The property appears to have been disked recently. A large fenced in Oak tree is located along the north of the property. Large pepper trees and eucalyptus trees are located along the northern, eastern and southern perimeters of the property. An old baseball field with backstop fence, bleachers, brick BBQ and cargo container is situated near the southwestern portion of the property, parallel to the Bank of America parking lot. A large concrete, subterranean, flood control basin is located to the southeast of the baseball field. Naturally occurring quartzite, conglomerate/breccia, and sandstone were seen on the property. The property has been extensively disturbed in the past by grading, disking and prior development activities (Figure 4) Figure 5 illustrates a proposed site plan.

Figure 4: Aerial View of the Project Area Looking North

Figure 5 illustrates a proposed site plan, which includes office buildings, parking and associated landscaping features.

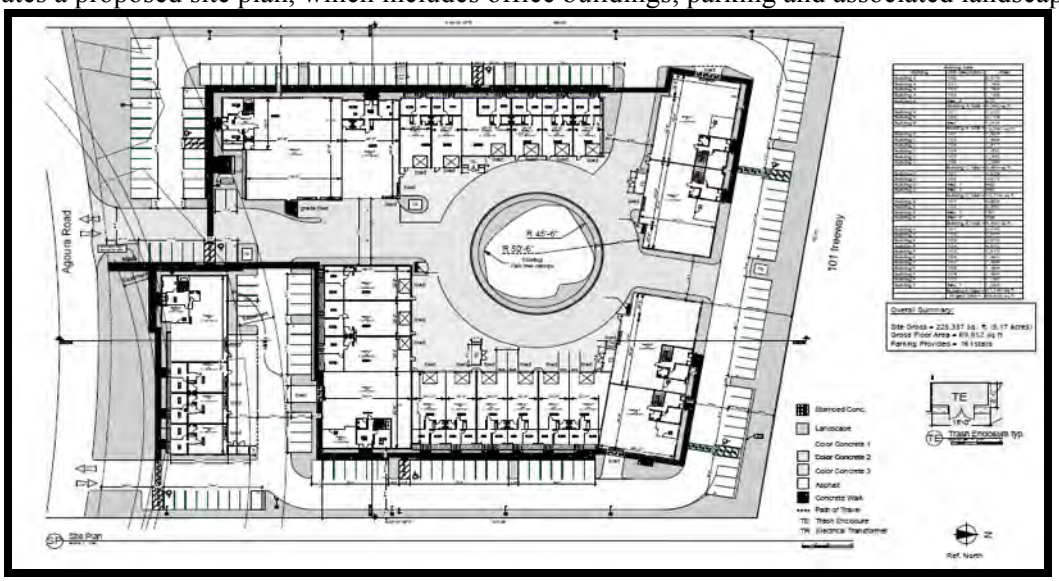


Figure 5: Proposed Site Plan Looking West

II. Environmental Information

2.1 Geology

The property lies within the Santa Monica Mountains, which is part of the Transverse Range geologic province. This mountain range is primarily composed of sedimentary and volcanic formations. The general topography consists of rolling hills, seasonal drainages, and narrow-to-moderate broad valleys, interspersed with sage/chaparral and oak-woodland plant communities. The major stratigraphic units in the area include: Upper Miocene Marine Sedimentary Rocks consisting of interbedded sandstone, shale, siltstone and conglomerate; and, Miocene Volcanic Rocks, consisting of agglomerate, flow breccias, flows, tuffs, and volcanic materials (State of California 1969).

2.2 Soils

Soils on the property belong to the ***Cropley Series*****,** which are very deep, well drained soils developed on nearly level to moderately sloping alluvial fans and valley floors in alluvium from mixed materials. They are characterized by dark gray, fine textured, angular blocky, neutral surface layers, with grayish brown, fine textured, massive, moderately alkaline and calcareous subsoils, over grayish brown moderately fine textured, massive, strongly calcareous substrata; and, ***Gilroy Series***, which are moderately deep to deep, well-drained residual soils developed on gently rolling to steep uplands on basic igneous rock. They are characterized by dark grayish brown, medium to moderately fine textured, granular, slightly acid surface soils, brown moderately fine textured angular blocky, medium acid subsoils resting on fractured basalt and volcanic breccia at 22-40 inches; (U.S. Department of Agriculture 1967).

2.3 Climate

The region, classified as Mediterranean warm, lies between the dry Mojave Desert and the humid Pacific Coast. It is characterized by warm, dry summers, and mild, moderately wet winters. Temperatures range from 100 degrees in July and August to the low 30s in January. Snowfall is rare and rainfall occurs normally between November and April.

2.4 Flora and Wildlife

The region supports several major plant communities including Oak Woodland, Riparian, and Sage/ Chaparral with species of sycamore, willow, alder and mulefat, white, black and coastal sage, buckwheat, poison oak, lemonadeberry, chamise, yucca, scrub oak, laurel sumac, toyon, and open grassland. Regional wildlife consists of seasonal populations of quail, rabbit, rodents, deer, lizards, snakes and numerous species of birds. Combined with coastal resources that are available less than ten miles away, the region provided an extensive resource base for prehistoric populations.

III. Cultural Overview

3.1 Prehistory/Protohistory

At Spanish Contact, the region was occupied by the Chumash, a diverse population living in settlements along the California coast from Malibu Creek to the southeast, Estero Bay in the north, Tejon Pass, Lake Casitas and the Cuyama River inland, and the islands of San Miguel, Santa Rosa, and Santa Cruz. Chumash society became more complex over the last 9,000 years. Wallace (1955) and Warren (1968) developed chronologies for the region. King (1982) proposed sequences based on changes in ornaments, beads and other artifacts. After A.D. 1000, changes in bead types suggest the operation of a highly complex economic system by the time the Spanish arrived. Following the 1542 Cabrillo voyage, many small Chumash settlements were abandoned and some of the largest historic towns were founded. This change in population distribution is attributed to growth in importance of trade centers and the development of more integrated political confederations. The Chumash economic system enabled them to make efficient use of diverse environments within their territory. Acorns and seeds were traded between the islands, mainland and interior populations who lacked marine resources traded with coastal populations for fish and other seafood. Most religious ceremonies had their roots in the Early Period when objects similar to those used historically were placed in mortuary associations or owned by religious leaders. References for the Chumash include: Carrico and Wlodarski (1983), Dillon & Boxt (1989), Grant (1978), Hudson et al. (1977), Hudson & Underhay (1978), Hudson (1979), Hudson & Blackburn (1979-87), C. King (1994, 2000), Kroeber (1925), Landberg (1965), Leonard (1971), Miller (1988), Gibson (1991), and Santa Barbara Museum of Natural History (1986, 1991).

3.2 Ethnographic Information

The Spanish viewed the Chumash as unique among California Indians due to their knowledge of the sea, canoe building expertise, ceremonial organization, their interest in acquiring and displaying possessions, willingness to work, and their extensive trade networks. According to C. King (1982) the protohistoric Chumash maintained the most complex bead money system documented in the world. Information from Schumacher & Bowers in 1877-1878, Rogers in the 1920s, Harrington in the 1930s, and Woodward & Van Valkenburgh in the late 1920s and 1930s, suggests that the Chumash were divided into political provinces, with each containing a capital where villages now exist. Based on C. King (1975), and Applegate (1974, 1975) the following placenames exist in the region:

Alqilko'wi	"white of the eye" - Village in Little Sycamore Canyon, west of Point Dume
Humaliwo	"[The surf] sounds loudly" - Village at what is now Malibu
Lisiqishi	A village at Arroyo Sequit, west of Point Dume
Lohostohni	A village at Trancas Canyon, west of Point Dume
Muwu	"beach" - Village at what is now the mouth of Mugu Lagoon
Niko	"water?" - A place in Malibu, east of Point Dume

Seq'is	"beachworm" - now Arroyo Sequit
Shuwalahsho	"sycamore" - Village in Big Sycamore Canyon
Sumo	"abundance" - village at mouth of what is now Zuma Canyon

3.3 History

From the voyages of Cabrillo in 1542 and Vizcaino in 1602 through the Mexican and American Periods, land use patterns changed little in the Santa Monica Mountains. The Portola-Crespi Expedition of 1769 passed through Calabasas and Agoura while returning to San Diego. Juan Bautista de Anza (1773-1775/1776) helped establish the Franciscan missions and Spanish settlements in the region, and opened the door to future development of the region. A branch of the El Camino Real passed through Calabasas and Agoura after leaving the San Fernando Valley, a route that was frequently traveled by Native American, soldier, explorer and civilians. Today, the Ventura Freeway (Highway 101) follows the former alignment of the El Camino Real. By the 1840's and 50's, cattlemen, sheepherders, squatters and ranch owners were acquiring portions of former Mexican land grants in the region. Legendary landowners such as Miguel Leonis the co-owner (along with his wife Espiritu), of Rancho El Escorpion to the north of the project area, Domingo Carrillo and Nemisio Dominguez of Rancho Las Virgenes, and Matthew Keller of Rancho Topango Malibu Sequit, owned much of region. To the west, Don Pedro Alacantara Sepulveda built an adobe (which still stands, and is under the jurisdiction of the State Park system) for his wife Maria Magdalena Soledad Dominguez circa 1853. Under the direction of King Philip of Spain, Rancho Las Virgenes, Rancho El Paraje de Las Virgenes or El Rancho de Nuestra Senora La Reina de Las Virgenes as it was first called, was granted to Miguel Ortega. It was one of the smallest of all the California grants, consisting of only 17,760 acres. Later, under the United States flag, the grant was filed under the ownership of Dona Maria Antonia Machado del Reyes. Her heirs, Jose Reyes and Maria Altgracia Reyes de Vejar, built a home of adobe, "The Reyes Adobe", close to a natural spring near Strawberry Peak, and it was last owned by Jacinta Reyes.

