any environmental assessment or study for the presence of hazardous to toxic materials in the soil, surface water, or air, on or below or around the site. CMAG is not a mold prevention consultant; none of our services performed in connection with the proposed project are for the purpose of mold prevention. Proper implementation of the recommendations conveyed in our reports will not itself be sufficient to prevent mold from growing in or on the structures involved.

## **REFERENCES**

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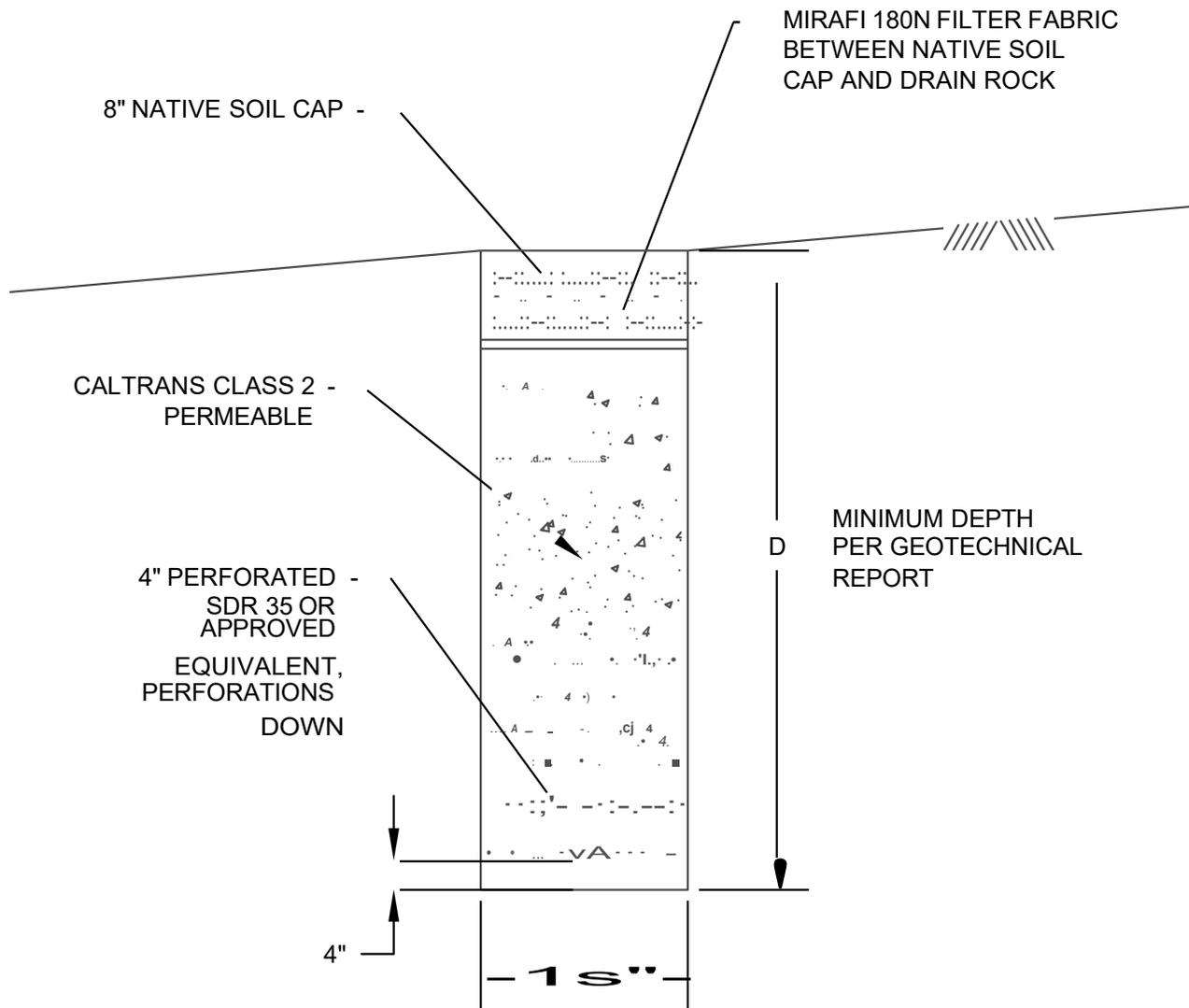
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William C. Kempf Architects (April 27, 2021). *New Apartment Building for 150 Felker Street, Santa Cruz, California, APN 008-181-23*. Project Name: Felker Street. Sheets: A1 through A8.



NOTES:

1. DRAWING IS NOT TO SCALE
2. 2+ PERCENT TO PIPE AND TRENCH BOTTOM
3. PERFORATED SDR 35 PVC PIPE, OR APPROVED EQUIVALENT, CONNECTED TO CLOSED CONDUITS THAT DISCHARGE TO AN APPROVED LOCATION
4. INSTALL CLEAN OUTS AT APPROVED LOCATIONS

## APPENDIX A

### FIELD EXPLORATION PROGRAM

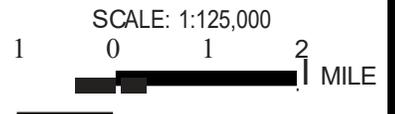
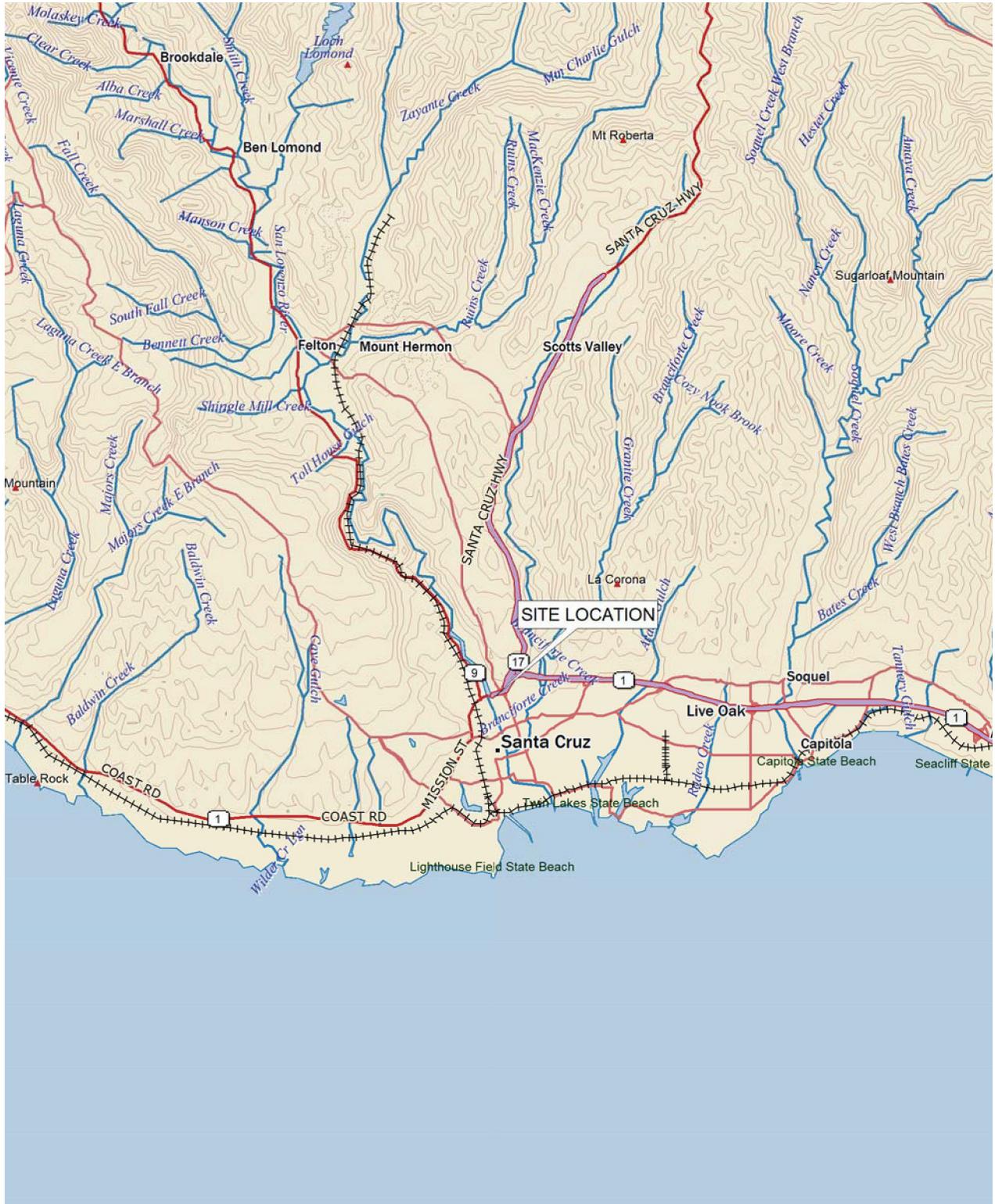
Field Exploration Procedures	Page A-1
Site Location Map	Figure A-1
Boring Location Plan	Figure A-2
Key to the Logs	Figure A-3
Logs of the Borings	Figures A-4.0 through A-7.1

## **FIELD EXPLORATION PROCEDURES**

Subsurface conditions were explored by drilling 4 borings to depths between 30.5± and 36± feet below the existing grades. Boring B-1 was drilled with a track mounted drill rig using mud rotary with a 4 inch diameter bit. Borings B-2 through B-4 were drilled with a track mounted drill rig equipped with 6 inch diameter solid stem augers. The Key to The Logs and the Logs of the Borings are included in Appendix A, Figures A-3 through A-7.1. The approximate locations of the borings are shown on the Boring Location Plan, Figure A-2.

The earth materials encountered in the borings were continuously logged in the field by a representative of CMAG. Bulk and relatively undisturbed samples were obtained for identification and laboratory testing. The samples were classified based on field observations and the laboratory test results. Classification was performed in accordance with the Unified Soil Classification System (Figure A-3).

Representative samples were obtained by means of a drive sampler, the hammer weight and drop being 140 lb and 30 inches, respectively. These samples were recovered using a 3 inch outside diameter Modified California Sampler or a 2 inch outside diameter Terzaghi Sampler. The number of blows required to drive the samplers 12 inches are indicated on the Boring Logs. The penetration test data for the Terzaghi driven samples has been presented as  $N_{60}$  values. The  $N_{60}$  values are also indicated on the Boring Logs.



BASEMAP: Delorme Topo USA®

**CMAG ENGINEERING**

**SITE LOCATION MAP**

**FIGURE**

150 Felker Street

A-1



N  
SCALE: 1" = 20'

PROPOSED 4 STORY  
APARTMENT BUILDING

B-4

B-1

B-2

B-3

FELKE STREET

EXPLANATION OF SYMBOLS

 APPROXIMATE LOCATION OF BORING

BASEMAP: Google Earth

CMAG ENGINEERING

BORING LOCATION PLAN

150 Felker Street

FIGURE

A-2

## KEY TO LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM				
PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
<b>COARSE GRAINED SOILS</b> More than half of the material is larger than the No. 200 sieve	<b>GRAVELS</b> More than half of the coarse fraction is larger than the No. 4 sieve	<b>CLEAN GRAVELS</b> (Less than 5% fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
		<b>GRAVEL WITH FINES</b>	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
			GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
		GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines	
	<b>SANDS</b> More than half of the coarse fraction is smaller than the No. 4 sieve	<b>CLEAN SANDS</b> (Less than 5% fines)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands, gravelly sands, little or no fines
		<b>SAND WITH FINES</b>	SM	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
<b>FINE GRAINED SOILS</b> More than half of the material is smaller than the No. 200 sieve	<b>SILTS AND CLAYS</b> Liquid limit less than 50		ML	Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	<b>SILTS AND CLAYS</b> Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
<b>HIGHLY ORGANIC SOILS</b>			Pt	Peat and other highly organic soils

GRAIN SIZE LIMITS							
SILT AND CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		
No. 200	No. 40	No. 10	No. 4	3/4 in.	3 in.	12 in.	
US STANDARD SIEVE SIZE							

RELATIVE DENSITY	
SAND AND GRAVEL	BLOWS/FT*
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

CONSISTENCY	
SILT AND CLAY	BLOWS/FT*
VERY SOFT	0 - 2
SOFT	2 - 4
FIRM	4 - 8
STIFF	8 - 16
VERY STIFF	16 - 32
HARD	OVER 32

MOISTURE CONDITION
DRY
MOIST
WET

BEDROCK
(GROUP SYMBOL)
Brackets Denote Bedrock

\* Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 inch I.D.) split spoon (ASTM D-1586).

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-1
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 4in. Mud Rotary, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			Terzaghi Split Spoon Sample                           2" Ring Sample                           2.5" Ring Sample 3" Shelby Tube                           Bulk Sample                           Groundwater Elevation					
1			4" AC / 3" Baserock					
2			<b>Qal:</b>					
3	ML		Dark Brown Sandy SILT. Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	19		103.4	13.3	E.I. = 23 Particle Size F.C. = 71.4%
4	ML		Dark Brown and Gray Sandy SILT. Firm, Moist, Slightly Plastic. Sand - Fine Grained.	6	6		12.1	
8	CL		Yellowish Brown and Gray Sandy Lean CLAY. Hard, Moist, Plastic. Sand - Fine Grained.	52		106.1	21.2	
10	SM		Dark Yellowish Brown Silty SAND. Medium Dense, Moist, Non Plastic. Sand - Fine to Medium Grained. Trace Gravel up to 1 in, Rounded.	20	23		11.5	
16	SM		Dark Yellowish Brown Silty SAND with Gravel. Very Dense, Wet, Non Plastic. Sand - Fine to Medium Grained. Gravel up to 1 in, Subrounded.	41	50		12.0	
17								
18			Intermittent Gravel and Cobble Layers.					
21	SW-SM		Dark Yellowish Brown Well Graded SAND with Silt. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Some Gravel up to 1 in, Subrounded.	24	30		17.9	Particle Size F.C. = 9.7%
23			Intermittent Gravel and Cobble Layers.					

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-1 (continued)
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 4in. Mud Rotary, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			<div style="display: flex; justify-content: space-around; font-size: small;"> <div style="text-align: center;">  Terzaghi Split Spoon Sample                 </div> <div style="text-align: center;">  2" Ring Sample                 </div> <div style="text-align: center;">  2.5" Ring Sample                 </div> </div> <div style="display: flex; justify-content: space-around; font-size: small; margin-top: 5px;"> <div style="text-align: center;">  3" Shelby Tube                 </div> <div style="text-align: center;">  Bulk Sample                 </div> <div style="text-align: center;">  Groundwater Elevation                 </div> </div>					
-25 -26	SM	[ ]	Dark Yellowish Brown Silty SAND. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Some Gravel up to 1 in, Subrounded.	29	38		15.4	
-27 -28 -29			<b>Tsm:</b>					
-30 -31 -32 -33	(SM)	[ ]	Gray and Light Yellowish Brown SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			24.1	
-34 -35 -36	(SM)	[ ]	Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			25.3	Particle Size F.C.= 15.0%
-37 -38 -39 -40 -41 -42 -43 -44 -45 -46 -47 -48			Boring Terminated at 36± ft. Groundwater Encountered at 17± ft. Boring Backfilled with Cuttings and Concrete Cap.					

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-2
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			 Terzaghi Split Spoon Sample  2" Ring Sample  2.5" Ring Sample  3" Shelby Tube  Bulk Sample  Groundwater Elevation					
1	ML		4" AC / 4" Baserock <b>af:</b> Dark Brown Sandy SILT. Moist, Slightly Plastic. Sand - Fine Grained.					
2	ML		<b>Qal:</b> Dark Brown Sandy SILT. Soft, Moist, Slightly Plastic. Sand - Fine Grained.	6		100.3	17.3	Direct Shear $\phi' = 27^\circ$ $c' = 100$ psf Particle Size F.C. = 69.5% Sulfate
3	ML		Dark Brown Sandy SILT. Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	7	8		18.9	
4								
5								
6	CL		Yellowish Brown and Gray Sandy Lean CLAY. Very Stiff, Moist, Plastic. Sand - Fine Grained.	26		97.0	26.4	Particle Size F.C. = 77.8% $q_u = 4606$ psf LL = 47 PL = 21 PI = 26
7	CL		Yellowish Brown and Gray Sandy Lean CLAY. Stiff, Moist, Plastic. Sand - Fine Grained.	11	13		25.7	
8								
9								
10								
11	SM		Dark Yellowish Brown and Gray Silty SAND. Loose, Wet, Non Plastic. Sand - Fine Grained.	7	9		24.4	Particle Size F.C. = 27.8%
12								
13			Intermittent Gravel and Cobble Layers.					
14								
15								
16	SM		Dark Yellowish Brown Silty SAND with Gravel. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subrounded to Rounded.	36	47		9.6	
17								
18			Intermittent Gravel and Cobble Layers.					
19								
20								
21	SW-SM		Dark Yellowish Brown Well Graded SAND with Gravel. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subrounded.	34	45		14.4	Particle Size F.C. = 11.8%
22								
23								
24								

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-2 (continued)
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			 Terzaghi Split Spoon Sample  3" Shelby Tube  2" Ring Sample  Bulk Sample  2.5" Ring Sample  Groundwater Elevation					
-25 -26 -27	SM		Dark Yellowish Brown Silty SAND. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Some Gravel > 1.5 in, Subrounded.	32	43		13.0	
-28 -29 -30			<b>Tsm:</b>					
-30 -31	(SM)		Yellowish Brown and Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	95	131		24.9	
-32 -33 -34 -35 -36 -37 -38 -39 -40 -41 -42 -43 -44 -45 -46 -47 -48			Boring Terminated at 31.5+ ft. Groundwater Encountered at 17+ ft. Boring Backfilled with Cuttings and Concrete Cap.					

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-3
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			 Terzaghi Split Spoon Sample  3" Shelby Tube  2" Ring Sample  Bulk Sample  2.5" Ring Sample  Groundwater Elevation					
1			<b>Qal:</b>					
2								
3	ML		Dark Brown and Gray Sandy SILT. Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	11	12		9.4	Sulfate
4								
5								
6	CL		Yellowish Brown and Gray Sandy Lean CLAY. Stiff, Moist, Plastic. Sand - Fine Grained.	32		99.5	17.5	Particle Size F.C. = 87.7% q <sub>u</sub> = 2245 psf
7								
8								
9								
10								
11	SM		Yellowish Brown Silty SAND. Medium Dense, Moist, Non Plastic. Sand - Fine to Medium Grained.	18	22		7.0	
12								
13			Intermittent Gravel and Cobble Layers.					
14								
15								
16	SM		Dark Yellowish Brown Silty SAND with Gravel. Medium Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subrounded to Rounded.	20	26		13.3	Particle Size F.C. = 13.7%
17								
18			Intermittent Gravel and Cobble Layers.					
19								
20								
21	SM		Dark Yellowish Brown Silty SAND with Gravel. Very Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subrounded. Schist Cobble in Shoe.	100+			13.9	
22								
23			Intermittent Gravel and Cobble Layers.					
24			<b>Tsm:</b> Yellowish Brown and Gray SANDSTONE. Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.					

**CMAG ENGINEERING**

FIGURE  
A-6.0

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-3 (continued)
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			 Terzaghi Split Spoon Sample  3" Shelby Tube  2" Ring Sample  Bulk Sample  2.5" Ring Sample  Groundwater Elevation					
-25	(SM)		<b>ISM:</b> Yellowish Brown and Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			27.8	
-26								
-27								
-28								
-29								
-30	(SM)		Light Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			25.8	
-31								
-32			Boring Terminated at 31± ft. Groundwater Encountered at 17+ ft. Boring Backfilled with Cuttings.					
-33								
-34								
-35								
-36								
-37								
-38								
-39								
-40								
-41								
-42								
-43								
-44								
-45								
-46								
-47								
-48								

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-4
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests	
			 Terzaghi Split Spoon Sample  3" Shelby Tube  2" Ring Sample  Bulk Sample  2.5" Ring Sample  Groundwater Elevation						
1			4" AC / 3" Baserock						
1			<b>Qal:</b>						
2	ML		Dark Brown Sandy SILT. Firm, Moist, Slightly Plastic. Sand - Fine Grained.	10		85.4	9.0	Particle Size F.C.= 70.9% Sulfate	
3	ML		Dark Yellowish Brown Sandy SILT. Firm, Moist, Slightly Plastic. Sand - Fine Grained.	6	7		8.3		
4									
5									
6	ML		Grayish Brown Sandy SILT. Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	25		101.9	9.1		
7	ML		Yellowish Brown Sandy SILT. Very Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	21	25		9.3		
8									
9									
10									
11	ML		Yellowish Brown Sandy SILT. Hard, Moist, Slightly Plastic. Sand - Fine Grained.	40	49		8.7		
12									
13									
14									
15									
16	SM		Yellowish Brown Silty SAND with Gravel. Dense, Moist, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subangular to Subrounded.	30	39		9.9		
17									
18			Intermittent Gravel and Cobble Layers.						
19									
20									
21	SM		Yellowish Brown Silty SAND with Gravel. Very Dense, Moist, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subangular to Subrounded. Schist Cobble in Shoe.	100+			7.4		
22									
23									
24			<b>Tsm:</b> Yellowish Brown and Gray SANDSTONE. Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.						

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-4 (continued)
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			 Terzaghi Split Spoon Sample  2" Ring Sample  2.5" Ring Sample  3" Shelby Tube  Bulk Sample  Groundwater Elevation					
-25	(SM)		Yellowish Brown and Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			26.4	
-26								
-27								
-28								
-29								
-30	(SM)		Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			26.1	
-31								
-32			Boring Terminated at 30.5± ft. Groundwater Encountered at 24± ft. Boring Backfilled with Cuttings.					
-33								
-34								
-35								
-36								
-37								
-38								
-39								
-40								
-41								
-42								
-43								
-44								
-45								
-46								
-47								
-48								

## APPENDIX B

### LABORATORY TESTING PROGRAM

Laboratory Testing Procedures	Page B-1
Direct Shear Test Results	Figure B-1
Unconfined Compression Test Results	Figures B-2 and B-3
Particle Size Distribution Test Results	Figures B-4 through B-13
Liquid Limit and Plastic Limit Test Results	Figure B-14
Expansion Index Test Results	Table B-1
Soluble Sulfate Test Results	Table B-2

## **LABORATORY TESTING PROCEDURES**

### **Classification**

Earth materials were classified according to the Unified Soil Classification System in accordance with ASTM D 2487 and D 2488. See Figure A-3. Moisture content and dry density determinations were made for representative, relatively undisturbed samples in accordance with ASTM D 2216. Results of the moisture-density determinations, together with classifications, are shown on the Boring Logs in Appendix A.

### **Direct Shear**

A consolidated drained direct shear test was performed in accordance with ASTM D 3080 on a representative, relatively undisturbed sample of the on-site soils. To simulate possible adverse field conditions the sample was saturated prior to shearing. A saturating device was used which permitted the sample to absorb moisture while preventing volume change. The direct shear test results are presented on the Boring Logs and Figure B-1.

### **Unconfined Compression**

Unconfined compression tests were performed on representative samples of the on-site soils in accordance with ASTM D 2166. The test results are presented on the Boring Logs and Figures B-2 and B-3.

### **Particle Size Distribution**

Particle size distribution tests were performed on representative samples of the on-site soils and bedrock in accordance with ASTM D 422. The test results are presented on the Boring Logs and Figures B-4 through B-13.

### **Liquid Limit, Plastic Limit and Plasticity Index**

A liquid limit and plastic limit test was performed on a representative sample of the on-site soils in accordance with ASTM D 4318. The test results are presented on the Boring Logs and Figure B-14.

### **Expansion**

An expansion index test was performed on a representative remolded sample of the on-site soils in accordance with the ASTM D 4829. The test results are presented on the Boring Logs and in Table B-1.

**Table B-1. Expansion Index Test Results**

Boring	Depth (ft)	Soil Type	Expansion Index	Expansion Potential
B-1	2	ML	23	Low

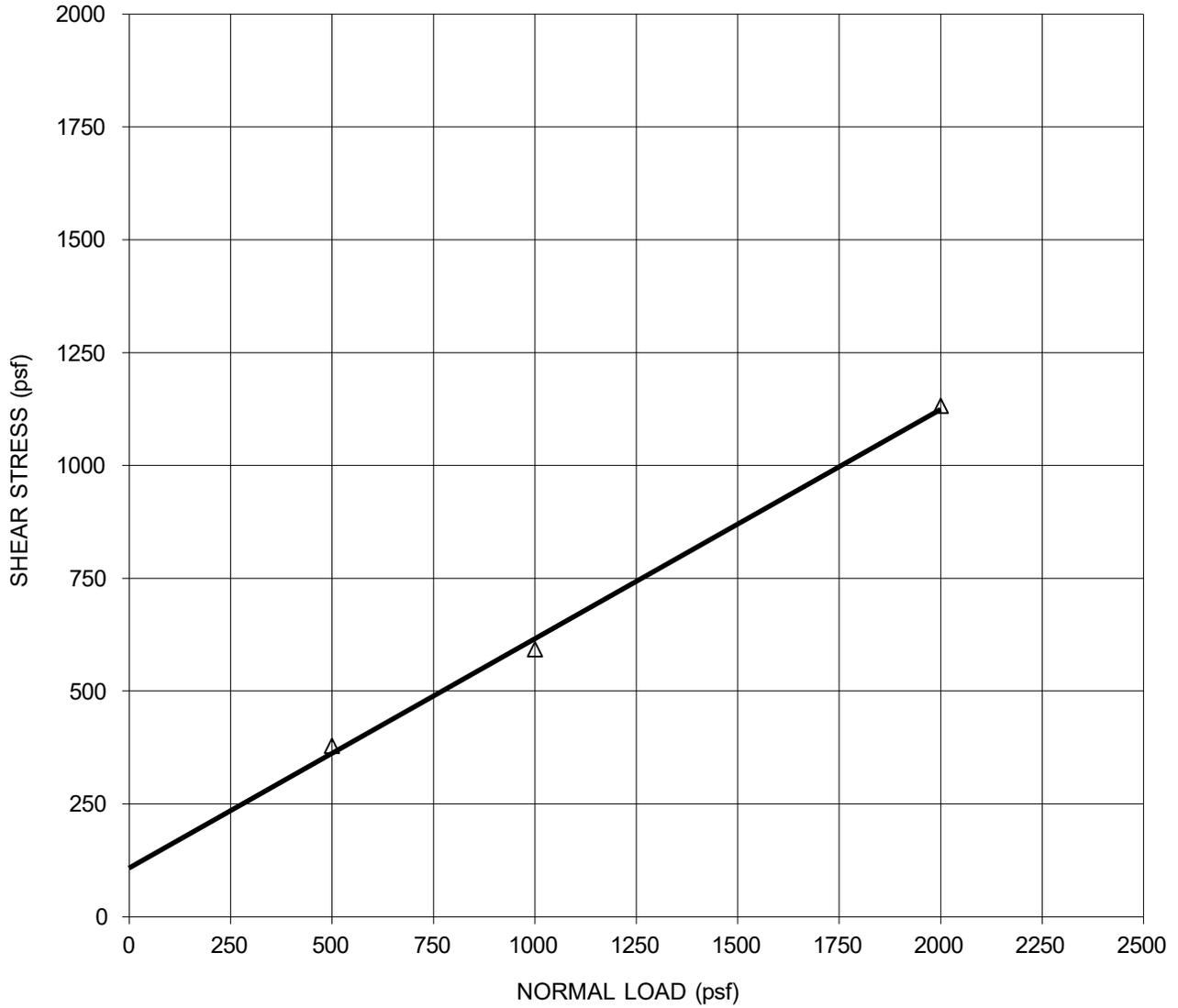
**Soluble Sulfates**

The soluble sulfate content was determined for samples considered representative of the on-site soils in accordance with Caltrans 417. The test results are presented in Table B-2.

**Table B-2. Sulfate Test Results**

Boring	Depth (ft)	Soil Type	Sulfates (ppm)	Exposure
B-2	2.5	ML	19	Negligible
B-3	2	ML	10	Negligible
B-4	1	ML	89	Negligible

BORING:	B-2		COHESION	FRICTION
DEPTH (ft):	2		(psf)	ANGLE
SOIL TYPE (USCS):	ML		100	27
MOISTURE: <b>SATURATED</b>		TEST TYPE: <b>CONSOLIDATED - DRAINED</b>		



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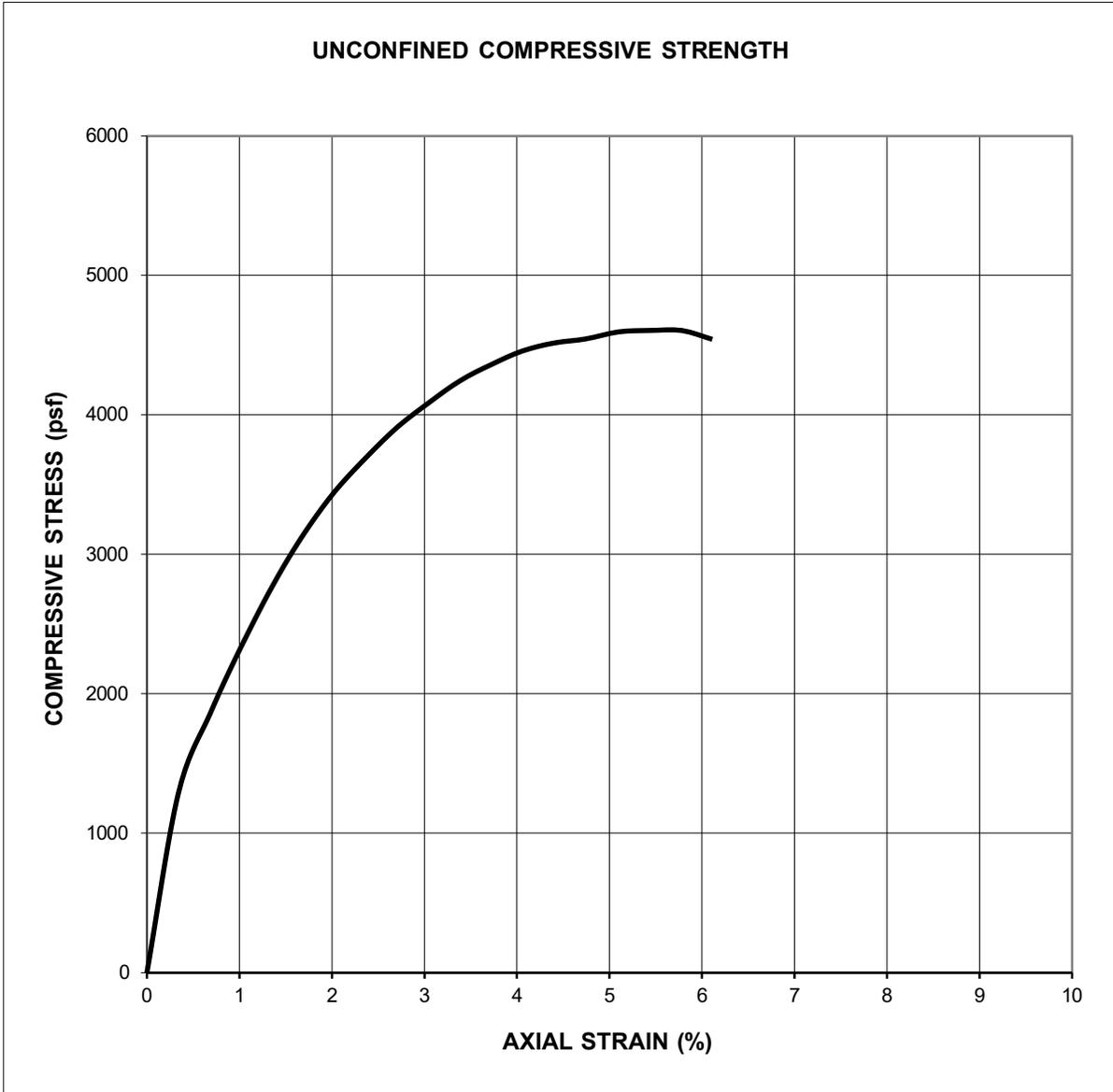
**DIRECT SHEAR TEST RESULTS**

150 Felker Street

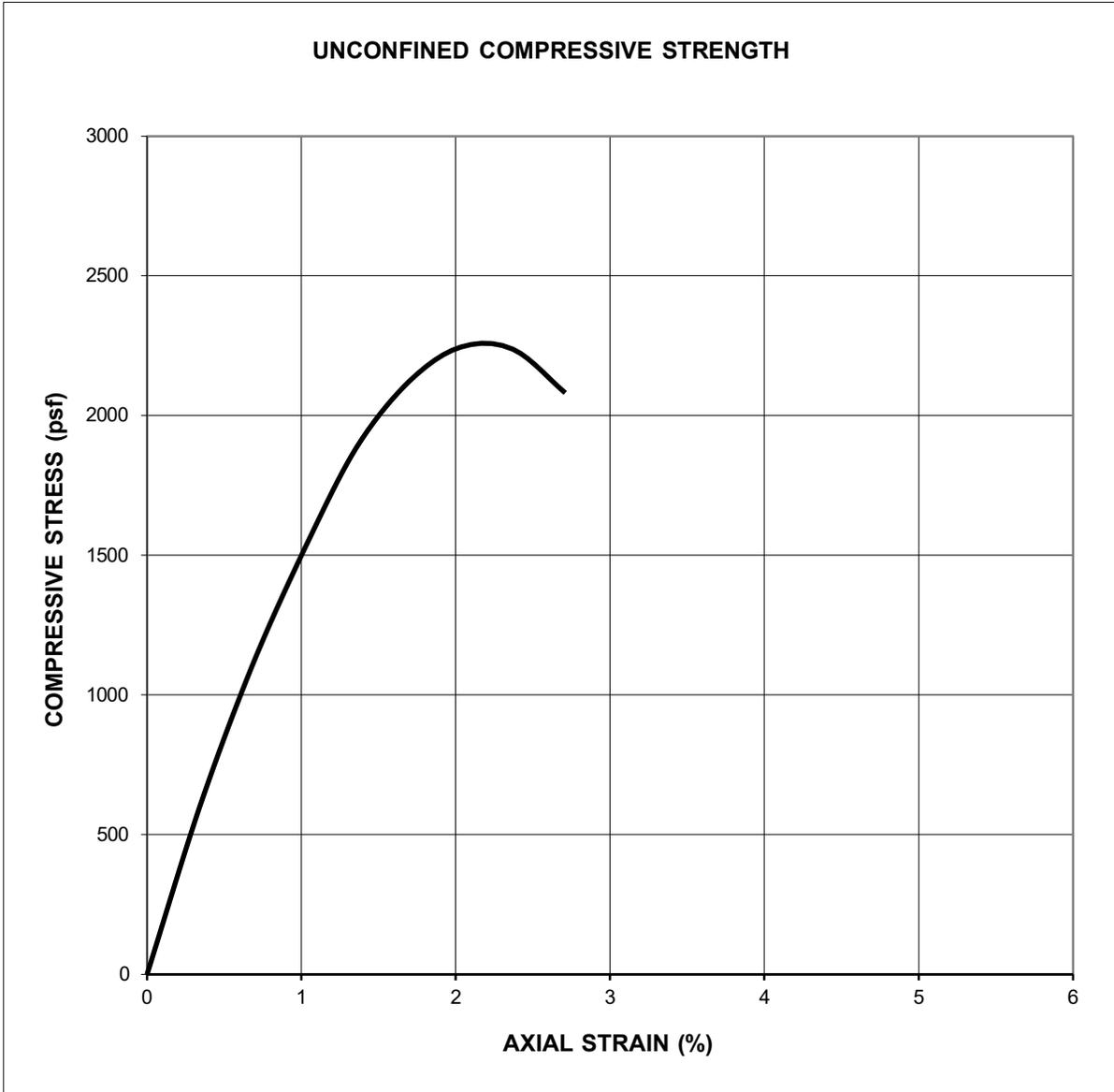
FIGURE

B-1

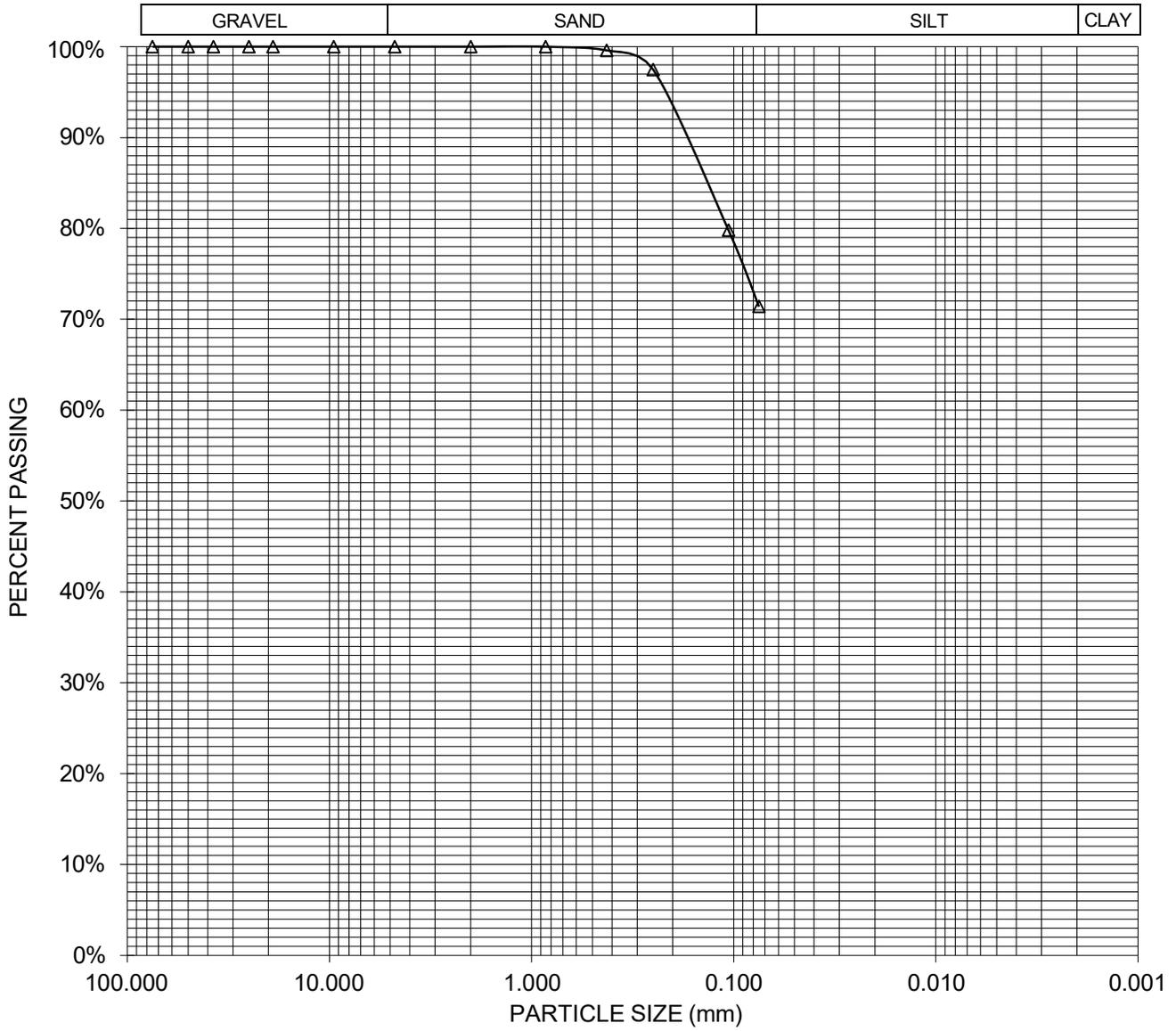
BORING:	B-2	UNCONFINED COMPRESSIVE STRENGTH (psf)	4,606
DEPTH (ft):	6	SAMPLE TYPE: UNDISTURBED	
SOIL TYPE (USCS):	CL	MOISTURE: INSITU - SATURATED	



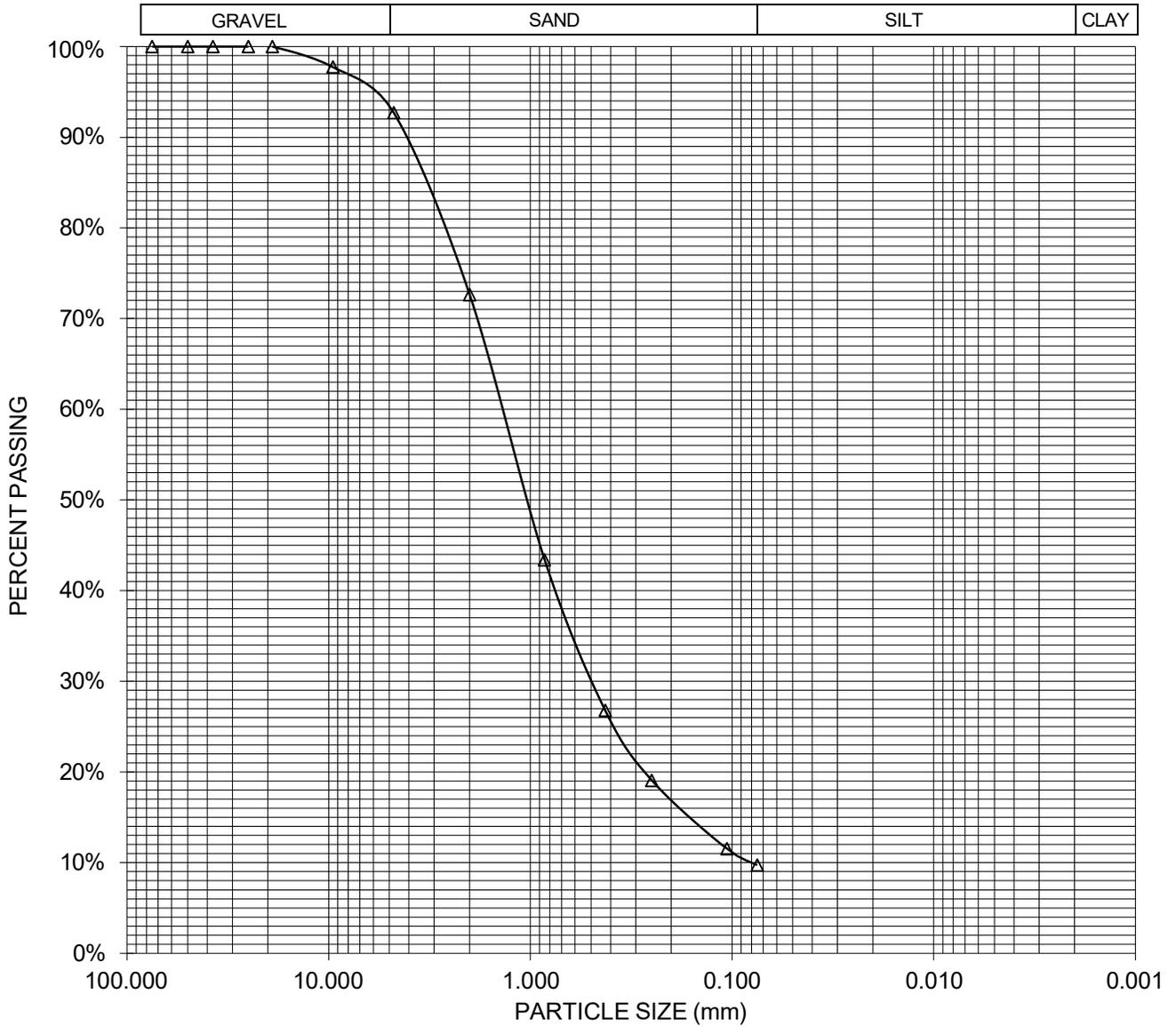
BORING:	B-3	UNCONFINED COMPRESSIVE STRENGTH (psf)	2,245
DEPTH (ft):	6	SAMPLE TYPE: UNDISTURBED	
SOIL TYPE (USCS):	CL	MOISTURE: INSITU - SATURATED	



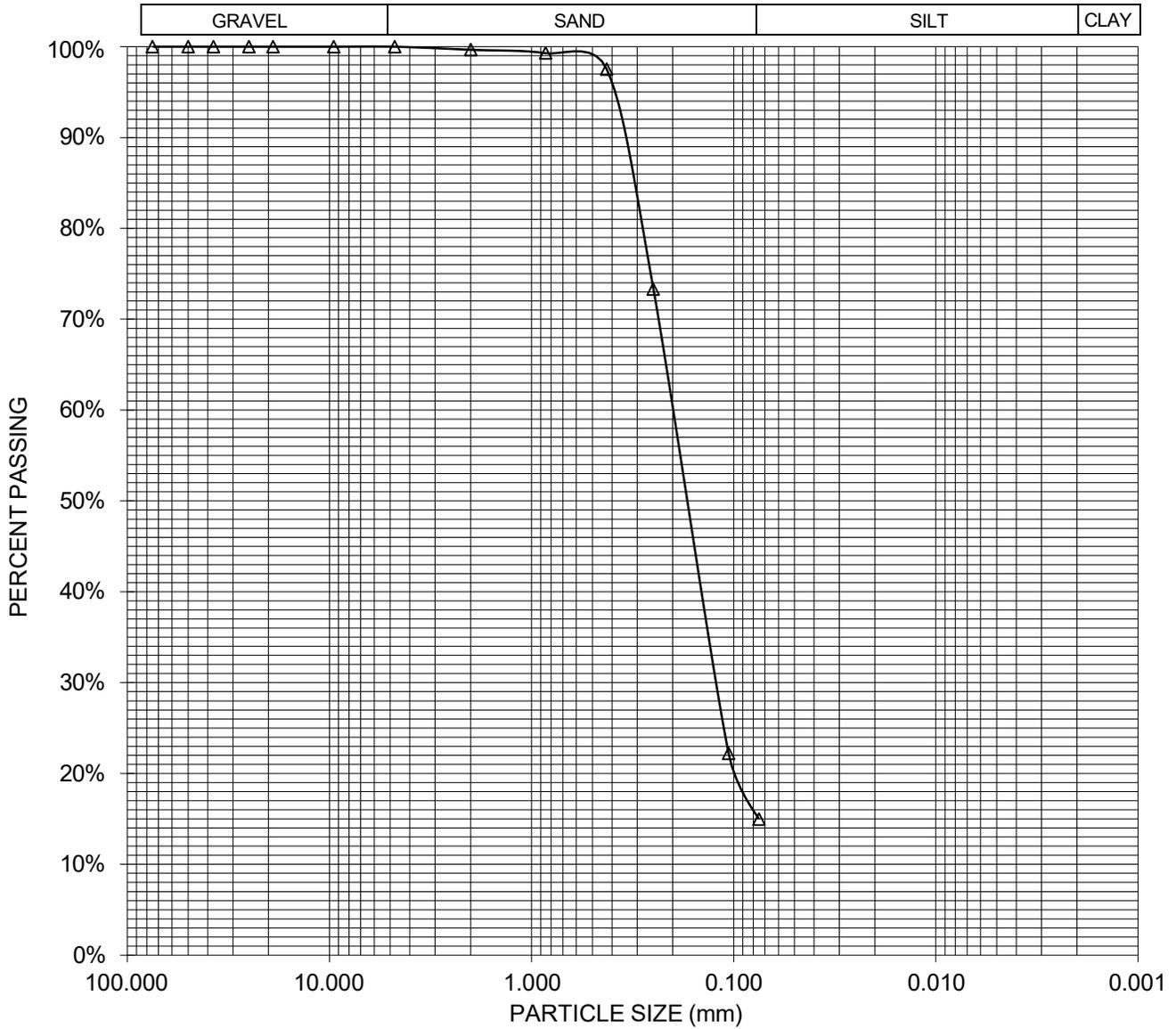
BORING:	B-1	PERCENT	PERCENT
DEPTH (ft):	2	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	ML	100.0%	71.4%



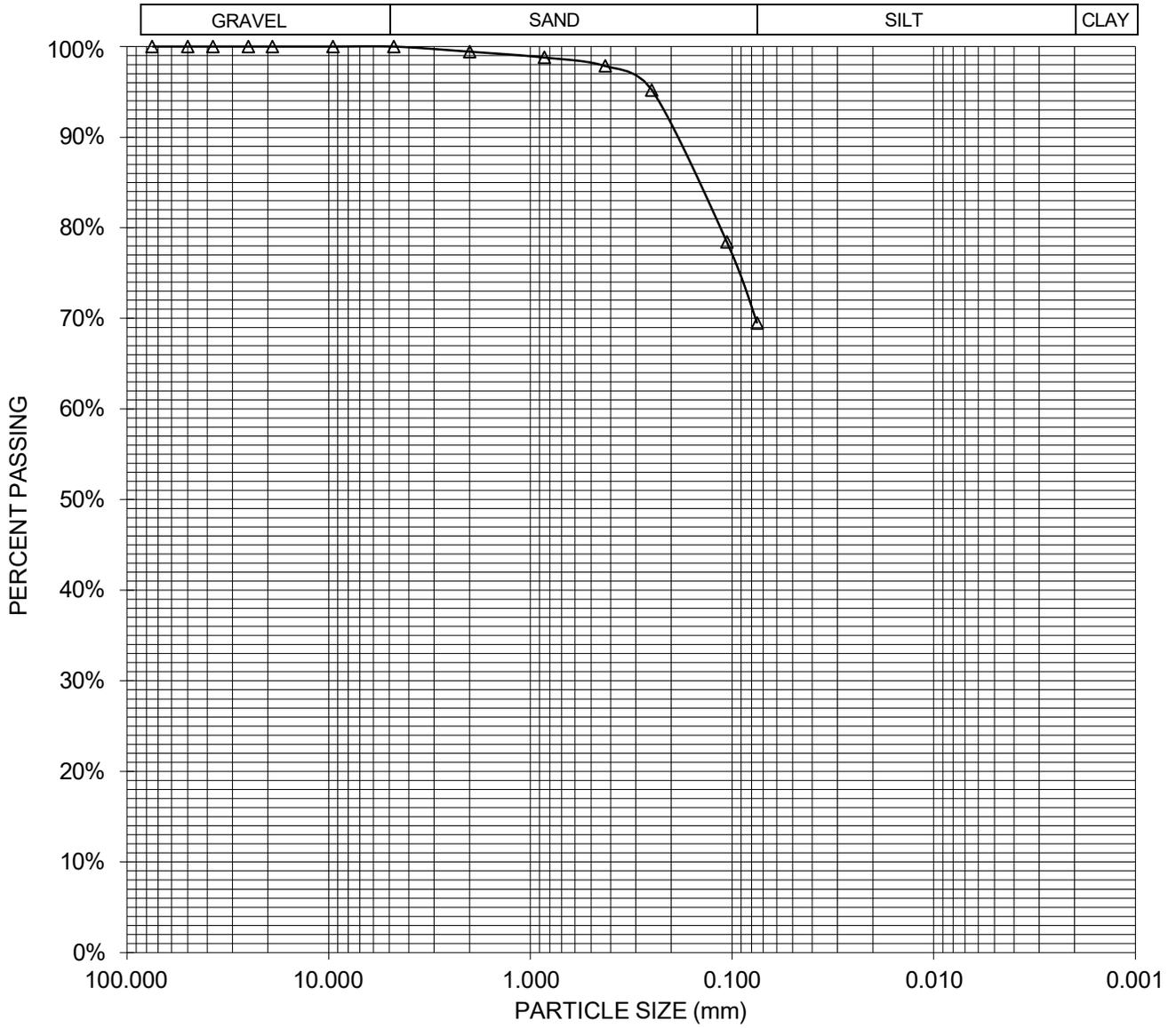
BORING:	B-1	PERCENT	PERCENT
DEPTH (ft):	20	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	SW-SM	92.7%	9.7%



BORING:	B-1	PERCENT	PERCENT
DEPTH (ft):	35	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	(SM)	100.0%	15.0%



BORING:	B-2	PERCENT	PERCENT
DEPTH (ft):	2	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	ML	100.0%	69.5%



**CMAG ENGINEERING**

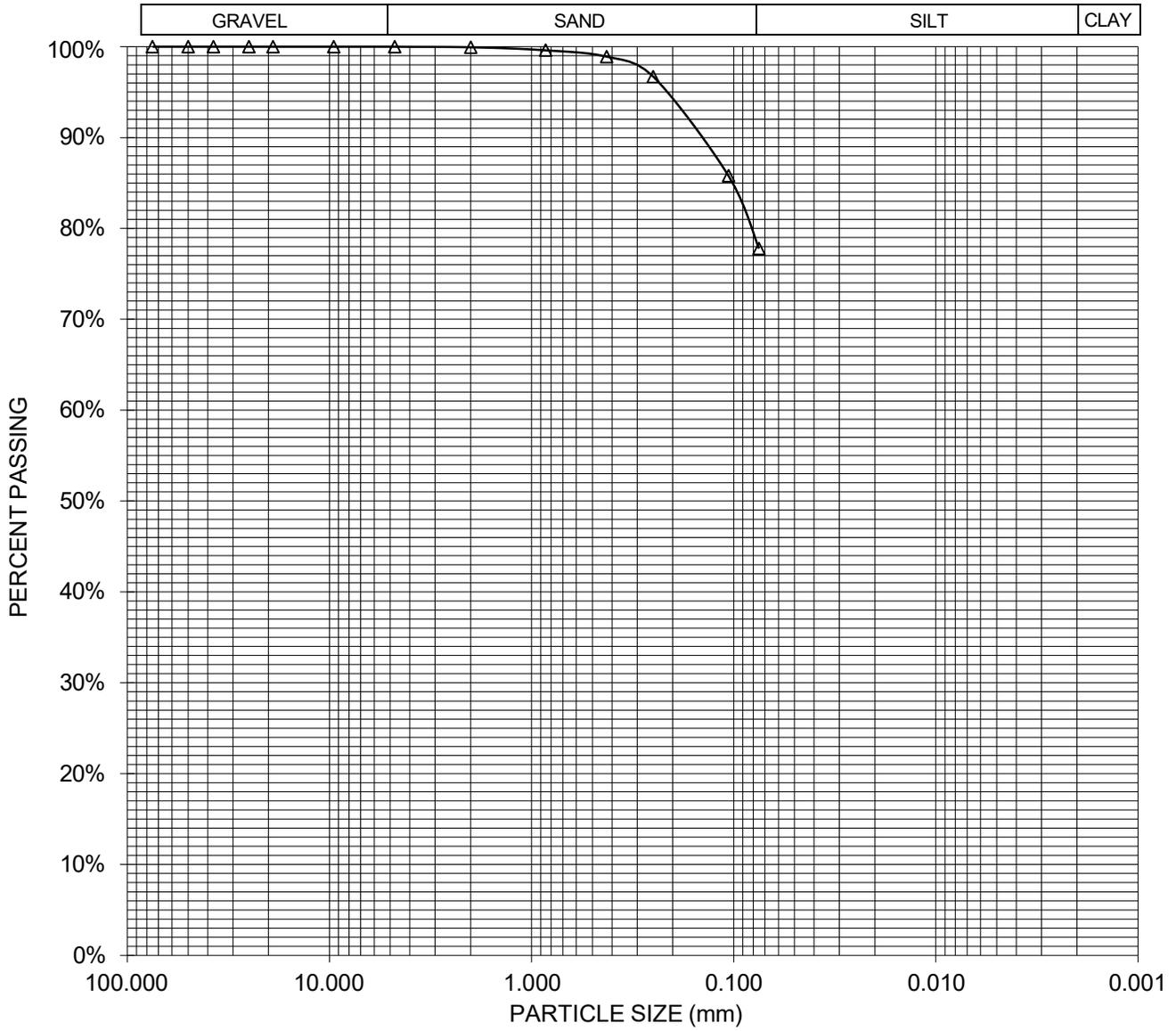
**PARTICLE SIZE DISTRIBUTION**

150 Felker Street

FIGURE

B-7

BORING:	B-2	PERCENT	PERCENT
DEPTH (ft):	6	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	CL	100.0%	77.8%



**CMAG ENGINEERING**

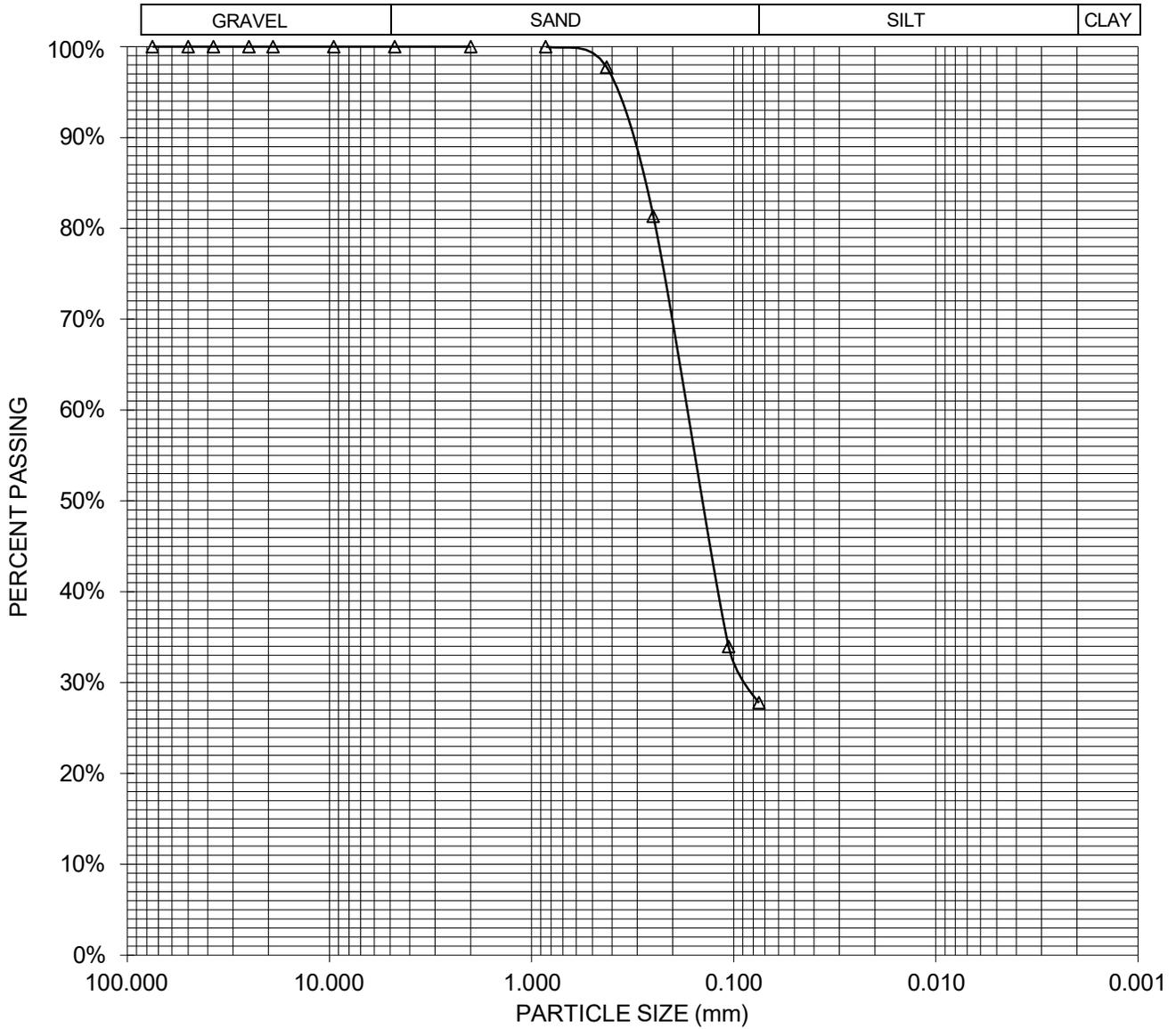
**PARTICLE SIZE DISTRIBUTION**

150 Felker Street

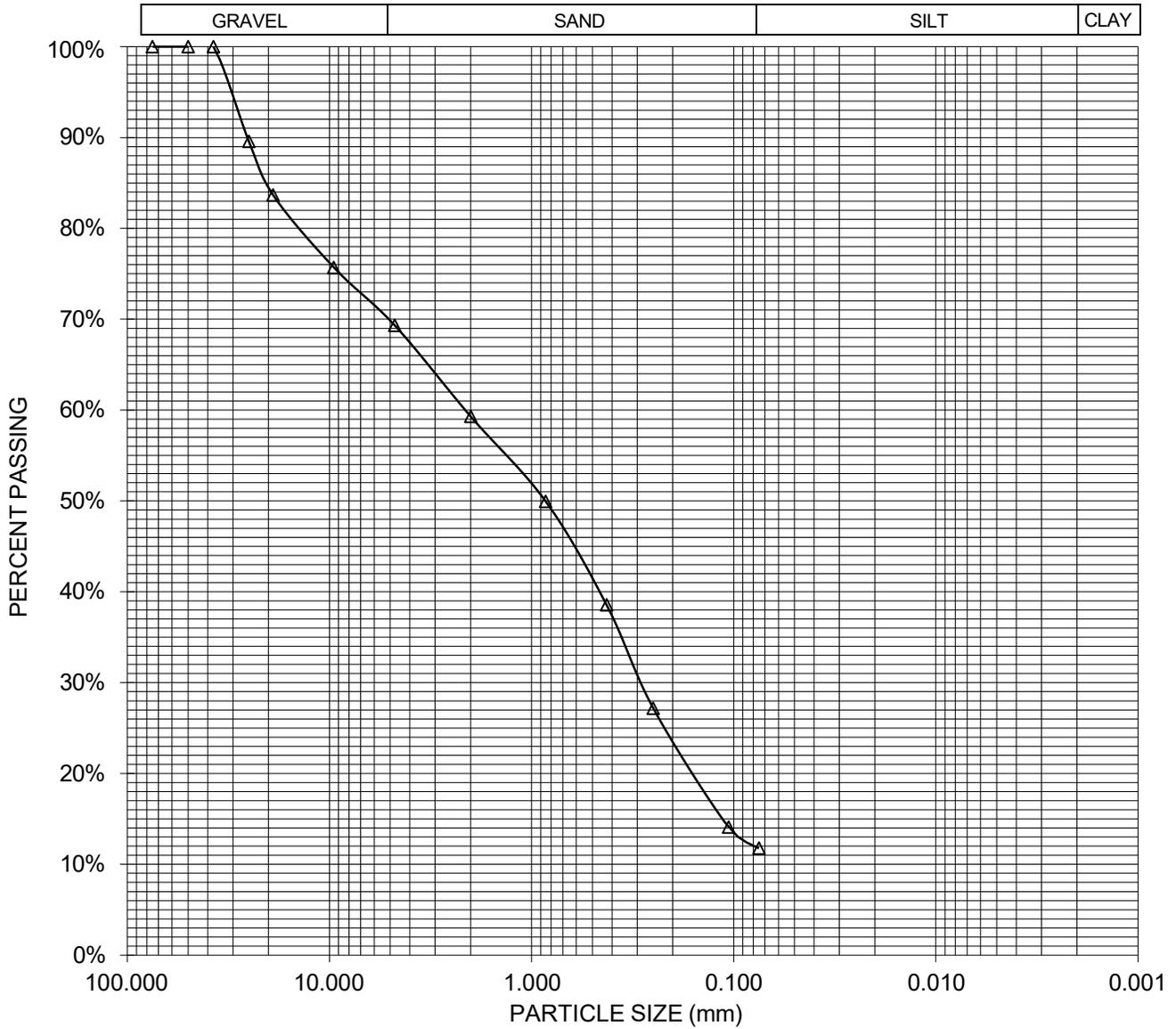
**FIGURE**

**B-8**

BORING:	B-2	PERCENT	PERCENT
DEPTH (ft):	10	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	SM	100.0%	27.8%



BORING:	B-2	PERCENT	PERCENT
DEPTH (ft):	20	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	SW-SM	69.3%	11.8%



**CMAG ENGINEERING**

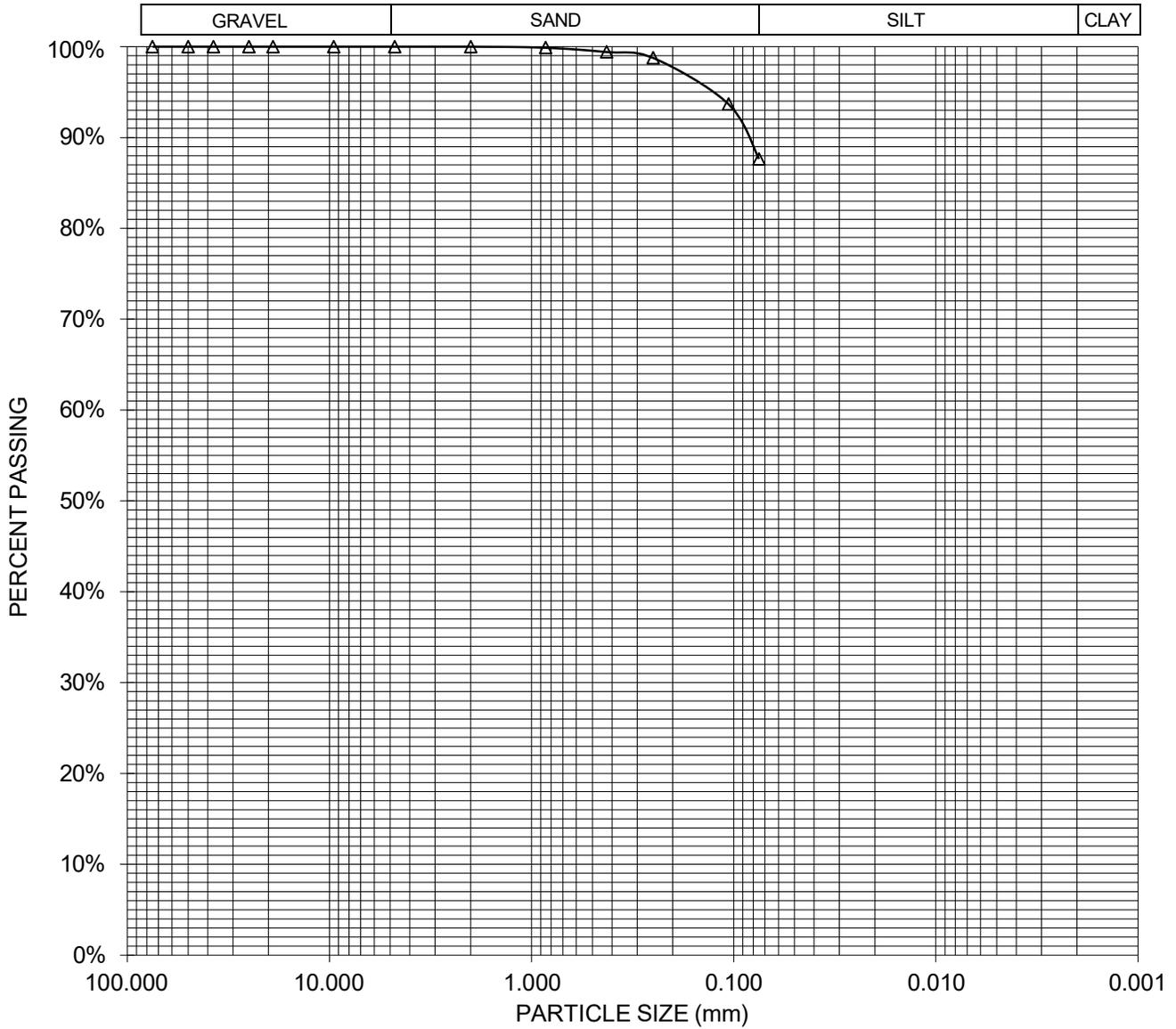
**PARTICLE SIZE DISTRIBUTION**

**FIGURE**

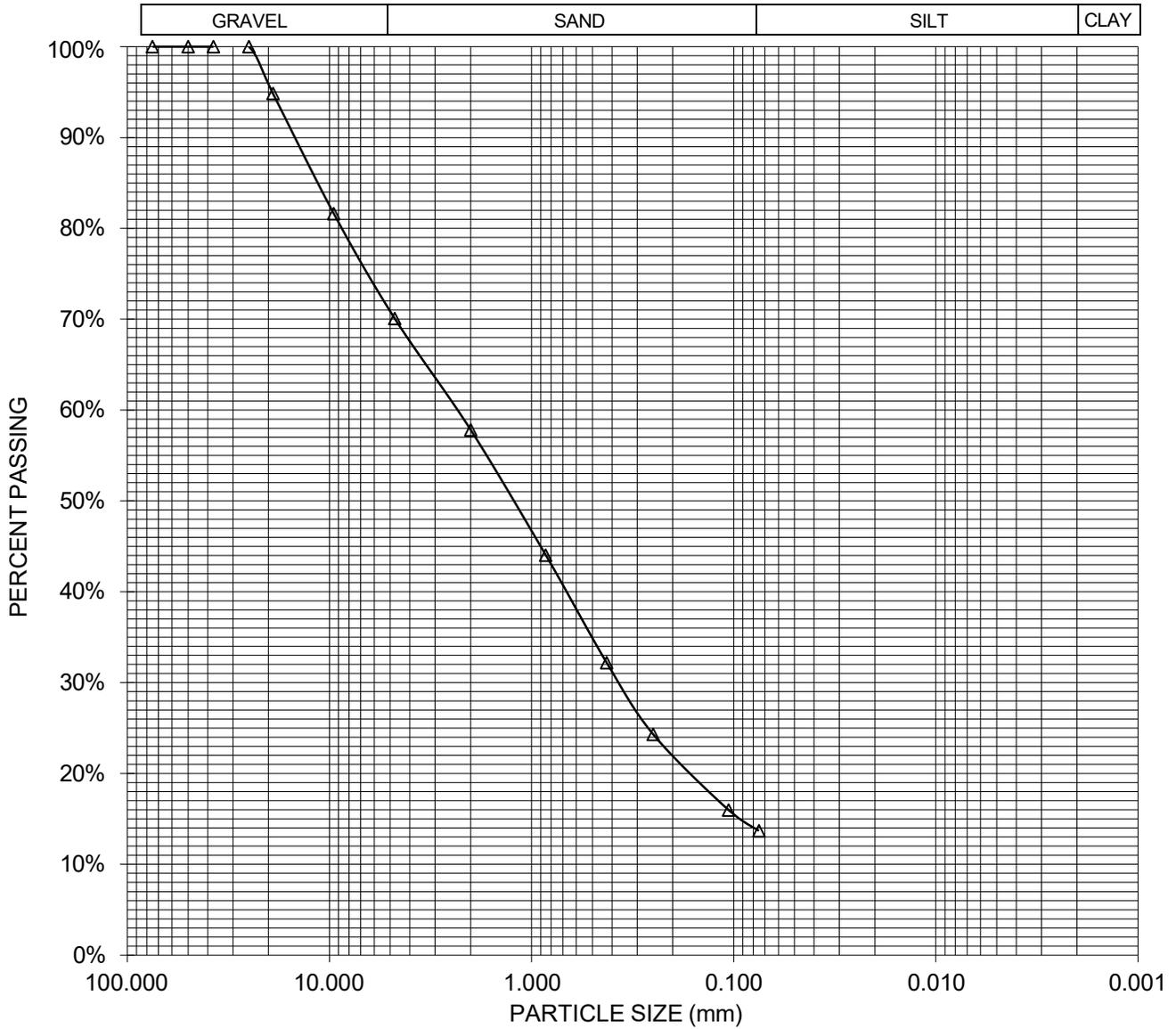
150 Felker Street

B-10

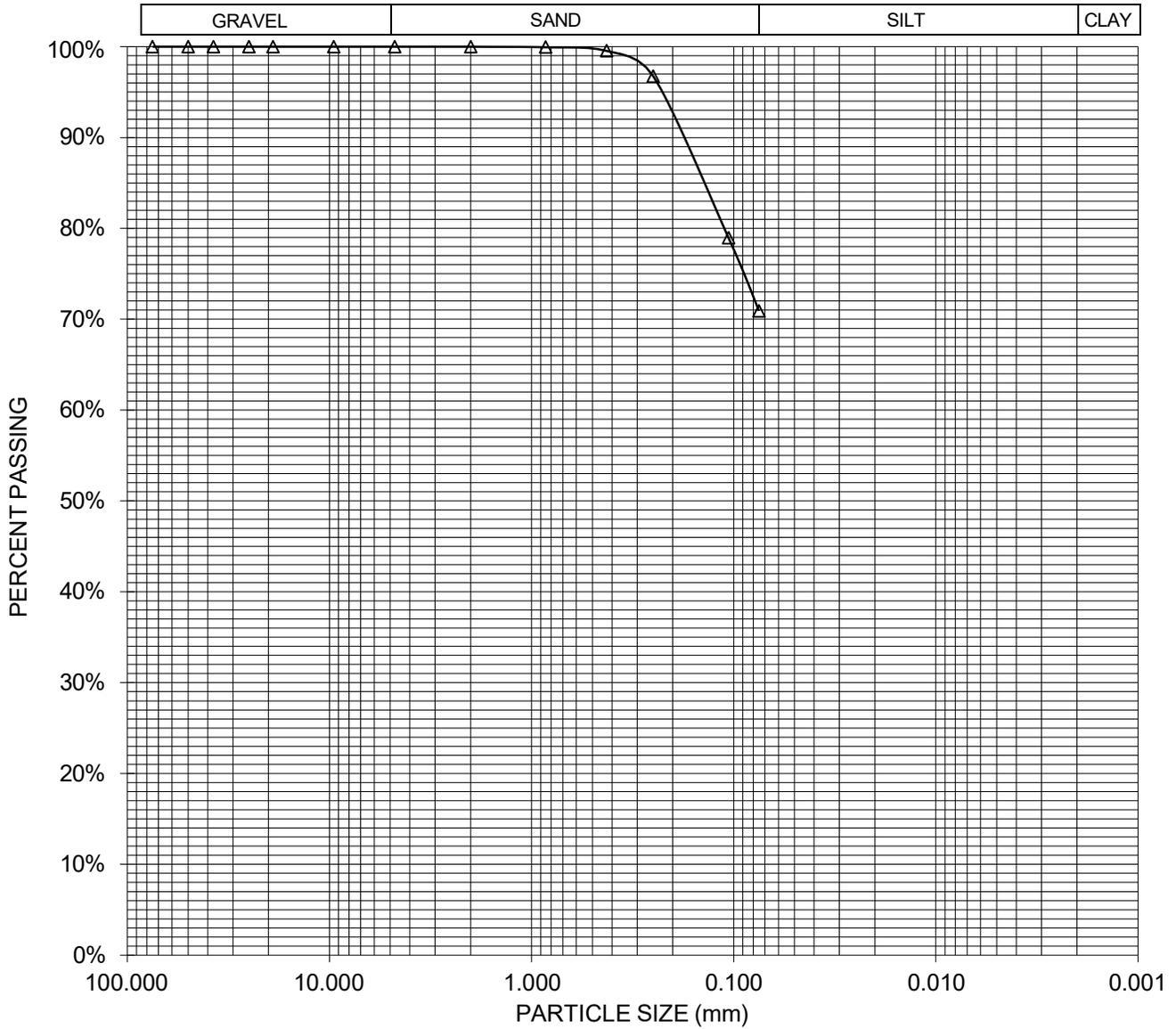
BORING:	B-3	PERCENT	PERCENT
DEPTH (ft):	6	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	CL	100.0%	87.7%



BORING:	B-3	PERCENT	PERCENT
DEPTH (ft):	15	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	SM	70.1%	13.7%



BORING:	B-4	PERCENT	PERCENT
DEPTH (ft):	1	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	ML	100.0%	70.9%



**CMAG ENGINEERING**

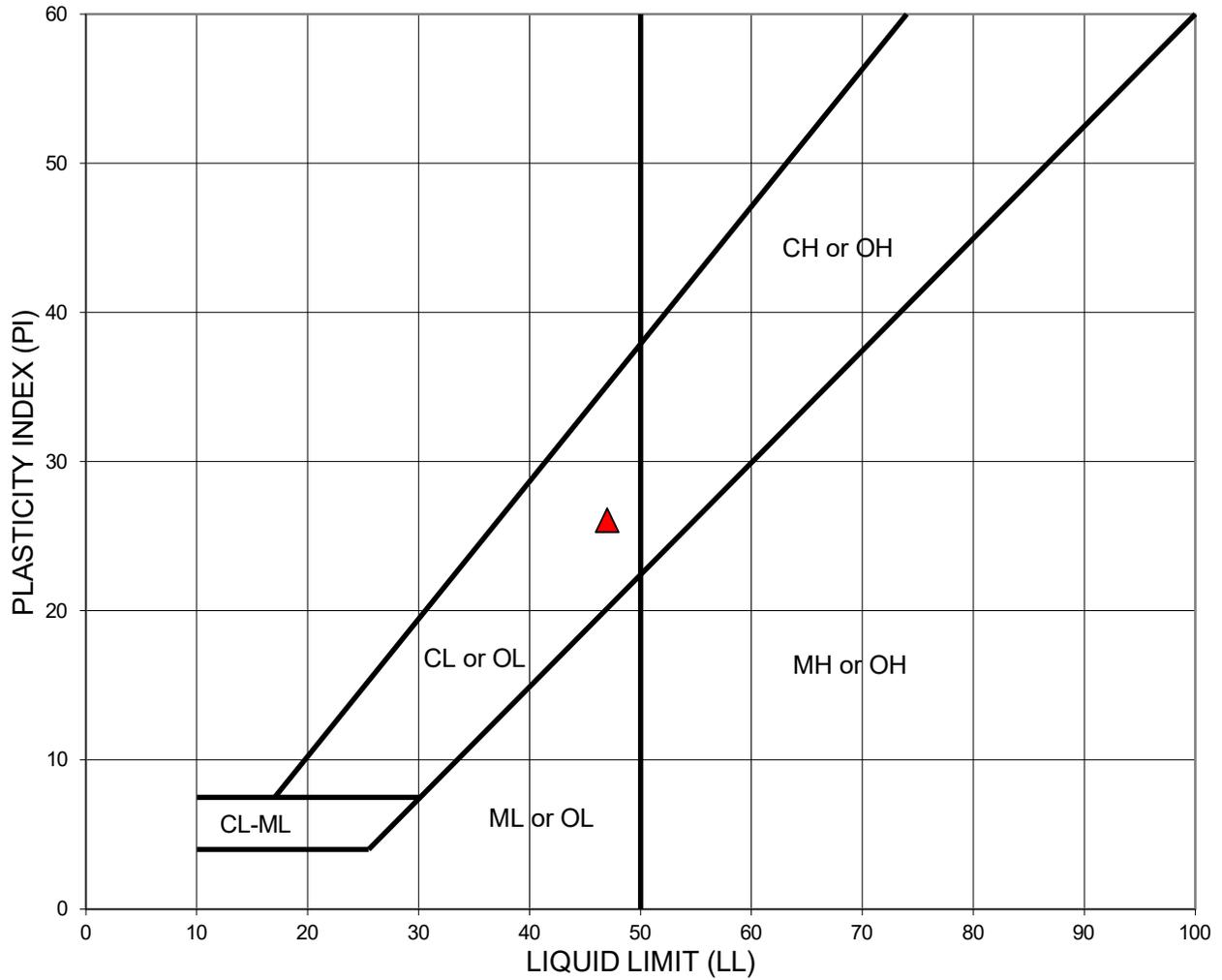
**PARTICLE SIZE DISTRIBUTION**

150 Felker Street

FIGURE

B-13

# PLASTICITY CHART



KEY					
SYMBOL	BORING	DEPTH(FT)	LL	PL	PI
▲	B-2	6.5	47	21	26

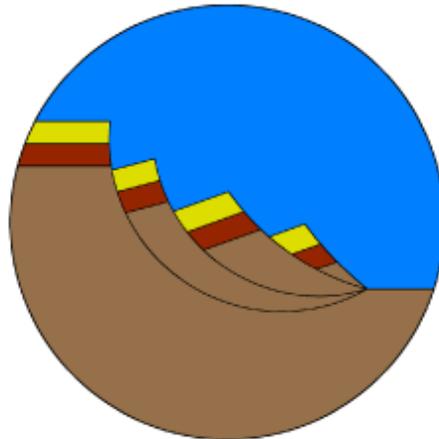
# **GEOTECHNICAL INVESTIGATION**

**150 Felker Street  
Santa Cruz, Santa Cruz County, California**

Submitted to:

AEST Realty  
4100 Moorpark Avenue, Suite 205  
San Jose, California 95117

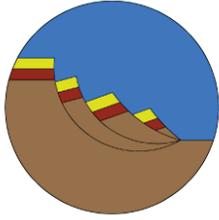
ATTN: Arthur Lin



Prepared by:

**CMAG ENGINEERING, INC.**

Project No. 21-116-SC  
September 13, 2021



# CMAG ENGINEERING, INC.

P.O. BOX 640 APTOS, CALIFORNIA 95001

PHONE: 831.475.1411

WWW.CMAGENGINEERING.COM

September 13, 2021  
Project No. 21-116-SC

AEST Realty  
4100 Moorpark Avenue, Suite 205  
San Jose, California 95117

ATTN: Arthur Lin

**SUBJECT: GEOTECHNICAL INVESTIGATION**  
Proposed Apartment Building  
150 Felker Street, Santa Cruz, Santa Cruz County, California  
APN 008-181-23

Dear Mr. Lin:

In accordance with your authorization, we have completed a geotechnical investigation for the subject project. This report summarizes the findings, conclusions, and recommendations from our field exploration, laboratory testing, and engineering analysis. It is a pleasure being associated with you on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office.

Sincerely,

**CMAG ENGINEERING, INC.**

Reviewed by:



Shannon Chome', PE  
Senior Engineer  
C 68398  
Expires 9/30/23



Adrian L. Garner, PE, GE  
Principal Engineer  
C 66087, GE 2814  
Expires 6/30/22

Distribution: Addressee (4 Hard Copies; Electronic Copy)

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	Terms of Reference	1
1.2	Site Location	1
1.3	Surface Conditions	1
<b>2.0</b>	<b>PROJECT DESCRIPTION</b>	<b>1</b>
<b>3.0</b>	<b>FIELD EXPLORATION AND LABORATORY TESTING PROGRAMS</b>	<b>2</b>
<b>4.0</b>	<b>SUBSURFACE CONDITIONS AND EARTH MATERIALS</b>	<b>2</b>
4.1	General	2
4.2	Artificial Fill - af	2
4.3	Alluvial Deposits - Qal	3
4.4	Santa Margarita Sandstone - Tsm	3
4.5	Groundwater	3
<b>5.0</b>	<b>GEOTECHNICAL HAZARDS</b>	<b>3</b>
5.1	General	3
5.2	Seismic Shaking	3
5.3	Collateral Seismic Hazards	4
5.3.1	Seismically Induced Liquefaction	4
<b>6.0</b>	<b>DISCUSSIONS AND CONCLUSIONS</b>	<b>6</b>
<b>7.0</b>	<b>RECOMMENDATIONS</b>	<b>6</b>
7.1	General	6
7.2	Site Grading	7
7.2.1	Site Clearing	7
7.2.2	Preparation of On-Site Soils	7
7.2.3	Cut and Fill Slopes	9
7.2.4	Utility Trenches	9
7.2.5	Vibration During Compaction	10
7.2.6	Excavating Conditions	10
7.2.7	Surface Drainage	10
7.2.8	Subsurface Drainage	11
7.3	Foundations	11
7.3.1	Mat Foundations	11
7.3.2	Settlements	12
7.4	Plan Review	13
7.5	Observation and Testing	13
<b>8.0</b>	<b>LIMITATIONS</b>	<b>14</b>
	<b>REFERENCES</b>	<b>15</b>

**TABLES**

Table 1. Seismic Design Parameters - 2019 CBC ..... 4

**FIGURES AND STANDARD DETAILS**

Figure 1: Typical Subdrain Detail

**APPENDICES**

**APPENDIX A**

Field Exploration Program

**APPENDIX B**

Laboratory Testing Program

## **1.0 INTRODUCTION**

This report presents the results of our geotechnical investigation for the proposed apartment building and associated improvements located at 150 Felker Street in Santa Cruz, Santa Cruz County, California.

The purpose of our investigation was to provide information regarding the surface and subsurface soil and bedrock conditions, and based on our findings, provide geotechnical recommendations for the design and construction of the proposed project. Conclusions and recommendations related to geotechnical hazards, site grading, drainage, foundations, and driveway areas are presented herein.

### **1.1 Terms of Reference**

CMAG Engineering, Inc.'s (CMAG) scope of work for this phase of the project included site reconnaissance, subsurface exploration, soil and bedrock sampling, laboratory testing, engineering analyses, and preparation of this report.

The work was undertaken in accordance with CMAG's *Proposal for Geotechnical Services* dated April 9, 2021.

The recommendations contained in this report are subject to the limitations presented in Section 8.0 of this report.

### **1.2 Site Location**

The project site is located on the north side of Felker Street just west of its intersection with Ocean Street in Santa Cruz, Santa Cruz County, California. The site location is shown on the Site Location Map, Figure A-1, in Appendix A.

### **1.3 Surface Conditions**

The parcel is approximately 0.4 acres, relatively flat, and occupied by a commercial building and attendant parking lot. The property is bounded by the Highway 1 right-of-way to the north, a residential property to the east, and an undeveloped area to the west which slopes gently to the San Lorenzo River. A moderately steep ascending slope, approximately 16 feet tall, is situated between the northern property line and Highway 1. The property is landscaped with some mature trees and shrubs.

## **2.0 PROJECT DESCRIPTION**

Based on our review of the preliminary plans (William C. Kempf Architects, 2021), it is our understanding that the project consists of the demolition of the existing commercial building, and the construction of a new four story apartment building and associated

improvements. The ground floor will consist of parking and the upper three stories living space. Anticipated construction consists of wood/steel frame walls, floors, and roof with a concrete slab-on-grade ground floor.

### **3.0 FIELD EXPLORATION AND LABORATORY TESTING PROGRAMS**

Our field exploration program included drilling, logging, and interval sampling of 4 borings on June 24, 2021. The borings were advanced to depths between 30.5± feet and 36± feet below the existing grades. Details of the field exploration program, including the Boring Logs, Figures A-4.0 through A-7.1, are presented in Appendix A.

Representative samples obtained during the field investigation were taken to the laboratory for testing to determine physical and engineering properties. Details of the laboratory testing program are presented in Appendix B. Test results are presented on the Boring Logs and in Appendix B.

### **4.0 SUBSURFACE CONDITIONS AND EARTH MATERIALS**

#### **4.1 General**

The geologic map of Santa Cruz County (Brabb, 1989) depicts the subject property as underlain by Alluvial Deposits (Qal; Holocene) described as consisting of unconsolidated, heterogenous, moderately sorted silt and sand containing discontinuous lenses of clay and silty clay. Santa Margarita Sandstone (Tsm, Upper Miocene) described as consisting of very thick bedded to massive and thickly crossbedded yellowish gray to white, friable, granular, medium to fine grained arkosic sandstone is depicted to the north and east of the site.

Four borings were advanced in the area of the proposed apartment building. The subsurface profile encountered in our field exploration consisted of alluvial deposits overlying Santa Margarita Sandstone within the depths explored. A thin veneer of artificial fill was also encountered in Boring B-2 overlying the alluvium. Complete subsurface profiles are presented on the Boring Logs, Figures A-4.0 through A-7.1, in Appendix A. The boring locations are shown on the Boring Location Plan, Figure A-2.

#### **4.2 Artificial Fill - af**

Artificial fill was encountered in Boring B-2 from the surface to a depth of 1.5± feet below the existing grade. The fill generally consisted of moist, slightly plastic sandy silt.

#### **4.3 Alluvial Deposits - Qal**

Alluvial deposits were encountered from the surface in Borings B-1, B-3, and B-4 and underlying the artificial fill in Boring B-2 to depths between 23± and 28± feet below the existing grades. The near-surface deposits within the upper 5± to 8± feet generally consisted of soft to very stiff, moist, slightly plastic sandy silt. The surficial material was underlain by stiff to hard, moist, plastic sandy lean clay (Borings B-1 through B-3) and very stiff to hard, moist, slightly plastic sandy silt (Boring B-4) to depths between 8± and 12± feet below the existing grades. The clay and silt was underlain by medium dense to very dense, moist to wet, non plastic silty sand, silty sand with gravel, and well graded sand with silt and gravel. Intermittent gravel and cobble layers were encountered during drilling within the alluvium at depths greater than 12± feet below the existing grades. Based on our field exploration and laboratory testing, the near-surface sandy silt is considered moderately to highly compressible and has a low expansion potential.

#### **4.4 Santa Margarita Sandstone - Tsm**

Santa Margarita Sandstone was encountered underlying the alluvial deposits in all four borings at depths between 23± and 28± feet below the existing grades. The bedrock generally consisted of very dense, wet, weakly cemented sandstone.

#### **4.5 Groundwater**

Groundwater was encountered in Borings B-1 through B-3 at a depth of 17± feet below the existing grades, and in Boring B-4 at a depth of 24± feet below the existing grade, during our field exploration. It should be noted that groundwater conditions, perched or regional, may vary with location and may fluctuate with variations in rainfall, runoff, irrigation, and other changes to the conditions existing at the time our field investigation was performed.

### **5.0 GEOTECHNICAL HAZARDS**

#### **5.1 General**

In our opinion, the geotechnical hazards that could potentially affect the proposed project are:

- Seismic shaking
- Collateral seismic hazards

#### **5.2 Seismic Shaking**

The hazard due to seismic shaking in California is high in many areas, indicative of

the number of large earthquakes that have occurred historically. Intense seismic shaking may occur at the site during the design lifetime of the proposed structure from an earthquake along one of the local fault systems. Generally, the intensity of shaking will increase the closer the site is to the epicenter of an earthquake, however, seismic shaking is a complex phenomenon and may be modified by local topography and soil conditions. The transmission of earthquake vibrations from the ground into the structure may cause structural damage.

The City of Santa Cruz has adopted the seismic provisions set forth in the 2019 California Building Code (2019 CBC) to address seismic shaking. The seismic provisions in the 2019 CBC are minimum load requirements for the seismic design for the proposed structure. The provisions set forth in the 2019 CBC will not prevent structural and nonstructural damage from direct fault ground surface rupture, coseismic ground cracking, liquefaction and lateral spreading, seismically induced differential compaction, or seismically induced landsliding.

Table 1 has been constructed based on the 2019 CBC requirements for the seismic design of the proposed structure. The Site Class has been determined based on our field investigation and laboratory testing.

**Table 1. Seismic Design Parameters - 2019 CBC**

$S_s$	$S_1$	Site Class	$F_a$	$F_v$	$S_{MS}$	$S_{M1}$	$S_{DS}$	$S_{D1}$	$PGA_M$
1.667g	0.640g	D	1.0	Null*	1.667g	Null*	1.111g	Null*	0.770g

Note: \*Refer to Section 11.4.8 in ASCE 7-16.

### 5.3 Collateral Seismic Hazards

In addition to seismic shaking, other seismic hazards that may have an adverse affect to the site and/or the structure are: fault ground surface rupture, coseismic ground cracking, seismically induced liquefaction and lateral spreading, seismically induced differential compaction, and seismically induced landsliding. It is our opinion that the potential for collateral seismic hazards to affect the site, and to damage the proposed structure is low with the exception of seismically induced liquefaction. See Subsection 5.3.1 for more information.

#### 5.3.1 Seismically Induced Liquefaction

Seismically induced liquefaction tends to occur in loose, unconsolidated, noncohesive soils beneath the groundwater table. Liquefaction may cause the soil to settle uniformly or differentially. The magnitude of the liquefaction is a function of the severity of the seismic shaking, the relative density of the soil, the elevation of the groundwater table, and the thickness of the liquefiable soils. The alluvial soils

which underlie the site potentially meet this criteria and we therefore performed a quantitative liquefaction analysis.

For our analysis, we assumed a groundwater table at 8 feet below the existing grades and the subsurface profiles encountered in Borings B-2 and B-3. The groundwater elevation used in our analysis was based on our experience in the vicinity and subsurface data obtained during the rainy season from nearby parcels. The ground shaking parameter used for our analysis was determined using the *2014 National Seismic Hazard Maps* published by the U.S. Geological Survey (USGS) and *ASCE 7-16 Minimum Design Loads for Buildings and Other Structures* (2016) published by the American Society of Civil Engineers. A Maximum Considered Geometric Mean Peak Ground Acceleration ( $PGA_M$ ), adjusted for Site Class effects, of 0.770g was determined based on the national maps and Section 11.8.3 of ASCE 7-16. A magnitude of 7.9 on the San Andreas Fault Zone was also used in our analysis.

Particle size analyses and liquid/plastic limit tests were performed on samples considered representative of the potentially liquefiable soils encountered. Results of our particle size analyses and liquid/plastic limit tests are presented in Appendix B.

The results of our laboratory testing indicate that the clayey soils (sandy lean clay) encountered between 4± feet and 8± feet have a Plasticity Index greater than 7. Based on the recommendations as outlined in the Monograph *Soil Liquefaction During Earthquakes* (I.M. Idriss and R.W. Boulanger 2008), the clayey soils encountered in the potentially liquefiable zone are considered to fall outside of the range of soils susceptible to “classic” cyclically induced liquefaction (Plasticity Index  $\leq 7$ ).

A quantitative liquefaction analysis was performed using empirical predictions of earthquake-induced liquefaction potential. The analysis is based on a comparison of the in situ cyclic stress ratio (CSR) with that historically present in areas experiencing liquefaction for a given earthquake magnitude and recorded soil grain size distribution and penetration resistance (as expressed by SPT blows/ft). The analysis is based on the method presented by Seed et al. (2003).

Under the conditions anticipated during the design seismic event, our liquefaction analyses determined that a portion of the alluvial soils are potentially liquefiable. Based on the recommended volumetric reconsolidation strains produced by Cetin et. al (2009), a settlement of approximately 1.5 inches should be anticipated beneath the proposed apartment building. Differential settlement of approximately 1 inch should be anticipated across the least dimension of the structure.

## **6.0 DISCUSSIONS AND CONCLUSIONS**

The subsurface profile across the site consists of alluvial deposits overlying Santa Margarita Sandstone within the depths explored. A thin veneer of artificial fill was also encountered in the southeastern corner of the property. The near-surface deposits within the upper 5± to 8± feet generally consisted of soft to very stiff sandy silt. Based on our field exploration and laboratory testing, this material is considered moderately to highly compressible and has a low expansion potential.

Groundwater was encountered in our borings at depths between 17± feet and 24± feet below the existing grades during our field exploration. However, based on our experience in the vicinity, the groundwater elevation is expected to rise significantly during the rainy season.

The results of our liquefaction analysis indicates that a portion of the alluvial deposits have a high potential for seismically induced liquefaction under the conditions anticipated during the design seismic event. Reconsolidation settlements, of approximately 1.5 inches, should be anticipated beneath the proposed apartment building. Differential settlement of approximately 1 inch should be anticipated across the least dimension of the structure.

## **7.0 RECOMMENDATIONS**

### **7.1 General**

Based on the results of our field investigation, laboratory testing, and engineering analysis, it is our opinion, from the geotechnical standpoint, the subject site will be suitable for the proposed development provided the recommendations presented herein are implemented during grading and construction.

We recommend that the proposed apartment building be supported on a mat foundation system founded on a mechanically stabilized engineered fill pad. The recommended foundation system will help prevent damage caused by liquefaction induced differential settlement. Recommendations for the mechanically stabilized engineered fill pad are presented in Subsection 7.2.2. Recommendations for mat foundations including anticipated differential settlements are presented in 7.3.

Due to the poor engineering qualities of the on-site soils, imported, non-expansive granular material will be required for use as engineered fill within the mechanically stabilized engineered fill pad.

It is our understanding that the subject project is in the early planning stages and the structural design of the proposed apartment building has not commenced. When foundation loads become available, it may be feasible to consider a deep foundation system embedded into the underlying sandstone bedrock. Alternative

recommendations for a deep foundation system may be supplied upon request.

In order to mitigate the potential for the compressible near-surface soils to adversely affect driveway sections, removal and recompaction of these soils will be required. Refer to Subsection 7.2.2 for details.

The site is relatively flat and site drainage is an important aspect of the project design. Site drainage should be designed to collect and direct surface water away from the proposed apartment building to approved drainage facilities per Subsection 7.2.7.

A perimeter subdrain should be constructed to help prevent groundwater migration beneath the proposed apartment building. Subdrain recommendations are presented in Subsection 7.2.8.

## **7.2 Site Grading**

### **7.2.1 Site Clearing**

Prior to grading, the areas to be developed for structures, pavements and other improvements, should be stripped of any vegetation and cleared of any surface or subsurface obstructions, including any existing foundations, utility lines, basements, septic tanks, pavements, stockpiled fills, and miscellaneous debris.

Surface vegetation and organically contaminated topsoil should be removed from areas to be graded. The required depth of stripping will vary with the time of year the work is done and should be observed by the Geotechnical Engineer. It is generally anticipated that the required depth of stripping will be 4 to 8 inches.

Holes resulting from the removal of buried obstructions that extend below finished site grades should be backfilled with compacted engineered fill compacted to the requirements of Subsection 7.2.2.

### **7.2.2 Preparation of On-Site Soils**

**Mechanically Stabilized Engineered Fill Pad** - Beneath mat foundations, the native soil should be overexcavated a minimum of 4 feet below the lowest foundation elements, or 6 feet below finished exterior grades, whichever is greater. The exposed surface should be scarified, moisture conditioned, and compacted and geogrid consisting of Tensar TriAx TX140 (or approved equivalent) should be placed at the base of the overexcavation. Imported, non-expansive granular material should then be placed as engineered fill compacted to a minimum of 90 percent relative compaction to finished subgrade. Two additional layers of geogrid, (Tensar TriAx TX140 or approved equivalent) should be installed in the engineered fill at 15 inches and 30 inches from the base of the overexcavation. The zone of the

mechanically stabilized engineered fill should extend a minimum of 5 feet beyond the building footprint.

The geogrid should be installed per the manufacturer's recommendations. Geogrid should be free of wrinkles and may be temporarily secured in-place with staples, pins, or backfill. Adjacent rolls of geogrid should have a minimum overlap of 18 inches. A minimum fill thickness of 8 inches is required prior to the operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent damage. Any geogrid damaged during installation shall be replaced. The manufacturers of the geogrid supply additional installation recommendations not outlined in this report. All manufacturer's installation recommendations should be adhered to.

**Driveway Areas** - In driveway areas (including concrete, asphalt, and non-permeable pavers), the native soil should be overexcavated to a minimum of 2 feet below the bottom of the aggregate base course, or 2.5 feet below existing grades, whichever is greater. The exposed surface should be scarified, moisture conditioned, and compacted. The native soil, or imported, non-expansive granular material should then be placed as engineered fill compacted to a minimum of 90 percent relative compaction. The upper 6 inches of subgrade and all aggregate base and subbase in driveway areas shall be compacted to a minimum of 95 percent relative compaction. This zone of reworking should extend laterally a minimum of 3 feet beyond the driveway.

**Although the on-site soils are not recommended for use as engineered fill within the mechanically stabilized fill pad, they may be considered within driveway areas. Note: If this work is done during or soon after the rainy season, or in the spring, the soil may require significant drying prior to use as engineered fill.** Regardless of the time of year, moisture conditioning the native soils to achieve moisture requirements should be anticipated. Moisture conditioning may include adding water or drying back the soil to achieve the required moisture. It is the contractors responsibility to adequately process the soil to achieve uniform moisture conditions of the material to be used as engineered fill. The soil should be verified by a representative of CMAG in the field during grading operations. All soils, both existing on-site and imported, to be used as fill, should contain less than 3 percent organics and be free of debris and gravel over 2.5 inches in maximum dimension.

Imported fill material should be approved by a representative of CMAG prior to importing. Soils having a significant expansion potential should not be used as imported fill. **The Geotechnical Engineer should be notified not less than 5 working days in advance of placing any fill or base course material proposed for import.** Each proposed source of import material should be sampled, tested, and approved by the Geotechnical Engineer prior to delivery of any soils imported for use on the site.

All fill should be compacted with heavy vibratory equipment. Fill should be compacted by mechanical means in uniform horizontal loose lifts not exceeding 8 inches in thickness. The relative compaction and required moisture content shall be based on the maximum dry density and optimum moisture content obtained in accordance with ASTM D1557. **The Geotechnical Engineer should observe the overexcavations, and placement of engineered fill.**

Any surface or subsurface obstruction, or questionable material encountered during grading, should be brought immediately to the attention of the Geotechnical Engineer for proper processing as required.

### 7.2.3 Cut and Fill Slopes

**Cut and Fill slopes are not anticipated for the project at this time.** Cut and fill slopes may affect the stability of the site, and should be analyzed for overall stability and suitability by the Geotechnical Engineer if project requirements change.

### 7.2.4 Utility Trenches

Bedding material should consist of sand with SE not less than 30 which may then be jetted.

**The on-site soils may be utilized for trench backfill outside of the mechanically stabilized engineered fill pad only.** See Subsection 7.2.2 for additional information regarding the use of the native soil for engineered fill. Imported fill should be free of organic material and gravel over 2.5 inches in diameter. Backfill of all exterior and interior trenches should be placed in thin lifts and mechanically compacted to achieve a relative compaction of not less than 95 percent in paved areas and 90 percent in other areas per ASTM D1557. Care should be taken not to damage utility lines.

Utility trenches that are parallel to the sides of a building should be placed so that they do not extend below a line sloping down and away at an inclination of 2:1 H:V (horizontal to vertical) from the bottom outside edge of foundation elements.

A 3 foot concrete plug should be placed in each trench where it passes under the exterior footings. Anti-seep collars (trench dams) should also be placed in utility trenches on steep slopes to prevent migration of water and sand.

Trenches should be capped with 1.5± feet of impermeable material. Import material should be approved by the Geotechnical Engineer prior to its use.

Trenches must be shored as required by the local regulatory agency, the State Of California Division of Industrial Safety Construction Safety Orders, and Federal

OSHA requirements.

#### 7.2.5 Vibration During Compaction

The neighboring parcels are within close proximity to the proposed apartment building. The contractor should take all precautionary measures to minimize vibration on the site during grading operations. This may require that the engineered fill be placed in thin lifts using a static roller or hand operated equipment. It is the contractor's responsibility to ensure that the process in which the engineered fill is placed does not adversely affect the neighboring parcels.

#### 7.2.6 Excavating Conditions

We anticipate that excavation of the on-site soils may be accomplished with standard earthmoving and trenching equipment.

If grading commences during, or shortly after the rainy season, difficult construction due to saturated soil conditions should be anticipated. The bottom of excavations may require stabilization measures, in order to construct the graded building pads.

#### 7.2.7 Surface Drainage

Pad drainage should be designed to collect and direct surface water away from structures to approved drainage facilities. A minimum gradient of 2± percent should be maintained and drainage should be directed toward approved swales or drainage facilities. Concentrations of surface water runoff should be handled by providing the necessary structures, paved ditches, catch basins, etc.

All roof eaves should be guttered with the outlets from the downspouts provided with adequate capacity to carry the storm water away from structures to reduce the possibility of soil saturation and erosion.

Drainage patterns approved at the time of construction should be maintained throughout the life of the structure. The building and surface drainage facilities must not be altered nor any grading, filling, or excavation conducted in the area without prior review by the Geotechnical Engineer.

Irrigation activities at the site should be controlled and reasonable. Planter areas should not be sited adjacent to walls without implementing approved measures to contain irrigation water and prevent it from seeping into walls and under foundations and slabs-on-grade.

The finished ground surface should be planted with erosion resistant landscaping and ground cover and continually maintained to minimize surface erosion.

### 7.2.8 Subsurface Drainage

To help reduce the potential for groundwater to adversely affect the proposed apartment building, we recommend constructing a subdrain. The subdrain should wrap around the perimeter of the building pad and extend a minimum of 1 foot below the lowest foundation elements of the proposed apartment building.

Subdrains should be placed a minimum of 3 feet away from foundations and should not extend below a line sloping down and away at an inclination of 2:1 H:V (horizontal to vertical) from the bottom outside edge of foundations.

Subdrains should consist of 4 inch diameter SDR 35 PVC perforated pipe or equivalent, embedded in Caltrans Class 2 permeable drain rock. The drain should be a minimum of 18 inches in width and should extend to within 8 inches from the surface. The upper 8 inches should be capped with native soils. Mirafi 180N filter fabric or approved equivalent should be placed between the surface cap and the drain rock. The pipe should be 4± inches above the trench bottom; a gradient of 2± percent being provided to the pipe and trench bottom; discharging into suitably protected outlets. Refer to the Typical Subdrain Detail, Figure 1, for recommendations.

Perforations in subdrains are recommended as follows: ½ inch diameter, in 2 rows at the ends of a 120 degree arc, at 5 inch centers in each row, staggered between rows, placed downward.

**Subdrains should be observed by the Geotechnical Engineer after placement of bedding and pipe and prior to the placement of clean crushed gravel.**

## 7.3 Foundations

### 7.3.1 Mat Foundations

Mat foundations should be founded on a mechanically stabilized engineered fill pad per Subsection 7.2.2. The subgrade should be proof-rolled just prior to construction to provide a firm, relatively unyielding surface, especially if the surface has been loosened by the passage of construction traffic.

For mat foundations designed with the flexible method, a unit coefficient of subgrade reaction,  $k_{v1} = 200$  kcf, may be assumed for design purposes. This value is for a 1 foot wide footing and should be reduced for the effective width. For the recommended imported engineered fill soils:

$$k_s = k_{v1} ((B + 1) / 2B)^2$$

where:

$k_s$  = coefficient of subgrade reaction (kcf)

$k_{v1}$  = unit coefficient of subgrade reaction (kcf)

B = effective footing width (feet)

The design values recommended above are based on the assumption that the mat foundations are founded on the recommended mechanically stabilized engineered fill pad consisting of compacted imported, non-expansive granular material. If material other than that recommended in Subsection 7.2.2 is used, the above values will need to be revised.

The subgrade reaction value may be increased by a factor of four for seismic loading.

Mat foundations should be designed to tolerate a differential settlement of 1 inch, across the least dimension of the structure, during the design seismic event. Mat foundations should be combined with flexible utility connections, sleeves, or flexible cushions in order to prevent breakage.

A friction coefficient of 0.35, between the engineered fill and rough concrete may be assumed for design purposes.

The mat foundations should be underlain by a minimum 4 inch thick capillary break of clean crushed rock. It is recommended that neither Class II baserock nor sand be employed as the capillary break material. Where moisture sensitive floor coverings are anticipated or vapor transmission may be a problem, a vapor retarder should be placed between the granular layer and the floor slab in order to reduce moisture condensation under the floor coverings. The vapor retarder should be specified by the slab designer. It should be noted that conventional slab-on-grade construction is not waterproof. Under-slab construction consisting of a capillary break and vapor retarder will not prevent moisture transmission through the slab-on-grade. CMAG does not practice in the field of moisture vapor transmission evaluation or mitigation. Where moisture sensitive floor coverings are to be installed, a waterproofing expert should be consulted for their recommended moisture and vapor protection measures.

**The foundation excavations should be observed by the Geotechnical Engineer before steel reinforcement is placed and concrete is poured.**

### 7.3.2 Settlements

Total and differential **static** settlements beneath mat foundations are expected to be within tolerable limits. Vertical movements are not expected to exceed 1 inch. Differential movements are expected to be within the normal range ( $\frac{1}{2}$  inch) for the

anticipated loads and spacings. These preliminary estimates should be reviewed by the Geotechnical Engineer when foundation plans for the proposed structure become available.

#### **7.4 Plan Review**

The recommendations presented in this report are based on preliminary design information for the proposed project and on the findings of our geotechnical investigation. When completed, the Grading Plans, Foundation Plans and design loads should be reviewed by CMAG prior to submitting the plans and contract bidding. Additional field exploration and laboratory testing may be required upon review of the final project design plans.

#### **7.5 Observation and Testing**

Field observation and testing must be provided by a representative of CMAG to enable them to form an opinion regarding the adequacy of the site preparation, the adequacy of fill materials, and the extent to which the earthwork is performed in accordance with the geotechnical conditions present, the requirements of the regulating agencies, the project specifications, and the recommendations presented in this report. Any earthwork performed in connection with the subject project without the full knowledge of, and not under the direct observation of CMAG will render the recommendations of this report invalid.

CMAG should be notified **at least 5 working days** prior to any site clearing or other earthwork operations on the subject project in order to observe the stripping and disposal of unsuitable materials and to ensure coordination with the grading contractor. During this period, a preconstruction meeting should be held on the site to discuss project specifications, observation and testing requirements and responsibilities, and scheduling.

## **8.0 LIMITATIONS**

The recommendations contained in this report are based on our field explorations, laboratory testing, and our understanding of the proposed construction. The subsurface data used in the preparation of this report was obtained from the borings drilled during our field investigation. Variation in soil, geologic, and groundwater conditions can vary significantly between sample locations. As in most projects, conditions revealed during construction excavation may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by the Project Geotechnical Engineer and the Geologist, and revised recommendations be provided as required. In addition, if the scope of the proposed construction changes from the described in this report, our firm should also be notified.

Our investigation was performed in accordance with the usual and current standards of the profession, as they relate to this and similar localities. No other warranty, expressed or implied, is provided as to the conclusions and professional advice presented in this report.

This report is issued with the understanding that it is the responsibility of the Owner, or of his Representative, to ensure that the information and recommendations contained herein are brought to the attention of the Architect and Engineer for the project and incorporated into the plans, and that it is ensured that the Contractor and Subcontractors implement such recommendations in the field. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

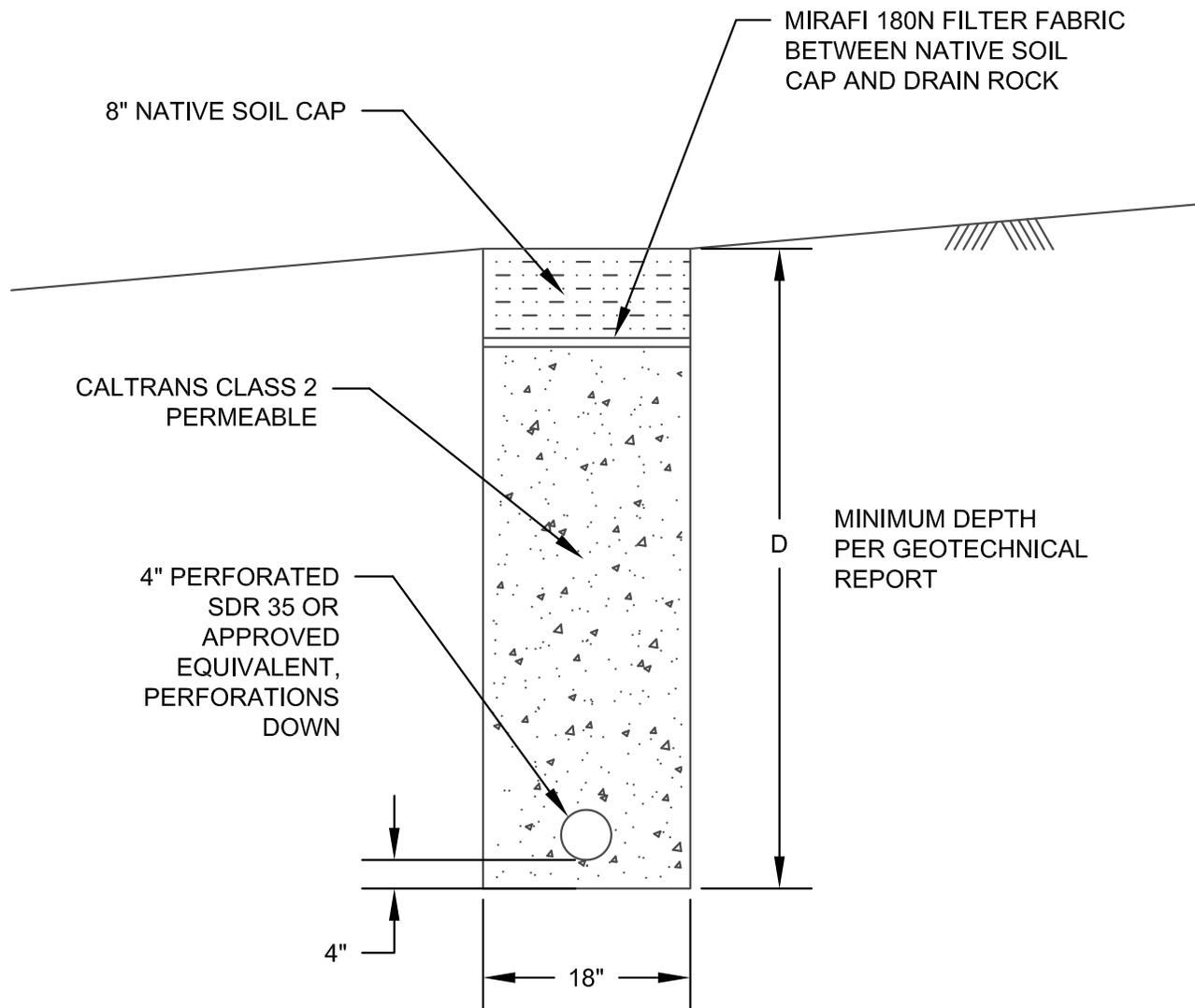
This firm does not practice or consult in the field of safety engineering. We do not direct the Contractor's operations, and we are not responsible for other than our own personnel on the site; therefore, the safety of others is the responsibility of the Contractor. The Contractor should notify the Owner if he considers any of the recommended actions presented herein to be unsafe.

The findings of this report are considered valid as of the present date. However, changes in the conditions of a site can occur with the passage of time, whether they be due to natural events or to human activities on this or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, this report may become invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

The scope of our services mutually agreed upon did not include any environmental assessment or study for the presence of hazardous to toxic materials in the soil, surface water, or air, on or below or around the site. CMAG is not a mold prevention consultant; none of our services performed in connection with the proposed project are for the purpose of mold prevention. Proper implementation of the recommendations conveyed in our reports will not itself be sufficient to prevent mold from growing in or on the structures involved.

## REFERENCES

- American Society of Civil Engineers (2016). *Minimum Design Loads for Buildings and Other Structures*. ASCE Standard 7-16.
- ASTM International (2014). *Annual Book of ASTM Standards, Section Four, Construction*. Volume 4.08, Soil and Rock (I): D 420 - D 5876.
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- CMAG Engineering, Inc. (April 9, 2021). *Proposal for Geotechnical Services, Geotechnical Investigation, Proposed Apartment Building, 150 Felker Street, Santa Cruz, Santa Cruz County, California APN 008-181-23*. Proposal No. P21-07.
- Dupre, R.W. (1975). *Maps Showing Geology and Liquefaction Potential of Quaternary Deposits in Santa Cruz County, California*. U.S. Geological Survey Miscellaneous Field Studies Map, Map MF-648, scale 1:62500.
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- William C. Kempf Architects (April 27, 2021). *New Apartment Building for 150 Felker Street, Santa Cruz, California, APN 008-181-23*. Project Name: Felker Street. Sheets: A1 through A8.



NOTES:

1. DRAWING IS NOT TO SCALE
2. 2+ PERCENT TO PIPE AND TRENCH BOTTOM
3. PERFORATED SDR 35 PVC PIPE, OR APPROVED EQUIVALENT, CONNECTED TO CLOSED CONDUITS THAT DISCHARGE TO AN APPROVED LOCATION
4. INSTALL CLEAN OUTS AT APPROVED LOCATIONS

## APPENDIX A

### FIELD EXPLORATION PROGRAM

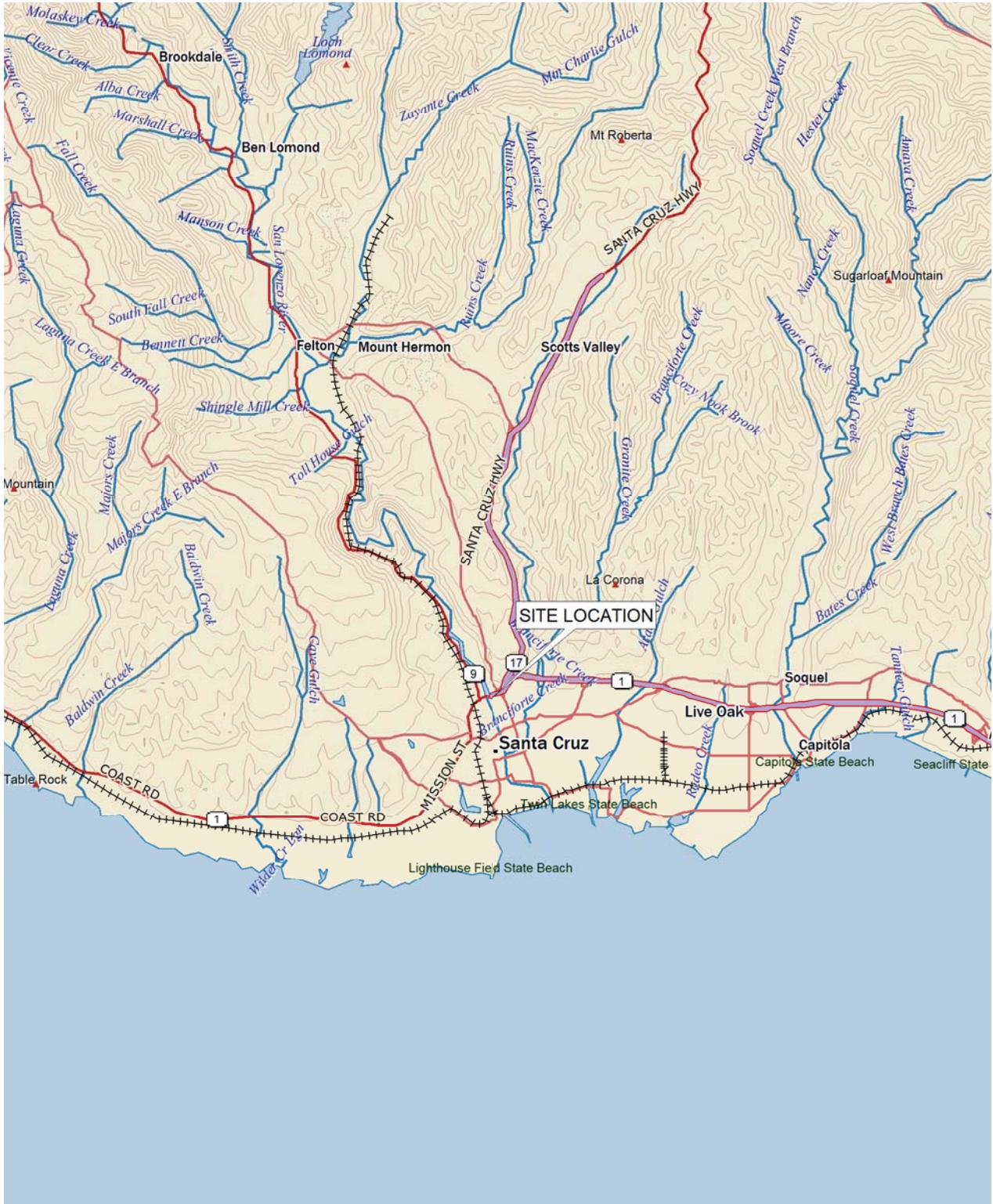
Field Exploration Procedures	Page A-1
Site Location Map	Figure A-1
Boring Location Plan	Figure A-2
Key to the Logs	Figure A-3
Logs of the Borings	Figures A-4.0 through A-7.1

## **FIELD EXPLORATION PROCEDURES**

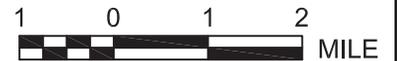
Subsurface conditions were explored by drilling 4 borings to depths between 30.5± and 36± feet below the existing grades. Boring B-1 was drilled with a track mounted drill rig using mud rotary with a 4 inch diameter bit. Borings B-2 through B-4 were drilled with a track mounted drill rig equipped with 6 inch diameter solid stem augers. The Key to The Logs and the Logs of the Borings are included in Appendix A, Figures A-3 through A-7.1. The approximate locations of the borings are shown on the Boring Location Plan, Figure A-2.

The earth materials encountered in the borings were continuously logged in the field by a representative of CMAG. Bulk and relatively undisturbed samples were obtained for identification and laboratory testing. The samples were classified based on field observations and the laboratory test results. Classification was performed in accordance with the Unified Soil Classification System (Figure A-3).

Representative samples were obtained by means of a drive sampler, the hammer weight and drop being 140 lb and 30 inches, respectively. These samples were recovered using a 3 inch outside diameter Modified California Sampler or a 2 inch outside diameter Terzaghi Sampler. The number of blows required to drive the samplers 12 inches are indicated on the Boring Logs. The penetration test data for the Terzaghi driven samples has been presented as  $N_{60}$  values. The  $N_{60}$  values are also indicated on the Boring Logs.



SCALE: 1:125,000



BASEMAP: DeLorme Topo USA®

**CMAG ENGINEERING**

**SITE LOCATION MAP**

**FIGURE**

150 Felker Street

A-1



BASEMAP: Google Earth

EXPLANATION OF SYMBOLS



B-1

APPROXIMATE LOCATION OF BORING

**CMAG ENGINEERING**

**BORING LOCATION PLAN**

150 Felker Street

FIGURE

A-2

## KEY TO LOGS

### UNIFIED SOIL CLASSIFICATION SYSTEM

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
<b>COARSE GRAINED SOILS</b> More than half of the material is larger than the No. 200 sieve	<b>GRAVELS</b> More than half of the coarse fraction is larger than the No. 4 sieve	CLEAN GRAVELS (Less than 5% fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
		GRAVEL WITH FINES	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
			GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
		GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines	
	<b>SANDS</b> More than half of the coarse fraction is smaller than the No. 4 sieve	CLEAN SANDS (Less than 5% fines)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands, gravelly sands, little or no fines
		SAND WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
<b>FINE GRAINED SOILS</b> More than half of the material is smaller than the No. 200 sieve	<b>SILTS AND CLAYS</b> Liquid limit less than 50		ML	Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	<b>SILTS AND CLAYS</b> Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils

GRAIN SIZE LIMITS							
SILT AND CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		
	No. 200	No. 40	No. 10	No. 4	3/4 in.	3 in.	12 in.
US STANDARD SIEVE SIZE							

RELATIVE DENSITY	
SAND AND GRAVEL	BLOWS/FT*
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

CONSISTENCY	
SILT AND CLAY	BLOWS/FT*
VERY SOFT	0 - 2
SOFT	2 - 4
FIRM	4 - 8
STIFF	8 - 16
VERY STIFF	16 - 32
HARD	OVER 32

MOISTURE CONDITION
DRY
MOIST
WET

BEDROCK
(GROUP SYMBOL)
Brackets Denote Bedrock

\* Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 inch I.D.) split spoon (ASTM D-1586).

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-1
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 4in. Mud Rotary, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			4" AC / 3" Baserock					
1			<b>Qal:</b>					
2								
3	ML		Dark Brown Sandy SILT. Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	19		103.4	13.3	E.I. = 23 Particle Size F.C.= 71.4%
4								
5	ML		Dark Brown and Gray Sandy SILT. Firm, Moist, Slightly Plastic. Sand - Fine Grained.	6	6		12.1	
6								
7								
8	CL		Yellowish Brown and Gray Sandy Lean CLAY. Hard, Moist, Plastic. Sand - Fine Grained.	52		106.1	21.2	
9								
10	SM		Dark Yellowish Brown Silty SAND. Medium Dense, Moist, Non Plastic. Sand - Fine to Medium Grained. Trace Gravel up to 1 in, Rounded.	20	23		11.5	
11								
12								
13								
14								
15								
16	SM		Dark Yellowish Brown Silty SAND with Gravel. Very Dense, Wet, Non Plastic. Sand - Fine to Medium Grained. Gravel up to 1 in, Subrounded.	41	50		12.0	
17								
18			Intermittent Gravel and Cobble Layers.					
19								
20								
21	SW-SM		Dark Yellowish Brown Well Graded SAND with Silt. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Some Gravel up to 1 in, Subrounded.	24	30		17.9	Particle Size F.C.= 9.7%
22								
23			Intermittent Gravel and Cobble Layers.					
24								

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-1 (continued)
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 4in. Mud Rotary, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			<div style="display: flex; justify-content: space-around; font-size: small;"> <div style="text-align: center;">  Terzaghi Split Spoon Sample                 </div> <div style="text-align: center;">  2" Ring Sample                 </div> <div style="text-align: center;">  2.5" Ring Sample                 </div> </div> <div style="display: flex; justify-content: space-around; font-size: small; margin-top: 5px;"> <div style="text-align: center;">  3" Shelby Tube                 </div> <div style="text-align: center;">  Bulk Sample                 </div> <div style="text-align: center;">  Groundwater Elevation                 </div> </div>					
-25	SM		Dark Yellowish Brown Silty SAND. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Some Gravel up to 1 in, Subrounded.	29	38		15.4	
-27			<b>Tsm:</b>					
-28								
-29								
-30	(SM)		Gray and Light Yellowish Brown SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			24.1	
-31								
-32								
-33								
-34								
-35	(SM)		Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			25.3	Particle Size F.C.= 15.0%
-36								
-37			Boring Terminated at 36± ft. Groundwater Encountered at 17± ft. Boring Backfilled with Cuttings and Concrete Cap.					
-38								
-39								
-40								
-41								
-42								
-43								
-44								
-45								
-46								
-47								
-48								

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-2
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
1	ML		4" AC / 4" Baserock <b>af:</b> Dark Brown Sandy SILT. Moist, Slightly Plastic. Sand - Fine Grained.					
2	ML		<b>Qal:</b> Dark Brown Sandy SILT. Soft, Moist, Slightly Plastic. Sand - Fine Grained.	6		100.3	17.3	Direct Shear ϕ' = 27° c' = 100 psf
3	ML		Dark Brown Sandy SILT. Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	7	8		18.9	Particle Size F.C. = 69.5% Sulfate
5	CL		Yellowish Brown and Gray Sandy Lean CLAY. Very Stiff, Moist, Plastic. Sand - Fine Grained.	26		97.0	26.4	Particle Size F.C. = 77.8% q <sub>u</sub> = 4606 psf
7	CL		Yellowish Brown and Gray Sandy Lean CLAY. Stiff, Moist, Plastic. Sand - Fine Grained.	11	13		25.7	LL = 47 PL = 21 PI = 26
11	SM		Dark Yellowish Brown and Gray Silty SAND. Loose, Wet, Non Plastic. Sand - Fine Grained.	7	9		24.4	Particle Size F.C. = 27.8%
13			Intermittent Gravel and Cobble Layers.					
16	SM		Dark Yellowish Brown Silty SAND with Gravel. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subrounded to Rounded.	36	47		9.6	
17								
18			Intermittent Gravel and Cobble Layers.					
21	SW-SM		Dark Yellowish Brown Well Graded SAND with Gravel. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subrounded.	34	45		14.4	Particle Size F.C. = 11.8%

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-2 (continued)
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			<div style="display: flex; justify-content: space-around; font-size: small;"> <div style="text-align: center;">  Terzaghi Split Spoon Sample                 </div> <div style="text-align: center;">  2" Ring Sample                 </div> <div style="text-align: center;">  2.5" Ring Sample                 </div> </div> <div style="display: flex; justify-content: space-around; font-size: small; margin-top: 5px;"> <div style="text-align: center;">  3" Shelby Tube                 </div> <div style="text-align: center;">  Bulk Sample                 </div> <div style="text-align: center;">  Groundwater Elevation                 </div> </div>					
-25 -26 -27	SM	[ ]	Dark Yellowish Brown Silty SAND. Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Some Gravel > 1.5 in, Subrounded.	32	43		13.0	
-28 -29 -30			<b>Tsm:</b>					
-31	(SM)	[ ]	Yellowish Brown and Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	95	131		24.9	
-32 -33 -34 -35 -36 -37 -38 -39 -40 -41 -42 -43 -44 -45 -46 -47 -48			Boring Terminated at 31.5± ft. Groundwater Encountered at 17± ft. Boring Backfilled with Cuttings and Concrete Cap.					

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-3
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			 Terzaghi Split Spoon Sample  3" Shelby Tube  2" Ring Sample  Bulk Sample  2.5" Ring Sample  Groundwater Elevation					
1			<b>Qal:</b>					
2								
3	ML		Dark Brown and Gray Sandy SILT. Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	11	12		9.4	Sulfate
4								
5								
6	CL		Yellowish Brown and Gray Sandy Lean CLAY. Stiff, Moist, Plastic. Sand - Fine Grained.	32		99.5	17.5	Particle Size F.C.= 87.7% q <sub>u</sub> = 2245 psf
7								
8								
9								
10								
11	SM		Yellowish Brown Silty SAND. Medium Dense, Moist, Non Plastic. Sand - Fine to Medium Grained.	18	22		7.0	
12								
13			Intermittent Gravel and Cobble Layers.					
14								
15								
16	SM		Dark Yellowish Brown Silty SAND with Gravel. Medium Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subrounded to Rounded.	20	26		13.3	Particle Size F.C.= 13.7%
17								
18			Intermittent Gravel and Cobble Layers.					
19								
20								
21	SM		Dark Yellowish Brown Silty SAND with Gravel. Very Dense, Wet, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subrounded. Schist Cobble in Shoe.	100+			13.9	
22								
23			Intermittent Gravel and Cobble Layers.					
24			<b>Ism:</b> Yellowish Brown and Gray SANDSTONE. Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.					

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-3 (continued)
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			<div style="display: flex; justify-content: space-around; font-size: small;"> <div style="text-align: center;">  Terzaghi Split Spoon Sample                 </div> <div style="text-align: center;">  2" Ring Sample                 </div> <div style="text-align: center;">  2.5" Ring Sample                 </div> </div> <div style="display: flex; justify-content: space-around; font-size: small; margin-top: 5px;"> <div style="text-align: center;">  3" Shelby Tube                 </div> <div style="text-align: center;">  Bulk Sample                 </div> <div style="text-align: center;">  Groundwater Elevation                 </div> </div>					
-25	(SM)		<b>ISM:</b> Yellowish Brown and Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			27.8	
-26								
-27								
-28								
-29								
-30	(SM)		Light Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			25.8	
-31								
-32			Boring Terminated at 31± ft. Groundwater Encountered at 17± ft. Boring Backfilled with Cuttings.					
-33								
-34								
-35								
-36								
-37								
-38								
-39								
-40								
-41								
-42								
-43								
-44								
-45								
-46								
-47								
-48								

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-4
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests	
			 Terzaghi Split Spoon Sample  3" Shelby Tube  2" Ring Sample  Bulk Sample  2.5" Ring Sample  Groundwater Elevation						
			4" AC / 3" Baserock						
1			<b>Qal:</b>						
2	ML		Dark Brown Sandy SILT. Firm, Moist, Slightly Plastic. Sand - Fine Grained.	10		85.4	9.0	Particle Size F.C.= 70.9% Sulfate	
3	ML		Dark Yellowish Brown Sandy SILT. Firm, Moist, Slightly Plastic. Sand - Fine Grained.	6	7		8.3		
4									
5									
6	ML		Grayish Brown Sandy SILT. Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	25		101.9	9.1		
7	ML		Yellowish Brown Sandy SILT. Very Stiff, Moist, Slightly Plastic. Sand - Fine Grained.	21	25		9.3		
8									
9									
10									
11	ML		Yellowish Brown Sandy SILT. Hard, Moist, Slightly Plastic. Sand - Fine Grained.	40	49		8.7		
12									
13									
14									
15									
16	SM		Yellowish Brown Silty SAND with Gravel. Dense, Moist, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subangular to Subrounded.	30	39		9.9		
17									
18			Intermittent Gravel and Cobble Layers.						
19									
20									
21	SM		Yellowish Brown Silty SAND with Gravel. Very Dense, Moist, Non Plastic. Sand - Fine to Coarse Grained. Gravel > 1.5 in, Subangular to Subrounded. Schist Cobble in Shoe.	100+			7.4		
22									
23									
24			<b>Tsm:</b> Yellowish Brown and Gray SANDSTONE. Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.						

## LOG OF EXPLORATORY BORING

Project No: 21-116-SC	Boring: B-4 (continued)
Project: 150 Felker Street	Date Drilled: June 24, 2021
Santa Cruz County, California	Logged By: SSC
Drill Rig: Track Mounted CME 55 Drill Rig, 6in. Solid Stem Auger, 140lb. Automatic Trip Hammer	

Depth (ft.)	Soil Type	Sample	Description	Blows / Foot	N <sub>60</sub>	Dry Density (pcf)	Moisture Cont. (%)	Other Tests
			<div style="display: flex; justify-content: space-around; font-size: small;"> <div style="text-align: center;">  Terzaghi Split Spoon Sample                 </div> <div style="text-align: center;">  2" Ring Sample                 </div> <div style="text-align: center;">  2.5" Ring Sample                 </div> </div> <div style="display: flex; justify-content: space-around; font-size: small; margin-top: 5px;"> <div style="text-align: center;">  3" Shelby Tube                 </div> <div style="text-align: center;">  Bulk Sample                 </div> <div style="text-align: center;">  Groundwater Elevation                 </div> </div>					
-25	(SM)		Yellowish Brown and Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			26.4	
-26								
-27								
-28								
-29								
-30	(SM)		Gray SANDSTONE. Very Dense, Wet, Weakly Cemented. (Silty Sand). Sand - Fine Grained.	100+			26.1	
-31			Boring Terminated at 30.5± ft. Groundwater Encountered at 24± ft. Boring Backfilled with Cuttings.					
-32								
-33								
-34								
-35								
-36								
-37								
-38								
-39								
-40								
-41								
-42								
-43								
-44								
-45								
-46								
-47								
-48								

## APPENDIX B

### LABORATORY TESTING PROGRAM

Laboratory Testing Procedures	Page B-1
Direct Shear Test Results	Figure B-1
Unconfined Compression Test Results	Figures B-2 and B-3
Particle Size Distribution Test Results	Figures B-4 through B-13
Liquid Limit and Plastic Limit Test Results	Figure B-14
Expansion Index Test Results	Table B-1
Soluble Sulfate Test Results	Table B-2

## **LABORATORY TESTING PROCEDURES**

### Classification

Earth materials were classified according to the Unified Soil Classification System in accordance with ASTM D 2487 and D 2488. See Figure A-3. Moisture content and dry density determinations were made for representative, relatively undisturbed samples in accordance with ASTM D 2216. Results of the moisture-density determinations, together with classifications, are shown on the Boring Logs in Appendix A.

### Direct Shear

A consolidated drained direct shear test was performed in accordance with ASTM D 3080 on a representative, relatively undisturbed sample of the on-site soils. To simulate possible adverse field conditions the sample was saturated prior to shearing. A saturating device was used which permitted the sample to absorb moisture while preventing volume change. The direct shear test results are presented on the Boring Logs and Figure B-1.

### Unconfined Compression

Unconfined compression tests were performed on representative samples of the on-site soils in accordance with ASTM D 2166. The test results are presented on the Boring Logs and Figures B-2 and B-3.

### Particle Size Distribution

Particle size distribution tests were performed on representative samples of the on-site soils and bedrock in accordance with ASTM D 422. The test results are presented on the Boring Logs and Figures B-4 through B-13.

### Liquid Limit, Plastic Limit and Plasticity Index

A liquid limit and plastic limit test was performed on a representative sample of the on-site soils in accordance with ASTM D 4318. The test results are presented on the Boring Logs and Figure B-14.

### Expansion

An expansion index test was performed on a representative remolded sample of the on-site soils in accordance with the ASTM D 4829. The test results are presented on the Boring Logs and in Table B-1.

**Table B-1. Expansion Index Test Results**

Boring	Depth (ft)	Soil Type	Expansion Index	Expansion Potential
B-1	2	ML	23	Low

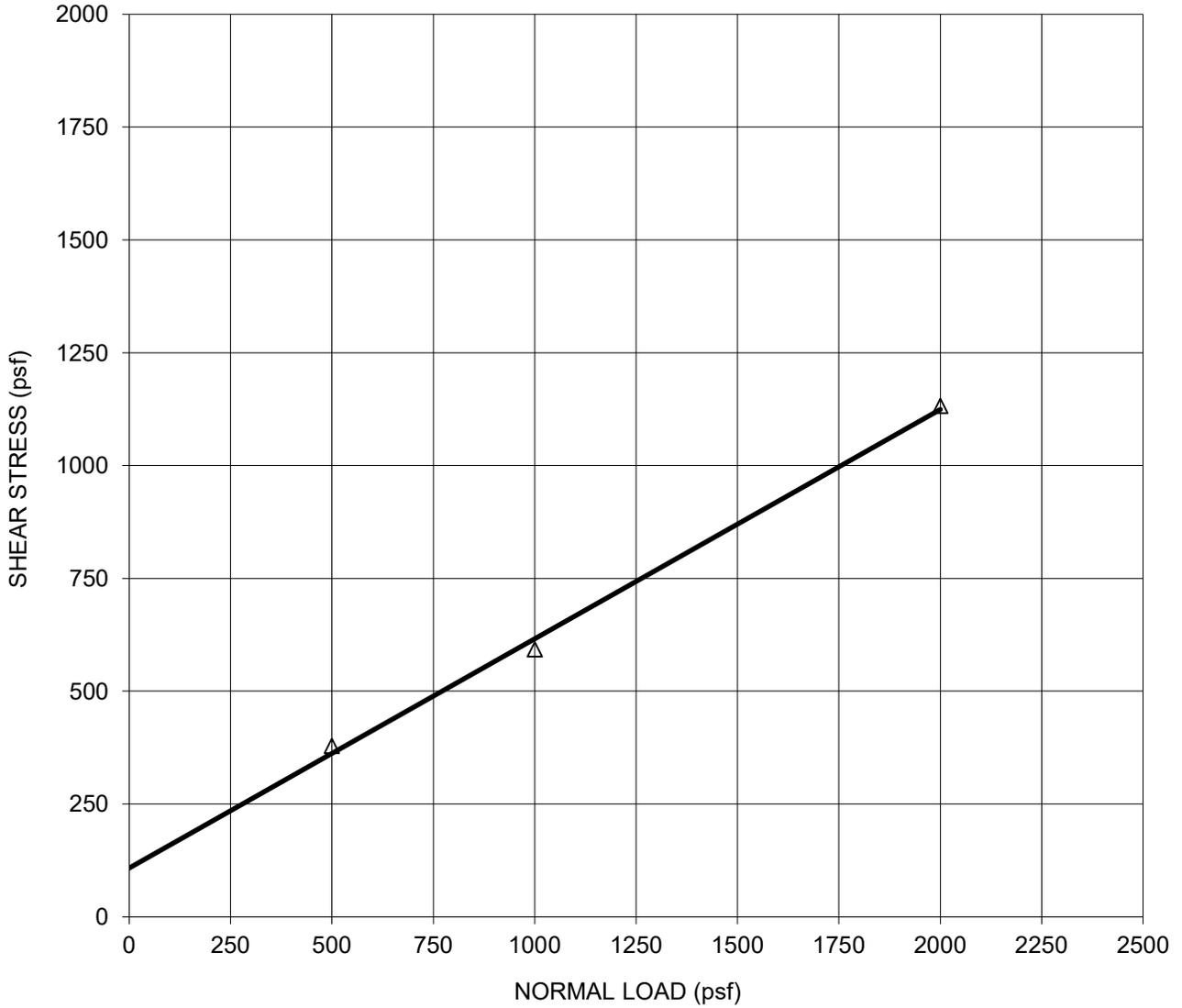
**Soluble Sulfates**

The soluble sulfate content was determined for samples considered representative of the on-site soils in accordance with Caltrans 417. The test results are presented in Table B-2.

**Table B-2. Sulfate Test Results**

Boring	Depth (ft)	Soil Type	Sulfates (ppm)	Exposure
B-2	2.5	ML	19	Negligible
B-3	2	ML	10	Negligible
B-4	1	ML	89	Negligible

BORING:	B-2		COHESION	FRICTION
DEPTH (ft):	2		(psf)	ANGLE
SOIL TYPE (USCS):	ML		100	27
MOISTURE: <b>SATURATED</b>		TEST TYPE: <b>CONSOLIDATED - DRAINED</b>		



**CMAG ENGINEERING**

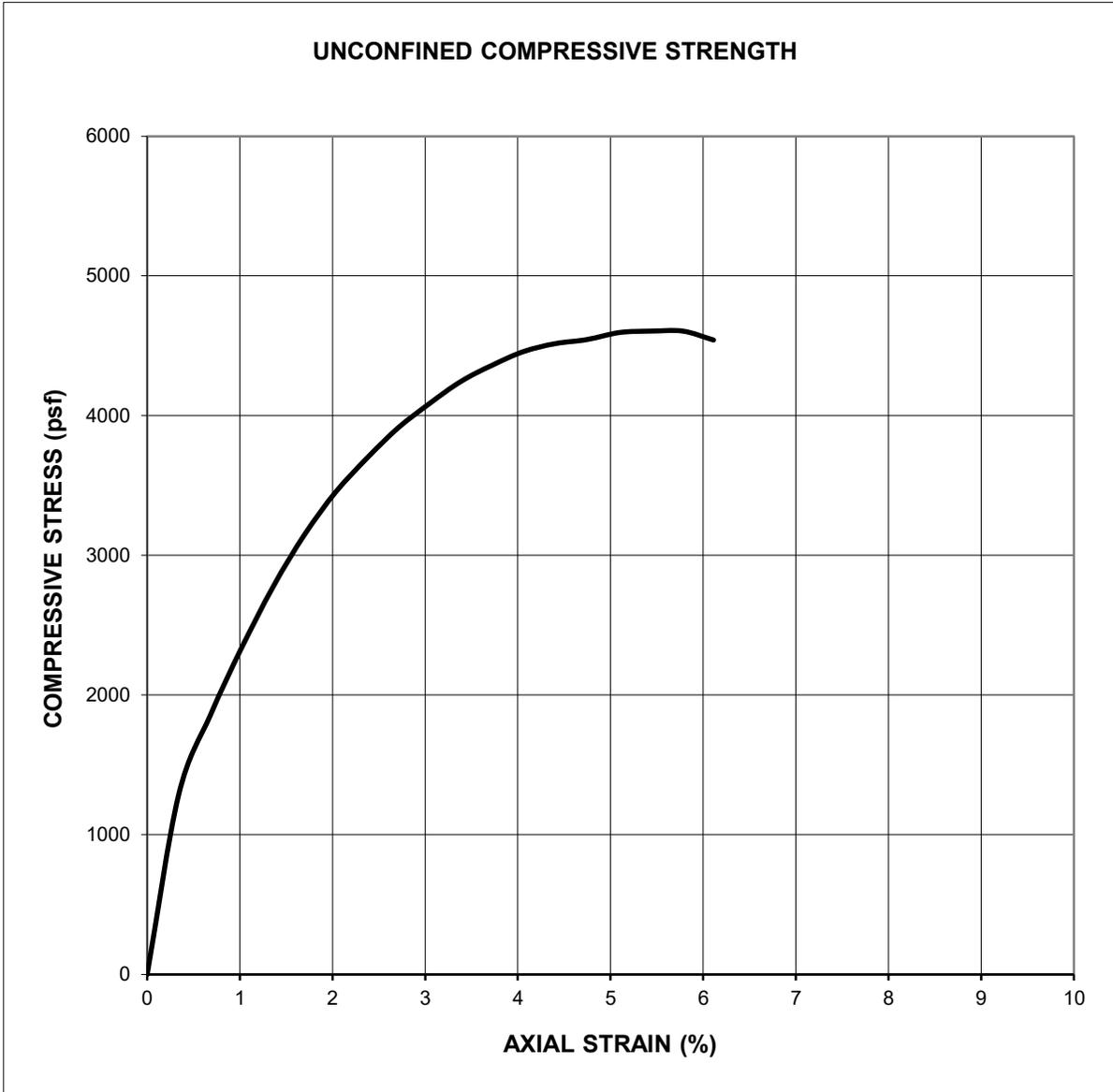
**DIRECT SHEAR TEST RESULTS**

FIGURE

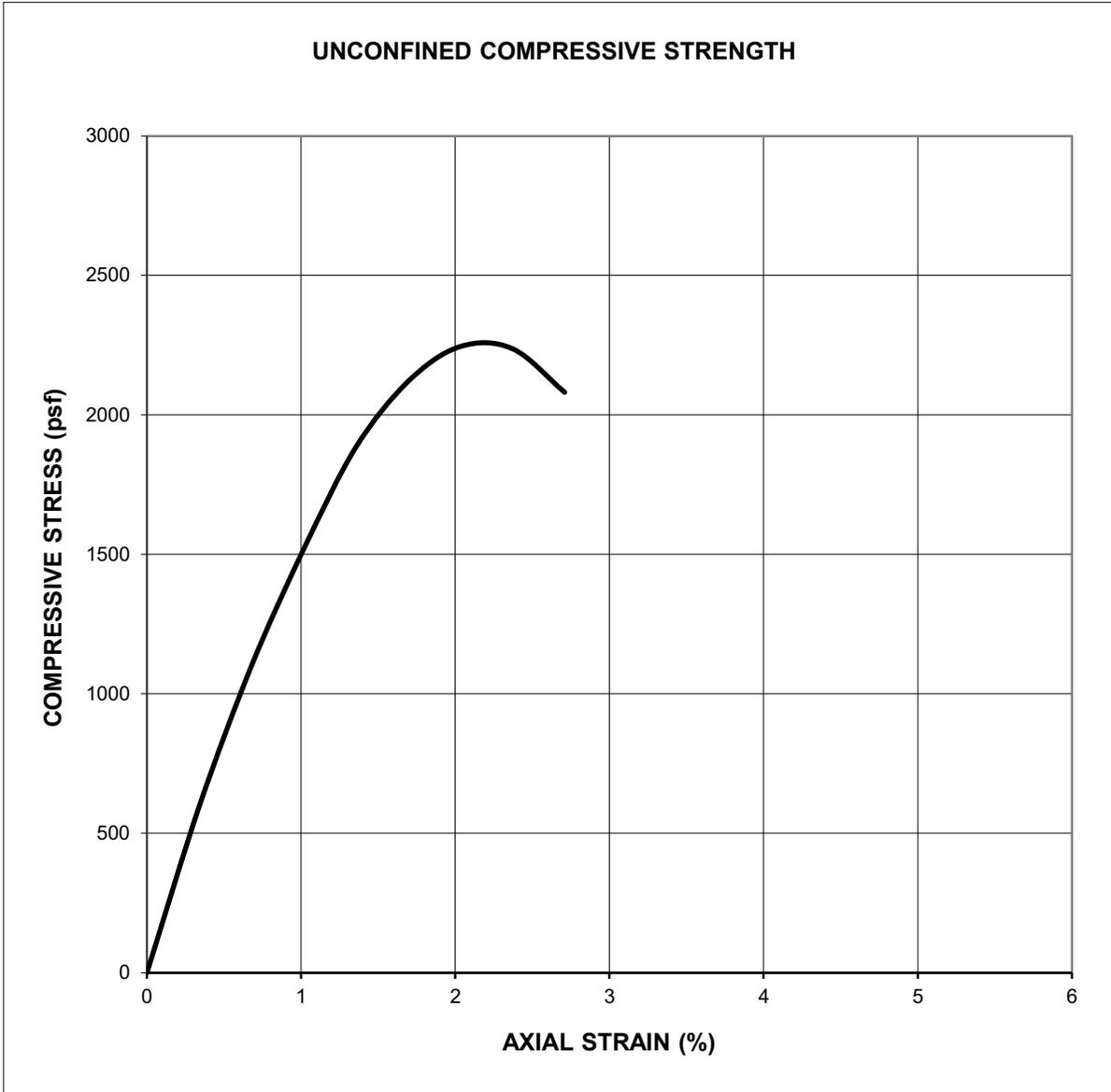
150 Felker Street

B-1

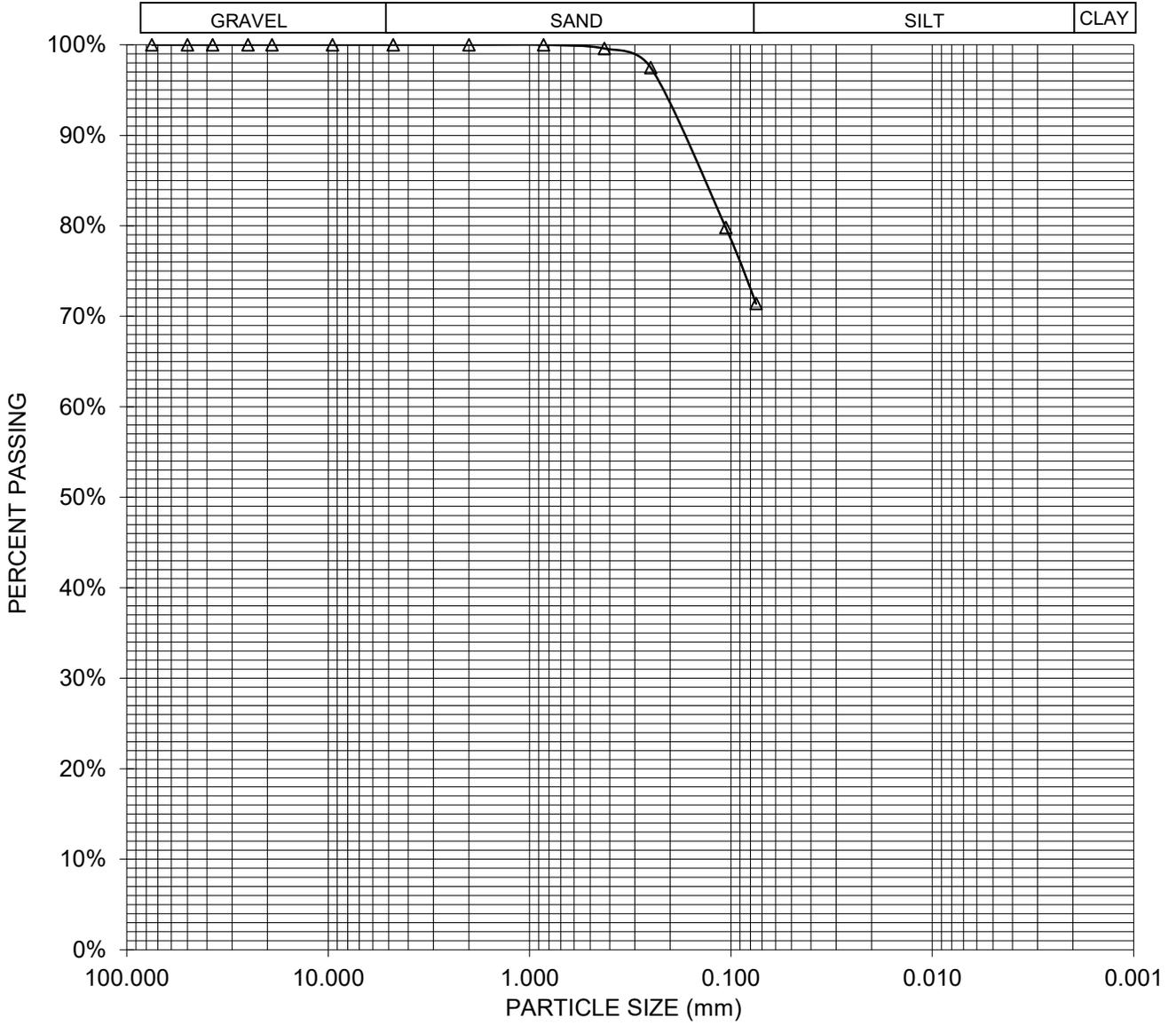
BORING:	B-2	UNCONFINED COMPRESSIVE STRENGTH (psf)	4,606
DEPTH (ft):	6	SAMPLE TYPE: UNDISTURBED	
SOIL TYPE (USCS):	CL	MOISTURE: INSITU - SATURATED	



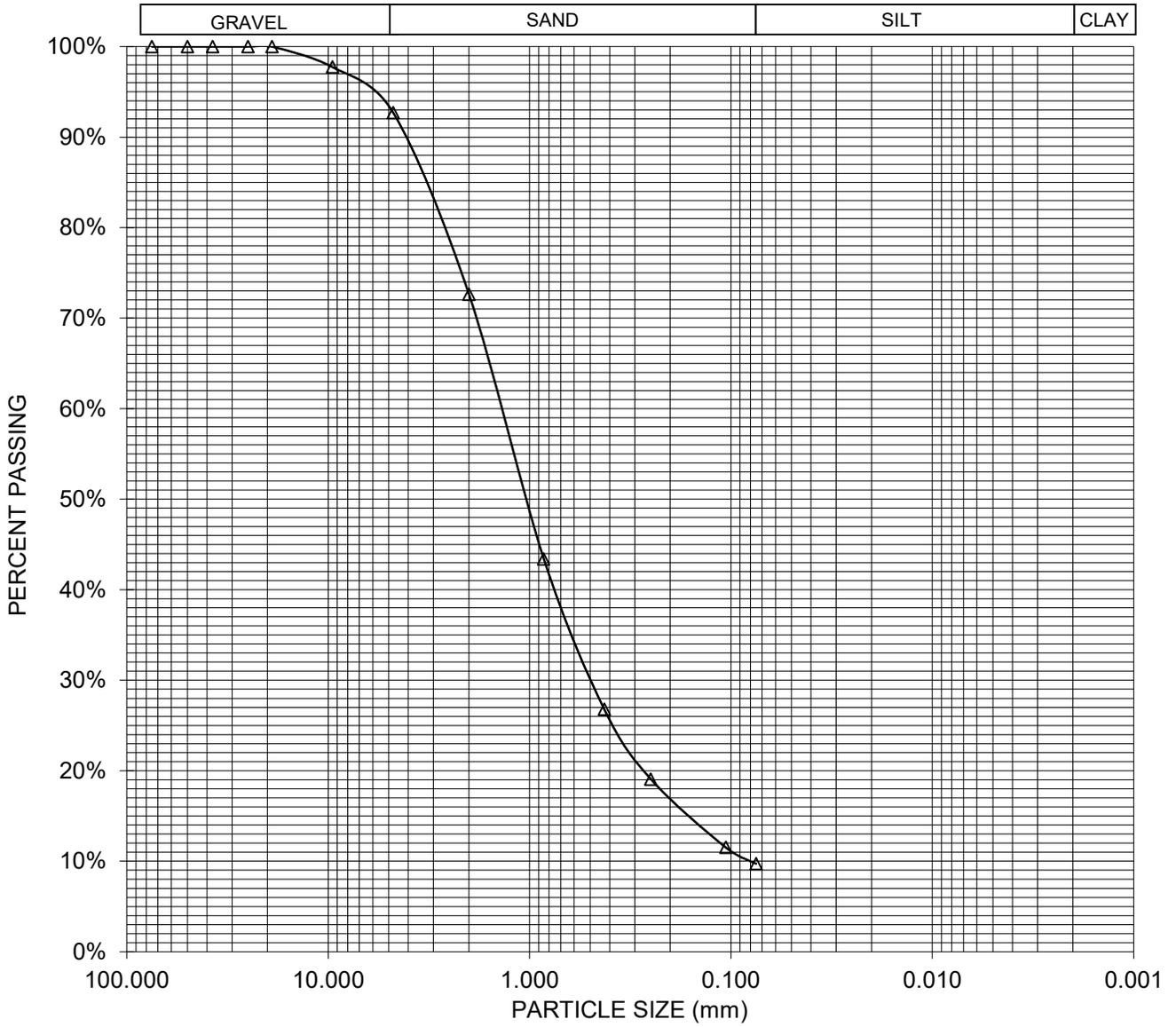
BORING:	B-3	UNCONFINED COMPRESSIVE STRENGTH (psf)	2,245
DEPTH (ft):	6	SAMPLE TYPE: UNDISTURBED	
SOIL TYPE (USCS):	CL	MOISTURE: INSITU - SATURATED	



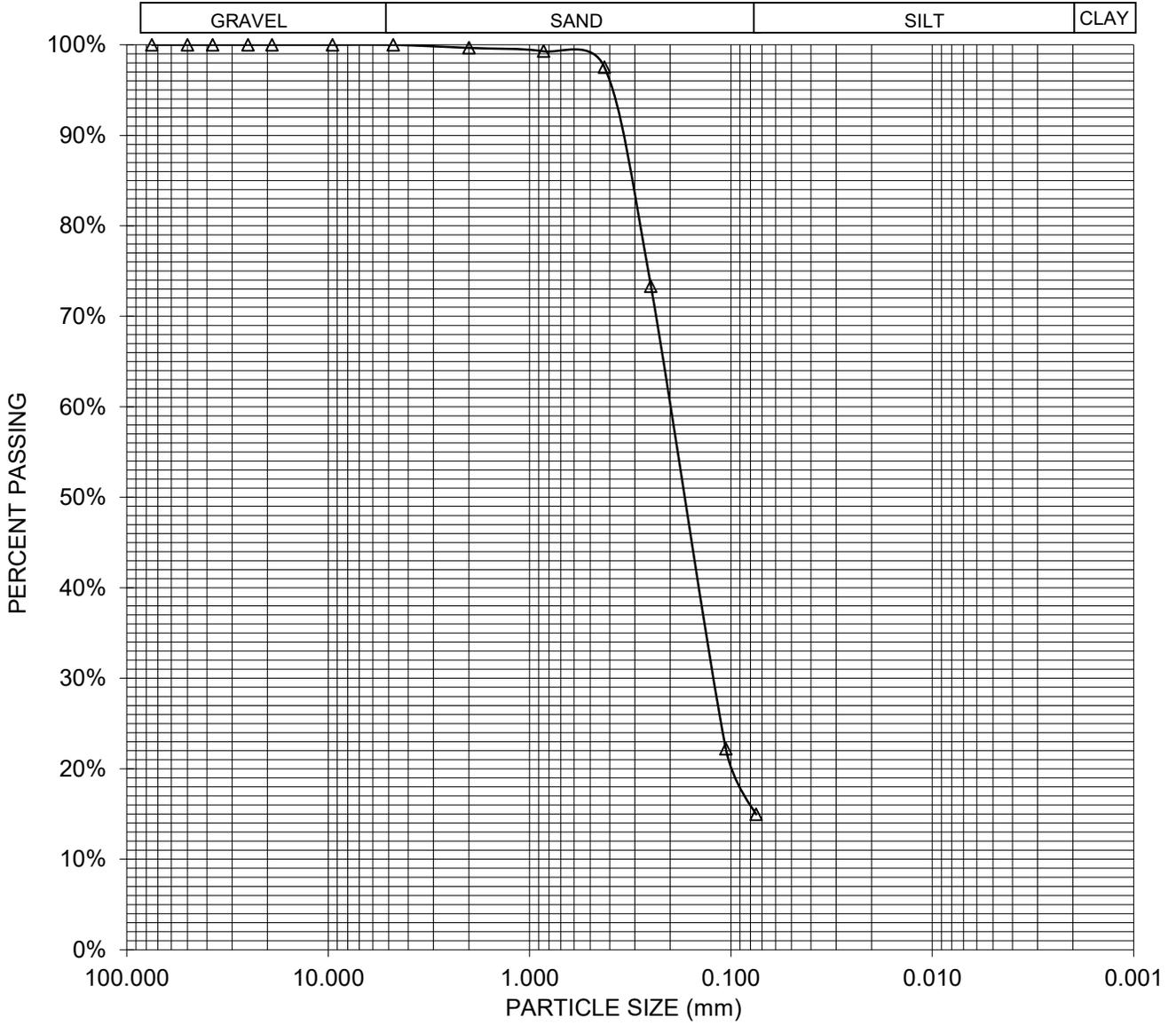
BORING:	B-1	PERCENT	PERCENT
DEPTH (ft):	2	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	ML	100.0%	71.4%



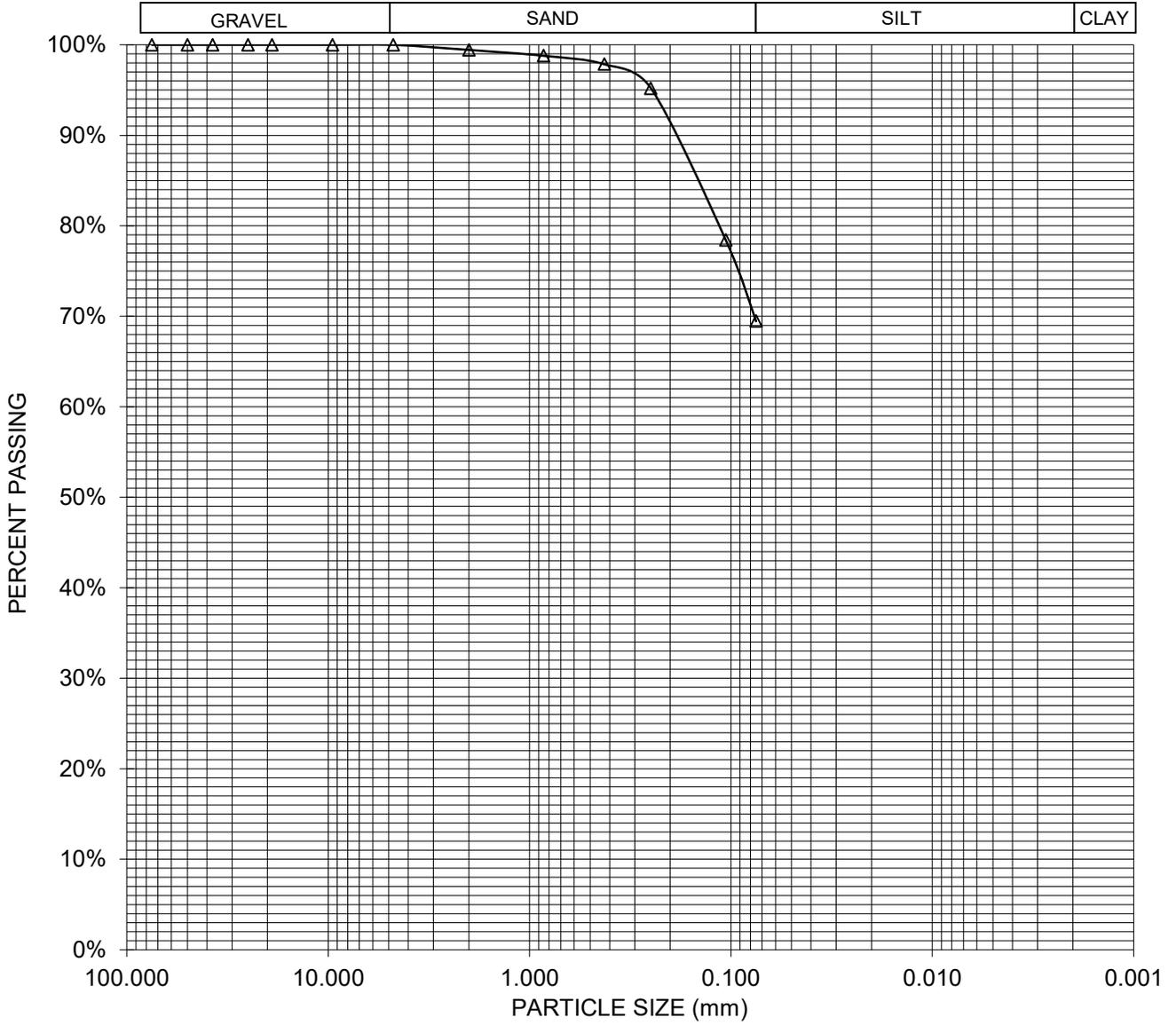
BORING:	B-1	PERCENT	PERCENT
DEPTH (ft):	20	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	SW-SM	92.7%	9.7%



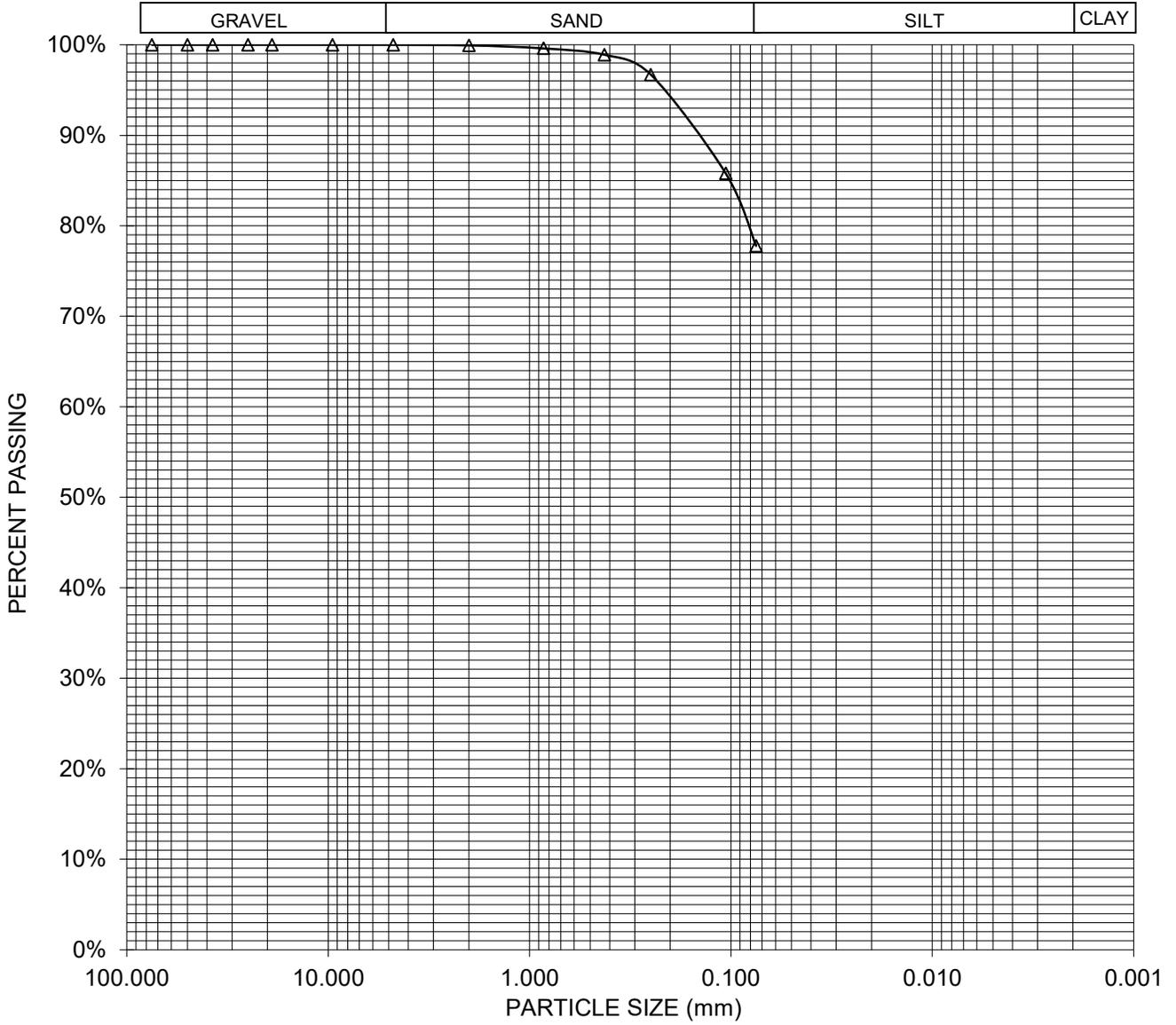
BORING:	B-1	PERCENT	PERCENT
DEPTH (ft):	35	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	(SM)	100.0%	15.0%



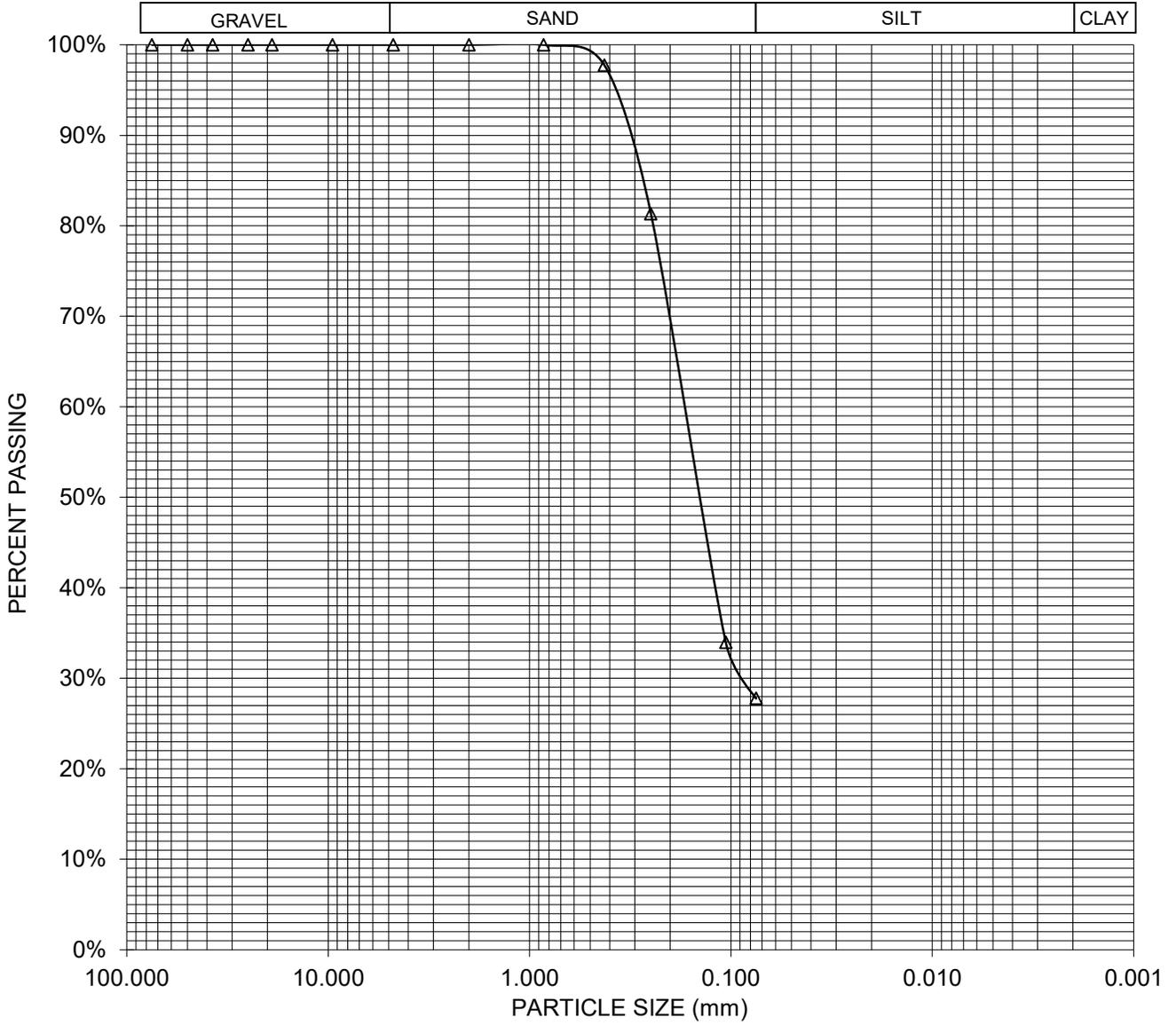
BORING:	B-2	PERCENT	PERCENT
DEPTH (ft):	2	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	ML	100.0%	69.5%



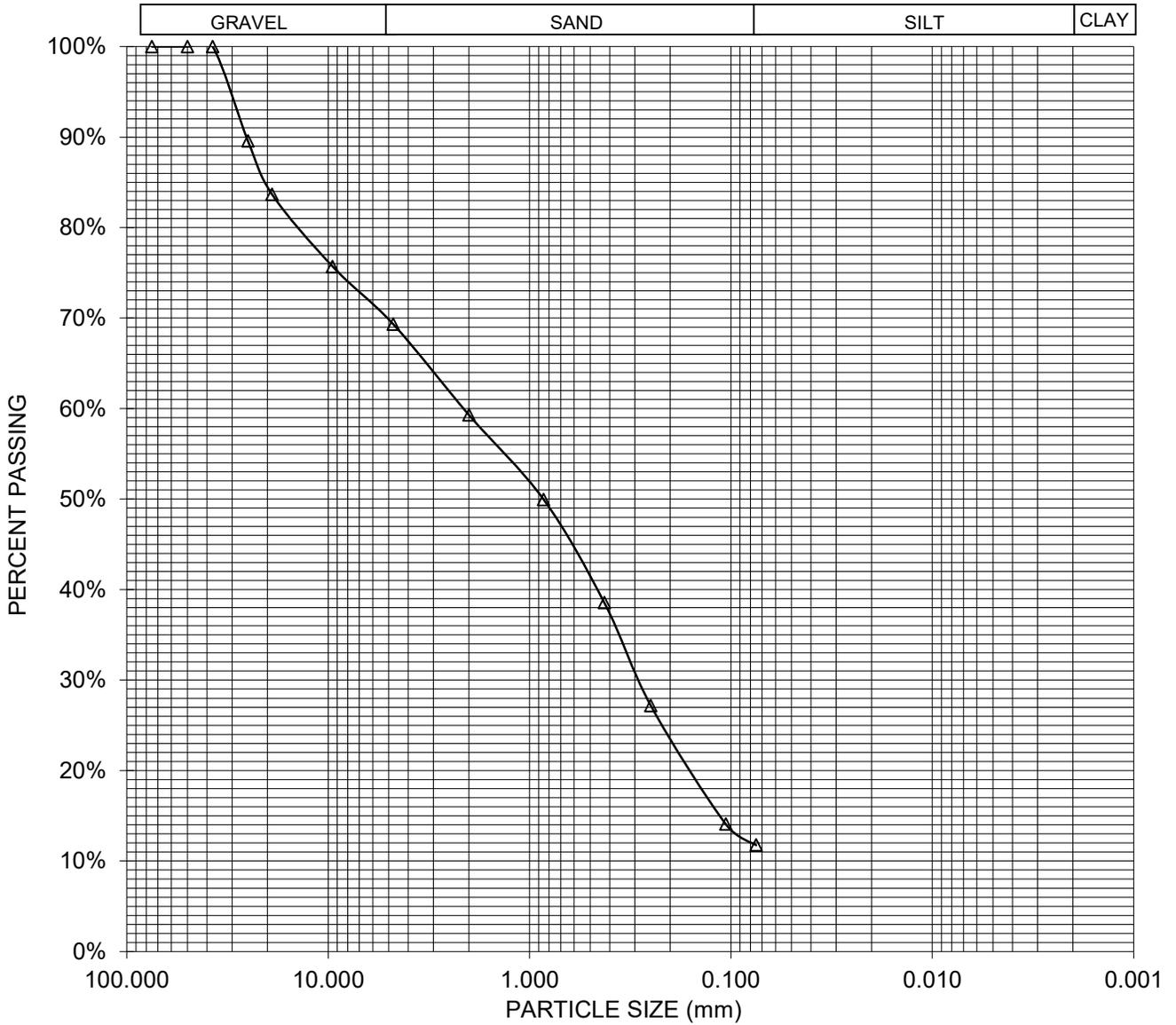
BORING:	B-2	PERCENT	PERCENT
DEPTH (ft):	6	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	CL	100.0%	77.8%



BORING:	B-2	PERCENT	PERCENT
DEPTH (ft):	10	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	SM	100.0%	27.8%

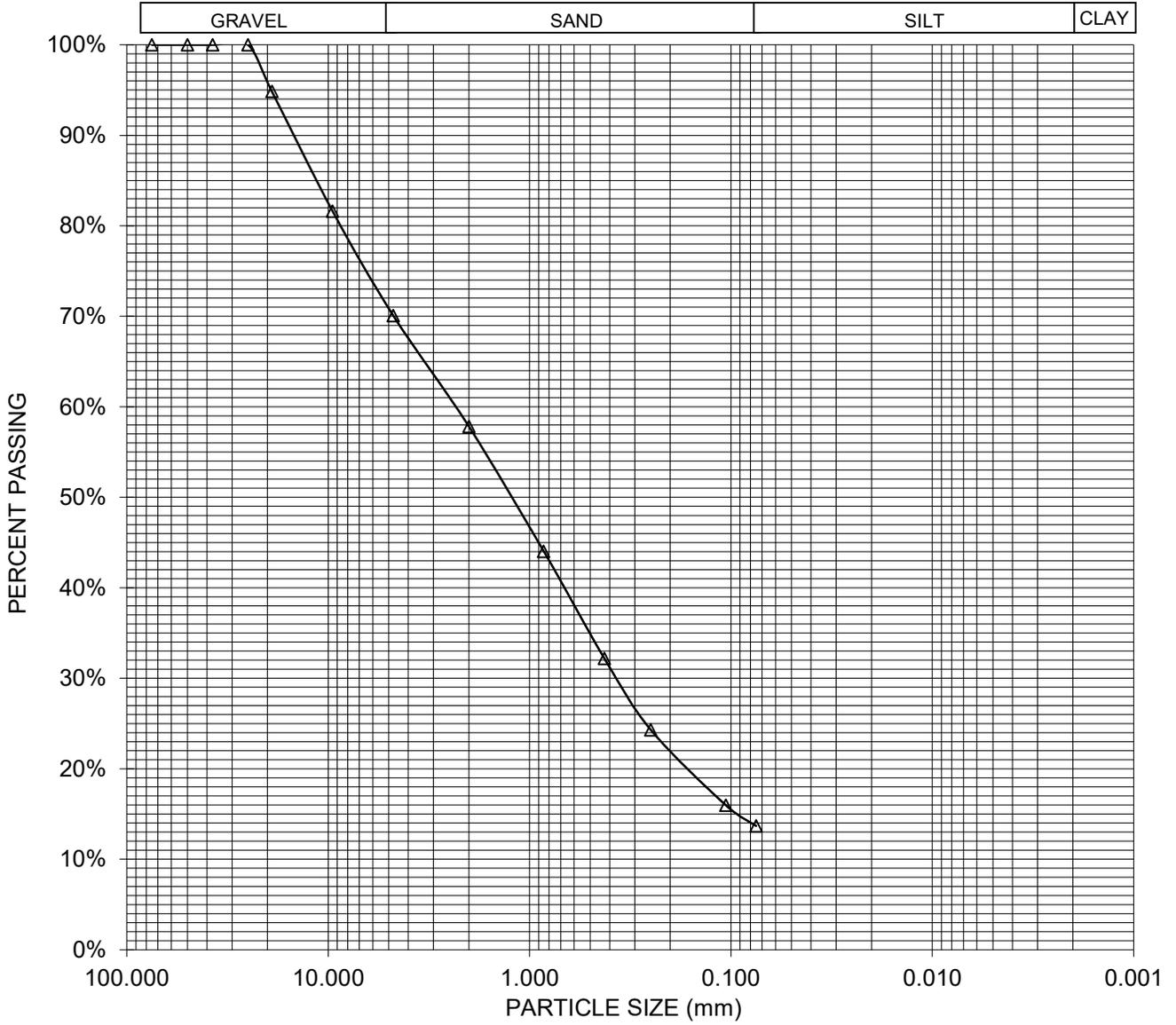


BORING:	B-2	PERCENT	PERCENT
DEPTH (ft):	20	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	SW-SM	69.3%	11.8%





BORING:	B-3	PERCENT	PERCENT
DEPTH (ft):	15	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	SM	70.1%	13.7%



**CMAG ENGINEERING**

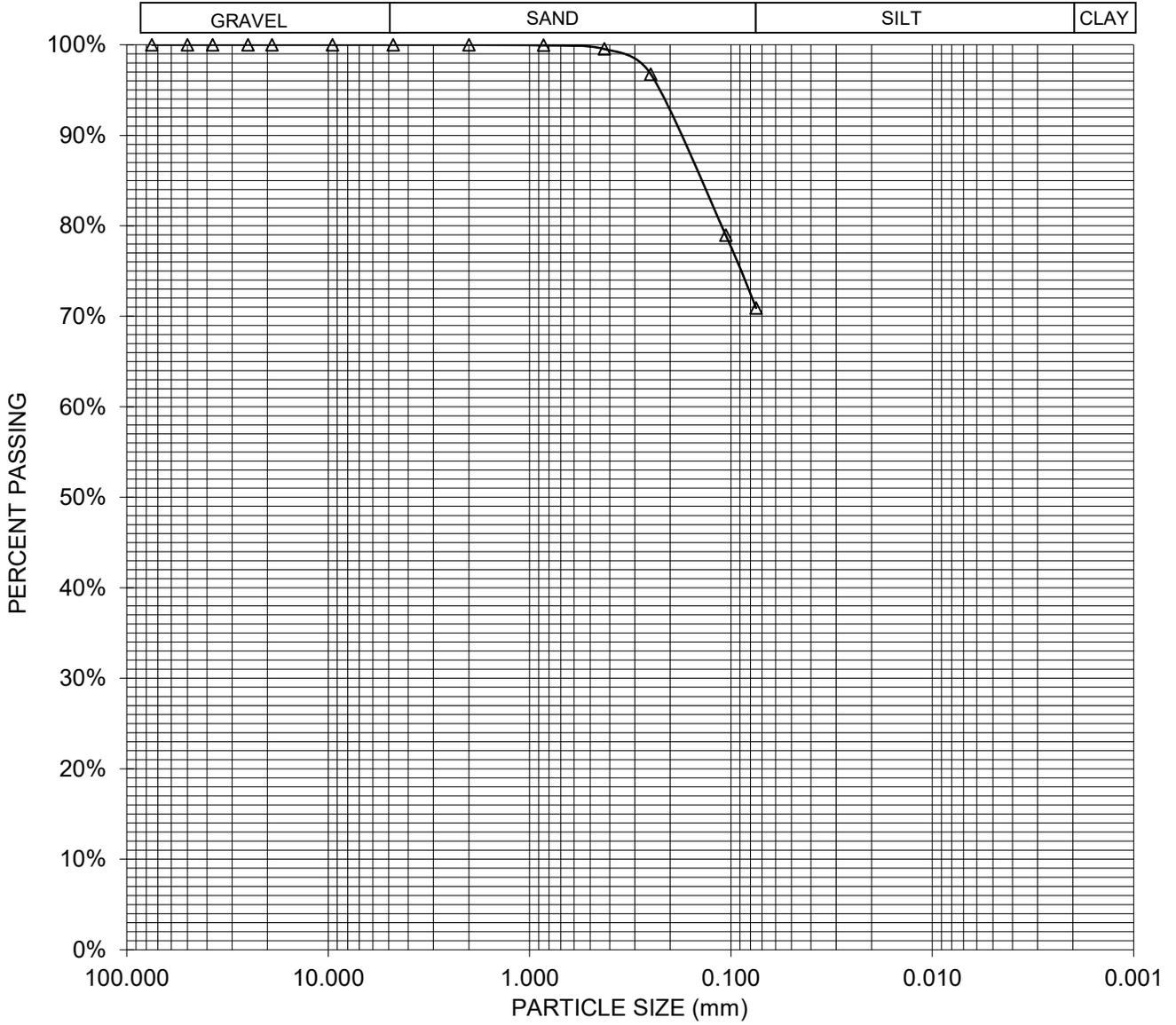
**PARTICLE SIZE DISTRIBUTION**

150 Felker Street

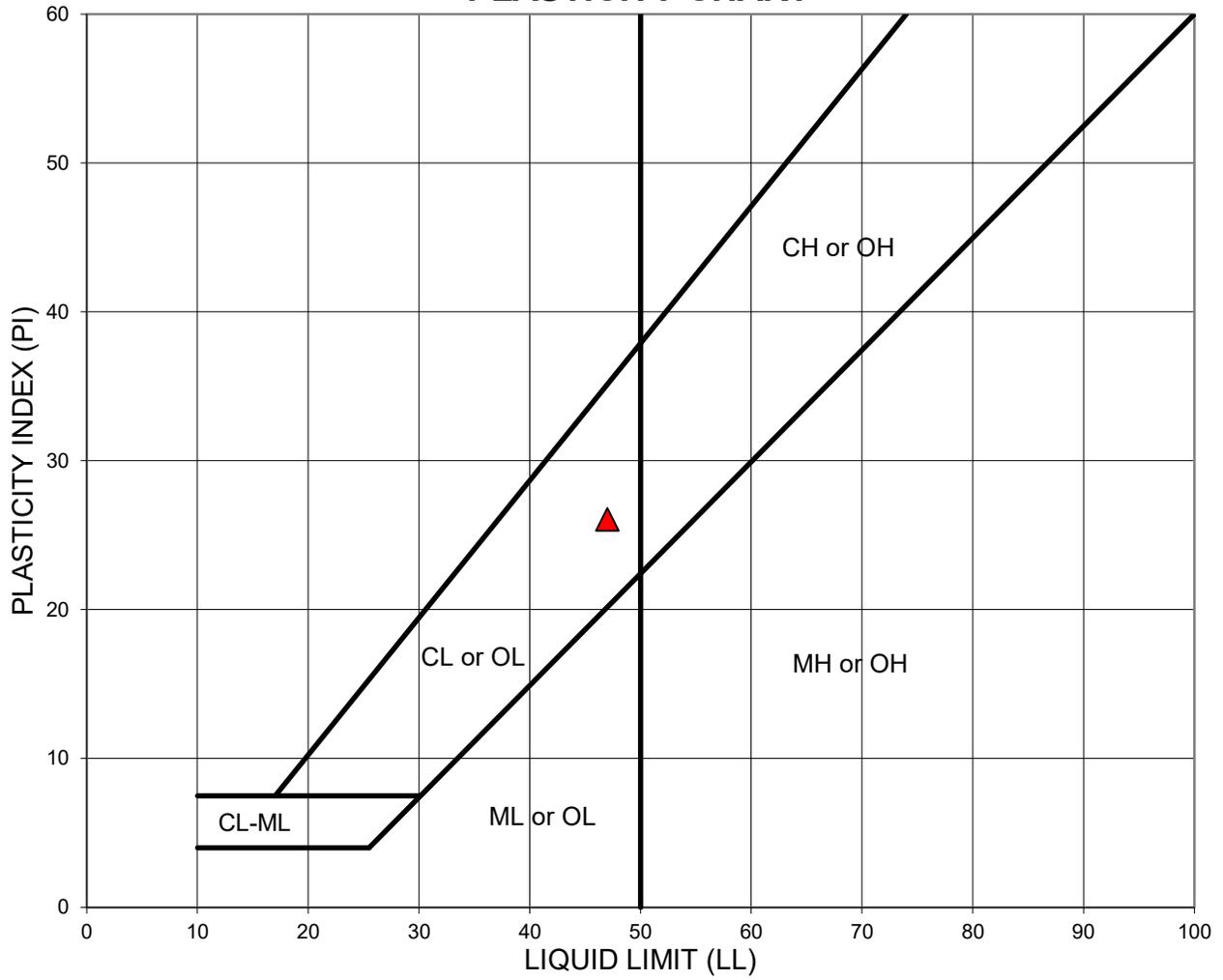
FIGURE

B-12

BORING:	B-4	PERCENT	PERCENT
DEPTH (ft):	1	PASSING No. 4	PASSING No. 200
SOIL TYPE (USCS):	ML	100.0%	70.9%



# PLASTICITY CHART



KEY					
SYMBOL	BORING DEPTH(FT)	LL	PL	PI	
▲	B-2	6.5	47	21	26



**Ruler** [Close]

Line Path Polygon Circle 3D path 3D polygon

Measure the distance between multiple points on the ground

Length: 87.26 Feet [Dropdown]

Show Elevation Profile

Mouse Navigation [Save] [Clear]

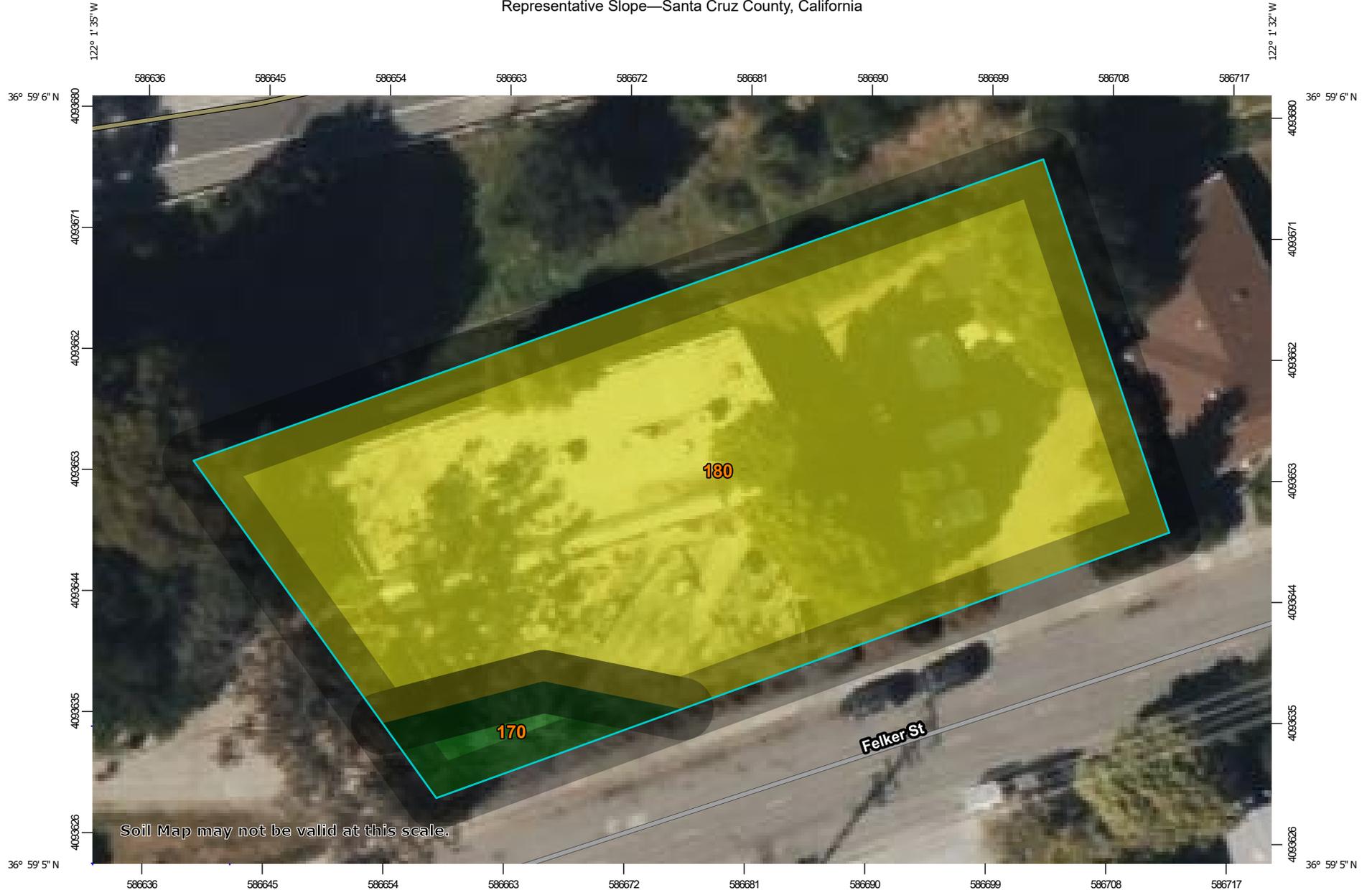
150 Felker St  
30 ft  
0.0% 0.0%

1985 Imagery Date: 9/11/2022 36°59'07.93" N 122°01'36.58" W elev 39 ft eye alt 989

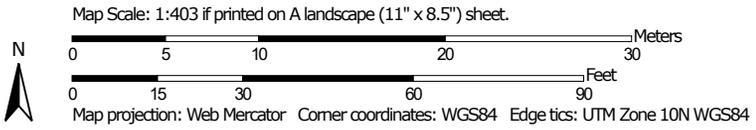
Graph Min Avg Max Elevation: 30, 32, 33 ft  
Range Totals Distance: 89.5 ft Elev Gain/Loss: 3.48 ft, -0.19 ft Max Slope: -,- Avg Slope: -,-



Representative Slope—Santa Cruz County, California

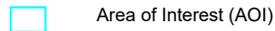


Soil Map may not be valid at this scale.



## MAP LEGEND

### Area of Interest (AOI)



Area of Interest (AOI)

### Soils

#### Soil Rating Polygons



0 - 5



5 - 15



15 - 45



45 - 60



60 - 100



Not rated or not available

#### Soil Rating Lines



0 - 5



5 - 15



15 - 45



45 - 60



60 - 100



Not rated or not available

#### Soil Rating Points



0 - 5



5 - 15



15 - 45



45 - 60



60 - 100



Not rated or not available

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Cruz County, California

Survey Area Data: Version 18, Sep 8, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 11, 2022—May 29, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Representative Slope

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
170	Soquel loam, 0 to 2 percent slopes	1.0	0.0	5.0%
180	Watsonville loam, thick surface, 15 to 30 percent slopes	23.0	0.4	95.0%
<b>Totals for Area of Interest</b>			<b>0.5</b>	<b>100.0%</b>

### Description

Slope gradient is the difference in elevation between two points, expressed as a percentage of the distance between those points.

The slope gradient is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

### Rating Options

*Units of Measure:* percent

*Aggregation Method:* Dominant Component

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

*Interpret Nulls as Zero:* No

# **Storm Water Control Plan**

**Felker Street Apartments**  
***(Residential Development)***  
**150 Felker St., Santa Cruz, CA**  
**APN 008-181-23**

***Revised 06.17.22***

By:

C2G / Civil Consultants Group, Inc.  
4444 Scotts Valley Drive, Suite 6  
Scotts Valley, CA 95066  
(831) 438-4420

Storm Water Control Plan

**I. Project Information**

- a. Residential Development – Site Improvement Plans for “Felker Street Apartments”  
Application No. TBD  
APN 008-181-23  
150 Felker Street, Santa Cruz, CA 95060
- b. Attn:
- c. Project is not phased
- d. The project proposes to construct 1 new residential apartment building. There are 2 access points off of Felker Street and a parking garage on the ground level.

**II. Project Site Assessment Summary**

- a. The site is located south of Highway 1 and approximately 550 feet west of Ocean Street Exit.
- b. Total Project Site Area = 17,436 S.F.
- c. Watershed management zone = 1
- d. Design storm intensity = 2.1 inches
- e. Geology and soil types.

**180—Watsonville loam, thick surface, 15 to 30 percent slopes**

**Map Unit Setting**

*National map unit symbol: h9g8  
Elevation: 20 to 1,200 feet  
Mean annual precipitation: 28 inches  
Mean annual air temperature: 57 degrees F  
Frost-free period: 245 to 275 days  
Farmland classification: Not prime farmland*

**Map Unit Composition**

*Watsonville and similar soils: 85 percent  
Minor components: 12 percent  
Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Watsonville**

**Setting**

*Landform: Marine terraces  
Landform position (two-dimensional): Toeslope  
Landform position (three-dimensional): Tread  
Down-slope shape: Linear  
Across-slope shape: Linear  
Parent material: Alluvium*

**Typical profile**

*H1 - 0 to 18 inches: loam*  
*H2 - 18 to 39 inches: clay*  
*H3 - 39 to 63 inches: sandy clay loam*

**Properties and qualities**

*Slope: 15 to 30 percent*  
*Depth to restrictive feature: More than 80 inches*  
*Drainage class: Somewhat poorly drained*  
*Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)*  
*Depth to water table: More than 80 inches*  
*Frequency of flooding: None*  
*Frequency of ponding: None*  
*Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)*  
*Available water supply, 0 to 60 inches: Very low (about 2.9 inches)*

**Interpretive groups**

*Land capability classification (irrigated): 4e*  
*Land capability classification (nonirrigated): 4e*  
*Hydrologic Soil Group: D*  
*Ecological site: R014XD089CA - CLAYPAN*

- f. Hydrologic Considerations: The nearest hydrological resources to the site is San Lorenzo River approximately 500 feet west of the site;

Depth to bedrock exceeds 80 inches, and depth to seasonal high-water table is approximately 60 inches per the project's soils report.

- g. The existing site is developed (impervious) with a commercial building that will be removed. Existing trees are on the site that will need to be protected during construction.
- h. The site currently drains via sheet flow into the public storm drain system comprised of curb and gutter along Felker Street. The adjacent gutter flowlines are a minimum of 6-inches below the perimeter concrete walk, and the site slopes generally up from the back of curb, removing any possibility of runoff from the public Right-of-Way. At the back of the property there is a small pervious area drains onto the property.

No soil or groundwater contamination has been documented at the site. Structures on the site are limited to the existing buildings, curbs, fences, and asphalt parking area with associated concrete driveways. No public utilities cross the site, underground utilities are located within Felker Street, and electrical power is provided by overhead drop.

The site is zoned RM, Multiple Residence Medium-Rise, see City Zoning Map, provided as Attachment D. There are no known covenants associated with this site.

- i. Site constraints consist of very poor infiltrating soils (Refer to Ksat value noted above in Section II.e. and letter from Project Geotechnical Engineer in Attachment H), limited on grading around existing trees to remain and there is no public storm drain system to tie into along the frontage of the property.

**III. Project Storm Water Performance Criteria and Drainage Management**

a. Development Area and BMP Requirement Tier

i. The site encompasses 12,200 square feet (sf) of new and/or replaced impervious area, and is a Tier 2 multi-family project.

ii. Proposed Development Area and Impervious Area:

Pre-project impervious surface area:	12,416 sf
Post-project impervious surface area:	12,200 sf
Amount of impervious surface area that will be replaced:	12,200 sf
Amount of new impervious surface area that will be created:	0 sf
Reduced Impervious Area Credit:	216 sf
New and Replaced Impervious Area:	12,200 sf
Net Impervious Area:	11,984 sf

The site is not located within the Urban Sustainability Area (USA), per the City of Santa Cruz USA Map; included as Attachment E. The site is surrounded by Major Roads and is within the Coastal Zone, as shown within the USA Map.

b. Nine (9) Drainage Management Areas (DMAs) have been delineated for new construction on the site. Flow-through Planters are proposed for treating the new impervious area associated with the building. Due to very poor infiltrating soils, infiltration is not recommended for this site. In DMA H and I, pervious pavers have been proposed to provide an aesthetically appealing vehicular entrance and also reduce the overall replaced and/or created impervious area.

Self-Treating Area F and H have been designed to be in compliance with Chapter 6B of the City of Santa Cruz Stormwater Best Management Practices (BMP) manual and are shown on sheet C3.2 Stormwater, see Attachment A.

DMAs E, I and G are self-retaining areas to provide opportunity for runoff to infiltrate prior to leaving the site. These DMAs have designated depressed areas that allow ponding (approximately an inch and a half, due to poor site infiltration) with amended soil.

**IV. Site Design and SCMs**

a. Due to the new and/or replaced impervious area of 12,200 square feet proposed, this project falls within the Tier 2 Post-Construction BMP Requirements.

i. Tier 1 - Site Design and Runoff Reduction elements intended to control runoff from the site consist of the following:

1. Disconnected downspouts that drain to landscape areas as detailed in Chapter 6B of the BMP manual.
2. Disperse driveway runoff to landscape areas
3. Implementation of pervious pavement

- ii. Tier 2 – Water Quality Treatment elements intended to treat stormwater from the site consist of the following:
  - 1. Implementation of raised Flow-through Planters to treat 85-percentile storm.

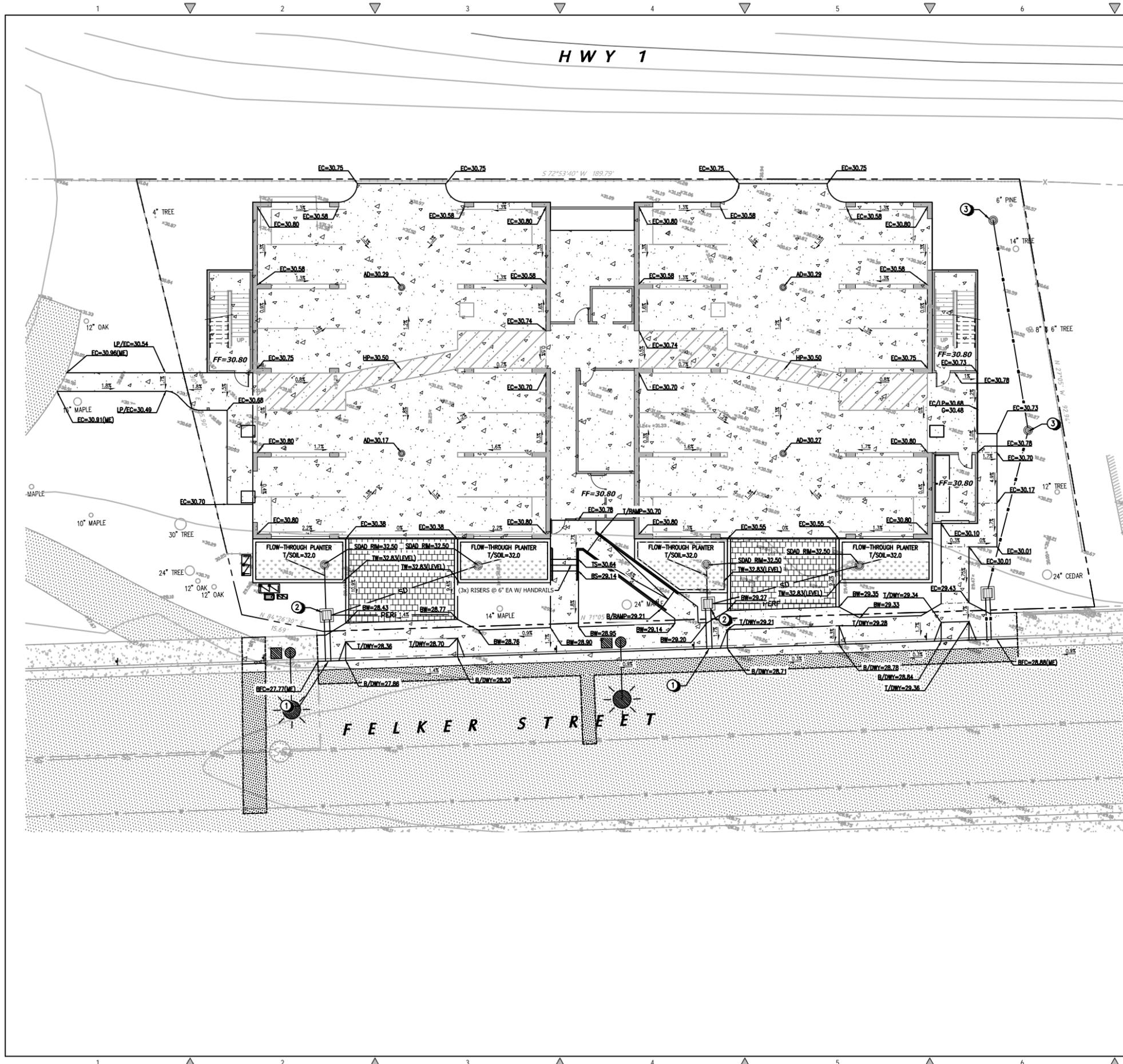
**V. BMP Operation and Maintenance Plan**

- a. Structural Storm Water Control Measures requiring maintenance are shown on sheet C3.2, provided in Attachment A, consisting of flow-through planters and pervious pavement.
- b. O&M procedures for the SCMs consist of monthly inspection and removal of trash or other deleterious materials; annual inspection and replacement of any removed soils or vegetation, replanting as required, and repair of any structural damage. O&M procedures for structural stormwater control measures consist of monthly inspection and removal of trash or other deleterious materials, replacement of any removed or damaged pavers. Annual inspections shall take place in September, prior to start of the rainy season. See Attachment F for specific requirements and maintenance checklist.
- c. Maintenance will be performed by the property owner, and will include both monthly and annual inspections, maintenance, and repair as needed of the SCMs.
- d. Signed Maintenance Agreement included as Attachment G.

## **Attachment A**

*-C3.1 Grading Plan*

*-C3.2 Stormwater Management Plan*



- ### GENERAL GRADING NOTES
- ALL AREAS TO RECEIVE FILL SHALL BE STRIPPED TO A DEPTH TO BE DETERMINED BY THE SOILS ENGINEER. ANY (E) A.C. OR P.C.C. PAVING SHALL BE SCARIFIED & REMOVED & SUBGRADE PREPARED & COMPACTED AS SHOWN IN THESE PLANS.
  - ALL MATERIAL TO BE USED AS FILL WITHIN BUILDING PAD AREAS & PARKING OR DRIVEWAY AREAS TO BE FREE OF ALL VEGETATION & FOREIGN MATTER AND SHALL BE APPROVED BY THE SOILS ENGINEER.
  - ALL BUILDING PADS TO BE COMPACTED TO 95% RELATIVE COMPACTION; DRIVEWAY & STREET AREAS TO BE COMPACTED TO 95% RELATIVE COMPACTION PER ASTM D1557-91.
  - BUILDING PADS TO BE LEVEL SIDE-TO-SIDE, FRONT-TO-REAR, UNLESS OTHERWISE SHOWN.
  - STRIPPINGS MAY BE PLACED IN PLANTING AREAS. ALL EXCESS STRIPPING SHALL BE HAULED OFF. PAVING DEBRIS SHALL BE HAULED OFF TO AN APPROVED DISPOSAL SITE.
  - ALL WORK SHOWN OR NOTED IN THESE PLANS SHALL BE IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE SOILS ENGINEER; ALL LOCAL, STATE AND FEDERAL MINIMUM STANDARDS AND THE LATEST ADDITION OF THE UNIFORM BUILDING CODE.
  - CONTRACTOR SHALL PROTECT ALL EXISTING SITE IMPROVEMENTS NOT IDENTIFIED FOR REMOVAL DURING CONSTRUCTION AND SHALL REPAIR ANY DAMAGE TO NEW CONDITION AT THEIR EXPENSE.
  - CONTRACTOR SHALL VERIFY ALL EXISTING SITE CONDITIONS, SITE DIMENSIONS AND GRADES PRIOR TO THE START OF CONSTRUCTION.
  - ALL GRADING AND RELATED WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARD REQUIREMENTS OF THE CITY OF SANTA CRUZ AND THE PROJECT'S CONDITIONS OF APPROVAL.
  - GRADING SLOPES FOR BOTH CUT AND FILL SHALL NOT EXCEED 2(H):1(V) UNLESS OTHERWISE DIRECTED BY THE GEOTECHNICAL ENGINEER.
  - ALL SOFTSCAPE GRADES ADJACENT TO (N) BUILDINGS SHALL BE 8" (MIN.) BELOW FINISH FLOOR.
  - CONTRACTOR SHALL GRADE TO ENSURE DRAINAGE FLOWS AWAY FROM NEW BUILDINGS.

- ### ABBREVIATIONS
- |        |                  |       |                        |
|--------|------------------|-------|------------------------|
| AB     | AGGREGATE BASE   | SD    | STORM DRAIN            |
| AC     | ASPHALT CONCRETE | SDAD  | STORM DRAIN AREA DRAIN |
| B/     | BOTTOM OF ...    | SDDI  | STORM DRAIN DROP       |
| BLDG   | BUILDING         | INLET | STORM DRAIN INLET      |
| BS     | BOTTOM OF STAIR  | SDMH  | STORM DRAIN MANHOLE    |
| BW     | BACK OF WALK     | T/    | TOP OF ...             |
| CONC   | CONCRETE         | TG    | TOP OF GRATE           |
| DWY    | DRIVEWAY         | TS    | TOP OF STAIR           |
| EC     | EDGE OF CONCRETE | TW    | TOP OF WALL            |
| EP     | EDGE OF PAVEMENT | UG    | UNDERGROUND            |
| EL     | ELEVATION        | W/    | WITH                   |
| FF     | FINISH FLOOR     |       |                        |
| FL     | FLOWLINE         |       |                        |
| G      | GROUND           |       |                        |
| HP     | HIGH POINT       |       |                        |
| INV    | INVERT ELEVATION |       |                        |
| LP     | LOW POINT        |       |                        |
| NG     | NATURAL GROUND   |       |                        |
| P.O.T. | PATH OF TRAVEL   |       |                        |
| PL     | PROPERTY LINE    |       |                        |
| PVR    | PERVIOUS PAVER   |       |                        |
- ### LEGEND
- |   |                          |
|---|--------------------------|
| ● | STORM DRAIN AREA DRAIN   |
| ■ | STORM DRAIN DROP INLET   |
| ⊥ | POINT OF CONNECTION      |
| ○ | SANITARY SEWER CLEAN OUT |

- ### STORM DRAIN NOTES:
- CURB DRAIN PER CITY OF SANTA CRUZ STD DRAWING 10
  - V64 DROP INLET WITH OPEN BOTTOM
  - 10" AREA DRAIN
- ### STORM DRAIN PIPE DATA:
- 45 LF OF 4" PERF PIPE @ 0.0% SLOPE
  - 7 LF OF 6" HDPE PIPE @ 1.0% SLOPE
  - 30 LF OF 6" HDPE PIPE @ 1.0% SLOPE
  - 38 LF OF 6" HDPE PIPE @ 1.0% SLOPE

### EARTHWORK QUANTITIES

NOTE: THE EARTHWORK QUANTITIES SHOWN HEREON ARE EXCLUSIVE OF WALL FOOTINGS, EXISTING PAVEMENT REMOVAL AND OVER EXCAVATION AND RECONSTRUCTION, UTILITY TRENCH SPOLLS & SOIL EXPANSION AND CONTRACTION FACTORS.

ITEM	DESCRIPTION	CUT (cu yds)	FILL (cu yds)
1	EG VS. FG	60	375

NET VOLUME = 315 CU.YDS. OF FILL

THE ABOVE QUANTITIES ARE FOR INFORMATION PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE NECESSARY CUT AND FILL TO ACCOMPLISH FINISH GRADE SHOWN ON THESE PLANS.

REVISIONS	BY

**GRADING AND DRAINAGE**



**C2G/CIVIL CONSULTANTS GROUP, INC.**  
 Engineers/Planners  
 Santa Cruz Valley Office / Suite 6  
 831 438 4420

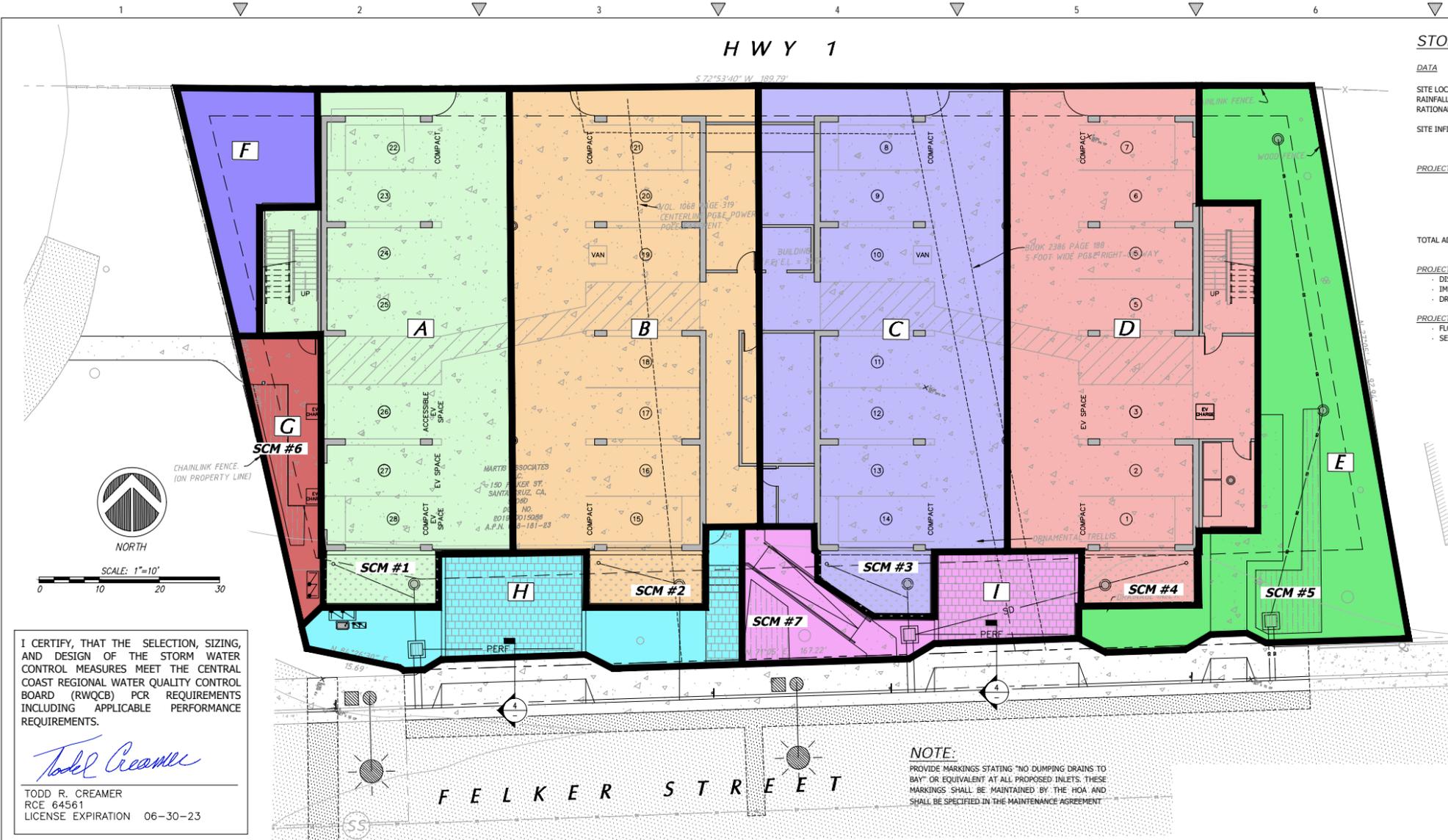
**SITE IMPROVEMENT PLANS**  
 150 FELKER STREET  
 SANTA CRUZ, CALIFORNIA 95060

Date: 11.05.2021  
 Scale: 1" = 10'  
 Drawn: JB/DD  
 Job: 2013.01  
 Sheet:  
**C3.1**  
 Of 10 Sheets



SCALE: 1" = 10'





**STORMWATER MITIGATION**

**DATA**

SITE LOCATION P60 ISOPLETH: 1.50  
 RAINFALL INTENSITY FOR 10yr: 2.1 IN/HR  
 RATIONAL COEFFICIENT Cpr: 0.25  
 Cpost: 0.90  
 SITE INFILTRATION RATE (WEBSOIL SURVEY): 0.03 IN/HR

**PROJECT REQUIREMENTS**

**TIER 2**

MITIGATION REQUIRED  
 TOTAL ADDED/REPLACED IMPERVIOUS AREA = 12,200 sq.ft.

**PROJECT MITIGATION FOR TIER 1**

- DISCONNECT DOWNSPOUTS
- IMPLEMENT PERVIOUS PAVEMENT
- DRAIN HARDSCAPE RUNOFF TO LANDSCAPE AREAS

**PROJECT MITIGATION FOR TIER 2**

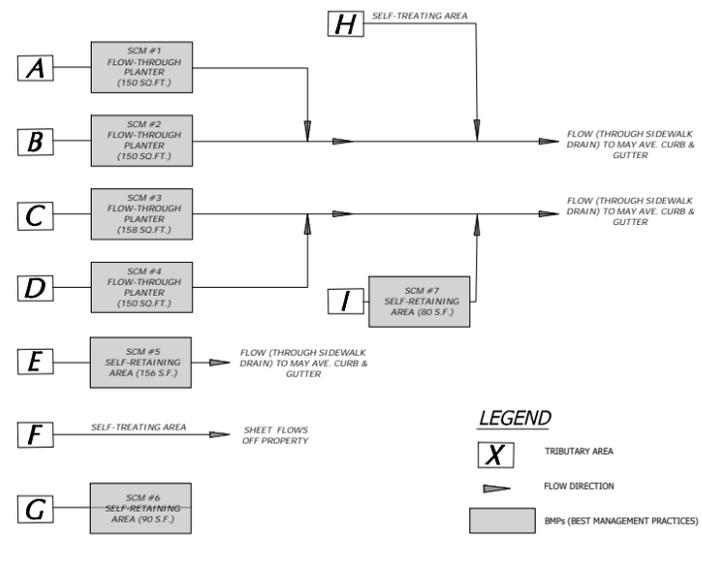
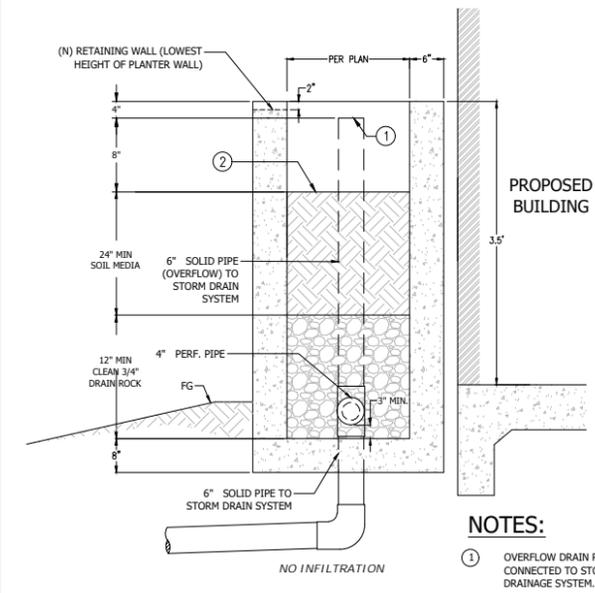
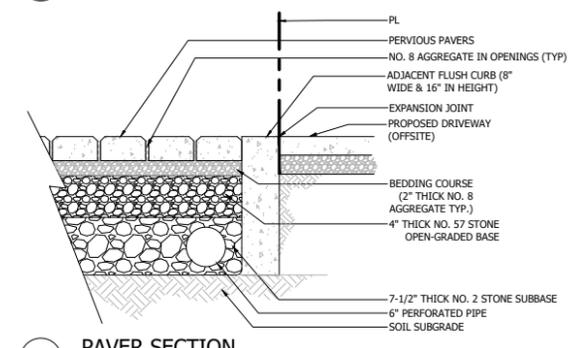
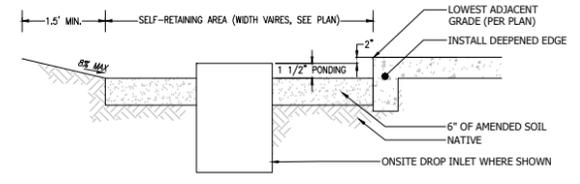
- FLOW-THROUGH PLANTERS
- SELF-RETAINING AREAS

**NOTE:**  
 PROVIDE MARKINGS STATING "NO DUMPING DRAINS TO BAY" OR EQUIVALENT AT ALL PROPOSED INLETS. THESE MARKINGS SHALL BE MAINTAINED BY THE HOA AND SHALL BE SPECIFIED IN THE MAINTENANCE AGREEMENT

I CERTIFY, THAT THE SELECTION, SIZING, AND DESIGN OF THE STORM WATER CONTROL MEASURES MEET THE CENTRAL COAST REGIONAL WATER QUALITY CONTROL BOARD (RWQCB) PCR REQUIREMENTS INCLUDING APPLICABLE PERFORMANCE REQUIREMENTS.

*Todd Creamer*

TODD R. CREAMER  
 RCE 64561  
 LICENSE EXPIRATION 06-30-23



**DMA ANALYSIS**

		EXISTING	
TOTAL AREA (sq.ft.)		17,436	
IMPERVIOUS AREA		12,416	
ROOF		5,569	
AC		4,404	
CONCRETE		2,443	
RUNOFF COEFFICIENT		0.71	
TIME OF CONCENTRATION		10	
RAINFALL INTENSITY (10YR)		2.1	
<b>RUNOFF RATE (CFS)</b>		<b>0.599</b>	

		PROPOSED										TOTAL	
TOTAL AREA		2,833	3,321	3,305	3,164	2,074	552	414	951	822	17,436		
IMPERVIOUS AREA		2,570	3,161	2,985	2,833	312	0	179	0	0	12,200		
ROOF		2,570	3,161	2,985	2,833	0	0	0	0	0	11,549		
AC		0	0	0	0	0	0	0	0	0	0		
CONCRETE		0	0	0	0	312	0	179	0	160	652		
EQUIV. IMPERVIOUS AREA		2,570	3,161	2,985	2,833	312	0	179	0	160	12,200		
PERVIOUS PAVERS ASSUMED 60% IMPERVIOUS													
LANDSCAPE/NATURAL/PAVERS		263	160	320	331	1,762	552	235	951	662	5,236		
SCM (TIER 2) REQUIRED AREA		109	126	119	113	156	NA	90	NA	80			
SCM (TIER 2) PROVIDED AREA		150	150	153	150	156	NA	90	NA	80			
RUNOFF COEFFICIENT		0.84	0.87	0.84	0.83	0.35	0.25	0.53	0.25	0.38	0.70		
TIME OF CONCENTRATION		10	10	10	10	10	10	10	10	10	10		
RAINFALL INTENSITY (10YR)		2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1		
<b>RUNOFF RATE (CFS)</b>		<b>0.115</b>	<b>0.139</b>	<b>0.133</b>	<b>0.127</b>	<b>0.035</b>	<b>0.007</b>	<b>0.021</b>	<b>0.021</b>	<b>0.015</b>	<b>0.592</b>		
(25 YR)		0.138	0.167	0.160	0.152	0.042	0.008	0.013	0.014	0.018	0.711		
(50 YR)		0.155	0.188	0.180	0.171	0.047	0.009	0.014	0.015	0.020	0.800		
(100 YR)		0.172	0.209	0.200	0.190	0.052	0.010	0.016	0.017	0.022	0.889		

REVISIONS BY

STORM WATER MANAGEMENT PLAN

REGISTERED PROFESSIONAL ENGINEER  
 No. C 64561  
 Exp. 6/30/23  
 CIVIL  
 STATE OF CALIFORNIA

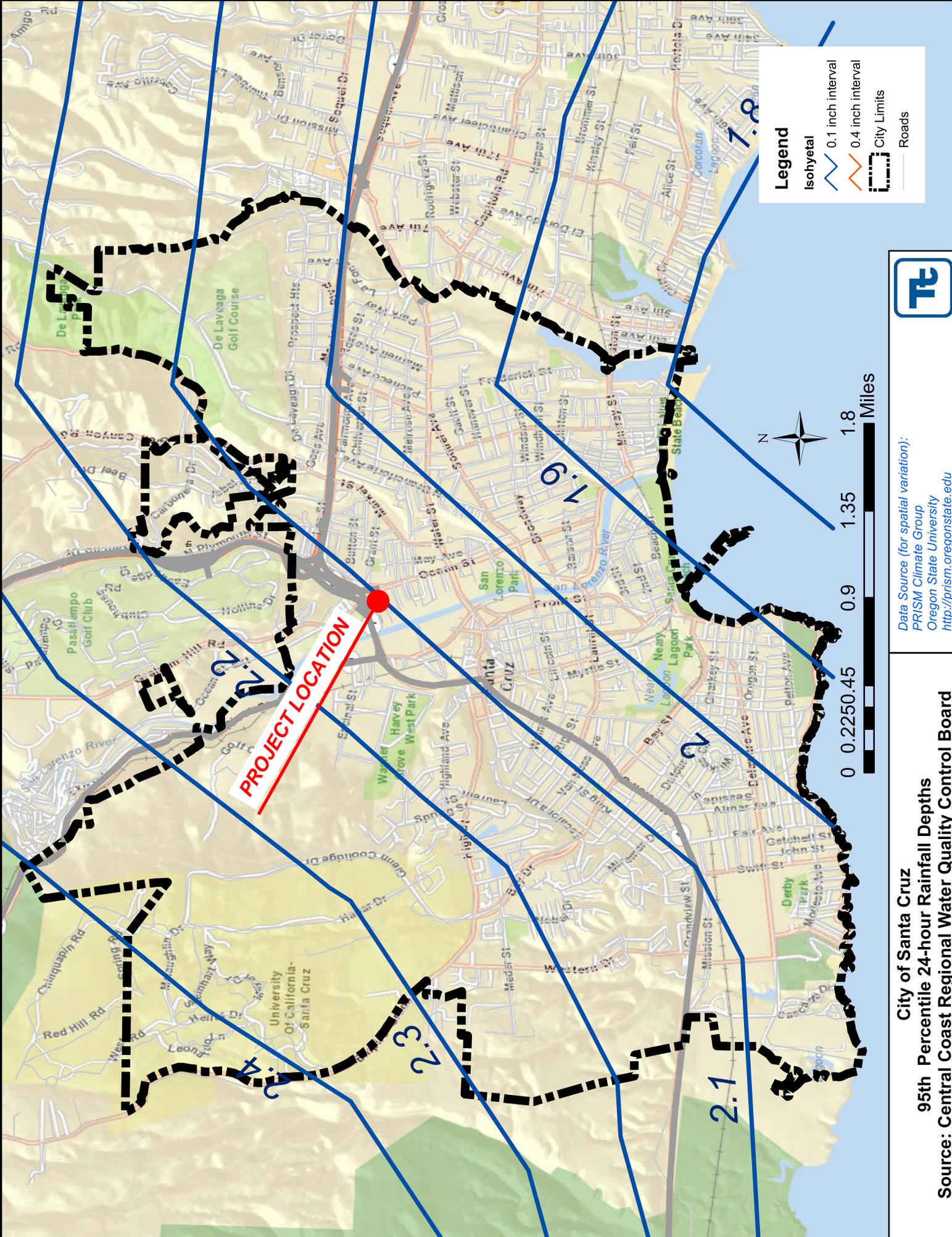
C2G/CIVIL CONSULTANTS GROUP, INC.  
 Engineers/Planners  
 4444 Scots Valley Drive / Suite 6  
 Santa Cruz, CA 95060  
 831.438.4120

SITE IMPROVEMENT PLANS  
 150 FELKER STREET  
 SANTA CRUZ, CALIFORNIA 95060

Date: 11.05.2021  
 Scale: 1" = 10'  
 Drawn: JB/DD  
 Job: 2013.01  
 Sheet: C3.2  
 Of 10 Sheets

## ***Attachment B***

95<sup>th</sup> Percentile 24-hour Rainfall Depths



**Legend**

- Isohyetal
- 0.1 inch interval
- 0.4 inch interval
- City Limits
- Roads



Data Source (for spatial variation):  
 PRISM Climate Group  
 Oregon State University  
<http://prism.oregonstate.edu>

**City of Santa Cruz**  
**95th Percentile 24-hour Rainfall Depths**  
**Source: Central Coast Regional Water Quality Control Board**

## ***Attachment C***

Storm water and Low-Impact Development BMP Requirement Worksheet

Central Coast SCM Sizing Calculator

# APPENDIX A

## STORM WATER AND LOW-IMPACT DEVELOPMENT BMP REQUIREMENT WORKSHEET

### How to Use This Worksheet

The City's Storm Water BMP requirements are based on project type, proposed impervious area, and location within the watershed. This worksheet was developed to help permit applicants determine and meet storm water BMP requirements applicable to a proposed development or redevelopment

- 1 - Download this fillable form online at [www.cityofsantacruz.com/LID](http://www.cityofsantacruz.com/LID)
- 2 - Fill out the Worksheet to determine what stormwater BMP requirements apply to a proposed project.
- 3 - Attach Worksheet and additional documentation required as listed in the City Storm Water Best Management Practices for Private and Public Development Projects to plans for review by the Department of Public Works
- 4 - Please contact the Public Works Environmental Project Analyst at 420-5160 if you have any questions on completing the worksheet.

**Project Address:** 150 Felker Street      **Bldg Permit #:**  

#### A - Project Type

Check project type that applies:

- Single Family Home       Multi-family, Commercial, Industrial, Public facilities

Check development type that applies:

- New Development       Redevelopment / Remodel

#### B - Proposed Development Area and Impervious Area:

Pre-project impervious surface area:	12416	sq ft
Post-project impervious surface area:	12200	sq ft
Amount of impervious surface area that will be <b>replaced</b> :	12200	sq ft
Amount of new impervious surface area that will be <b>created</b> :	0	sq ft
Reduced Impervious Area Credit:	216	sq ft

**New and Replaced Impervious Area =      12200      sq ft**

**Net Impervious Area =      11984      sq ft**

(Net Impervious Area = Impervious Area created + Impervious Area replaced - Reduced Impervious Area Credit)

#### C - Post-Construction BMP Tier requirement:

Check Project Type and Impervious Area (from calculations above) that applies.

**BMP requirements are cumulative** (e.g. a project subject to BMP Tier 3 is also subject to Tiers 1 and 2), permit review fees are not cumulative.

Projects requiring a Stormwater Control Plan will need to involve a civil engineer.

SINGLE-FAMILY HOMES	BMP TIER	Permit Review Fee	Stormwater Control Plan required?
<input type="checkbox"/> Single-family Home with Net Impervious Area < <b>15,000 sf</b> , please consult <b>Chapter 6A, BMPs for Single-Family Homes on Small Lots</b>	<b>N/A</b>	\$0	No
<input type="checkbox"/> Net Impervious Area ≥ <b>15,000 sf</b> ; New and replaced impervious area < <b>22,500 sf</b>	<b>3</b>	\$330	Yes
<input type="checkbox"/> New and replaced impervious area ≥ <b>22,500 sf</b>	<b>4</b>	\$550	Yes

MULTI-FAMILY, COMMERCIAL, INDUSTRIAL, PUBLIC FACILITIES	BMP TIER	Permit Review Fee	Stormwater Control Plan Required?
<input type="checkbox"/> New and Replaced Impervious Area ≥ <b>2,500 sf</b> ; Net Impervious Area < <b>5,000 sf</b>	<b>1</b>	\$0	No
<input checked="" type="checkbox"/> Net Impervious Area ≥ <b>5,000 sf</b> ; New and Replaced Impervious Area < <b>15,000 sf</b>	<b>2</b>	\$330	Yes
<input type="checkbox"/> New and Replaced Impervious Area ≥ <b>15,000 sf</b> but < <b>22,500 sf</b>	<b>3</b>	\$550	Yes
<input type="checkbox"/> New and replaced impervious area ≥ <b>22,500 sf</b>	<b>4</b>	\$550	Yes

**If the proposed project is only subject to BMP Tiers 1 or 2, skip to Step F.**

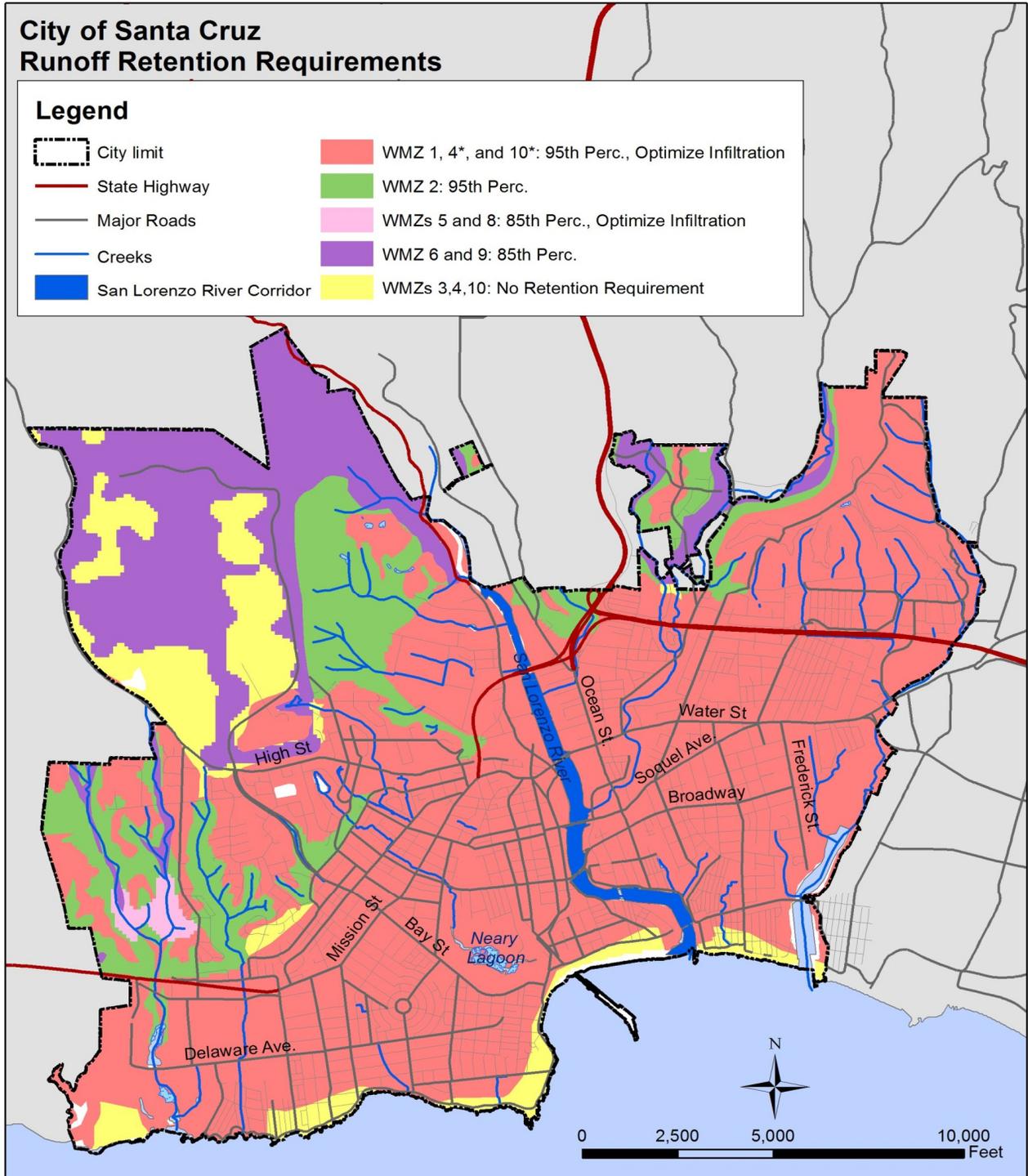
**D - Watershed Management Zones - For projects subject to Tiers 3 Post-Construction BMP requirements only.**

Watershed Management Zones are viewable online on the City of Santa Cruz GIS website at: <http://gis.cityofsantacruz.com/gis/index.html>

**Watershed Management Zones and associated Tier 3 (Runoff Retention) Post-Construction BMP requirements**

If Tier 3 BMP requirements are applicable to the project, check the watershed management zone area where the project is located.

- WMZ 1, and portions of 4, and 10 overlying groundwater basin
- WMZ 2
- WMZ 5 and 8
- WMZ 6 and 9
- WMZ 3, 4 and 10



**E - Special Circumstances - For projects subject to Tiers 3 and 4 Post-Construction BMP requirements only.**

Check if special circumstance applies to the project

- Highly Altered Channel and Intermediate Flow Control Facility  Urban Sustainability Area

**F - Additional Stormwater BMP Requirements for Multi-family, Commercial and Industrial projects**

Check if additional BMP requirements apply to the project

a) State Construction Activities Storm Water General Permit

- Construction activity resulting in land disturbance of one acre or more, or part of a larger common plan of development

b) Additional Source Control BMP requirements for specific facilities

- |  |  |
|--|--|
| <input type="checkbox"/> Commercial or industrial facility           | <input type="checkbox"/> Parking areas   |
| <input type="checkbox"/> Material Storage Areas                      | <input type="checkbox"/> Pools, spas and other water features                        |
| <input type="checkbox"/> Vehicle fueling, maintenance and wash areas | <input checked="" type="checkbox"/> Trash Storage Areas                              |
| <input type="checkbox"/> Equipment and accessory wash areas          | <input type="checkbox"/> Restaurants and food processing or manufacturing facilities |
| <input type="checkbox"/> Interior and parking garage floor drains    | <input type="checkbox"/> Miscellaneous drain or wash water                           |

**G - Complete if your project is only subject to Tier 1 Requirements - Site planning and LID design measures.**

LID design measures shall be clearly marked on site plans

**Check applicable boxes and provide short description of measure and location**

- Conserve natural areas, riparian areas and wetlands

Description: \_\_\_\_\_

- Concentrate improvements on the least-sensitive portions of the site and minimize grading

Description: \_\_\_\_\_

- Direct roof runoff into cisterns or rain barrels

Description: \_\_\_\_\_

- Direct roof downspouts to landscaped areas or rain gardens

Description: downspouts are disconnected and drain across landscaped areas prior to entering storm drain system

- Use pervious pavement (pervious concrete or asphalt, turf block, crushed aggregate, etc.)

Description: Access drives are proposed to be pervious pavers

- Disperse runoff from paved areas to adjacent pervious areas

Description: \_\_\_\_\_

# Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

## 1. Project Information

Project name:	Felker Street Apartments
Project location:	150 Felker Street, Santa Cruz
Tier 2/Tier 3:	Tier 2 - Treatment
Design rainfall depth (in):	2.0
<b>Total project area (ft<sup>2</sup>):</b>	17436
Total new impervious area (ft <sup>2</sup> ):	0
Total replaced impervious in a USA (ft <sup>2</sup> ):	0
Total replaced impervious not in a USA (ft <sup>2</sup> ):	12200
Total pervious/landscape area (ft <sup>2</sup> ):	5236

## 2. DMA Characterization

Name	DMA Type	Area (ft <sup>2</sup> )	Surface Type	New, Replaced?	Connection
A.1	Drains to SCM	2570	Roof	Replaced	SCM 1
A.2	Drains to SCM	263	Landscape	Replaced	SCM 1
B.1	Drains to SCM	3161	Roof	Replaced	SCM 2
B.2	Drains to SCM	160	Landscape	Replaced	SCM 2
C.1	Drains to SCM	2985	Roof	Replaced	SCM 3
C.2	Drains to SCM	320	Landscape	Replaced	SCM 3
D.1	Drains to SCM	2833	Roof	Replaced	SCM 4
D.2	Drains to SCM	331	Landscape	Replaced	SCM 4
E.1	Self-Retaining	312			
E.2	Self-Retaining	1762			
F.1	Self-Treating	552			
G.1	Self-Retaining	179			
G.2	Self-Retaining	235			
H.1	Self-Treating	537			
H.2	Self-Treating	414			
I.1	Self-Retaining	160			
I.2	Self-Retaining	662			

### DMA Summary Area

Total project impervious area (ft <sup>2</sup> ):	11549
New impervious area (ft <sup>2</sup> ):	0
Replaced impervious within a USA (ft <sup>2</sup> ):	0
Replaced impervious not in a USA (ft <sup>2</sup> ):	11549
Total pervious/landscape area (ft <sup>2</sup> ):	1074

## 3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft <sup>2</sup> )
SCM 1	Bioretention	1	Site-Specific	0.03	150
SCM 2	Bioretention	1	Site-Specific	0.03	150
SCM 3	Bioretention	1	Site-Specific	0.03	158
SCM 4	Bioretention	1	Site-Specific	0.03	150

## 4. Run SBUH Model

## 5. SCM Minimum Sizing Requirements

SCM Name	Minimum SCM Area (ft <sup>2</sup> )		
SCM 1	104		
SCM 2	127		
SCM 3	121		
SCM 4	115		

6. Self-Retaining Area Sizing Checks				
Self-Retaining DMA Name	Self-Retaining DMA Area (ft <sup>2</sup> )	Tributary DMA Name	Tributary DMA Area (ft <sup>2</sup> )	Tributary / SRA Area Ratio
E.1	312		0	0.00
E.2	1762		0	0.00
G.1	179		0	0.00
G.2	235		0	0.00
I.1	160		0	0.00
I.2	662		0	0.00

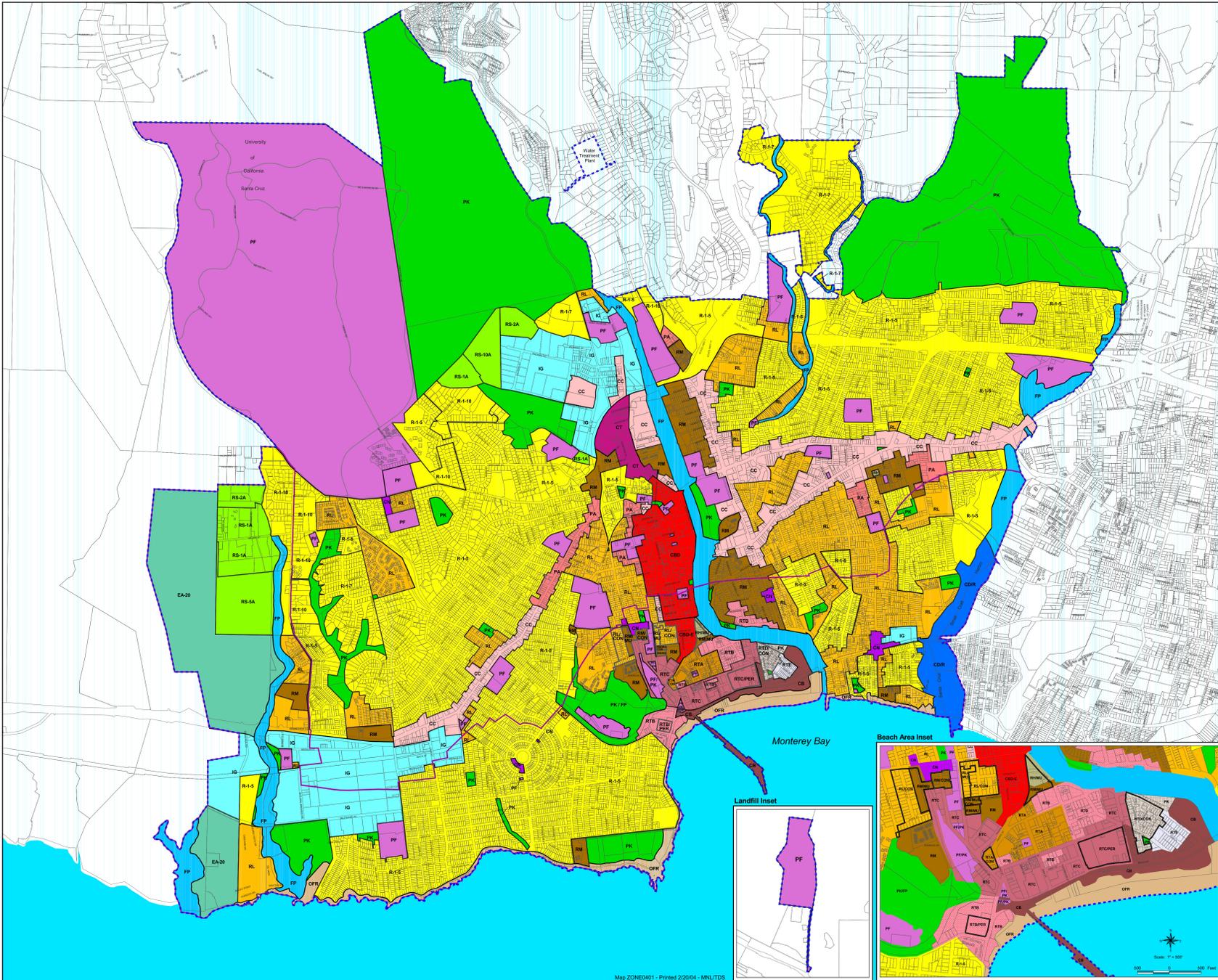
## **Attachment D**

*City of Santa Cruz Zoning Map*

*95<sup>th</sup> Percentile 24-hour Rainfall Depths Map*

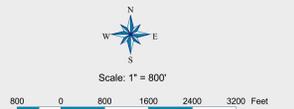
# City of Santa Cruz Zoning Districts Map

City of Santa Cruz  
 Planning Department  
 830 Center St., Room 208  
 Santa Cruz, CA 95060  
 PH: 425-5150



## Legend

- Santa Cruz City Limit
- ▭ Parcels
- Zoning Districts:**
  - ▭ CB - Beach Commercial
  - ▭ CBD - Central Business District
  - ▭ CBD-E - Subdistrict Lower Pacific Ave.
  - ▭ CC - Community Commercial
  - ▭ CD/R - Coastal Dependent Related
  - ▭ CN - Neighborhood Commercial
  - ▭ CT - Thoroughfare Commercial
  - ▭ EA-20 - Exclusive Agriculture
  - ▭ FP - Flood Plain
  - ▭ IG - General Industrial
  - ▭ OFR - Ocean Front Recreational
  - ▭ PA - Professional and Administration
  - ▭ PF - Public Facilities
  - ▭ PK - Parks
  - ▭ R-1 - Single Family Residence
  - ▭ RL - Multiple Residence Low Rise
  - ▭ RM - Multiple Residence Medium Rise
  - ▭ RH - High Density Residential
  - ▭ RS - Residential Suburban
  - ▭ RTA - Beach / Medium Density Residential
  - ▭ RTB - Motel Residential
  - ▭ RTC - Beach Commercial
  - ▭ RTD - Beach Residential
  - ▭ RTE - Beach High Density Residential
- Overlay Zones:**
  - ▭ CON - Conservation Overlay
  - ▭ MU - Mixed Use Overlay
  - ▭ PER - Performance Overlay
  - Coastal Zone Overlay Boundary



### Location Map

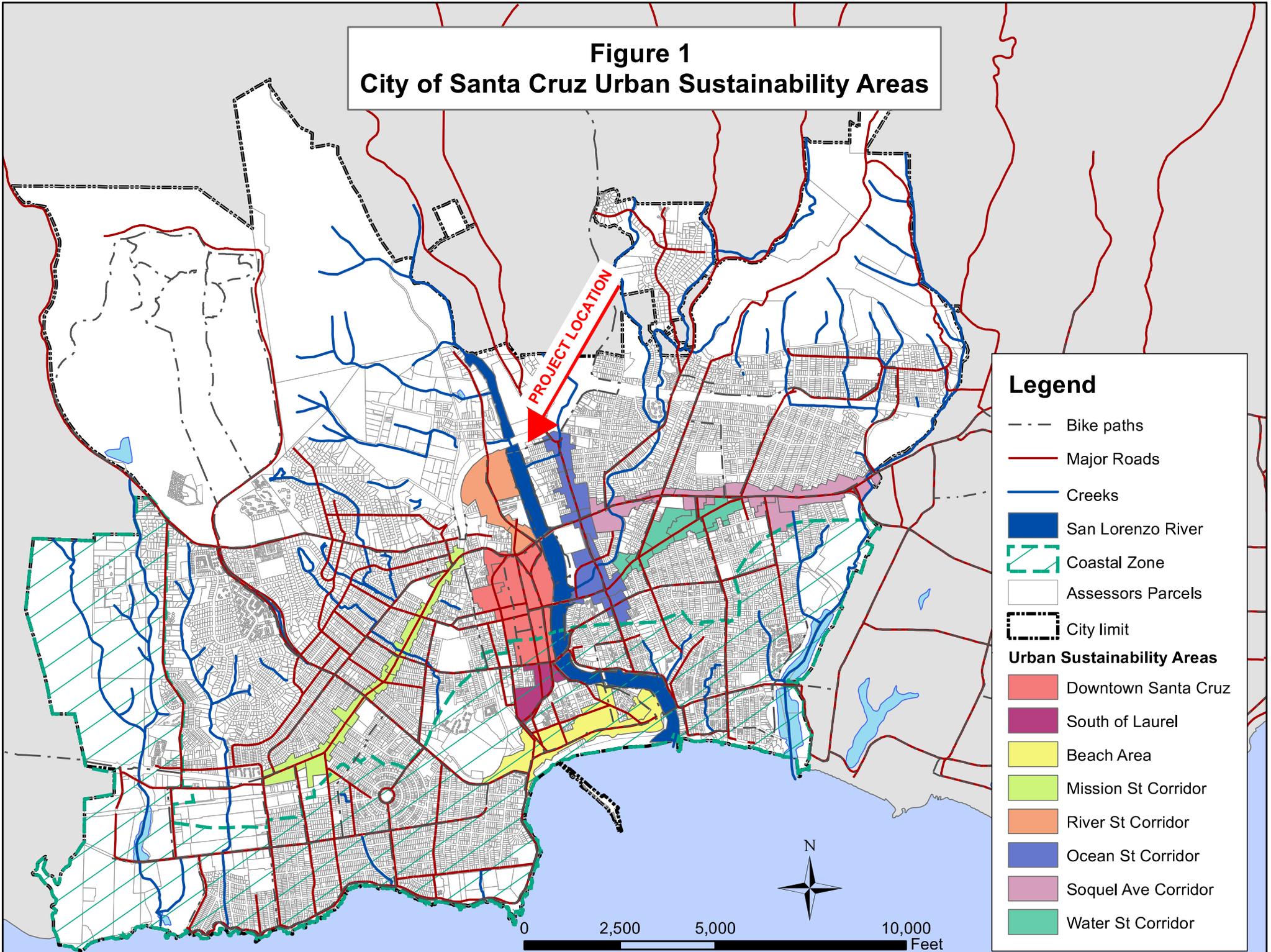


Prepared for the City of Santa Cruz by TriAxial Data Systems  
 36 Brennan Street - Watsonville, CA 95076 - Phone (831) 763-3697 - Fax (831) 763-3699  
 This is a graphic representation only of data provided by the City of Santa Cruz and the County of Santa Cruz.  
 The author assumes no responsibility nor liability for errors or omissions.

## **Attachment E**

*City of Santa Cruz Urban Sustainability Area Map*

**Figure 1**  
**City of Santa Cruz Urban Sustainability Areas**

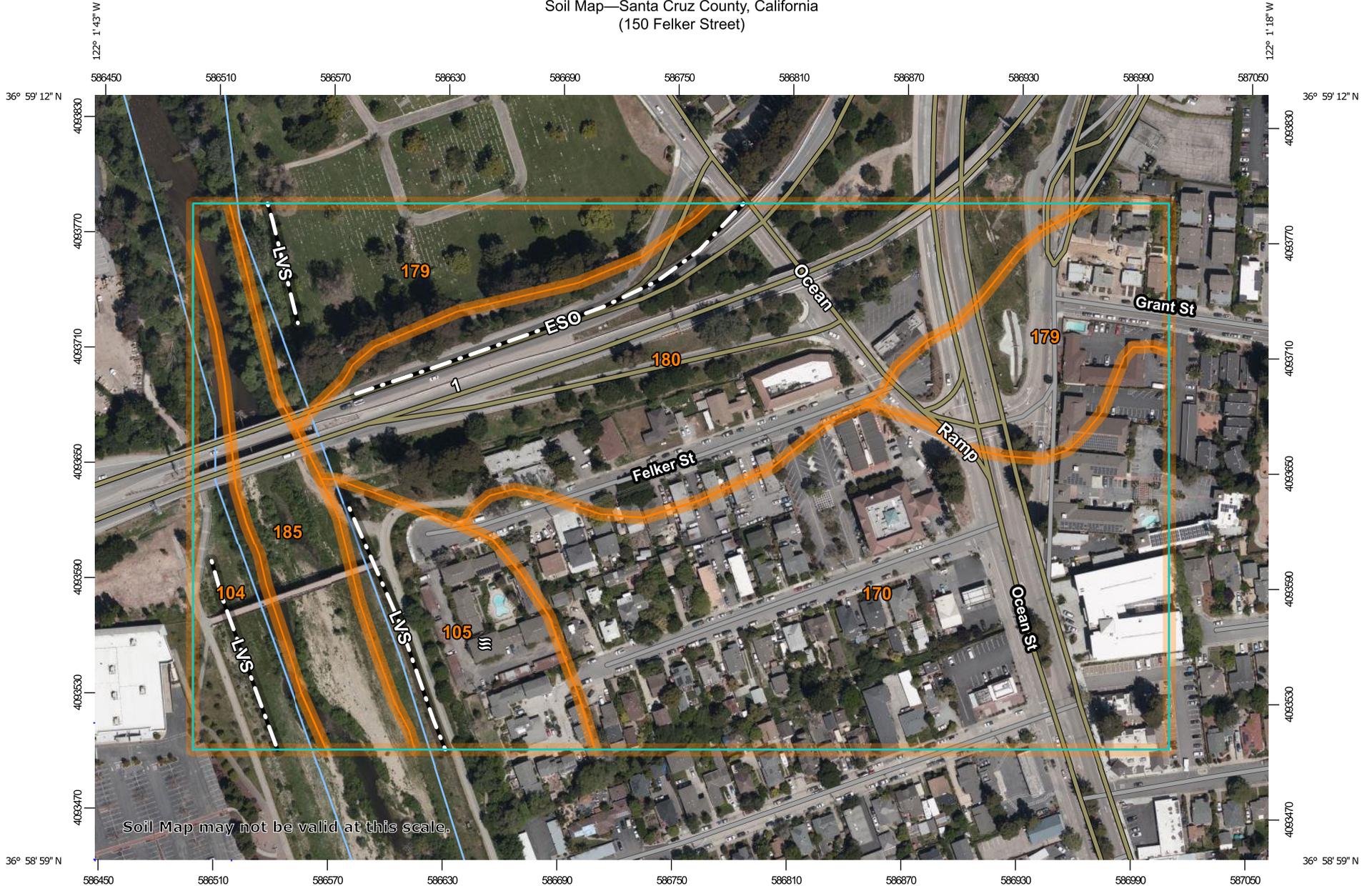


**Attachment F**

*Site Soils Data  
-Soils Map*

**Attachment G**

Soil Map—Santa Cruz County, California  
(150 Felker Street)



Soil Map may not be valid at this scale.

Map Scale: 1:2,810 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

## Santa Cruz County, California

### 180—Watsonville loam, thick surface, 15 to 30 percent slope

s

#### Map Unit Setting

*National map unit symbol:* h9g8

*Elevation:* 20 to 1,200 feet

*Mean annual precipitation:* 28 inches

*Mean annual air temperature:* 57 degrees F

*Frost-free period:* 245 to 275 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Watsonville and similar soils:* 85 percent

*Minor components:* 12 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Watsonville

##### Setting

*Landform:* Marine terraces

*Landform position (two-dimensional):* Toeslope

*Landform position (three-dimensional):* Tread

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Alluvium

##### Typical profile

*H1 - 0 to 18 inches:* loam

*H2 - 18 to 39 inches:* clay

*H3 - 39 to 63 inches:* sandy clay loam

##### Properties and qualities

*Slope:* 15 to 30 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Somewhat poorly drained

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water supply, 0 to 60 inches:* Very low (about 2.9 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 4e

*Land capability classification (nonirrigated):* 4e

*Hydrologic Soil Group:* D

*Ecological site:* R014XD089CA - CLAYPAN

*Hydric soil rating:* Yes

### **Minor Components**

#### **Tierra, sandy loam**

*Percent of map unit:* 4 percent

*Hydric soil rating:* No

#### **Watsonville, loam**

*Percent of map unit:* 3 percent

*Landform:* Marine terraces

*Landform position (two-dimensional):* Toeslope

*Landform position (three-dimensional):* Tread

*Hydric soil rating:* Yes

#### **Bonnydoon, loam**

*Percent of map unit:* 2 percent

*Hydric soil rating:* No

#### **Los osos, loam**

*Percent of map unit:* 1 percent

*Hydric soil rating:* No

#### **Elkhorn**

*Percent of map unit:* 1 percent

*Hydric soil rating:* No

#### **Fagan, loam**

*Percent of map unit:* 1 percent

*Hydric soil rating:* No

## **Data Source Information**

Soil Survey Area: Santa Cruz County, California

Survey Area Data: Version 15, Sep 9, 2021

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Cruz County, California

Survey Area Data: Version 15, Sep 9, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 13, 2020—Apr 24, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
104	Baywood loamy sand, 0 to 2 percent slopes	1.9	5.4%
105	Baywood loamy sand, 2 to 15 percent slopes	2.9	8.0%
170	Soquel loam, 0 to 2 percent slopes	12.7	35.1%
179	Watsonville loam, thick surface, 2 to 15 percent slopes	6.5	17.9%
180	Watsonville loam, thick surface, 15 to 30 percent slopes	9.5	26.3%
185	Water	2.6	7.3%
<b>Totals for Area of Interest</b>		<b>36.0</b>	<b>100.0%</b>

## **Attachment G**

*Operations and Maintenance Agreement*

# Attachment G

## Maintenance Agreement Regarding Maintenance of Structural or Treatment Control Best Management Practices (BMPs)

for: Address 150 Felker Street

APN# 008-181-23

I, \_\_\_\_\_, being the owner of the real property, APN 008-181-23, which is located at 150 Felker Street, Santa Cruz, California, consent and agree to inspect and maintain any and all structural or treatment control Best Management Practices (BMPs) a minimum of once per year prior to October 1 on the subject property. The structural or treatment control BMPs on the subject property include(s):

\_\_\_\_\_  
Pervious Pavers and Flow-Through Planters

**I agree to send a letter that provides proof of inspection and maintenance to the City of Santa Cruz Department of Public Works prior to December 1 of each year.** Proof of inspection and maintenance shall include a log of inspection and maintenance dates for the past year, and receipts if conducted by a hired service. The log should also indicate any significant observations or repairs made. The proof of inspection and maintenance should be sent to: Environmental Projects Analyst, Department of Public Works, City of Santa Cruz, 809 Center Street, Room 201, Santa Cruz, CA 95060.

In the event that the property is sold, transferred, or leased, the obligations hereby imposed on the property owner shall be assumed by subsequent property owners and lessees. To this end, property owner, in any deed transferring an ownership interest in the property or in any lease agreement for the property, shall include a term by which the subsequent property owner or lessee acknowledges his or her understanding of the obligations imposed by this agreement and expressly agrees to accept and assume responsibility for complying with all said obligations imposed by this agreement.

In addition, I will provide printed information to the new property owner or lessee regarding proper BMP inspection and maintenance frequency and methods. The information shall accompany the first deed transfer. This information shall include the following:

- (1) a description of any and all storm water structural or treatment control BMPs;
- (2) a map of the property indicating the BMP locations; and
- (3) a description of how inspections and necessary maintenance can be performed.

The transfer of this information shall also be required with any subsequent sale of the property.

Failure to comply with the provisions of this Maintenance Agreement may result in enforcement actions including assessment of civil penalties as allowed by the City's Municipal Code, Chapter 16.19.190 Administrative Remedies.

I have read the above agreement and understand it.

Owner Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

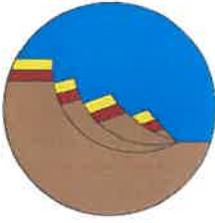
Owner Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

**Attachment H**

*Letter from project Geotechnical Engineer*



# CMAG ENGINEERING, INC.

P.O. BOX 640, APTOS, CALIFORNIA 95001

PHONE: 831.475.1411

WWW.CMAGENGINEERING.COM

May 13, 2022  
Project No. 21-116-SC

AEST Realty  
4100 Moorpark Avenue, Suite 205  
San Jose, California 95117

ATTN: Arthur Lin

**SUBJECT: ON-SITE INFILTRATION**  
Proposed Apartment Building  
150 Felker Street, Santa Cruz, Santa Cruz County, California  
APN 008-181-23

**REFERENCES:** See the Attached List of References.

Dear Mr. Lin:

Per the request of your Architect, regarding the referenced review comments letter for the project from the City of Santa Cruz, we offer our opinion, from the geotechnical aspect, as to the feasibility of using shallow SCM's at the subject site.

Based on the referenced Geotechnical Investigation report and our experience in the area, it is our opinion that the effectiveness of any proposed shallow SCM's at the subject site which require infiltration into the near-surface soils will be low for the following reasons:

- The near-surface soils are consistent with the "Watsonville Loam, 15-30 percent slope" classification depicted in the Soil Survey of Santa Cruz County, California, 1980. This classification is depicted as having a very low permeability (<0.06 in/hr from 26 to 41 inches below grade). Our investigation encountered fine grained soils consisting of sandy silt to sandy lean clay within the upper 10 feet.
- Based on the poor engineering qualities of the near-surface soils we have recommended a mechanically stabilized engineered fill pad beneath the proposed apartment building which encompasses most of the subject property. The recommended fill pad, which extends 5 feet beyond the proposed structure, will consist of imported material compacted to a minimum of 90 percent relative compaction. The engineered fill pad is considered to be relatively impermeable.
- Based on our experience in the area, the groundwater elevation can be at or near the ground surface during the rainy season. Proposed shallow SCM's will have little

effectiveness during high groundwater conditions.

It is a pleasure being associated with you on this project. If you have any questions, or if we may be of further assistance please do not hesitate to contact our office.

Sincerely,

**CMAG ENGINEERING, INC.**



Shannon Chome', PE  
Senior Engineer  
C 68398  
Expires 9/30/23



Adrian L. Garner, PE, GE  
Principal Engineer  
C 66087, GE 2814  
Expires 6/30/22

Distribution:      Client (Electronic Copy)  
                         Scott Brereton (Electronic Copy)  
                         Dave Dauphin (Electronic Copy)

### **REFERENCES**

City of Santa Cruz (April 18, 2022). *RE: 150 Felker St. CP21-0137, APN 008-181-23.*

CMAG Engineering, Inc. (September 13, 2021). *Geotechnical Investigation, Proposed Apartment Building, 150 Felker Street, Santa Cruz, Santa Cruz County, California, APN 008-181-23.* Project No. 21-116-SC.

C2G Civil Consultants Group (November 5, 2021). *Site Improvement Plans, 150 Felker Street, Santa Cruz, California, 95060.* Job: 2013.01. Sheets C0.1, C1.1, C2.1, C3.1, C3.2, C4.1, C4.2, C5.1 - C5.3.

William C. Kempf Architects (March 10, 2022). *New Apartment Building for 150 Felker Street, Santa Cruz, California, APN 008-181-23.* Client Name: Arthur Lin. Project Name: Felker Street. Sheets A-1.1, A-1.2, A-2.1, A-3.1 - A-3.6, A-4.1, A-5.1, A-5.2, A-6.1, A-6.2.

# Earthquake Zones of Required Investigation



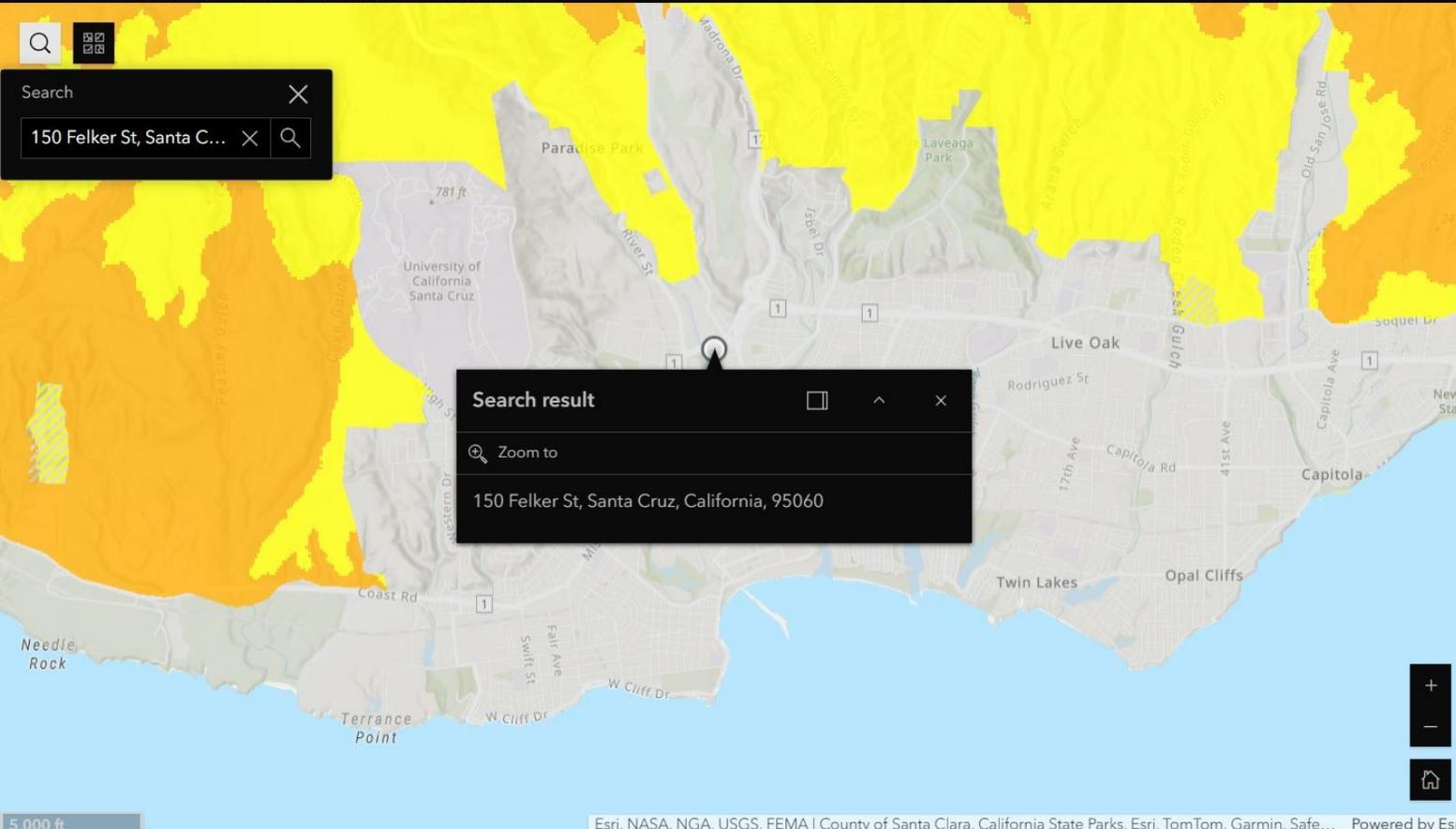


# Fire Hazard Severity Zone Viewer

FHSZ in State Responsibility Area effective April 1, 2024

FHSZ in reclassified LRA, adopted as SRA 2007

FHSZ in Local Responsibility Area as recommended 2007-2011



## About this Map

This map displays adopted Fire Hazard Severity Zones (FHSZ) in the State Responsibility Area (SRA), effective April 1st 2024. It also displays recommended FHSZ in the Local Responsibility Area (LRA) from 2007-2011.

Due to regulatory processes, there are lands that are no longer classified as SRA and have become classified as LRA yet had a FHSZ designation from the 2007 SRA FHSZ map adoption. These areas are shown on the map with hatched symbology.

To verify your Fire Hazard Severity Zone in LRA, please contact your local agency.

Legend	Map Layers
<b>Fire Hazard Severity Zones</b>	
<b>FHSZ in SRA - Effective April 1, 2024</b>	
	Very High
	High
	Moderate
<b>FHSZ in LRA - Reclassified from SRA</b>	
	Very High
	High
	Moderate

# CGS Seismic Hazards Program: Liquefaction Zones

✓ Authoritative  
Private Member  
California Department of Conservation

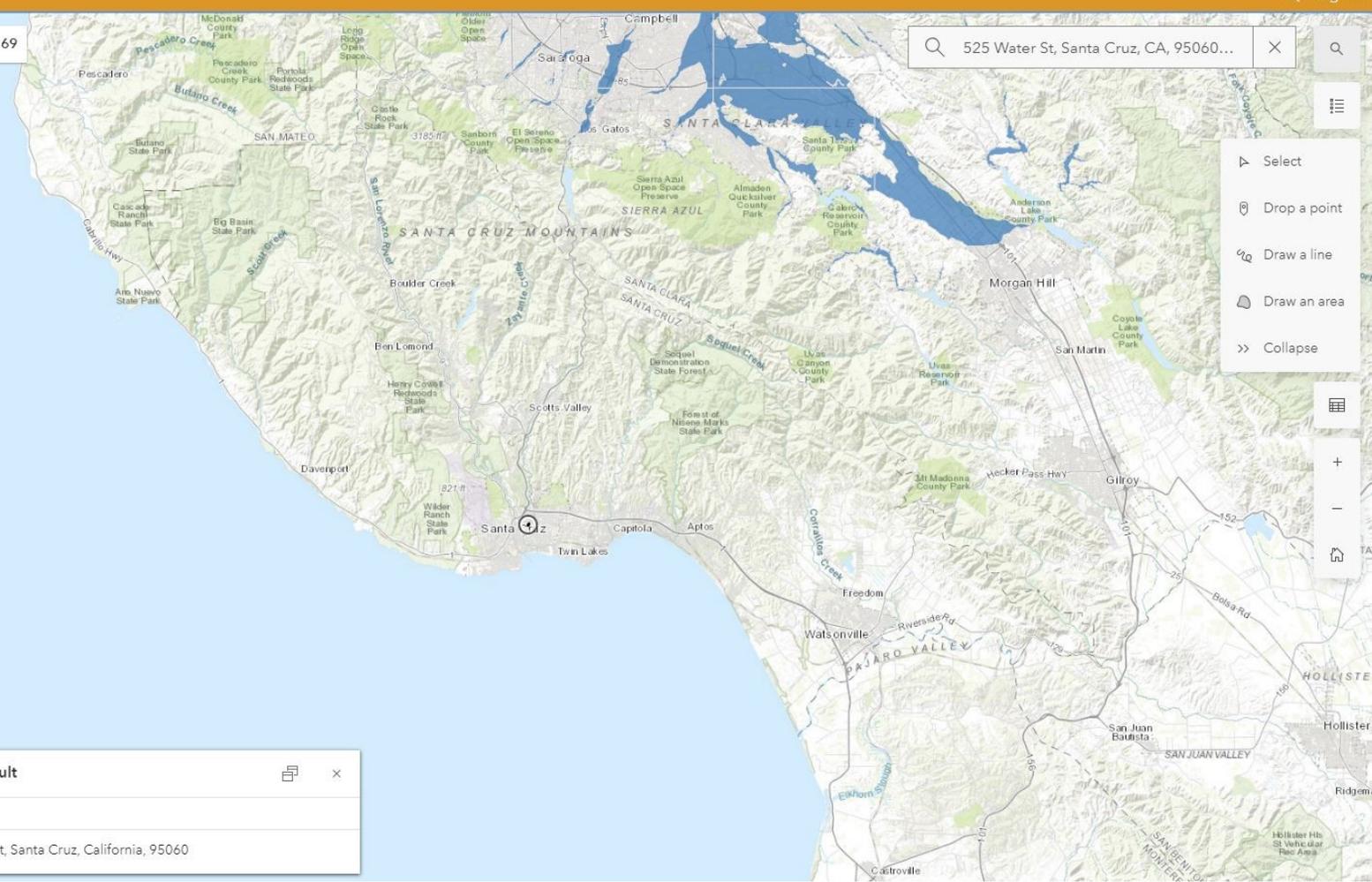
### Summary

MapService for Liquefaction Zones defined under the Seismic Hazards Mapping Act of 1990

[View Full Details](#)  
[Download](#)

- ### Details
- Dataset**  
Feature Layer
  - December 18, 2019**  
Info Updated
  - February 11, 2022**  
Data Updated
  - October 11, 2017**  
Published Date
  - Records: 1,769**  
[View data table](#)
  - Public**  
Anyone can see this content
  - Custom License**  
[View license details](#)

Records: 1,769



**Search result**

Zoom to

525 Water St, Santa Cruz, California, 95060

- Select
- Drop a point
- Draw a line
- Draw an area
- Collapse

# Tsunami Hazard Area Map



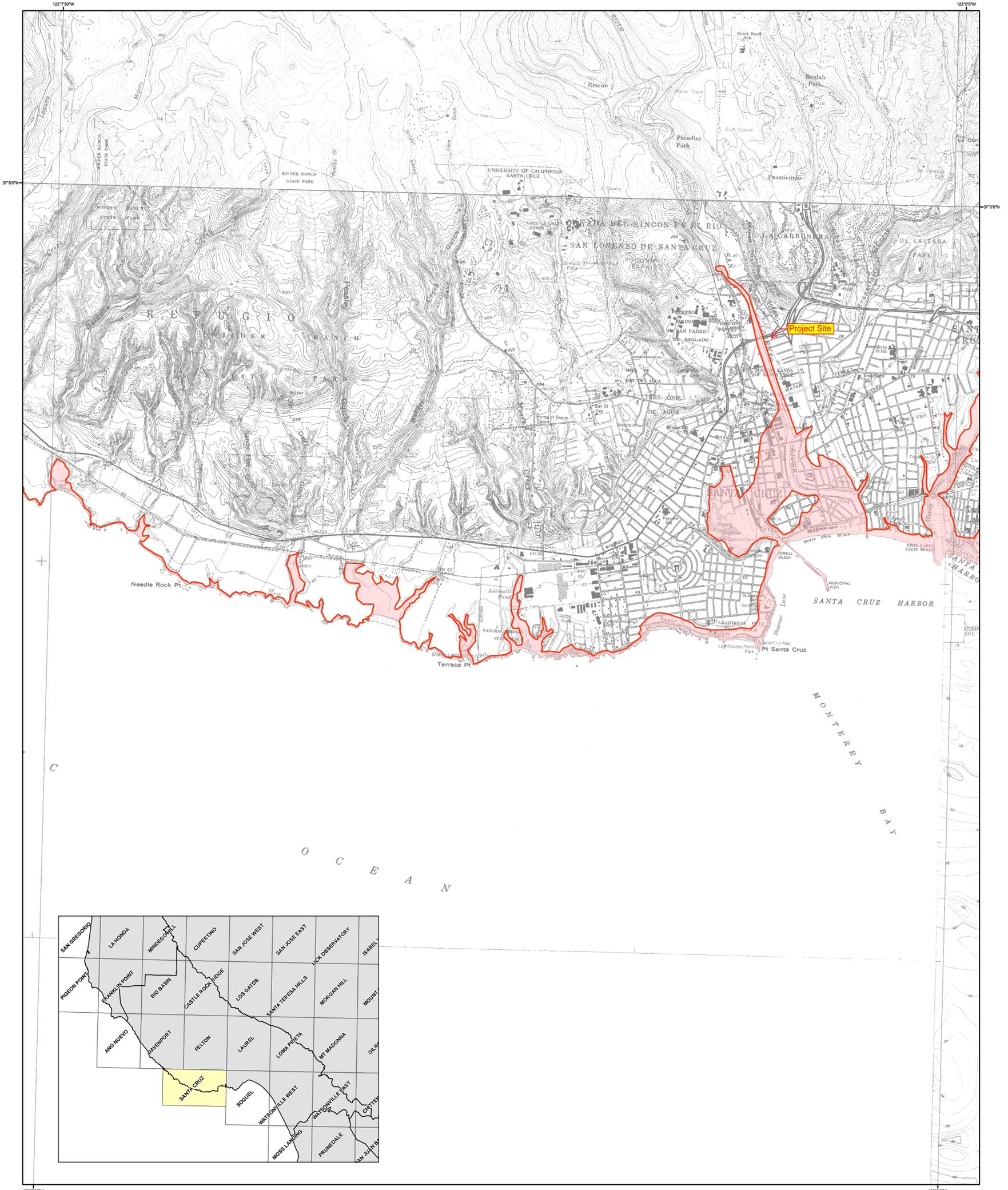
## Information

The Tsunami Hazard Area (shaded yellow on map) was prepared to assist cities and counties in identifying their tsunami hazard for tsunami response planning. The hazard area represents the maximum considered tsunami runoff from several extreme, infrequent, and realistic tsunami sources. These data are intended for local jurisdictional, coastal emergency planning uses only.

This map, and these data and the information presented herein, is not a legal document and does not meet disclosure requirements for real estate transactions nor for any other regulatory purpose. Tsunamis are rare events; due to a lack of known occurrences in the historical record, this map and these data include no information about the likelihood of any tsunami affecting any area within a specific time period.

The Tsunami Hazard Area Map was compiled with the best currently available scientific information and represents an area that could be exposed to tsunami hazards during a tsunami event. It is primarily based on inundation limits corresponding to a 975-year





## METHOD OF PREPARATION

Initial tsunami modeling was performed by the University of Southern California (USC) Tsunami Research Center funded through the California Emergency Management Agency (CalEMA) by the National Tsunami Hazard Mitigation Program. The tsunami modeling process utilized the MOST (Method of Splitting Tsunamis) computational program (Version 0), which allows for wave evolution over a variable bathymetry and topography used for the inundation mapping (Titov and Gonzalez, 1997; Titov and Synolakis, 1998).

The bathymetric/topographic data that were used in the tsunami models consist of a series of nested grids. Near-shore grids with a 3 arc-second (75- to 90-meters) resolution or higher, were adjusted to "Mean High Water" sea-level conditions, representing a conservative sea level for the intended use of the tsunami modeling and mapping.

A suite of tsunami source events was selected for modeling, representing realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides (Table 1). Local tsunami sources that were considered include offshore reverse-thrust faults, restraining bends on strike-slip fault zones and large submarine landslides capable of significant seafloor displacement and tsunami generation. Distant tsunami sources that were considered include great subduction zone events that are known to have occurred historically (1960 Chile and 1964 Alaska earthquakes) and others which can occur around the Pacific Ocean "Ring of Fire."

In order to enhance the result from the 75- to 90-meter inundation grid data, a method was developed utilizing higher-resolution digital topographic data (3- to 10-meters resolution) that better defines the location of the maximum inundation line (U.S. Geological Survey, 1993; Intermap, 2003; NOAA, 2004). The location of the enhanced inundation line was determined by using digital imagery and terrain data on a GIS platform with consideration given to historic inundation information (Lander, et al., 1993). This information was verified, where possible, by field work coordinated with local county personnel.

The accuracy of the inundation line shown on these maps is subject to limitations in the accuracy and completeness of available terrain and tsunami source information, and the current understanding of tsunami generation and propagation phenomena as expressed in the models. Thus, although an attempt has been made to identify a credible upper bound to inundation at any location along the coastline, it remains possible that actual inundation could be greater in a major tsunami event.

This map does not represent inundation from a single scenario event. It was created by combining inundation results for an ensemble of source events affecting a given region (Table 1). For this reason, all of the inundation region in a particular area will not likely be inundated during a single tsunami event.

### References:

Intermap Technologies, Inc., 2003, Intermap product handbook and quick start guide: Intermap NEXTmap document on 5-meter resolution data, 112 p.

Lander, J.F., Lockridge, P.A., and Kozuch, M.J., 1993, Tsunamis Affecting the West Coast of the United States 1806-1992: National Geophysical Data Center Key to Geophysical Record Documentation No. 29, NOAA, NESDIS, NGDC, 242 p.

National Atmospheric and Oceanic Administration (NOAA), 2004, Interferometric Synthetic Aperture Radar (IFSAR) Digital Elevation Models from GeoSAR platform (EarthData): 3-meter resolution data.

Titov, V.V., and Gonzalez, F.I., 1997, Implementation and Testing of the Method of Tsunami Splitting (MOST): NOAA Technical Memorandum ERL PMEL - 112, 11 p.

Titov, V.V., and Synolakis, C.E., 1998, Numerical modeling of tidal wave runup: Journal of Waterways, Port, Coastal and Ocean Engineering, ASCE, 124 (4), pp 157-171.

U.S. Geological Survey, 1993, Digital Elevation Models: National Mapping Program, Technical Instructions, Data Users Guide 5, 49 p.

## TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING

### State of California ~ County of Santa Cruz SANTA CRUZ QUADRANGLE

July 1, 2009

SCALE 1:24,000

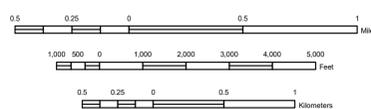


Table 1: Tsunami sources modeled for the Santa Cruz County coastline.

Sources (M = moment magnitude used in modeled event)	Areas of Inundation Map Coverage and Sources Used		
	Pescadero	Santa Cruz	Monterey Bay Big
Local Source			
Monterey Canyon Landslide		X	X
Cascadia Subduction Zone-full rupture (M9.0)		X	X
Central Aleutians Subduction Zone #1 (M8.9)	X	X	X
Central Aleutians Subduction Zone #2 (M8.9)		X	X
Central Aleutians Subduction Zone #3 (M9.2)	X		X
Distant Sources			
Chile North Subduction Zone (M9.4)		X	
1960 Chile Earthquake (M9.3)		X	
1964 Alaska Earthquake (M9.2)	X		X
Japan Subduction Zone #2 (M8.8)		X	
Kuril Islands Subduction Zone #2 (M8.8)		X	
Kuril Islands Subduction Zone #3 (M8.8)		X	
Kuril Islands Subduction Zone #4 (M8.8)		X	
Marianas Subduction Zone (M8.6)	X		X

## MAP EXPLANATION

- Tsunami Inundation Line
- Tsunami Inundation Area

## PURPOSE OF THIS MAP

This tsunami inundation map was prepared to assist cities and counties in identifying their tsunami hazard. It is intended for local jurisdictional, coastal evacuation planning uses only. This map, and the information presented herein, is not a legal document and does not meet disclosure requirements for real estate transactions nor for any other regulatory purpose.

The inundation map has been compiled with best currently available scientific information. The inundation line represents the maximum considered tsunami runup from a number of extreme, yet realistic, tsunami sources. Tsunamis are rare events; due to a lack of known occurrences in the historical record, this map includes no information about the probability of any tsunami affecting any area within a specific period of time.

Please refer to the following websites for additional information on the construction and/or intended use of the tsunami inundation map:

State of California Emergency Management Agency, Earthquake and Tsunami Program:  
<http://www.oes.ca.gov/WebPage/oeswebsite.nsf/Content/B1EC51BA21593176882574F005E8D80?OpenDocument>

University of Southern California - Tsunami Research Center:  
<http://www.usc.edu/dept/tsunami/2005/index.php>

State of California Geological Survey Tsunami Information:  
[http://www.conservation.ca.gov/cgs/geologic\\_hazards/tsunami/index.htm](http://www.conservation.ca.gov/cgs/geologic_hazards/tsunami/index.htm)

National Oceanic and Atmospheric Agency Center for Tsunami Research (MOST model):  
<http://nctr.pmel.noaa.gov/time/background/models.html>

## MAP BASE

Topographic base maps prepared by U.S. Geological Survey as part of the 7.5-minute Quadrangle Map Series (originally 1:24,000 scale). Tsunami inundation line boundaries may reflect updated digital orthophotographic and topographic data that can differ significantly from contours shown on the base map.

## DISCLAIMER

The California Emergency Management Agency (CalEMA), the University of Southern California (USC), and the California Geological Survey (CGS) make no representation or warranties regarding the accuracy of this inundation map nor the data from which the map was derived. Neither the State of California nor USC shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account of or arising from the use of this map.



