February 3, 1992

Christopher C. Price  
City of Santa Clarita  
Building & Engineering Services  
23920 Valencia Blvd., Suite 304  
Santa Clarita, CA 91355

Dear Mr. Price:

We are placing on open file the following report, reviewed and approved by the City of Santa Clarita in compliance with the Alquist-Priolo Special Studies Zones Act:

Alquist-Priolo Special fault zone study, proposed Taco Bell restaurant, 26231 Bouquet Canyon Road, Santa Clarita, CA; by C.M. Payne; 8/13/91.

Please note that there is no indication that the report has been reviewed by a registered geologist as required by sec. 3603(e) of the California Administrative Code (see enclosed regulation). If the report has been reviewed, we would appreciate receiving a copy for our files. If it has not been reviewed, it should be reviewed prior to filing with our Division.

Please let me know if you have any questions.

Sincerely,

EARL W. HART, CEG 935  
Senior Geologist & Program Manager

cc: A-P file
TO: CALIFORNIA DIVISION OF MINING AND GEOLOGY
1145 MARKET ST. 3RD FLOOR
SAN FRANCISCO CA 94103-1513

DATE: JAN 29, 1992

ATTENTION: EARL HART

We are forwarding ☑ By Mail ☐ By Messenger

ONE COPY OF CITY ACCEPTED

ÁLQUIST-PRIOTO SPECIAL FAULT ZONE STUDY

SUBMITTED AS REQUIRED BY ÁLQUIST-PRIOTO SPECIAL STUDIES ZONE ACT.

PLEASE CONTACT CHRISTOPHER PRICE AT (805) 255-4935 IF ANY ADDITIONAL INFORMATION IS REQUIRED.

This Material is sent for ☐ Checking ☐ Your Files ☐ Approval ☐ Information

☐ Other ________________________________

☐ Please sign ___________ Copies and return to our office.

COPIES TO:

V ery Truly Yours

[Signature]
February 12, 1992

To: City of Santa Clarita
    Building & Safety Division
    23920 Valencia Boulevard, Suite 304
    Santa Clarita, California 91355

Attention: Mr. Ruben M. Barrera, Building Official

Subject: Geotechnical Review of Fault Study Report by C. Marshall Payne, Consulting Geologist, for Proposed Taco Bell Restaurant, 26231 Bouquet Canyon Road, Santa Clarita, California (Ref. Plot Plan No. 91-030)

Introduction and Scope of Review

In accordance with your request on January 7, 1992, and as authorized under our contract agreement with the City, this letter report presents the findings and recommendations of our review of the subject report, dated August 13, 1991, prepared for Giles Engineering Associates, Inc.

The subject report consisting of 13 pages, presents the results of a field investigation (trench excavation, logging and mapping), review of available literature related to the regional geology and fault hazards, and an evaluation of the potential fault rupture impacts to the proposed construction, specifically. Inasmuch as the site lies within a state-designated Alquist-Priolo Special Studies Zone for active faults (in this case for the San Gabriel fault), the subject report is limited primarily to fulfilling the geologic/fault investigation requirements of the state.

Findings and Recommendations

1. It is our finding and conclusion that the subject report satisfactorily documents an investigation which was made in accordance with generally accepted professional practice for the region, and with the state guidelines for fault studies. Therefore, the project consultant's conclusion that there has been no active fault movement within the proposed building area is acceptable.

2. To appropriately mitigate the effects of future seismic shaking anticipated from strong earthquakes on nearby active and potentially active faults, we recommend that the opinions of the project engineering geologist and/or structural engineer be obtained regarding the design of the proposed building (i.e., whether special design parameters, over and above those required by the latest Uniform Building Code, are necessary).
3. We recommend, in addition, that the project geotechnical engineer be requested to make recommendations regarding uncertified fill which resulted from backfilling of the fault study trench, and any other site preparation grading deemed necessary for the proposed building.

4. Because of the strong earthquake shaking potential at the site, we recommend that the project geotechnical engineer be requested to evaluate the soil liquefaction potential at the site. Although the ground water level in the general area of the site is believed to be deeper than 30 feet (per the subject report), the near-surface soils are apparently loose and caving.