According to the City of Agoura Hills website (www.ci.agoura-hills.ca.us), Don Pedro (Pierre) Agoure came to California when he was 17 in 1871. He was a shepherd and swashbuckler. The son of a French farmer, he adopted the style of the Spanish, tacked a "Don" to his name and used the name Pierre. By the early 1900s Agoura was used as a stage stop, having one of the wells used to provide water for travelers located where Agoura and Cornell Roads meet. Travelers enjoyed Ladyface Mountain, which was a Chumash lookout. Folklore suggests that Ladyface was named because of the profile resembled a lady lying on her back and searching the heavens for the return of her lover. During 1924, Ira and Leon Colodny purchased the George Lewis Ranch in what is now known as Old Agoura. This land was known as Independence Acres. Shortly thereafter, this area became known as "Picture City" and was used for many backdrops for motion pictures. In 1928 the Postal Department selected the name of Agoure and chose to change the last letter "e" to an "a" for ease of pronunciation. During 1955, the first water started flowing into the Las Virgenes area, and in 1959 the Las Virgenes Municipal Water District was formed. During the late 1960s the Hillrise, Liberty Canyon and Lake Lindero housing tracts were begun. During the 1970's, schools and shopping centers were constructed. During 1982, the residents of the City of Agoura Hills voted in favor of cityhood by a 68% majority. Agoura Hills became the 83rd City in Los Angeles County. Today large portions of land in the region are protected by the Santa Monica Mountains National Recreation Area for the enjoyment of all.

IV. Background Research Synthesis

A record search performed on September 22, 2015, by professional RPA-certified archaeologist Wayne Bonner, at the South Central Coastal Information Center, California State University, Fullerton (SCCIC), indicated that no previously recorded prehistoric or historic archaeological sites or isolates exist on the property. Also, the following results apply within a ½ -mile radius of the subject property:

- Fourteen prehistoric archaeological resources are recorded: CA-LAN-320; -321; -432; -462; -671; -776; -842; -970; -971; -1021;-1024; -1027; -1069; and -1236.
- CA-LAN-1021, which was recorded in 1979, is situated roughly 400-feet to the south of the subject property, and 126 stone tools and debitage were collected during 1979, along with three pieces of large burned mammal bone. Major disturbances occurred to the site during the construction of Agoura Road and the completion of Hidden Hills Trail Camp where road clearance and landscaping occurred. During 1988, additional testing was performed by Singer and an assortment of tools, debitage, mammal and fish bone were recovered. Woodworking, tool maintenance and hunting seemed to be the primary activities taking place at the site over 1000 years ago.

- CA-LAN-1027 was recorded by Griff Coleman in 1972. The resource contained a midden component and numerous andesite and chert flakes and cores. During 1979, Clay Singer and Jamie Karl noted that the archaeological site covered a graded terrace immediately south of Agoura Road. The upper portion of the site had been graded and used to level the ground surface. Fire-affected rock, fused shale, chert, quartzite, chalcedony and andesite flakes, shellfish, mammal bone, awls, projectile bones and human remains were noted. Dr. Chester King, who visited the site in 1984, noted artifacts and human remains on the surface.
- No historic archaeological resources were identified.
- Twenty-six prior investigations have been conducted (Atlantis Scientific 1977; Barkley & Cannon 1982; Brock & Van Horn 1980; Brown 1981; Chace 1979; D'Altroy 1976; Greenwood 1976; Hatheway & McKenna 1989a,b; Kirkish 1978; Leach 1980; Maki & Carbone 1996; Padon 1978; Rosen 1979; Rosen & Clewlow 1975; Scientific Resource Surveys 1979; Singer 1979a,b; Singer & Atwood 1988, 1989; Tartaglia 1977; Van Horn 1985; Webb and Romani 1982; and, Wlodarski 1996, 2003, 2004).
- None of these prior investigations encompassed the project area; therefore, the SCCIC mandated a Phase 1 Archaeological Study for the subject property.
- No National Register of Historic Places are identified (10/15/2004 with supplements to date).
- No California Register of Historic Resources exists (1992, with supplemental information to date).
- No California Historical Landmarks are listed (1995, with supplemental information to date).
- No California Points of Historical Interest are noted (1992, with supplemental information to date).
- No California State Historic Resources Commission issues are noted.
- No listed properties in the Office of Historic Preservation Historic Property data file are identified.
- No Archaeological Determinations of Eligibility are listed.

Additional information obtained from The Geography Department Map Reference Center, California State University Northridge, and the Los Angeles County Archives Project (Historical Records of Los Angeles County) follows:

- Township-Range Plat Map Surveys by, Henry Washington (1853), Henry Hancock (1854), J.E. Terrell (1861), G.H. Thompson (1870), J.R. Glover (1895) and M.E. Reilly (1895);
- 1853-Plat of the Rancho Las Virgenes (claimant: Maria Antonio Machado);
- 1874-Plat of the Rancho Las Virgenes (surveyed by W.P. Reynolds);
- 1876-Plat of the Rancho Las Virgenes (surveyed by John Goldsworthy);
- 1878-Plat of the Rancho Las Virgenes (confirmed to Maria Antonia Machado on July 11, 1878);
- 1879-Plat of the Rancho Las Virgenes (surveyed by William Minto in February, 1879);
- 1881-Plat Rancho Las Virgenes (surveyed by William Minto, June 10, 1881);
- Map of the County of Los Angeles, California (Stevenson, 1881);
- Map of the County of Los Angeles, California (Rowan, 1888);
- Map of the Reservoir Lands in the County of Los Angeles (Seebold-1891);
- Calabasas 15 minute USGS Topographic Map (1903 edition - surveyed in 1893, 1900-1901);
- Camulos 15 minute USGS Topographic Map (1903 edition - surveyed in 1893, 1900-1901);
- Triunfo Pass 15 minute USGS Topographic Map (surveyed in 1921 and 1943);
- Dry Canyon 15 minute USGS Topographic Map (1932 edition - surveyed in 1925 and 1929).

V. Field Reconnaissance Program

5.1 Methodology

A field inspection which entails the examination of all land surfaces that can reasonably be expected to contain cultural resources without major modification of the land surface was performed for the parcel on September 23, 2015.

5.2 Crew

The crew consisted of Principal Investigator, ***Robert Wlodarski*** who has a: BA in History and Anthropology and an MA in Anthropology from California State University Northridge (CSUN); 43 years of professional experience in California archaeology; over 1600 projects completed to date; certification in field archaeology, and theoretical/ archival research by the Register of Professional Archaeologists [RPA], registered as a California historian by the California Committee for the Promotion of History [CCPH]; a member of the National Council on Public History; and, meets National Park Service standards & guidelines for Archaeology and Historic Preservation; and Project Manager,

Lauren DeOliveira, who has a BA in Anthropology from California State University Channel Islands (CSUCI); has been working in California archaeology since 2006; is currently employed by HEART; is completing her requirements for a MA in Anthropology from CSUCI; and is qualified in field archaeology by the RPA.

5.3 Results

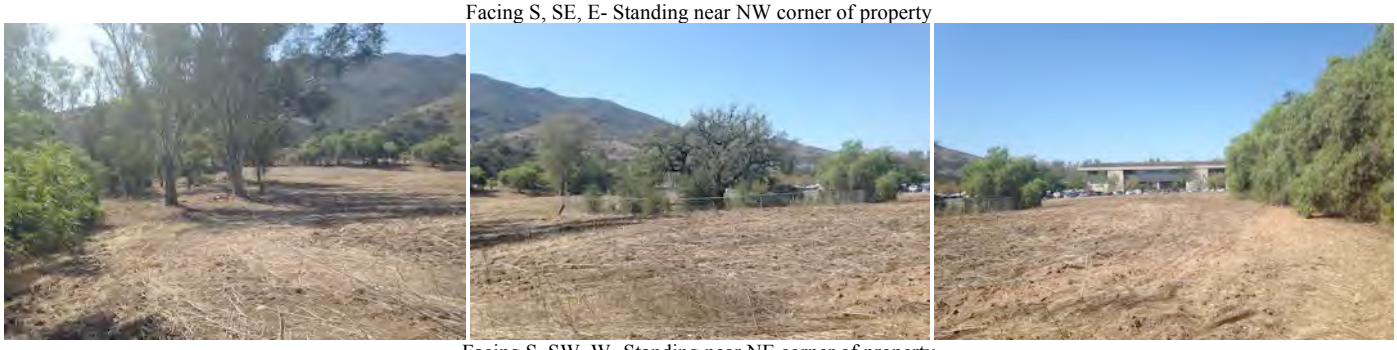
The parcel was inspected for surface indications of cultural resources. All exposed terrain and fortuitous exposures such as rodent burrows and excavated or cleared areas, were thoroughly inspected for signs of cultural resources. The following observations were made while in the field:

- The property is bordered on the north by Highway 101, on the south by Agoura Road, on the west by 29851 Agoura Road (Bank of America Corporate offices), and on the east by 29525 Agoura Road (the Agoura Hills Animal Shelter).
- The property appears to have been disked recently.
- A large fenced in Oak tree is located along the north of the property.
- Large pepper and eucalyptus trees are located along the northern, eastern and southern perimeters of the property.
- An old baseball field with backstop fence, bleachers, brick BBQ and cargo container is situated near the southwestern portion of the property, parallel to the Bank of America parking lot.
- A large concrete, subterranean, flood control basin is located to the southeast of the baseball field.
- Naturally occurring quartzite, conglomerate/breccia, and sandstone were seen on the property.
- The property has been extensively disturbed in the past by grading, disking and prior development activities

The results of the Phase 1 archaeological study yielded no indications of prehistoric or historic archaeological resources within the surveyed area. Plate 1 illustrates selected views of the property.

Plate 1: Selected Views of the Subject Property

Facing S, SE, E- Standing near NW corner of property



Facing S, SW, W- Standing near NE corner of property

Facing E, NE, SE- Standing along the western perimeter of the property, parallel to the Bank of America parking lot

Facing W, SW, NW- Standing along the eastern perimeter of the property, parallel to the Animal Shelter.

Facing N, NW, W- Standing near the SE corner of the property, parallel to Agoura Road

Facing E, NE- Showing baseball field area with bleachers and built in BBQ

Facing N, NE, E- Standing near SW corner of property, behind the baseball field area

Facing northeast and the LA flood control basin to the SE of the baseball field; Facing N, NW, NE- across Agoura Road showing the front of the property

5.4 Recommendations

Any proposed improvements within the parcel will have no adverse impacts on known cultural resources. No additional hindrances affected the results of this survey, and no conditions are placed on the project based on the results of this study.

The nature of a walkover can only confidently assess the potential for encountering surface cultural resource remains; therefore, customary caution is advised in developing within the project area. Should unanticipated cultural resource remains be encountered during land modification activities, work must cease, and the Planning Department of the City of Agoura Hills, County of Los Angeles shall be contacted immediately to determine appropriate measures to mitigate adverse impacts to the discovered resources. Cultural resource remains may include artifacts, shell, bone, features, foundations, trash pits and privies, etc.

If human remains are found during excavations related with this project, all work must halt, and the County Coroner must be notified (Section 7050.5 of the California Health and Safety Code). The coroner will determine if the remains are of forensic interest. If the coroner and supervising archaeologist, determine that the remains are prehistoric, the Coroner will contact the Native American Heritage Commission (NAHC). The NAHC will be responsible for designating the most likely descendant (MLD), who will be responsible for the disposition of the remains, as required by Section 5097.98 of the Public Resources Code. The MLD should make his/her recommendations within 48 hours of their notification by the NAHC. This recommendation may include A) the nondestructive removal and analysis of human remains and items associated with Native American human remains; (B) preservation of Native American human remains and associated items in place; (C) relinquishment of Native American human remains and associated items to the descendants for treatment; or (D) other culturally appropriate treatment.

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Geotechnical Report and City Geotechnical Consultant's Memorandum

APPENDIX G

FAX TRANSMITTAL

Fax Number: **(818) 597-7352**

To: City of Agoura Hills

Attention: Valerie Darbouze

Number of Pages Including Cover Sheet: 5

Date: February 5, 2015

Project No. #: 05.00103.0128

Comments

Two hard copies will be mailed to you.

Signed: Ali Abdel-Haq

If an error occurs during transmission, please call Ali Abdel-Haq at (805) 496-1222

Date: February 5, 2015
GDI #: 05.00103.0128

CITY OF AGOURA HILLS - GEOTECHNICAL REVIEW SHEET

To:	Valerie Darbouze
Project Location:	29621 Agoura Road, Agoura Hills, California.
Planning Case #:	01048-2015 & OAK-01049-2015
Building & Safety #:	None
Geotechnical Report:	Gorian and Associates, Inc. (2014), "Geotechnical Site Evaluation Update and Responses to the City of Agoura Hills Geotechnical Review of October 30, 2008, Agoura Landmark, 29621 Agoura Road, City of Agoura Hills, California," Work Order 2675-MT-0-101, dated December 12, 2014. Gorian and Associates, Inc. (2008), "Geotechnical Site Evaluation Update, Agoura Landmark, 29621 Agoura Road, Agoura Hills, California," Work Order 2675-MT-0-100, dated August 14, 2008.
References:	see attached list.
Plans:	Delane Engineering (2014) "Site Plan/Architectural Review (SPAR) For Agoura Landmark, Sheets 1 to 5", Plot Date: 12-11-2014. Lanet/Shaw Architects, Inc. (2014), "Architectural Drawings, Agoura Landmark, 29621 Agoura Road, Agoura, CA 93033, Sheets T.0, A1.01, A2.01, A2.04, A3.01, A3.04, A4.01, A4.03, A5.01, A5.04, A6.01-A6.04, and AD.02," dated Project No.: 1325, December 23, 2014.
Previous Reviews:	October 30, 2008 and April 29, 2009.

Findings

Planning/Feasibility Issues	Geotechnical Report
☒ Acceptable as Presented	☐ Acceptable as Presented
☐ Response Required	☒ Response Required

Remarks

Gorian and Associates, Inc. (GAI; consultant) provided a "Geotechnical Site Evaluation Update" for the proposed Agoura Landmark Development at 29621 Agoura Road, City of Agoura Hills, California. The update report includes responses to comments in the geotechnical review letter dated October 30, 2008 by the City of Agoura Hills. The proposed development includes the construction of several two-story light industrial/office buildings. The buildings have office areas in the front and industrial areas in the back. No subterranean parking is currently proposed. Improvements associated with the proposed development include retaining walls less than 6 ft high, access and parking areas, and landscaping. Information regarding the need for an on-site storm drainage disposal system is not provided.

The City of Agoura Hills – Planning Department reviewed the above-referenced reports as well as reports in the attached list of references including the report by Delane Engineering (Delane) from a geotechnical perspective for compliance with applicable codes, guidelines, and standards of practice. The main focus

of reviewing the report by Delane is to identify the need for an on-site storm water disposal system for compliance with the Best Management Practices (BMP). We also contacted Mr. Scott Uhles at Delane on February 4, 2015 to further discuss this issue. Based on our discussion with Mr. Uhles, it is our understanding that an on-storm water site infiltration system would be proposed and indicated in future plans.

GeoDynamics, Inc. (GDI) performed the geotechnical review on behalf of the City. Based upon a review, we recommend the Planning Commission consider approval of Case # 01048-2015 & OAK-01049-2015 from a geotechnical perspective. The Consultant should respond to the following Report Review Comments prior to Building Plan Approval. Plan-Check comments should be addressed in Building & Safety Plan Check, and a separate geotechnical submittal is not required for plan-check comments

REPORT COMMENTS

1. The consultant should review final development plans, including grading plans when they become available, and provide additional recommendations as necessary to address any significant changes to the plans.
2. Drilled borings at the site indicate up to 14 ft of uncertified fill is present at the site. A total of two consolidation/hydrocollapse tests were performed as part of the subsurface investigation at the site. One test was performed on a sample obtained from the underlying fill while the other sample was obtained from the underlying alluvium. The consultant recommends that "*Within the building areas, all fill soils should be removed to firm in-place native alluvium or bedrock. Also, the minimum removals should be 10 feet from the existing grade or to 3 feet below the bottom of the footing, whichever is greater.*" Based on the above, the consultant should address the following items regarding the recommended removals:

    a) The sample of the underlying alluvium exhibited about 1.9% hydrocollapse when tested under a normal pressure of 1 ksf (see earth system report, Laboratory Testing Section). If the sample was tested at a normal pressure comparable to the post construction pressure, a higher hydrocollapse potential would be anticipated. Thereupon, the potential for hydrocollapse settlement of any alluvial deposits that would remain in-place should be evaluated at each building. Mitigation measures should be recommended as necessary.

    b) If some of the underlying alluvium is to remain in place, the consultant should delineate in each building location, the anticipated depth to competent alluvium. Any conclusion in this regard should be substantiated with data and analyses as necessary.

    c) The consultant should indicate on the grading plan the vertical and horizontal limits of the recommended overexcavation.

3. The consultant recommends on page 9 of the above-referenced report that "Adjacent the existing box culvert, footings should be embedded below a 2(H):1(V) line or the load….." The consultant should clarify the point from which the 2:1 line should be projected.

Plan-Check Comments

1. The name, address, and phone number of the Project Geotechnical Consultant and a list of all the applicable geotechnical reports shall be included on the building/grading plans.
2. The grading plan should include the limits and depths of overexcavation of the building pad areas as recommended by the Consultant.
3. The following note must appear on the grading and foundation plans: "*Tests shall be performed prior to pouring footings and slabs to determine the expansion index of the supporting soils. If the expansion index is greater than 20, foundation and slab plans should be revised accordingly*."
4. The following note must appear on the grading and foundation plans that states: "*Excavations shall be made in compliance with CAL/OSHA Regulations*."

5. The following note must appear on the foundation plans that states: "*All foundation excavations must be observed and approved, in writing, by the Project Geotechnical Consultant prior to placement of reinforcing steel*."
6. Foundation setback distances from ascending and descending slopes shall be in accordance with Section 1806.5 of the City of Agoura Hills Building Code, or the requirements of the Project Geotechnical Consultant's recommendations, whichever are more stringent. The required minimum foundation setback distances shall be clearly shown on the foundation plans, as applicable.
7. Foundation plans and foundation details shall clearly depict the embedment material and minimum depth of embedment for the foundations.
8. Drainage plans depicting all surface and subsurface non-erosive drainage devices, flow lines, and catch basins shall be included on the building plans.
9. Final grading, drainage, shoring, and foundation plans shall be reviewed, signed, and wet stamped by the project geotechnical consultant.
10. Provide a note on the grading and foundation plans that states: "*An as-built report shall be submitted to the City for review. This report prepared by the Geotechnical Consultant must include documentation of any foundation inspections, the results of all compaction tests as well as a map depicting the limits of fill, locations of all density tests, outline and elevations of all removal bottoms, keyway locations and bottom elevations, locations of all subdrains and flow line elevations, and location and elevation of all retaining wall backdrains and outlets. Geologic conditions exposed during grading must be depicted on an as-built geologic map*."

If you have any questions regarding this review letter, please contact GeoDynamics, Inc. at (805) 216-6160.

Respectfully Submitted,

GeoDynamics, INC.

Ali Abdel-Haq
Geotechnical Engineering Reviewer
GE 2308 (exp. 12/31/15)

Christopher J. Sexton
Engineering Geologic Reviewer
CEG 1441 (exp. 11/30/16)

REFERENCES

Delane Engineering (2014), “Preliminary Drainage and Best Management Practices Report For Agoura Landmark, Agoura Hills, California,” Project No.JN-01-100066, dated December 11, 2014.

Gorian and Associates, Inc. (2006b), “Revised Geotechnical Map, Improvements to Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, CA,” Work Order 2675-2-0-102, dated January 12, 2006.

Gorian and Associates, Inc. (2006a), “Geotechnical Site Investigation Supplement, Proposed 1-1/2(H):1(V) Cut Slope South Side of Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, CA,” Work Order 2675-2-0-101, dated January 11, 2006.

Gorian and Associates, Inc. (2005d), “Geotechnical Site Investigation, Proposed Cut Slope South Side of Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, CA,” Work Order 2675-2-0-10, dated December 2, 2005.

Gorian and Associates, Inc. (2005c), “Response to City of Agoura Hills – Geotechnical Review Sheet dated July 20, 2005, Agoura Oaks Plaza, 29857 Agoura Road, Agoura Hills, California,” Work Order 2675-0-0-10, Log Number 24010, dated July 15, 2005 (revised August 11, 2005).

Gorian and Associates, Inc. (2005b), “Geotechnical Site Investigation Update, Agoura Oaks Plaza, 29857 Agoura Road, Agoura Hills, California,” Work Order 2675-0-0-10, Log Number 23956, dated July 12, 2005.

Earth Systems Southern California (2005a), “Addendum Letter – Response to Geotechnical Reviewer, Proposed Commercial Development, Lot 3, PM Per BK 157 P 50-52 of PM, Vicinity of 29851 Agoura Road, Agoura Hills, California,” PL-06405-01, dated June 1, 2005.

Earth Systems Southern California (2004), “Preliminary Geotechnical Engineering Report, Proposed Office Building, Lot 3, PM Per BK 157 P 50-52 of PM, Vicinity of 29851 Agoura Road, Agoura Hills, California,” PL-06405-01, dated November 10, 2004.

Development Resource Consultants, Inc., “Conceptual Grading Plan, 4 Sheets”, 30-scale, dated March 4, 2005.

GEOTECHNICAL SITE EVALUATION UPDATE
AGOURA LANDMARK
29621 AGOURA ROAD
AGOURA HILLS, CALIFORNIA

prepared for

Martin Teitelbaum Construction, Inc.
569 Constitution Ave., Suite H
Camarillo, California 93012

GORIAN & ASSOCIATES, INC.

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GORIAN & ASSOCIATES, INC.

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December 12, 2014

Martin Teitelbaum Construction, Inc.
569 Constitution Ave., Suite H
Camarillo, California 93012

Work Order: 2675-MT-0-101

Attention: Martin Teitelbaum

Subject: **Geotechnical Site Evaluation Update and Responses to the City of Agoura Hills Geotechnical Review of October 30, 2008, Agoura Landmark, 29621 Agoura Road, City of Agoura Hills, California**.

1. INTRODUCTION

This geotechnical update report was prepared to address the revised development plan for 29621 Agoura Road within the City of Agoura Hills, California. The revised development as shown on our Geotechnical Map, Plate 1 consists of a series of light industrial / office buildings centered around an existing large oak tree with a stand-alone building on the south side of the existing box culvert in the southern portion of the site. The buildings with have office areas in the front with shop areas in the rear. This building layout will not have subterranean construction as previously proposed for the prior development layout.

Gorian and Associates, Inc. previously reviewed and evaluated the property for the prior development plans as outlined in the attached referenced list. This update report contains a summary of our site evaluations including research and engineering analyses with regards to the current development plan. In addition, it contains our conclusions and geotechnical recommendations, which should be implemented during design and construction of the project. Responses are also presented herein to the last geotechnical review letter dated October 30, 2008 from the City of Agoura Hills. A copy of that review letter is attached for reference. Remedial grading is needed to prepare the site as outlined herein to prepare the site for the proposed construction.

2. PRIOR EVALUATIONS

Gorian and Associates, Inc. initially evaluated the site at 29621 Agoura Road for our referenced report dated July 12, 2005 to address the use of conventional foundations. This report was approved for planning and feasibility issues in the city of Agoura Hills geotechnical review letter dated July 20, 2005 prepared by Bing Yen & Associates, Inc, which references the Earth Systems Southern California (ESSC) report of November 10, 2004. Our July 12, 2005 report is an update of the ESSC site evaluation report, in which a pile foundation system was considered for the support of the building. The ESSC report was approved in the geotechnical review letter by Bing Yen & Associates, Inc. dated July 11, 2005. The Earth Systems report is also listed in the approval letter of July 20, 2005. Gorian and

Associates, Inc. also prepared reports dated December 2, 2005, January 11, 2006, and January 12, 2006 for the improvements to Agoura Road. These reports were found acceptable in the City of Agoura Hills geotechnical review letter of January 19, 2006. A list of references follows the text of this report.

3. PROPOSED DEVELOPMENT

The proposed Agoura Landmark as previously described above in the introduction is a light industrial / office space development consisting of Buildings A through F. Structural loads are anticipated to range from 2000 to 3000 pounds for wall footings and 120 to 150 kips for column loads. The majority of the foundation will be conventional with interior concrete slabs on grade. However, adjacent the existing box culvert deepened footings will be necessary to minimize the impact of the buildings on the box culvert. The approximate location of the box culvert is shown on Plate 1.

Parking and drive areas are proposed adjacent the buildings. In addition to the required remedial grading, site grading is will consist of minor cuts and fills with slopes at a 2(h):1(v) gradient. The proposed layout is shown on the attached Geotechnical Map, Plate 1, which is based on the preliminary grading plan prepared by Delane Engineering.

4. SCOPE OF GEOTECHNICAL PROFESSIONAL SERVICES

The scope of services described below was performed to provide geotechnical engineering recommendations for design and construction of the proposed commercial development as described herein. The services were performed under the direction of a State registered geotechnical engineer.

Archival Review

Readily available geotechnical information in our files was reviewed and the pertinent data was used in the current geotechnical evaluation of the proposed construction. The logs of the previous borings by Earth Systems Southern California (ESSC) are presented in Appendix A with the approximate boring locations shown on Plate 1.

Field Reconnaissance

An engineer from our office visited the site to observe the surficial condition of the site.

Engineering Evaluation and Analyses

The results the above tasks were used in our engineering evaluation of the proposed development to develop geotechnical design and construction recommendations.

Report Preparation

This report contains our geotechnical recommendations regarding remedial grading and building design and construction.

5. SITE DESCRIPTION

The approximate 5.17 gross acre site (Assessor's Parcel No. 2061-003-027) is on the north side of Agoura Road midway between Reyes Adobe Road and Kanan Road in the City of Agoura Hills, California. The Ventura freeway (Hwy 101) forms the north boundary of the site. To the east is the Los Angeles County Agoura Hills Animal Shelter and to the west is a two-story office building with surface parking. The roughly rectangular-shaped site is currently unoccupied except for the remnants of a surface recreational facility (ballpark and running track). A large oak tree is in the central portion of the site. The remainder of the site is covered by weeds except along the southern boundary that is heavily brushed. Access to the property is available from Agoura Road on the south side and from the parking lot to the west. Topographically, the majority of the property consists of relatively flat ground at an elevation of approximately 875 feet above mean sea level. Fills have been placed to produce the noted grade. The rear (north end) of the lot slopes up approximately 8 feet at a gradient of approximately

4(h):1(v). Lindero Canyon Creek previously ran through the site and has been channelized below grade in a reinforced concrete box within the southern portion of the site. No significant changes have occurred to the site since our prior report.

6. SITE HISTORY

Earth Systems Southern California (ESSC) for the referenced November 10, 2004 report provided the following site history. Based on the shape of the site topography, including the presence of the oak tree within a depression, it appears fill was placed on the site to build up the ground level at some time in the past. (The observations from the exploratory borings excavated by ESSC also suggest the presence of fill). Older topographic mapping (prior to fill placement) suggests 10 feet or more of fill especially in the central and easterly parts of the site. Review of previously completed reports and maps available at the City of Agoura Hills indicates geotechnical evaluation was completed at the subject site around 1979 (Geosoils, 1979). A geotechnical evaluation was conducted in 1995 for the neighboring property at 29851 Agoura Road (Smith-Emery, 1995) in which a compaction report is referred to dated 1980 for the site, however, the compaction report was not available from the City. The reviewed reports indicate the upper site soils consisted of silts and clays with expansion indices (EI) that ranged from 93 to 173. The reviewed reports also indicate the neighboring property at 29851 Agoura Road experienced significant distress relating to poor drainage, over-watering, leaking pipes, under-designed retaining walls, shallow foundations, and loose backfill. A large portion of the observed problems was attributable to soil-related issues primarily expansive soils.

7. SITE GEOLOGY

The site is along the northern margin of the Santa Monica Mountains, part of the Transverse Ranges geomorphic province. Composed of parallel, east-west trending mountain ranges and sediment-filled valleys the Transverse Ranges is one of the most active tectonic/seismic areas of the United States. The distinctive geologic structure of the Transverse Ranges is dominated by the effects of north-south compressive deformation that result in thrust faulting, strike-slip faulting and bedrock folding. These active geologic features are attributable to convergence between the “Big Bend” of the San Andreas Fault and northwestern motion of the Pacific Plate and have caused thrust fault related earthquakes such as the 1994 Northridge, the 1971 San Fernando, and the 1987 Whittier Narrows earthquakes.

Geologic units at the site consist of clayey artificial fill, thin clayey alluvial soils, and Tertiary Topanga formation (Tt) clay shale bedrock. Outcrops of volcanic bedrock (Tertiary Conejo Volcanics, Tcvb) are present within the site vicinity.

No active or potentially active faults are known to traverse the site and the project area is not currently within an Alquist-Priolo Earthquake Fault Zone as defined by the State Geologist (Hart, et al; 2007). The potential for ground rupture on site due to faulting during the lifetime of the project is considered remote. The site does not fall within a liquefaction hazard zone or slope hazard zone as currently identified by CDMG on the Seismic Hazard Zones Thousand Oaks Quadrangle map dated November 17, 2000.

The Conejo Valley/Santa Monica Mountains area is in a seismically active region prone to occasional damaging earthquakes. The destructive power of earthquakes can be grouped into fault-rupture, ground shaking (strong motion), and secondary effects of ground shaking such as tsunami, liquefaction, settlement, landslides, etc. The hazard of fault-rupture is generally thought to be associated with a relatively narrow zone along well-defined pre-existing active or potentially active faults. No doubt there are and will be exceptions to this, because it is not possible to predict the precise location of a new fault where none existed before (CDMG, 1975).

Based on the latest United States Geological Survey (USGS) interactive web application, *2008 Interactive Deaggregations* https://geohazards.usgs.gov/deaggint/2008/, probabilistic seismic hazard analyses (PSHA) predict the Design Basis Earthquake peak ground acceleration will be on the order of

0.41g for the stiff soil-soft bedrock (Vs=350 m/sec) conditions of the site (Lat. 34.1462°N, Long. 118.7706°W). The Design Basis Ground Motion is defined as having a 10% chance of being exceeded in 50 years (475 year return period) based on probabilistic analyses. The mean magnitude from this PSHA is 6.8 (Mw) with a mean distance of 20.2 km from the property with a modal magnitude of 7.0 (Mw) and a modal distance of 13.9 km from the property. For liquefaction/seismic settlement evaluations the 2013 CBC / ASCE 7-10 designates a ground motion with a 2% chance of being exceeded in 50 year (2475 return period) be utilized. The mean magnitude from this PSHA is 6.8 (Mw) with a mean distance of 15.7 km from the property. The modal magnitude from this analyses is 7.0 (Mw) and the modal distance is 13.9 km from the property.

Secondary effects of strong ground motion include tsunami, seiche, liquefaction, seismic settlement, mass wasting, and flooding from dam failure. Tsunami, seiche, seismically induced mass wasting, and flooding from dam failure are not hazards inherent to the site. Because of the shallow depth to bedrock and the expansive/cohesive nature of the residual soils, the site is not considered susceptible to liquefaction and seismic settlement.

7.1 SUBSURFACE CONDITIONS

The following descriptions of the subsurface conditions were summarized in the referenced November 10, 2004 report by Earth Systems Southern California (ESSC).

Artificial fill soils (af) were encountered in 6 out of the 8 exploratory borings excavated by Earth Systems Southern California (ESSC) for the referenced November 10, 2004 report. The depth of (existing) fill observed ranged from approximately 8 to 9 feet at the locations of borings B2 - B6 to approximately 14 feet around boring B7. These fill soils were found to consist predominantly of moderately to very compact silty clay and sandy clay (CL and CH soil types based upon the Unified Soil Classification System). Based upon results of the Expansion Index (EI) Tests (ASTM D 4829) conducted for this evaluation, the on-site fill soils were observed to have a “medium” (EI = 51 to 90) expansion potential. However, as discussed under Site History above, previous geotechnical reports for the site and vicinity indicated “high” to “very high” (EI = 91 to >130) expansion potential.

Native quaternary alluvial soils (Qa) were found to consist predominantly of dense to very dense clayey sands and stiff to hard sandy clay (SC and CL soil types). Expansion Index (EI) tests conducted on the alluvial soils for this evaluation indicated a “very low” (EI = 0 to 21) expansion potential for those materials.

Bedrock of the Upper Topanga Formation (Tt) was encountered in four of the eight borings at depths ranging from 13 to 15 feet. The bedrock was observed to be weathered, laminated clay shale. The Logs of the Test Borings in Appendix A contain more detailed descriptions of the soils and bedrock encountered.

7.2 GROUNDWATER

No free groundwater was encountered to the maximum depth drilled of 51 feet for the referenced ESSC report. Based on the Seismic Hazards report for the Thousand Oaks Quadrangle (CDMG, 2000), the historic shallowest groundwater in the vicinity of the project site could be as shallow as approximately 10 feet. Fluctuations in groundwater levels may occur due to variations in rainfall, regional climate, and other factors.

8. RESPONSES TO GEOTECHNICAL REVIEW LETTER DATED OCTOBER 30, 2008

PLANNING/FEASIBILITY COMMENTS

COMMENT 1
The submitted update report appropriately references previous geotechnical reports prepared for the previously proposed development at the site and provides updated geotechnical recommendations. The consultant states on page 4 of the above-referenced report that "The logs of Test Borings in Appendix A contain more detailed descriptions of the soils and bedrock encountered." No boring logs or laboratory test data were included with the above-referenced geotechnical update report. Considering that the proposed development is a new project significantly different from the previously proposed one, the consultant should provide a standalone geotechnical report that incorporates and includes all previously obtained geotechnical data and laboratory test results. The report should address all the various aspects of the new development and provide additional geotechnical recommendations as necessary.

RESPONSE
This report is intended to be a standalone report and is an update of prior reports submitted for review by the City, see Site History, Section 6 herein and addresses the current development plan. As requested the boring logs and laboratory testing from the prior report prepared by Earth Systems Southern California (ESSC, November 10, 2004) are attached in Appendices A and B, respectively.

COMMENT 2
The consultant recommends on page 8 that footings adjacent to descending slopes should be setback from the descending slope per the requirements of the California Building Code (CBC). All foundations setback from slopes should be per the City of Agoura Hills building requirements, which is more stringent than the CBC requirements.

RESPONSE
The reviewer is directed to Section 9.5.3 herein titled *Footing Setback to Slopes*.

COMMENT 3
The recommended seismic earth pressure value of 15 pcf to be used in the design of retaining walls provided on page 11 appears to below. The consultant should provide calculations to substantiate this value or revise the recommended value as necessary.

RESPONSE
For the revised site development, retaining walls if required are not anticipated to be over 6 feet high and will therefore not require a seismic pressure in the wall design.

COMMENT 4
The consultant should evaluate the potential for settlement of foundations when development plans become available. Settlement estimate should be substantiated with site-specific geotechnical data and analyses. Mitigation measures should be recommended as necessary.

RESPONSE
As stated in Section 9.5.3 herein titled *Estimated Foundation Settlements* "Foundation settlement is anticipated to be minor and is not anticipated to exceed one inch. However, anticipated settlement should be reevaluated when the actual foundation loads are available.

COMMENT 5
The consultant should evaluate the potential for lateral surcharge on subterranean retaining walls due to adjacent foundations/structures when foundation plans become available. Mitigation measures should be recommended as necessary.

RESPONSE
Subterranean retaining walls have been removed from the current site development plan.

PLAN-CHECK COMMENTS
Plan Check Comments 1 through 15 are acknowledged and will be complied with at the appropriate design stage and by the appropriate design professional as the entitlement process moves forward.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 GENERAL

The site and subsurface conditions were evaluated from a geotechnical standpoint with respect to the proposed commercial complex. The project may be developed as described earlier in this report provided recommendations presented herein are followed and incorporated into the design and construction. Recommendations should be reviewed with respect to any changes in the proposed development and/or site conditions, should they occur.

9.2 SEISMIC DESIGN PARAMETERS

Structures within the site may be designed using a simplified code based approach and ground motion procedures for seismic design using the procedures in the California Building Code (CBC). Seismic ground motion values based on ASCE/SEI 7-10 are initially determined on site class B (rock) conditions. The values are adjusted to obtain the maximum considered earthquake (MCE) spectral acceleration values for the site based on its site class of D. The seismic design parameters for the site's coordinates (latitude 34.146° North and longitude of 118.770° West) were obtained from the USGS web based spectral acceleration response maps and calculator: (http://earthquake.usgs.gov/hazards/designmaps/).

CBC CHAPTER 16 TABLE/FIGURE NO.	SEISMIC PARAMETER	VALUE PER CBC
Figure 1613.5 (3)	Short Period Mapped Acceleration (S_s)	1.56g
Figure 1613.5 (4)	Long Period Mapped Acceleration (S_1)	0.60g
Table 1613.5.2	Site Class Definition	D
Table 1613.5.3 (1)	Site Coefficient (F_a)	1.0
Table 1613.5.3 (2)	Site Coefficient (F_v)	1.5
Equation 16-37	$S_{MS} = F_a S_s$	1.56g
Equation 16-38	$S_{M1} = F_v S_1$	0.90g
Equation 16-39	$S_{DS} = 2/3 S_{MS}$	1.04g
Equation 16-40	$S_{D1} = 2/3 S_{M1}$	0.60g

The purpose of the building code earthquake provisions is primarily to safeguard against major structural failures and loss of life, not to limit damage nor maintain function. Therefore, values provided in the building code should be considered minimum design values and should be used with the understanding site acceleration could be higher than addressed by code based parameters. Cracking of walls and possible structural damage should be anticipated in a significant seismic event.

9.3 SITE PREPARATION AND GRADING

9.3.1 General

The following remedial grading recommendations are for the construction of a building pads suitable for the support of the proposed structures using conventional foundations and slabs on-grade. Recommendations for remedial grading outside the building area remain as stated in the referenced report. All aspects of grading including site preparation, grading, and fill placement should be per the recommendations contained herein or the City of Agoura Hills specifications, whichever is more stringent.

9.3.2 Relative Compaction

Relative Compaction is the ratio of the in-place dry soil density to the maximum dry soil density determined in general conformance with ASTM test method D 1557-91.

9.3.3 Vegetation/Debris Removal

Before starting the removals or site processing, all major vegetation, trash, and debris should be removed from all areas to be graded.

9.3.4 Soil Removals

Within the building areas, all fill soils should be removed to firm in-place native alluvium or bedrock. Also, the minimum removal should be 10 feet from the existing grade or to 3 feet below the bottom of the footings, whichever is the deeper.

The removals should extend past the outside of the footings a minimum distance equal to the depth of removal below the footing or a minimum of 5 feet, whichever is greater. After removals are completed, a representative of this office should observe the bottom of the removal area prior to placing fill. No fills should be placed until the geotechnical observation of removal areas is completed.

Removals adjacent the oak tree or property lines may require slots or a steep temporary slope to provide the necessary removal past the footings. This should be resolved in the field when the building limits and tree drip line are surveyed and staked.

9.3.5 Processing

After completing removals, suitable in-place soils should be processed before placing fill. Processing should consist of scarification of the exposed soil to a minimum depth of 6 to 8 inches. The scarified surface should be relatively free of uneven features that would prevent uniform compaction. Soils should be moisture conditioned to slightly above the optimum moisture content and compacted to a minimum of 90% relative compaction.

9.3.6 Fill Placement

Excavated on-site soils and fill should be cleaned of major vegetation, trash, and debris prior to placement as fill. Fill soils should be placed in thin uniform lifts, brought to slightly above optimum moisture content, and compacted to a minimum of 90% relative compaction.

9.3.7 Temporary Excavations

During construction, the excavation and maintenance of safe and stable slope angles are the responsibility of the contractor, who should consider the subsurface conditions and the method of operation. All subsurface construction should conform to the requirements of OSHA. Surcharge loads should be setback from the top of temporary excavations a minimum horizontal distance equal to the depth of the cut or 10 feet, whichever is more. All excavated backfill should be properly placed and compacted.

Services of Gorian and Associates, Inc. or this report should not be construed to relieve the owner or any construction contractor from their responsibility or liabilities, or for maintaining a safe jobsite. Neither the professional activities of Gorian and Associates, Inc. nor the presence of our employees shall be construed to imply Gorian and Associates, Inc. has any responsibility for methods of work performance, superintendence, sequencing of construction, or safety in, on, or about the jobsite.

9.3.8 Utility Trenches

Backfill of all utility trenches within building, parking, and drive areas should be compacted to a minimum of 90% relative compaction.

9.4 SOIL EXPANSIVENESS

Expansion tests by ESSC (report of November 10, 2004) ranged from low to medium expansion. However, the expansion potential of the building pads should be evaluated at the end of grading. Expansive soils contain clay minerals that change in volume (shrink or swell) due to changes in the soil moisture content. The volume change is caused by the attraction of water to the clay minerals. The amount of volume change depends upon the soil swell potential, availability of water, and soil restraining pressure.

The swelling occurs when the clay soils become wet due to excessive water. Excessive water can be caused by poor surface drainage, over irrigation of lawns and planters, sprinkler or plumbing leaks, and numerous other causes.

Construction on expansive soil has an inherent risk that must be acknowledged and understood by the property owner. The recommendations herein are not intended to eliminate the effects of expansive soils. Additional recommendations can be provided to further reduce the potential for expansive soil action and inherent risk. The following should be maintained within the site.

a) Positive drainage should be continuously maintained away from structures and slopes. Ponding or trapping of water in localized areas near the foundations can cause differential moisture levels in subsurface soils. Plumbing leaks should be immediately repaired so that subgrade soils underlying the structures do not become saturated.

b) Trees and large shrubbery should not be planted where roots can grow under foundations and flat-work when they mature.

c) Landscape watering should be held to a minimum; however, landscaped areas should be maintained in a uniformly moist condition and not allowed to dry-out. During extreme hot and dry periods, adequate watering should be provided to keep soil from separating or pulling back from foundations.

9.5 FOUNDATION RECOMMENDATIONS

9.5.1 Design Data

Footings may be designed using an allowable bearing pressure of 3000 pounds per square foot (psf). The bearing pressure is for dead plus live loads and may be increased by one-third when considering wind or seismic loads. Footings should have minimum widths of 12 and 24 inches for continuous and isolated footings, respectively and should be embedded a minimum of 30 inches. Isolated footings along the perimeter of the building should be tied together using a tie-beam embedded a minimum of 30 inches depth. In addition, the interior slab-on-grade should be tied to the footings using No. 4 bars at 24 inch centers. The lowest adjacent grade is the lowest soil grade adjacent the footings, interior or exterior. Steel reinforcement should be per the structural engineer's recommendations. However, minimum reinforcement for continuous footings should consist of two number five bars in the top and bottom (minimum total of four bars).

Lateral forces on foundations may be resisted by passive earth pressure and base friction. For the sides of footings bearing against engineered compacted fill or competent native soils, the lateral passive earth pressure may be considered equal to that exerted by an equivalent fluid having a density of 250 pounds per cubic foot (pcf). Base friction may be computed at 0.3 times the normal load. Base friction and passive earth pressure may be combined without reduction.

9.5.2 Footing Setback to the Box Culvert

Adjacent the existing box culvert, footings should be embedded below a 2(H):1(V) line or the loads should be determined by recognized methods and found to be within the allowable loads for the box. The approximate location of the box culvert is shown on Plate 1.

9.5.3 Footing Setback to Slopes

Were the footing is adjacent a descending slope such as near the oak trees, it should be setback from the descending slope per the requirements of the City of Agoura Hills. The City requires "Footings shall be place into firm material and located a distance of one-half (1/2) the vertical height of the slope with a minimum of 5 feet (1524 mm) for slopes greater than 6 feet (1829 mm) and less than 80 feet (24,384 mm) in height measured horizontally from the slope surface to the lower edge of the footing. The minimum setback from top of a slope 80 feet (24,384 mm) in height and taller shall be 40 feet (12,192 mm)." The minimum setback should be 5 feet.

9.5.4 Estimated Foundation Settlements

Foundation settlement is anticipated to be minor and is not anticipated to exceed one inch. However, anticipated settlement should be reevaluated when the actual foundation loads are available. Settlements due to static loading are expected to occur rapidly as loads are applied. Differential settlement between adjacent footings with similar static loading is anticipated to be one half the total settlement or less.

Minor wall cracking could occur within the structures associated with expansion and contraction of the structural wood members due to thermal or moisture changes. All structures settle during construction and some minor settlement of the structures can occur after construction during the life of the project.

9.5.5 Footing Excavations

All footings should be cut square and level and cleaned of slough. Soil excavated from the footing and utility trenches should not be spread over areas of construction unless properly compacted. A representative of this office should observe the footing excavations prior to placing reinforcing steel. Soils silted into the footing excavations during the premoistening operations should be removed prior to casting the concrete. The footings should be cast as soon as possible to avoid deep desiccation of the footing subsoils.

9.5.6 Premoistening

The footing subgrade soils should be premoistened to 3% over the optimum moisture content to a depth of 18 inches below the footing subgrade. A representative of this office should observe the premoistening.

9.6 SLABS-ON-GRADE

9.6.1 Site Preparation

Concrete slabs on-grade may be supported on compacted engineered fill soils. The subgrade soils should be compacted prior to placing the sand subbase, if the soils were disturbed during footing or utility construction.

9.6.2 Design Data
Concrete slabs on-grade should be 5 inches thick and underlain by 6 inches of sand or sand-rock base. Where the slabs will support vehicles, the aggregate subgrade should consist of aggregate base. The slab should be reinforced with a minimum of number 4 bars at 16 inch centers in each direction. Reinforcement should be placed and kept at slab mid-depth.

Exterior concrete slabs-on-grade (non-auto traffic) and walkways should be a minimum of 4 inches thick and underlain by a minimum of 4 inches of sand. Exterior slabs should be reinforced with minimum No. 3 bars on 24 inch centers in each direction. The reinforcement should be placed at mid-depth of the slab. Sidewalks may be constructed of non-reinforced concrete provided they are cut into square panels (i.e., 4 foot wide walks should be cut into 4 foot by 4 foot squares). A deepened edge should be considered on exterior slabs (non-auto traffic) to prevent water from entering the sand base. The edge should extend a minimum of 2 inches into the subgrade soils.

9.6.3 Premoistening
Soils under lightly loaded slabs on-grade should be premoistened to 3% over the optimum moisture content for a depth of 24 inches. A representative of this office should observe the premoistening.

9.6.4 Moisture Vapor Retarder Layer
A moisture vapor retarder layer should be installed below slabs on-grade that are covered with moisture sensitive floorings. The minimum moisture vapor retarder layer should consist of minimum 10 mil plastic sheeting placed mid-height in sand layer directly below the slab. However, if higher level of resistance to moisture permeation is desired a retarder layer specifically manufactured per ASTM E 1745-97 *Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs* should be considered below the interior concrete slabs on-grade. The class of moisture vapor retarder layer should be strong enough to withstand abrasion during construction. The retarder should be installed per ASTM E1643-98(2005) *Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs*.

Perforations through the moisture vapor retarder such as at pipes, conduits, columns, grade beams, and wall footing penetrations should be sealed per the manufacture's specifications or ASTM E1643-98(2005) *Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs*. Proper construction practices should be followed during construction of the slab on-grade. Repair and seal tears or punctures in the moisture barrier that may result from the construction process prior to concrete placement.

Minimizing shrinkage cracks in the slab on-grade can further minimize moisture vapor emissions. A properly cured slab utilizing low-slump concrete will reduce the risk of shrinkage cracks in the slab as described herein.

The concrete contractor should be made aware of the moisture vapor retarder and required to protect the layer. Perforations made in the layer by the concrete contractor should be properly sealed prior to concrete placement. In addition, if the concrete is placed directly on top of the layer the concrete contractor should make the necessary changes in the concrete placement and curing. Placing the concrete directly on top of the moisture vapor retarder layer allows the layer to be observed for damage directly prior to concrete placement.

The slabs should be tested for moisture content prior to the selection of the flooring and adhesives. Moisture in the slabs should not exceed the flooring manufacture's specifications. The concrete surface should be sealed per the manufacture's specifications if the moisture readings are excessive. It may be necessary to select floor coverings that are applicable to high moisture conditions.

Where cuts are made into the slab for future construction, the moisture vapor retarder layer should be repaired per the manufacture's recommendation. Information regarding the need to repair the moisture vapor retarder layer and information on the selection of acceptable floor coverings should be conveyed to the building tenants.

9.6.5 Tile Flooring

Tile flooring can crack, reflecting cracks in the concrete slab below the tile. Therefore, the slab designer should consider this in the design of concrete slabs-on-grade where tile will be placed. The tile installer should consider installation methods that reduce possible tile cracking. Placement of a vinyl crack isolation membrane between tile and concrete slabs on-grade (utilizing approved materials and techniques per Tile Council of America/Ceramic Tile Institute guidelines) is one such method to reduce possible cracking of tile.

9.7 CONCRETE PLACEMENT AND CRACKING

Concrete shrinks as it cures resulting in shrinkage tension within the concrete mass. Since concrete is weak in tension, development of tension results in cracks within the concrete. In addition, since a post-tensioned slab is basically unreinforced until tensioned, post-tensioned slabs can crack. Cracking from curing can on occasion appear after tensioning of the slab. Therefore, concrete should be placed using procedures to minimize the cracking within the slab. Shrinkage cracks can become excessive if water is added to the concrete above the allowable limit and proper finishing and curing practices are not followed. Concrete mixing, placement, finishing, and curing should be performed per the American Concrete Institute Guide for Concrete Floor and Slab Construction (ACI 302.1). Concrete slump during concrete placement should not exceed the design slump specified by the structural engineer. Where shrinkage cracks would be unsightly, concrete slabs on grade including post-tensioned slabs should be provided with tooled crack control joints at 10-15 foot centers or as specified by the structural engineer.

Minor cracking of concrete slabs is common and generally the result of concrete shrinkage continuing after construction. Minor wall cracking could occur within the residences associated with expansion and contraction of the structural wood members due to thermal or moisture changes. In addition, minor wall or slab cracking may be associated with settlement or expansive soil movement. All structures settle during construction and some minor settlement of the residences can occur after construction during the life of the project. However, additional settlement or expansive soil movement could occur if the soils become saturated due to excessive water infiltration generally caused by excessive irrigation, poor drainage, etc.

9.8 SOIL CORROSIVITY

Schiff Associates provided a Soil Corrosivity Study for the site dated March 7, 2006, which is attached herein in Appendix C.

9.9 RETAINING WALLS

9.9.1 Foundations

Retaining wall foundations may be designed using the foundation design parameters including bearing and lateral pressures previously provided herein.

9.9.2 Lateral Earth Pressures

Site retaining walls allowed yield at the top should resist an active pressure exerted by compacted backfill or retained soil. Walls that may yield at the top should be designed for an equivalent fluid pressure equal to 40 and 60 pcf for a level and 2(h):1(v) condition behind the wall, respectively. Wall heights are measured from the top of the retained material to the bottom of the foundation.

The wall pressures provided above are for low to moderate expansive backfill materials. Expansion tests by ESSC (report of November 10, 2004) ranged from low to medium expansion. Therefore, select grading could possibly be provided on-site materials for retaining wall backfill. However, if suitable materials are not available on-site at the time of wall backfill, import soils such as sand may be necessary.

Surcharges may be treated as additional height of backfill. Assume one foot of additional height for each 125 psf of areal surcharge. Vehicle wheel loads (light to moderate) should be taken as two feet of additional surcharge. Lateral loads imposed by adjacent shallow foundations should be added to the lateral earth pressure. A surface surcharge of 300 pounds per square foot (psf) should be included in the design where the shoring is near traffic zones. Surcharge on the wall from loads directly adjacent the wall can be evaluated by this office on an individual basis.

9.9.3 Seismic Pressure

Walls under six feet in height need not be designed for an additional seismic pressure.

9.9.4 Waterproofing

All retaining walls (basement and site) should be waterproofed per the architect or waterproofing consultant's recommendations.

9.9.5 Drainage

On-site retaining walls should be constructed with a backdrain consisting of a manufactured composite drain board or a section of aggregate drain material. An aggregate drain should consist of a minimum one-foot wide continuous section of No. 4 rock (or pea gravel) and sand at a 1:1 ratio or equivalent or 3/4 rock wrapped in filter cloth. The aggregate drain material should extend from the base of the wall to within 2 feet of the top of exterior walls. The upper 2 feet of exterior wall backfill should consist of compacted native soils. A layer of filter cloth should be placed between the drain material and soil to minimize the migration of fines into the drain material. The composite drain board or aggregate section should be drained by a perforated drainpipe (perforations 3/8 inch or smaller, perforations down) located in the lower portion of the drain. The invert of the drainpipe should be at least 6 inches below any adjacent slab-on-grade. The drainpipe may be laid flat along the back of the wall.

9.9.6 Backfilling

Retaining walls should be backfilled with the granular on-site materials (see discussion under Lateral Earth Pressures). The backfill should be placed in 6 inch lifts at slightly over optimum moisture content and compacted to at least 90 percent of the maximum dry density. The backfill should be benched into the backcut slope if the backcut is flatter than ½(h):1(v). Light equipment should be used immediately behind the walls to prevent possible overstressing of the walls.

9.10 PRELIMINARY PAVEMENT DESIGN

The following structural sections are reiterated from our referenced report of August 1, 2006. Asphalt structural pavement sections designed to support traffic loading consist of an asphaltic concrete (AC) layer over an aggregate base (AB) layer. Generally, a Traffic Index (TI) of 4 is used for private parking stalls and adjacent aisles, whereas a higher TI of 5 is used commonly for highly traveled private roadways or aisles used for delivery or trash trucks aisles. Earth Systems (November 10, 2004) provided an estimated R-value of 10 for the on-site soils, which is considered reasonable.

Based on a TI of 4 and R-value of 10, a minimum structural section of 3 inches AC/6 inches Class II aggregate base (or acceptable equivalent) should be used for private parking stalls and adjacent aisles. However, highly traveled private roadways or roadways (TI=5) used for truck traffic may require a structural section of 3 inches AC /9 inches Class II aggregate base (or acceptable equivalent). The City

of Agoura Hills provided a minimum TI of 6.8 for Agoura Road for which the section should be a minimum of 4 inches AC/15 inches Class II aggregate base (or acceptable equivalent). A minimum buffer of 4 inches Class II aggregate base (or acceptable equivalent) should be placed under curbs, gutters and walkways placed on subgrade soils within Agoura Road exhibiting expansion indexes greater than 30. Curb and gutter on-site may be placed on the prepared subgrade. On-site sidewalks are addressed above under Slabs-On-Grade. These sections are preliminary and should be reviewed at the conclusion of grading.

Prior to placing the aggregate base, the upper 6 inches of the subgrade should be moisture conditioned to slightly over the optimum moisture and compacted to a minimum of 90% relative compaction. The aggregate base should be compacted to a minimum of 95% relative compaction.

The planter areas should be fine graded to prevent ponding behind the curbs. In addition, planter areas should not be over irrigated to minimize possible ponding or excessive water flowing over the pavement. Water should not be allowed to pond on the paved areas. Cracking in the asphalt should be sealed with an asphaltic sealer.

9.11 SITE DRAINAGE

Positive drainage should be provided away from the structures during and after construction. Planters adjacent a structure should be constructed so irrigation water will not saturate soils underlying footings and slabs. Building pads should be graded at a minimum gradient of 2 percent away from the structures towards an approved drainage course, or alternative drainage should be provided.

9.12 GUTTERS AND DOWNSPOUTS

Gutters and downspouts should be installed on structures to collect roof water. Downspouts should drain into collector pipes that will carry the water away from the building or other positive drainage should be constructed.

10. CLOSURE

This report was prepared under the direction of State registered Geotechnical Engineer. No warranty, express or implied, is made as to conclusions and professional advice included in this report. Gorian and Associates, Inc. disclaim responsibility and liability for problems that may occur if the recommendations presented in this report are not followed.

The report was prepared for Martin Teitelbaum Construction, Inc. and design consultants solely for design and construction of the project as described herein. It may not contain sufficient information for other uses or the purposes of other parties. These recommendations should not be extrapolated to other areas or used for other facilities without consulting Gorian and Associates, Inc. Our review or use of the referenced evaluation report (Earth Systems Southern California, November 10, 2004) is not intended as a warranty, expressed or implied, as to conclusions and professional advice contained in that report.

The recommendations are based on interpretations of the subsurface conditions. The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. Due to possible subsurface variations, this office should observe all aspects of field construction addressed in this report. Any persons using this report for bidding or construction purposes should perform such independent evaluations, as they deem necessary.

The scope of the services provided by Gorian and Associates, Inc. and its staff, excludes responsibility and/or liability for work conducted by others. Such work includes, but is not limited to, means and

methods of work performance, quality control of the work, superintendence, sequencing of construction and safety in, on, or about the jobsite.

oOo

Please call if you have any questions regarding the information or recommendations contained in this report or require additional consultation.

Respectfully,

Gorian and Associates, Inc.

By: Jerome J. Blunck, GE 151
Principal Geotechnical Engineer

Distribution: Addressee (2 + email)

11. REFERENCES:

Bryant, W.A. and E.W. Hart, (2007), Fault Rupture Hazard Zones in California. California Geological Survey Special Publication 42 (rev. 2007 Interim Revision).

California Division of Mines and Geology (CDMG) [now California Geological Survey (CGS)], 1975, Guidelines for Evaluating the Hazard of Surface Rupture. California Division of Mines and Geology Note Number 49.

California Division of Mines and Geology (CDMG) [now California Geological Survey (CGS)], 1995, Supplement No. 1 to Special Publication 42 (1994 edition).

California Geological Survey (CGS), 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California. California Geologic survey Special Publication 117A. (revised March 2009).

California Division of Mines and Geology (now California Geological Survey), 2000, Seismic Hazard Zone Report for the Thousand Oaks 7.5-minute Quadrangle, Ventura and Los Angeles Counties, California. Seismic Hazard Zone Report 042, last revised 1/17/06.

California Division of Mines and Geology, 2000b State of California Seismic Hazard Zones, Thousand Oaks 7.5-minute Quadrangle, Ventura and Los Angeles Counties, California. Official Map Released November 17, 2000.

Dibblee, Thomas W. Jr., and Ehrespeck, Helmut E., 1993, Geologic Map of the Thousand Oaks Quadrangle, Ventura County, California. Dibblee Geological Foundation Map #DF-49.

Earth Systems Southern California, November 10, 2004, Preliminary Geotechnical Engineering Report, Proposed Commercial Development, Lot 3, PM Per BK 157 P 50-52 of PM, Vicinity of 29851 Agoura Road, Agoura Hills, California. PL-06405-01.

Note: In the geotechnical review letter for this report and an addendum letter dated June 1, 2005 prepared by Bing Yen & Associates, Inc. dated July 11, 2005 for the City of Agoura Hills it is stated “Although we recommended form a geotechnical perspective in our previous review letter that the Planning Commission consider approval of Case No. 05-Spr-010, the plan has been revised and a new submittal for the revise plans needs to be submitted for review.”

Gorian and Associates, Inc., July 12, 2005,Geotechnical Site Investigation Update, Agoura Oaks Plaza, 29857 Agoura Road, Agoura Hills, California. Work Order: 2675-0-0-10, Log Number: 23956.

Note: The Gorian report of July 12, 2005 was prepared as an update of the site evaluation previously prepared by Earth Systems Southern California, November 10, 2004. Geotechnical recommendations were provided in the Gorian report for removal and recompaction of the soils within the building area, which would allow the use of conventional foundations for the support of the building.

In the geotechnical review letter prepared by Bing Yen & Associates, Inc. dated July 20, 2005 for the city of Agoura Hills, it is stated “the referenced reports are acceptable as presented with regard to planning and feasibility issues…”

Gorian and Associates, Inc., August 11, 2005, Response to City of Agoura Hills – Geotechnical Review Sheet dated July 20, 2005, Agoura Oaks Plaza, 29857 Agoura Road, Agoura Hills, California. Work Order: 2675-0-0-10,Log Number: 24010.

Note: This report was prepared to respond to the comments of the geotechnical reviewer for the City of Agoura Hills.

Gorian and Associates, Inc., August 18, 2005, Clarification regrading Perimeter Tie-Beam and Slab to Footing Connection, Agoura Oaks Plaza, 29857 Agoura Road, Agoura Hills, California. Work Order: 2675-0-0-10,Log Number: 24028.

Note: This report addressed isolated footings along the perimeter of the building, which should be tied together using a tie-beam embedded a minimum of 30 inches depth. In addition, the interior slab-on-grade should be tied to the footings using No. 4 bars at 24 inch centers.

Gorian and Associates, Inc., October 25, 2005, CEQA Environmental Checklist Form, Geology and Soils, Agoura Road Widening Only, Agoura Oaks Plaza, 29857 Agoura Road, Agoura Hills, California. Work Order: 2675-0-0-10,Log Number: 24161.

Note: This report contained our responses to the geology and soils section of the CEQA Environmental Checklist Form for the road widening along the southern side of Agoura Road.

Gorian and Associates, Inc., December 2, 2005, Geotechnical Site Investigation, Proposed Cut Slope South Side of Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, CA. Work Order: 2675-2-0-10, Log Number: 24199.

Note: This report was prepared to address the proposed road improvement for the Agoura Oaks Plaza development. The report was based upon a 30-scale street improvement plan by Development Resource Consultants Inc.

Gorian and Associates, Inc., January 11, 2006, Geotechnical Site Investigation Supplement, Proposed 1-1/2(H):1(V) Cut Slope South Side of Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, CA. