F I N A L

PALEONTOLOGICAL IDENTIFICATION REPORT

US 101 EXPRESS LANES PROJECT, SANTA CLARA COUNTY, CALIFORNIA

EA 04-2G7100
04-SCL-101 PM 16.0–52.55
04-SCL-85 PM 23.0–24.1

Prepared for

State of California
Department of Transportation
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and

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TABLE OF CONTENTS

Figures

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This Paleontological Identification Report (PIR) has been prepared to support the United States Highway 101 (US 101) Express Lanes Project in Santa Clara County, California (EA 04-2G7100). The California Department of Transportation (Caltrans) is the lead agency under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The project is proposed in cooperation with the Santa Clara Valley Transportation Authority (VTA).

This PIR was prepared in accordance with the Caltrans Standard Environmental Reference (SER), Volume 1, Chapter 8, *Paleontology* (Caltrans 2012). The PIR serves as an initial screening to assess whether project-related ground disturbance would take place in geologic units that have a high potential to contain sensitive paleontological resources.

PIR preparation included reviews of literature and maps to identify geologic units in the project area, the potential for those geologic units to contain fossils, and the types of fossils that may be in or adjacent to the project area.

1.1 PROJECT SUMMARY

The project proposes to convert the existing High-Occupancy Vehicle (HOV) lanes along US 101 to High-Occupancy Toll (HOT) lanes (hereafter known as express lanes) and add a second express lane in each direction on northbound and southbound US 101 within the overall project limits of East Dunne Avenue interchange in Morgan Hill to just north of the Oregon Expressway/Embarcadero Road interchange in Palo Alto. The project will also convert the US 101/State Route (SR) 85 HOV direct connectors in Mountain View to express lane connectors and restripe the northern 1.1 mile of SR 85 to introduce a buffer separating the mixed flow lanes from the express lane and connecting the SR 85 express lanes to the US 101 express lanes. The project length is 36.55 miles on US 101 and 1.1 miles on SR 85, for a total of 37.65 miles.

The addition of the second express lane will involve a combination of inside and outside widening. The majority of the inside widening will occur within the US 101 segments south of the SR 85/US 101 interchange in southern Santa Clara County where a wide unpaved median exists. The project proposes to widen and pave the median to accommodate the additional lanes. The outside widening will occur in the remainder of the corridor to accommodate the additional lanes where needed.

Bridge widening will be required at a number of grade separations and undercrossings, as well as modifications to existing overcrossing abutments. Bridge widening over creeks is not included as part of this project.

Project construction would include the following ground-disturbing activities:

- Overhead signs and tolling devices would be installed in the median throughout the project corridor. The signs and tolling devices would be mounted on cantilever structures supported on piles. The piles for the overhead signs would be up to 6 feet in diameter and extend to approximately 30 feet below ground surface. The piles for the tolling devices would be up to 2.5 feet in diameter and would extend to approximately 10 feet below ground surface.

- Bridge footings would require excavations of 5 to 6 feet. Bridge piles would require excavations of 7 to 8 feet followed by deep-driven piles. Bridge abutments would require drilling or driving piles up to 50 feet with a diameter of 1 to 2 feet.

- Trenching would be conducted along the outside edge of pavement for installation of conduits. The depth of trenching would be 3 to 5 feet below the roadway surface. Conduits would be jacked across the freeway to the median where needed to provide power and communication feeds to the new overhead signage and tolling equipment.

- Traffic Operations Systems (TOS) equipment such as traffic monitoring stations, Closed Circuit Televisions, cabinets, and controllers would be installed along the outside edge of pavement within the existing right-of-way.

1.2 RESOURCE SETTING

The project alignment follows the western margin of the Santa Clara Valley within the San Francisco Bay block, in the central portion of the Coast Ranges geomorphic province of California. Geologically, the project area is underlain by alluvial and fluvial deposits consisting of clay, silt, sand and gravel deposited by Coyote Creek, San Tomas Aquino Creek, Calabazas Creek, and Guadalupe River (URS 2012). These deposits range in age from Holocene Alluvium and Pleistocene Older Alluvium to the Pliocene–Pleistocene Santa Clara Formation. These alluvial deposits are largely derived from the Jurassic or Cretaceous Franciscan Complex mélange, which is the basement formation of the San Francisco Bay block and the principle bedrock unit exposed in the nearby Santa Cruz Mountains (Dibblee 1973a; URS 2012).

1.3 PALEONTOLOGICAL RESOURCES

Paleontological resources are the fossilized remains of plants and animals and associated deposits. Marine sediments may contain invertebrate fossils such as snail, clam and oyster shells, sponges, and protozoa; and vertebrate fossils such as fish, whale, and sea lion bones. Vertebrate land animal fossils may include bones of ground sloth, camel, bison, mammoth, horse, rodent, bird, reptile, and amphibian. Paleontological resources also include such trace fossils as plant imprints, petrified wood, and animal tracks.

2.1 REGULATORY CONTEXT

A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized or funded projects, including the Antiquities Act of 1906 (16 United States Code [USC] 431-433), the Federal-Aid Highway Act of 1960 (23 USC 305), and the Paleontological Resources Preservation Act (Omnibus Public Land Management Act of 2009, Title VI, Subtitle D on Paleontological Resources Preservation [123 Stat. 1172; 16 USC 470aaa]). This project may involve federal funding.

California Public Resources Code Section 5097.5 prohibits excavation or removal of any "vertebrate paleontological site…or any other archaeological, paleontological or historical feature, situated on public lands, except with express permission of the public agency having jurisdiction over such lands." Public lands are defined to include lands owned by or under the jurisdiction of the state or any city, county, district, authority or public corporation, or any agency thereof. Section 5097.5 states that any unauthorized disturbance or removal of archaeological, historical, or paleontological materials or sites located on public lands is a misdemeanor.

CEQA Chapter 1, Section 21002 states " It is the policy of the state that public agencies should not approve projects as proposed is there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required are intended to assist public agencies in systematically identifying both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects."

CEQA Guidelines, Article 1, Section 15002(a)(3) states that CEQA is intended to "prevent significant, unavoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible."

Per the Caltrans Environmental Handbook, Volume 1, Chapter 8, *Paleontology*, Caltrans' responsibility under CEQA is such that "If paleontological resources are identified during initial project scoping studies as being within the proposed project area, the sponsoring agency must take those resources into consideration when evaluating project effects. The level of consideration may vary with the importance of the resource" (Caltrans 2012).

2.2 CALIFORNIA DEPARTMENT OF TRANSPORTATION GUIDELINES

Caltrans has established guidelines for the evaluation of paleontological resources in the SER, Volume 1, Chapter 8, *Paleontology*. The approach involves identification of the presence, or potential for presence, of paleontological resources within the project area, evaluation of the significance of the resource, and assessment of project impacts and mitigation. The results of these steps can be documented in one or more of the following reports, as appropriate: 1) a Paleontological Identification Report (PIR), 2) a Paleontological Evaluation Report (PER), and if necessary, 3) a Paleontological Mitigation Plan (PMP). A PIR was prepared for this project as an initial screening assessment of the potential for the presence of, and impacts to, paleontological resources within the project area.

Caltrans uses the following scale to rank the "sensitivity" or "potential" of a particular geologic unit:

- High Potential – Geologic units which, based on previous studies, contain or are likely to contain significant vertebrate, significant invertebrate, or significant plant fossils. These units include, but are not limited to, sedimentary formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary geologic units temporally or lithologically suitable for the preservation of fossils.

- Low Potential – This category includes sedimentary geologic units that: 1) are potentially fossiliferous, but have not yielded significant fossils in the past; 2) have not yielded fossils, but possess a potential for containing fossil remains; or 3) contain common and/or widespread invertebrate fossils if the taxonomy, phylogeny, and ecology of the species contained in the rock are well understood.

- No Potential – Geologic units of intrusive igneous origin, most extrusive igneous rocks, and moderately to highly metamorphosed rocks are classified as having no potential for containing significant paleontological resources.

URS researched whether paleontological resources (fossils) and geologic formations known to contain fossils are in or adjacent to the project area. This research consisted of a review of geological literature and maps to identify fossils and fossiliferous geological formations that may occur in the project area. A field survey or museum archival review was not completed as part of this PIR.

Two main surficial geologic units underlie the project area. Approximately 92 percent of the project area is mapped by Helley et al. (1994) and Dibblee (1973a,b,c) as Holocene Quaternary Alluvium, and approximately 6 percent is mapped as Santa Clara Formation. The Santa Clara Formation is concentrated in the vicinity of the SR 85/US 101 interchange in southern San Jose and further south along the US 101 corridor (Figures 3.1 through 3.7). In addition, small portions (approximately 2 percent) of the project area are mapped as Pleistocene Older Alluvium and undifferentiated bedrock by Helley et al. (1994) and Dibblee (1973a,b,c). The lithology and paleontological sensitivity of each major unit and subunit are described below. Abbreviations for the major units and subunits correspond to those used in Figures 3.1 through 3.7.

3.1 QUATERNARY ALLUVIUM

Quaternary Alluvium deposits are recognized by Helley et al. (1994) as Holocene (recent – less than 10,000 years B.P.) and consist of unconsolidated and semi-consolidated, mostly nonmarine alluvium, lake, playa and terrace deposits. The Holocene units found along the project corridor are as follows:

- Floodplain Deposits (Qhfp)
- Estuary Deposits (Bay mud) (Qhbm)
- Salt Affected Floodbasin Deposits (Qhbs)
- Floodbasin Deposits (Qhb)
- Stream Channel Deposits (Qhsc)
- Natural Levee Deposits (Qhl)
- Alluvial Fan Deposits (Qhaf)
- First Alluvial Terrace Deposits (Qhfp1)
- Younger Alluvial Fan Deposits (Qhaf1)

Recent sedimentary deposits are generally considered too young geologically to contain significant paleontological resources. In other words, they have a “low potential” to contain significant paleontological resources.

3.2 OLDER ALLUVIUM

Older Alluvium deposits are recognized as Pleistocene in age (Helley et al. 1994) and consist of older alluvium, lake, playa, and terrace deposits. The Pleistocene units found along the project area are as follows:

- Younger Alluvial Fan Deposits (Qpaf1)

Fossils found in Pleistocene deposits may include bison, mammoth, rodents, birds, reptiles, amphibians, and plants (Bell et al. 2004; Helley et al. 1979; Savage 1951; Stirton 1951) and are considered paleontologically significant. These deposits are considered to have a "high potential" to contain significant paleontological resources.

3.3 SANTA CLARA FORMATION

Santa Clara Formation deposits (QTsc) are recognized as Pliocene to Pleistocene in age and generally consist of gravel, sand, and clay (Dibblee 1973b). Fossils found in the Santa Clara Formation may include birds, reptiles, fish, amphibians, plants, and terrestrial mammals (Helley et al. 1979; Savage 1951; Stirton 1951). These deposits are considered to have a "high potential" to contain significant paleontological resources.

3.4 UNDIFFERENTIATED BEDROCK

Undifferentiated bedrock (br) is recognized as Pliocene and older in age and mainly consists of serpentinite, and rocks of the Franciscan Complex including sandstone, claystone, and chert (Dibblee 1973b). Although some invertebrate fossils have been identified in this formation, it is rare to find vertebrate fossils (Bailey et al. 1964; Brabb and Blondeau 1983); therefore, there is a "low potential" for significant paleontological resources in this formation.