We appreciate this opportunity to be of service. If you have any questions regarding this report please contact us at (818) 587-9470.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

Richard Lung, CEG 111
Principal Engineering Geologist

Distribution: (4) Addressee
Giles Engineering Associates, Inc.
4875 E. La Palma Ave, Suite 607
Anahim, CA 92807

Attention: Mr. Douglas P. Dayton, Manager

RE: Alquist Priolo Special Fault Zone Study, Proposed Taco Bell
Restaurant, 26231 Bouquet Canyon Road, Santa Clarita, CA

Dear Mr. Dayton:

Submitted herewith is a report of a fault investigation study for the referenced proposed Taco Bell Restaurant. The purpose of the investigation was to determine if the project site is located on an active branch of the San Gabriel Fault which projects through the region. The project site does lie within an Alquist Priolo Special Study Zone as defined in Chapter 7.5, Division 2 of the California Public Resources Code. This study is required and is to be reviewed for approval by the City of Santa Clarita and submitted to the California Division of Mines and Geology.

The scope of this investigation included a review of available pertinent geologic and seismologic literature, a field reconnaissance and the excavation and logging of a backhoe trench. The trench was aligned across the projected trend of the fault and had a length of 86 feet and depth of 10 feet. Logging of the trench and preparation of the attached report was performed by the undersigned Certified Engineering Geologist.

Based on the results of this investigation, no evidence of faulting was identified as observed in the exploration trench. The oldest age of the natural soil deposits logged in the trench were estimated to be of very late Pleistocene age. No materials, such as carbon, were found for which to radiometrically date the soils. Pedogenic development of the oldest soil not ruptured by faulting was judged to be of late Pleistocene age. Severe unsafe caving conditions and structural constraints precluded excavating the trench to depths in excess of 10 feet below the existing ground surface.

This investigation was performed in accordance with generally accepted engineering geological procedures considered necessary in the circumstances. In the opinion of the undersigned, the accompanying report presents fairly the engineering geologic data information requested by your organization.

Respectfully submitted,

[Signature]

C. Marshall Payne, CEG No. 367
A proposed Taco Bell Restaurant is to be located in the K-Mart Shopping Center near the intersection of Bouquet Canyon Road and Valencia Boulevard in the City of Santa Clarita, California. According to the California Division of Mines and Geology and the City of Santa Clarita, the proposed restaurant lies just within an Alquist Priolo Special Studies Zone. The Alquist Priolo Special Studies Zone Act (Chapter 7.5, Division 2 of the California Public Resources Code) dictates that no structure of human occupancy is to be constructed over an active fault. An "active fault" is defined as a fault that has had surface displacement within Holocene time (about the last 11,000 years), hence constituting a potential hazard to structures that might be located across it. Any proposed structures within the study zone require a fault investigation. The objective of this study was to determine if the proposed restaurant is underlain by an active branch of the San Gabriel Fault.

A portion of the 1988, 7½ minute USGS Newhall Quadrangle is presented on Figure 1 and shows the location of the site relative to the Alquist Priolo Special Study Zone and the estimated location of the active San Gabriel Fault. Based on this map, the site lies at the extreme southwestern boundary of the zone, approximately 500 feet from the estimated fault location.

The fault investigation reported herein included: 1) review of all available geologic and seismologic literature for the site and region, 2) excavation of a 86 foot long, 10 foot deep trench and logging of the trench by a Certified Engineering Geologist, 3) geologic site reconnaissance and, 4) preparation of this report. The trench was located perpendicular to the trend of the fault and through the proposed building area as shown on Figure 2. The Trench was excavated on August 7, 1991.
Proposed Taco Bell Restaurant
Santa Clarita, California

SITE CONDITIONS

The project site is located on the west side of Bouquet Canyon Road and 540 feet south of the intersection of Valencia Boulevard and Bouquet Canyon Road at about elevation 1160 feet above sea level. The area presently consist of a relatively flat paved parking lot with associated curbed tree banks and concrete block walls. The K-Mart Shopping Center was constructed in about the mid-1970's and consists of retail commercial stores and restaurants. A search of the City's records and a phone conversation with Mr. Earl Hart (Cal. Div. Mines and Geology, July 15, 1991) indicates that no previous fault studies had been performed on or near the subject property.

The proposed single story restaurant is 60 feet long (north-south) by 35 feet wide (east-west). The structure will be constructed about 30 west of the Bouquet Canyon Road as shown on Figure 2. Based on the previous geotechnical investigation, minimal grading was performed on the site and consisted of land leveling and the placing of about two to three feet of compacted fill over recent alluvial deposits.

GEOLOGIC SETTING

The site lies in the Transvers Ranges Physiographic of Southern California and within the western San Gabriel Mountains. The region is characterized by low to moderate relief north-south to northwest-southeast trending dissected ridges interrupted by wide low relief, rather linear dry drainages. Drainage in the region is toward the west with the Santa Clara River being the dominant drainage.

The project site is located on the broad flood plains of the Santa Clara River at Bouquet Junction (Figure 1). The junction represent the confluence of Dry, Bouquet, Soledad Canyons and Newhall Creek. Within a few hundred feet to the east are some low relief hills which form the southerly boundary
Proposed Taco Bell Restaurant
Santa Clarita, California

of Soledad Canyon and easterly limits of Newhall Creek. The flood plains, prior to urbanization, were of very low relief though the various merging drainages were well entrenched based on older topographic maps of the region. The site lies between two drainages on a low elevated river terrace surface. Fluvial Holocene deposition has no doubt taken place over this surface and buried any geomorphic evidence of faulting if it had occurred in the last 11,000 years.

The site is underlain by alluvial debris derived from both Newhall Creek and the Santa Clara River. Some of the alluvial debris may have been derived locally from the adjacent hill to the west. The alluvium underlying the site consists of unconsolidated layers of sand, sandy silt and gravels.

Bedrock does not cropout on the property but is well exposed in a railroad cut about 500 feet to the east of the site. The Metropolitan Water District's Saugus Tunnel (MWD, 1966) is located to the southeast of the site and penetrated the entire length of the hills to Placerita Canyon and paralleling San Fernando Road. Exposed in the railroad cut and logged in the MWD tunnel was the Pliocene age Saugus Formation. It is judged that the same bedrock unit underlies the property at a depth of 50 to 100 feet.

The Saugus Formation consists locally of interbedded siltstone, sandstone and conglomerate. These various layers are slightly to moderately cemented, generally massive to thickly bedded and are very weathered at the ground surface. Bedding attitudes measured in the railroad cut generally strike to the northwest and dip southwest at moderate to high angles.

Ground water lies at a depth of about 60 feet below the ground surface based on water levels measured in 1975 (LACFCD). The depth to ground water varies seasonally based on precipitation, runoff and the amount of withdrawal from pumping wells. There was no evidence of near surface ground water on or near the site. A new unlined flood control channel located
Proposed Taco Bell Restaurant  
Santa Clarita, California

roughly 700 feet to the north of the property, was up to 30 feet deep in the river alluvium and was not producing ground water (August, 1991).

FAULTING

The site lies in a region where numerous faults have been mapped and where earthquakes often occur. The western San Gabriel Mountains are slowly being uplifted by active faults as a result of north-south compression along the San Andreas Fault Zone located 20 miles to the northeast of the site. The local San Gabriel Fault is believed by some to be an ancestral San Andreas Fault, though portions of this fault have been proven to be active. Historically, the San Gabriel Fault has not produced any moderate or large earthquakes but fault studies conducted about 2.2 miles to the northwest of the site clearly indicated that the fault had ruptured in the last 3500 years before present (Cotton, 1986).

According to Webber (1982), there is a lack of geomorphic evidence to suggest that the San Gabriel Fault, near the site, is active. This is due to the continuous fluvial modification by the Santa Clara River as it erodes and deposits materials. The Rancho Segment of the San Gabriel Fault was mapped by Webber (1982) in the hills east of site and was shown to projects out beneath the alluvial surface about 500 feet to the south. Webber also mapped an unnamed fault traces which projects through the intersection of Valencia Blvd. and Bouquet Canyon Road. Treiman (1986) mapped several fault traces in the hills opposite the site to the east. If projected these traces would project probably north of the junction (intersection) before crossing the flood channel of the Santa Clara River. Winterer an Durham, (1958), show only one trace of the fault which should have been exposed in the aforementioned railroad cut to the east of the property, but isn't. Based on the previous studies by others, the San Gabriel Fault is poorly constrained in the field. The most detailed study, by Treiman (1986), indicates the main and presumably the most active trace lies along the northeast side of the hills in Soledad Canyon. The strongest
Proposed Bell Taco Restaurant  
Santa Clarita, California

Air photo lineaments also occur along the mapped faults shown by Treiman. Other traces shown in the Bouquet Junction bedrock nose are curvi-linear and are judged to be secondary fault traces or may indeed be bedding planes separating different lithologies.

Still another fault study by Cotton, (1986), shows two traces of the fault, one projecting through the highway intersection and another roughly 1000 feet to the south of the intersection. In the MWD Saugus Tunnel, which was mapped by James Kahle (undated), the Holser Fault was mapped in a 50 foot wide zone. Projecting this fault northwestward, it would lie about 2400 feet south of the site.

The San Gabriel Fault appears to be a near vertical fault. In the site area the fault trends about N55°W. The sense of slip is oblique right lateral as determined in the fault studies by Cotton, (1986). The youngest soil units displaced by the fault have been carbon dated to 3500 +/- 250 years before present. Strata dated at 1500 +/- 190 years before present has not been faulted. Recurrence interval appears to be in the range of about 3500 years, which is considered fairly long. In comparison, the active San Andreas fault has recurrence intervals of 150 to 350 years. According to Stitt (1986), the San Gabriel Fault became active 10-million years ago. Most of the right slip on the fault was complete by the upper Pliocene time (about three million years ago). Movement on the fault in Quaternary time is contributed to north-south shortening (compression) across the Transverse Ranges.

Regionally, other faults have been mapped, some minor and some very major features such as the active San Fernando Fault which trends along the south side of the San Gabriel Mountains and merges westward with the Santa Susana System. The San Fernando Fault last ruptured in 1971 causing extensive damage and many deaths. This thrust fault system lies roughly 7.0 miles to the south of the site. The main active branches of the San Andreas Fault trend to the northwest and are located about 20 miles to the northeast of
Proposed Taco Bell Restaurant
Santa Clarita, California

the subject property. The San Andreas last ruptured in 1857 opposite the site with a very major earthquake. Though these regional active faults may influence the site relative to strong ground shaking, they do not project towards or directly through the property. None of the more regional active faults pose a hazard of direct surface fault rupture on the property. The possibility of direct fault rupture on the site from movement on the San Gabriel Fault is discussed in the following sections.

FAULT INVESTIGATION

Because the subject property lies in an Alquist Priolo Sepcial Studies Zone, a fault investigation was required. This investigation was conducted in an attempt to determine if an "active" trace of the fault trend through the site. A backhoe trench was excavated through (86 feet long) the development area as shown on Figure 2 to an average depth of 10 feet. Based on previous soil samples examined from geotechnical borings in the vicinity, it was determined that soils at about eight feet of depth would be of sufficient age to determine if an active fault was present. Constraints such as limited access, buried utility lines, surface structures, traffic congestion and severe caving conditions made it necessary to excavate the trench where shown on Figure 2.

After the trench was excavated and shored, the trench walls were cleaned and logged at a scale of one inch equals five feet. A two to three foot section of compacted artificial fill existed at the top of the excavation followed by four distinct natural soil units as shown on Figure 3. The natural units were of fluvial origin, typical river alluvium. The units were lying horizontal and had abrupt contacts except for the lower C/D contact which was gradational over a few inches. Excellent continuity of the soil units was established along both sides of the trench. No disruptions such as offsets or secondary effects (i.e., liquefaction) of faulting were observed. It can be stated, to the depth and area explored, that there was no evidence of faulting.
Proposed Taco Bell Restaurant
Santa Clarita, California

During the trench wall cleaning operation, an attempt was made to fined carbonized fragments for which to radiometrically date. Unfortunately, no carbon particles or organic matter of any kind were found except living tree roots. The three upper soil units (A, B and C) showed no signs of soil development and are most definitely Holocene in age. The lowest soil, Unit D, did show a mild soil development consisting of a slight illuviation of clays and deposition of these clays (clay skins) on prismatic pedogenic surfaces. This soil consists of a silty sand, very fine to fine grained, massive with a trace of clay and was well consolidated though not cemented. The color of the "D" soil was dark reddish brown (Hue 5YR, Value 3, Chroma 4) based on the Munsell Soil Color Chart. From this it is interpreted that Unit "D" is a buried paleosol (A-Horizon) and most likely represents, geomorphically, the top of an older alluvial river terrace. It is judged that this buried surface is of late Pleistocene age and accordingly has not been faulted in the area investigated (logged). Severe caving conditions prevented excavating deeper to examine the underlying B-Horizon if it existed.

Figure 2, shows the various soil units and describes the physical parameters of the soils as mapped in the field. The trench log was reduced to one inch equals 10 feet. Upon completion of the trenching and logging operation, the soils were replaced in the trench and compacted with a sheeps foot roller and also wheel rolled. The soils were not tested for compaction during the backfilling process and are considered uncertified fill. Excavation and certified recompaction of the fill materials is recommended prior to construction of the proposed facility. A thin cold mix asphalt concrete was placed on the surface where the removals were made. Minor settlement and pot-holing of the surface asphalt is anticipated over the next few months. The present backfilling and resurfacing are considered temporary.
DISCUSSION AND CONCLUSIONS

The preceding section describes the findings from this fault investigation. It is the opinion of the undersigned that there has been no surface Holocene fault rupture in the area investigated. The trench was located exactly where the proposed building is planned and was extended enough to either end (north and south) to intercept any possible fault trace which might project toward the building area. The trench extensions, beyond the building area, were based on the mapped trend of the fault in the area which is N55°W. It should be noted, that only the area presently proposed for the restaurant as shown on Figure 2, has been cleared. If the building is to be relocated or additions are to be made, additional fault investigation(s) will be required. Based on the Alquist Priolo Special Studies Zone Act, an active fault may exist outside of the immediate proposed building area.

Reviewing the published geologic data for the site area, at least five investigators have shown that the main and presumably the most recent break on the San Gabriel Fault projects to the northwest through the Bouquet Canyon - Valencia Intersection. The intersection is in excess of 500 feet northeast of the site with the site lying at the southerly boundary of the Alquist Priolo Special Studies Zone. It is the opinion of the undersigned, and based on the previous studies (see reference section) and results of this investigation, the most recently active trace(s) of the San Gabriel Fault are of sufficient distance north of the proposed restaurant to preclude surface fault rupture.

In the event the San Gabriel Fault was to rupture opposite the site and generate a major earthquake, very strong ground motions locally will occur. The fault has been assigned a moment magnitude of 7.0 (Wenousky, 1986). Peak horizontal accelerations of 0.55g are possible at the site based on empirical deterministic data after Joyner and Pumal (1986). Results of such an event would overshadow any event on other known regional active faults.
REFERENCES


Metropolitan Water District of Southern Calif. (MWD), 1966, Geologic Report Proposed Castaic No. 1, Castaic No. 2, Saugus and Placerita Tunnels; Unpublished report by MWD.

Metropolitan Water District of Southern Calif. (MWD), undated, Saugus Tunnel, Geology and As-Built; Unpublished, Geology by James Kahle.


Webber, Jr., F.H., 1982, Geology and Geomorphology along the San Gabriel Fault Zone, Los Angeles and Ventura Counties, Calif.; Calif. Div. of Mines and Geol. Open File Report 82-2 LA.

Webber, Jr., F.H., 1986, Geologic Relationships along the San Gabriel Fault between Castaic and the San Andreas Fault, Kern, Los Angeles and Ventura Counties, Calif.; Geol. Soc. of Amer., Cordilleran Section, 82 Annual Meeting, Los Angeles, Guidebook and Volume.

TRENCH LOCATION

Proposed Taco Bell
26231 Bouquet Canyon Road, Santa Clarita, CA

ALQUIST-PRIOLO - FAULT INVESTIGATION

Scale: 1 inch = 50 feet
EXPLANATION - Soil Units

A Dark grayish brown (10YR 4/2), SILTY SAND, very fine to fine grained, micaceous slightly porous, no soil development, massive, no apparent layering, dense, moist.

B Pinkish gray (7.5YR 6/2), SAND, fine to coarse grained, well graded, angular grains, clean, loose (no cementation), thinly layered, locally crossbedded, 1/4 to 1 inch gravel pockets at stoneline (base).

C Yellowish brown (10YR 5/4), interbedded SAND and SILTY SAND, very fine to fine grained, thinly bedded, micaceous, non-porous, no soil development, dense, moist.

D Dark reddish brown (5YR 3/4), SILTY SAND, very fine to fine grained with trace of clay. Slightly micaceous, very slight illuviation of clays on pedogenic surfaces (clay skins). Very crudely developed soil (A - Horizon), not cemented but appears well consolidated (stiff to very stiff), slightly moist.

Notes: Severe caving conditions, no ground water, logged by CEG (NO. 367). All contacts between soil units are abrupt except C/D which is gradational. Additional explanation in text.