The results of the literature and map review with regard to project-related ground disturbance are described below.

4.1 PALEONTOLOGICAL SETTING

There is a potential for sensitive paleontological resources to be encountered as a result of ground disturbance activities in portions of the project area that are underlain by the Santa Clara Formation or Older Alluvium. Although portions of the project area that are underlain by Quaternary Alluvium (Holocene) are not considered to be sensitive for paleontological resources, these recent sediments are likely underlain by Older Alluvium or the Santa Clara Formation, which may contain sensitive resources. The assessment of the specific depths of the Older Alluvium or the Santa Clara Formation underneath the Quaternary Alluvium (Holocene) is beyond the scope of this PIR, but depths likely range from a few feet to more than 20 feet in the study area. Thus, portions of the study area that are mapped as Quaternary Alluvium (Holocene) are also considered potentially sensitive for paleontological resources until further assessment can be completed to determine the depths of the underlying Older Alluvium or the Santa Clara Formation.

4.2 PROJECT EXCAVATION PARAMETERS

The proposed project would be constructed within the existing State right-of-way of US 101 and SR 85 between the limits shown on Figures 1 and 2. The project would include trenching and conduit installation at shallow depths (approximately 3 to 5 feet) in sediments that have been previously disturbed by the construction of US 101 and SR 85. Since these activities are in previously disturbed sediments, they are not expected to affect sensitive paleontological resources.

Overhead signage would be mounted on cantilever structures supported on piles of up to 6 feet in diameter that would extend approximately 30 feet below the ground surface. Overhead tolling equipment would be mounted on cantilever structures supported on piles of up to 2.5 feet in diameter and would extend approximately 10 feet below the ground surface. This review indicates a potential for paleontological resources to be encountered during pile installation for these structures.

The pile installations for the proposed overhead sign and tolling structures have the potential to disturb the Santa Clara Formation and Older Alluvium, which are considered to have relatively high paleontological sensitivity. Therefore, a Paleontological Evaluation Report (PER) will be prepared. A key component of the PER is to assess the number, locations, and drilling depths of the proposed structures. The locations of these structures have only been preliminarily identified.

A qualified paleontologist, as part of the PER, will compare the available project design information with the paleontological sensitivity of the geologic units, the depth of pile installation and the geotechnical profile at each location based on the *Preliminary Geotechnical Report* (URS 2012) and other available information. It may not be possible to relocate the pile(s) to avoid the sensitive area(s), therefore, a Paleontological Mitigation Plan (PMP) is also recommended, and will be prepared in concurrence with the PER. The PMP will address the following, as appropriate: timing, type and location of monitoring, if needed; recordation standards for fossil locality, data recovery and analysis, and reporting; and instructions for accessioning the fossil material and technical report to a paleontological repository.

Baily, E.H., W.P. Irwin and D.L. Jones. 1964. Franciscan and related rocks, and their significance in the geology of western California. California Division of Mines and Geology. Bulletin 183

Bell, C.J., E.L. Lundelius, Jr., A.D. Barnosky, R.W. Graham, E.H. Lindsay, D.R. Ruez, Jr., H.S. Semken, Jr., S.D. Webb, and R.J. Zakrzewski. 2004. The Blancan, Irvingtonian, and Rancholabrean Mammal Ages. In Late Cretaceous and Cenozoic Mammals of North America, edited by M.O. Woodburne, pp. 232-314. Columbia University Press, New York.

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Dibblee T.W., 1973a. Preliminary Geologic Map of the Gilroy Quadrangle, Santa Clara County, California. U.S. Geological Survey Open File Map, scale 1:24,000.

Dibblee T.W., 1973b. Preliminary Geologic Map of the Morgan Hill Quadrangle, Santa Clara County, California. U.S. Geological Survey Open File Map, scale 1:24,000.

Dibblee T.W., 1973c. Preliminary Geologic Map of the Mt. Madonna Quadrangle, Santa Clara and Santa Cruz Counties, California. U.S. Geological Survey Open File Map, scale 1:24,000.

Helley, E.J., K.R. Lajoie, W.E. Spangle, and M.L. Blair. 1979. Flatland deposits of the San Francisco Bay Region, California–their geology and engineering Properties, and their importance to comprehensive planning. Geological Survey Professional Paper 943. United States Geological Survey and Department of Housing and Urban Development, Washington, D.C.

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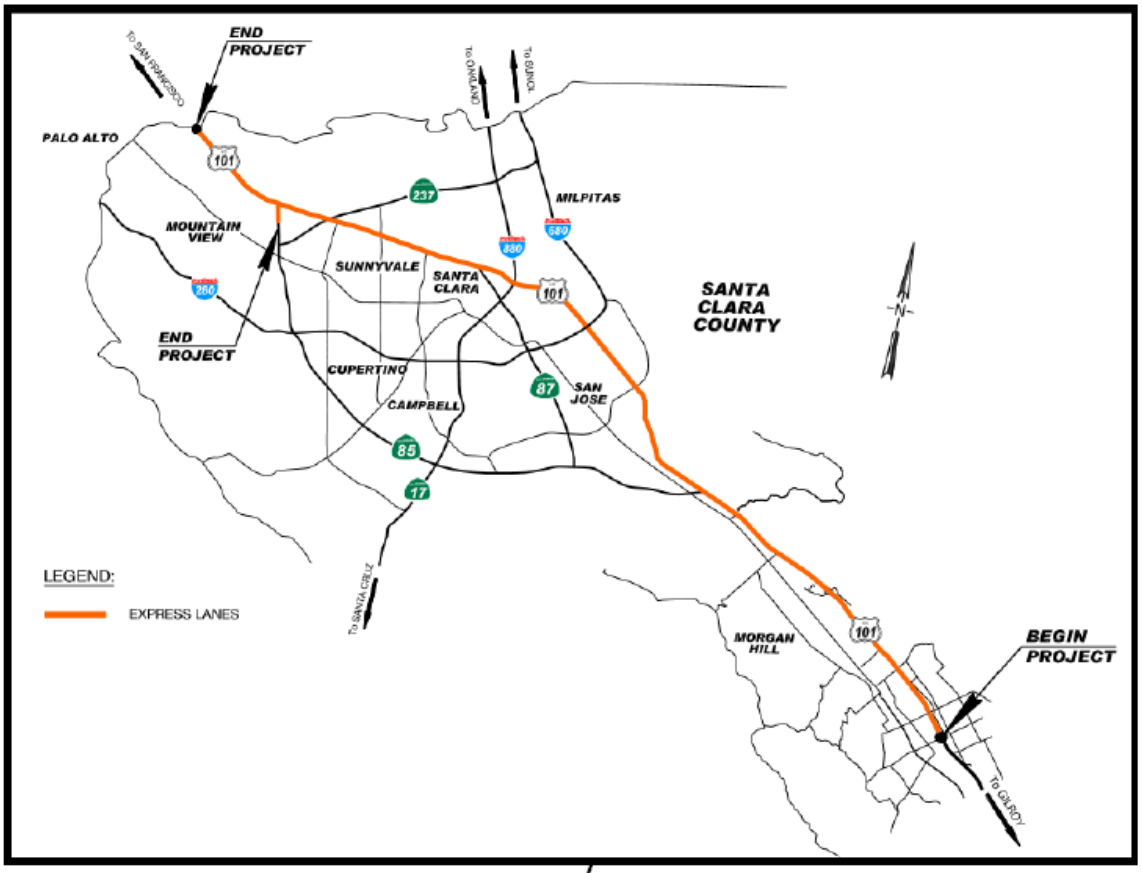
Stirton, R.A. 1951. “Prehistoric Land Animals of the San Francisco Bay Region.” California Division of Mines Bulletin. 154, pp. 177-186.

URS Corporation. 2012. Preliminary Geotechnical Report for the United States Highway 101 Express Lane Project. Prepared for the Santa Clara Valley Transportation Authority by URS Corporation, San Jose, California.

Figures



NO SCALE

US 101 Express Lanes Project
Dunne Ave to San Mateo/Santa Clara County Line

PROJECT LOCATION & VICINITY
Figure 1

URS

US 101 Express Lanes Project
DUNNE AVE TO SAN MATEO/SANTA CLARA COUNTY LINE
PROJECT LOCATION MAP

NOT TO SCALE
Figure 2
NOVEMBER 2011

Project area

Data boundary
West of boundary - Helley et al. (1994)
East of boundary - Dibblee (1973)

Geologic units

- GP - Gravel Pits
- PP - Percolation Ponds
- QTsc - Santa Clara Formation (Pliocene and Pleistocene)
- Qhaf - Alluvial Fan Deposits (Holocene)
- Qhaf1 - Younger Alluvial Fan Deposits (Holocene)
- Qhb - Floodbasin Deposits (Holocene)
- Qhbm - Estuary Deposits (bay mud) (Holocene)
- Qhbs - Salt affected Floodbasin Deposits (Holocene)
- Qhfp - Floodplain Deposits (Holocene)
- Qhfp1 - First Alluvial Terrace Deposits (Holocene)
- Qhfp2 - Second Alluvial Terrace Deposits (Holocene)
- Qhl - Natural Levee Deposits (Holocene)
- Qhsc - Stream Channel Deposits (Holocene)
- Qls - Landslide Deposits (Pleistocene and Holocene)
- Qpaf - Alluvial Fan Deposits (Pleistocene)
- Qpaf1 - Younger Alluvial Fan Deposits (Pleistocene)
- Qpoaf - Older Alluvial Fan Deposits (Pleistocene)
- br - Undifferentiated Bedrock (Pliocene and older)

Imagery source: Microsoft Bing Maps
Geological Data:Helley et al. (1994) and Dibblee (1973).
UCMP Fossil Source: University of California Museum of Paleontology, 2012.
Note: The project area is a tentative boundary

N

0 1,000 2,000
Feet

Figure 3.1
Figure 3.2
Figure 3.3
Figure 3.4
Figure 3.5
Figure 3.6
Figure 3.7

Data Source: Dibblee (1973)

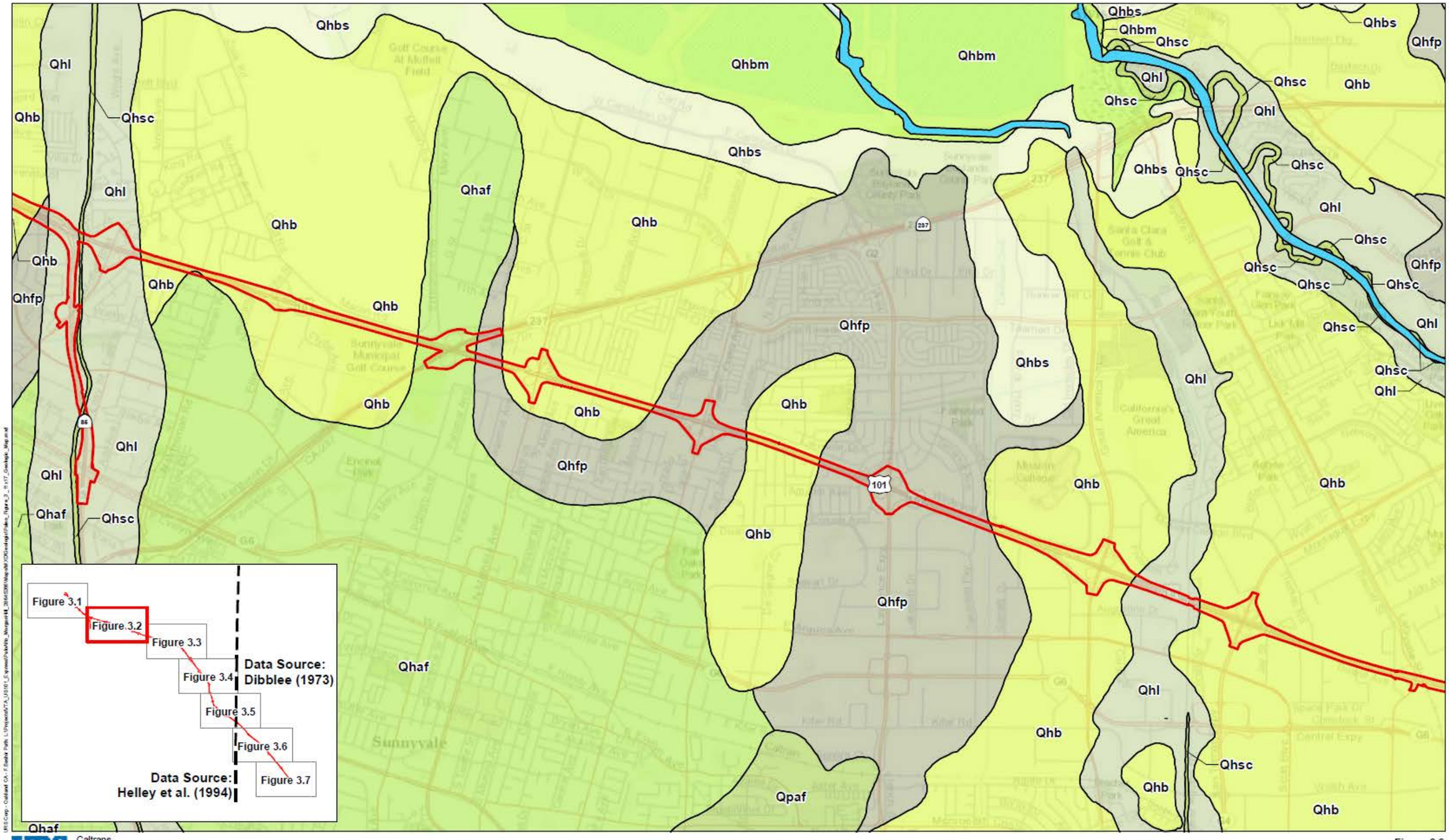
Data Source: Helley et al. (1994)

Qhl Qhfp Qhbm Qhbs Qhb Qhsc Qpaf Qhaf Qpoaf br QTsc Qhaf1 Qhfp1 Qhfp2 Qls

Palo Alto Stanford Sand Point Palo Alto Airport Shoreline Park Rinconada Park Lawn Bowling Green Park Henry Seale Park Stanford University

82 101 G3

Figure 3.1
Project Area Geologic Map, Santa Clara County, California



Caltrans
US 101 Express Lanes Project

Figure 3.2
Project Area Geologic Map, Santa Clara County, California

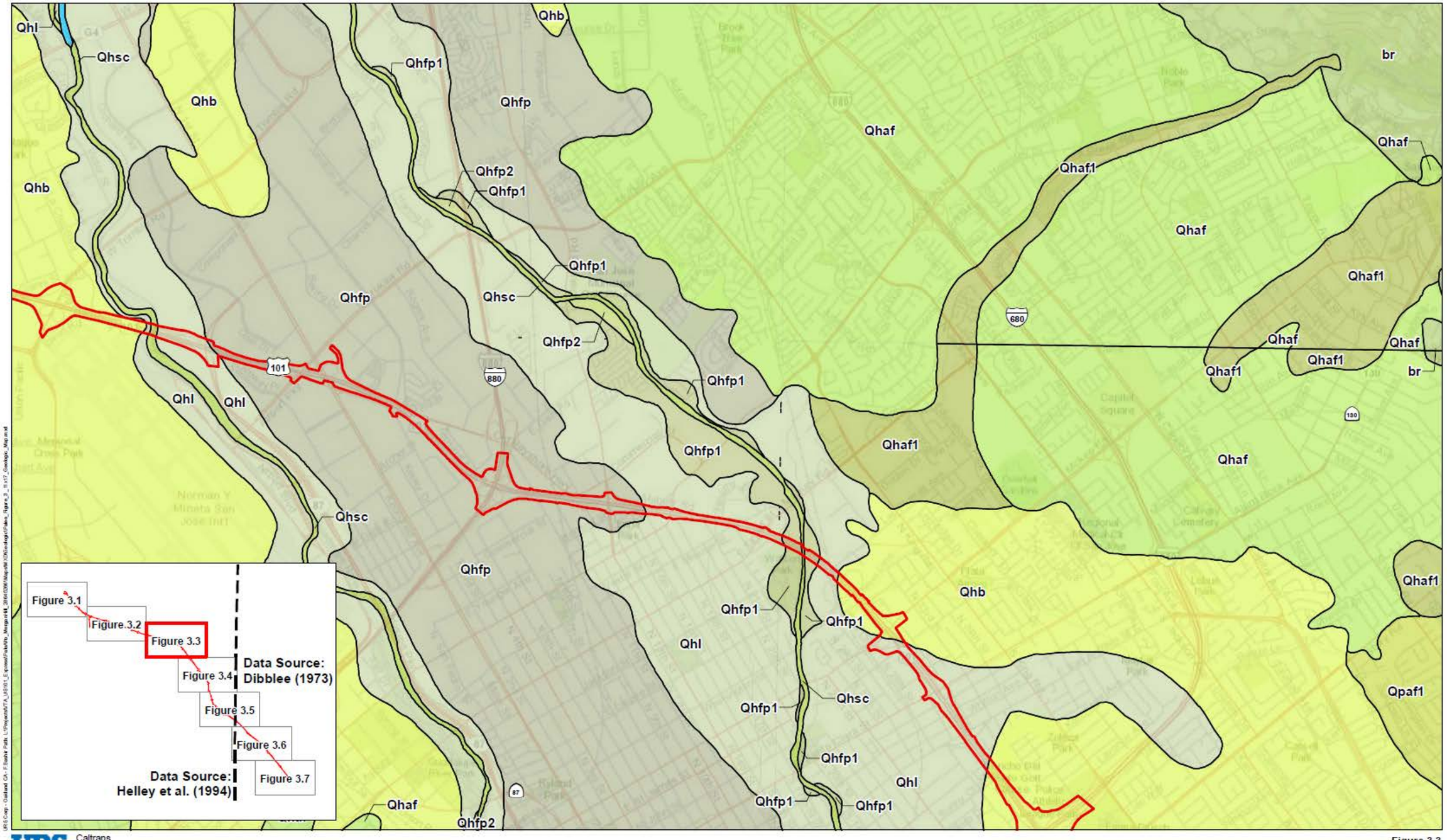


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Figure 3.3
Project Area Geologic Map, Santa Clara County, California

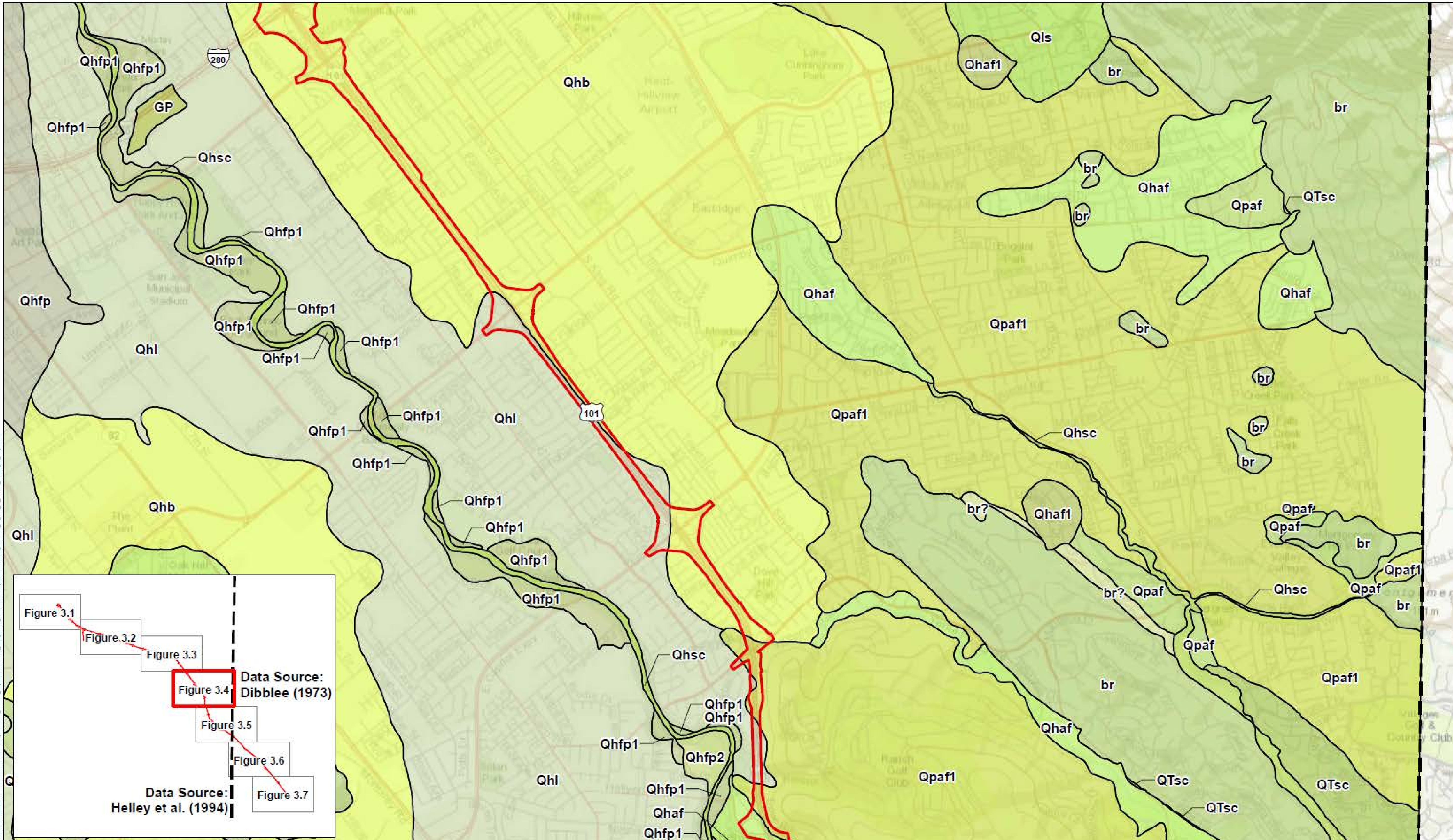

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Figure 3.4
Project Area Geologic Map, Santa Clara County, California

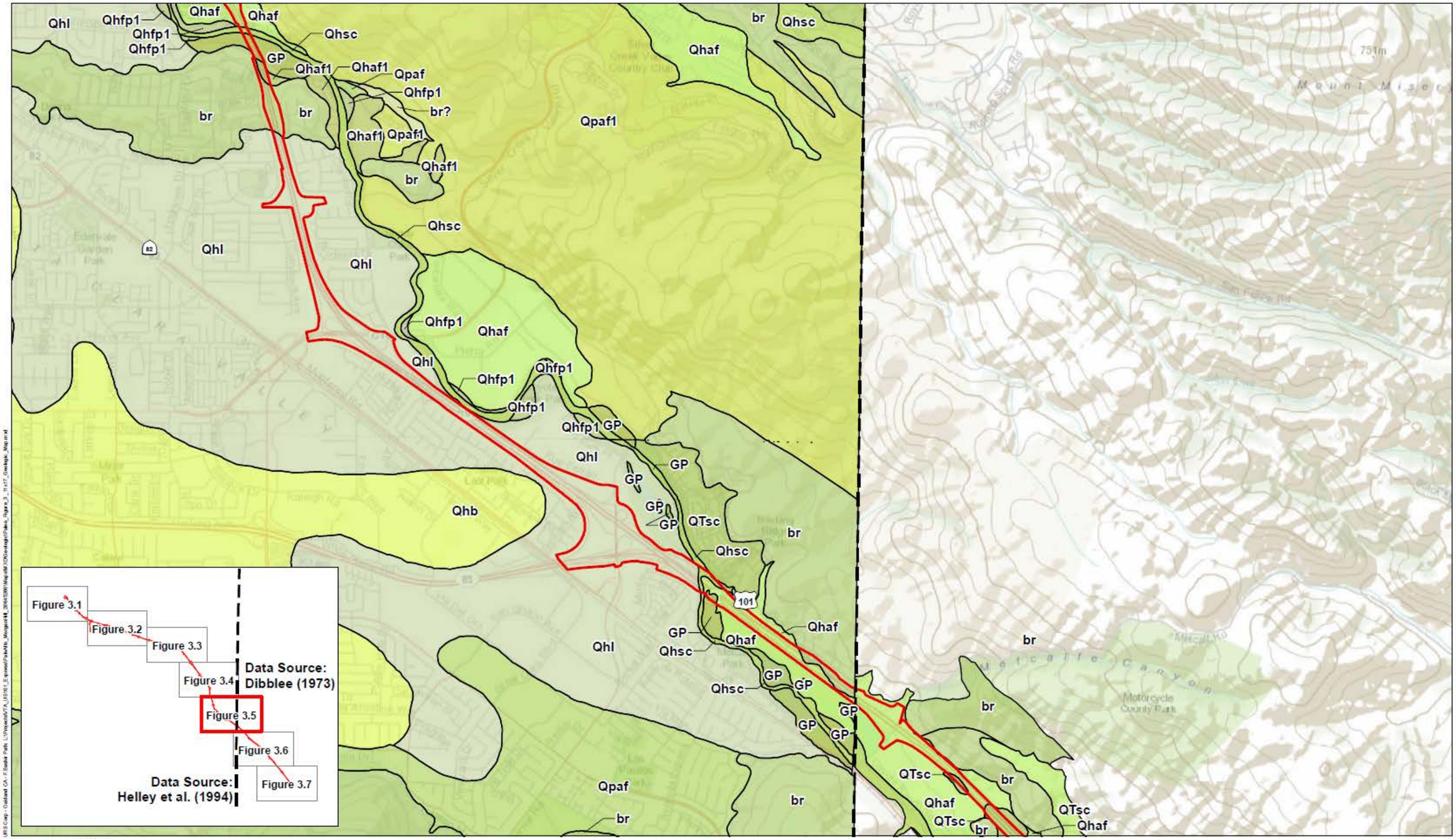

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Figure 3.5
Project Area Geologic Map, Santa Clara County, California

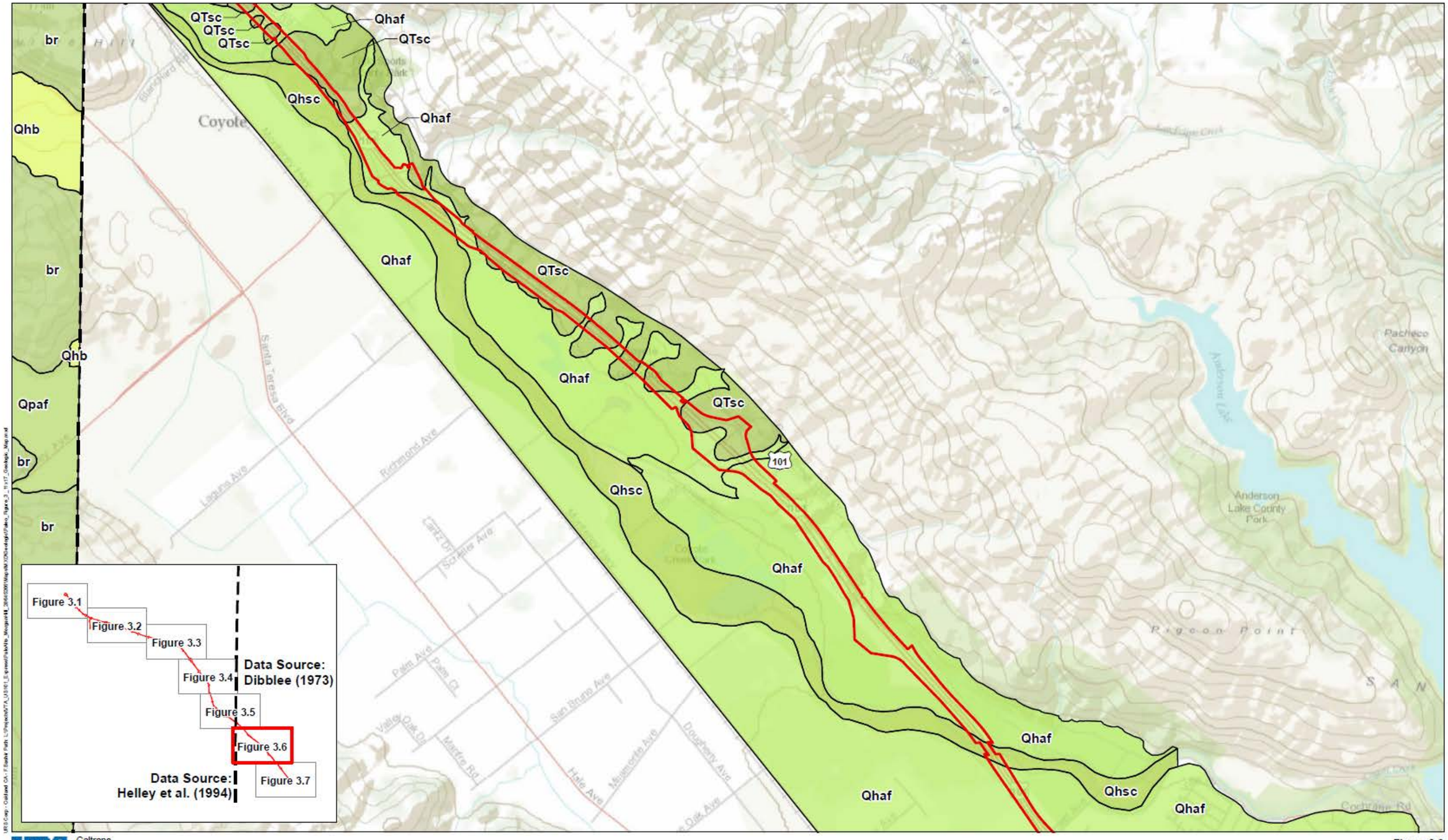

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Figure 3.6
Project Area Geologic Map, Santa Clara County, California

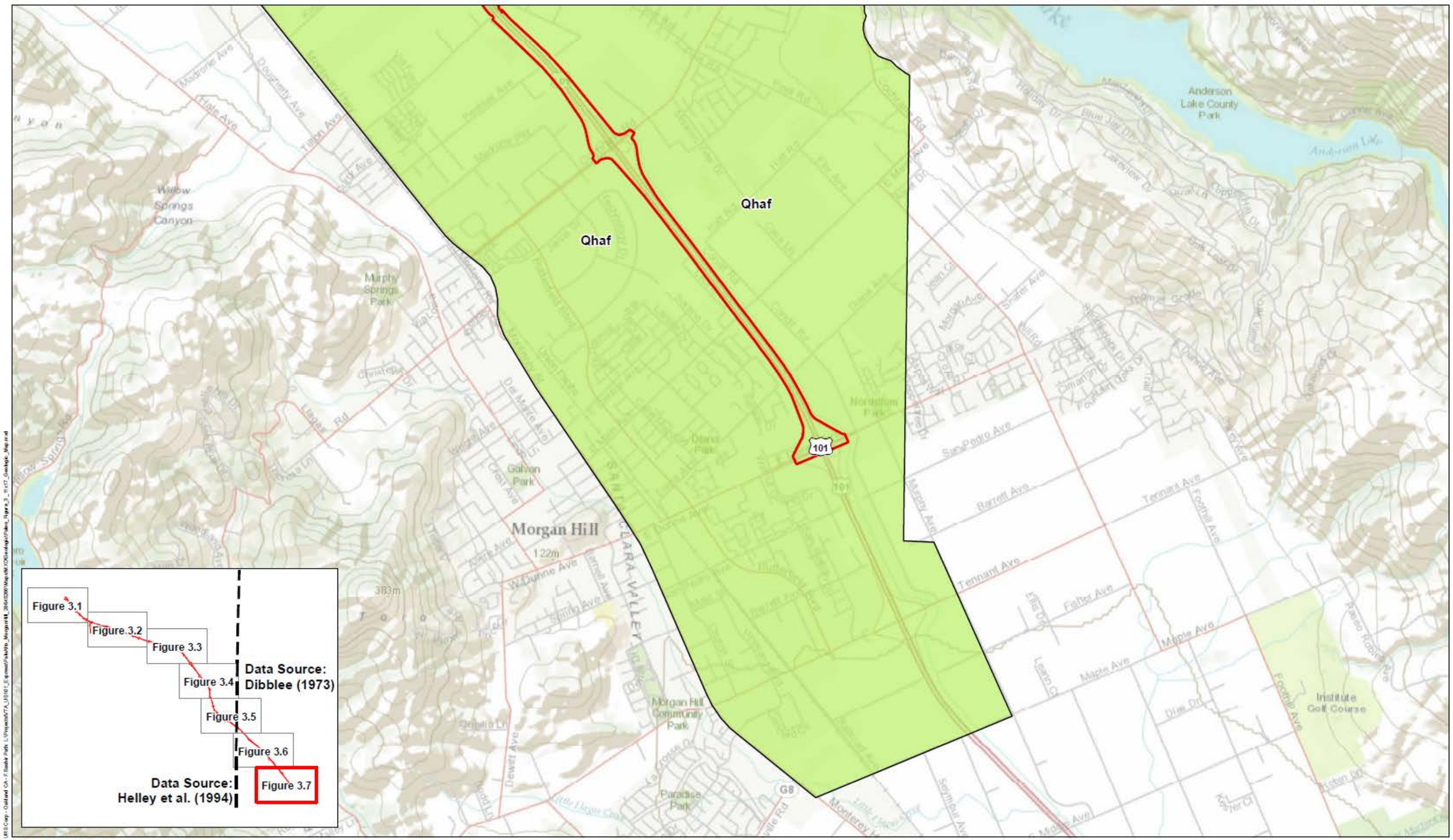

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Figure 3.7
Project Area Geologic Map, Santa Clara County, California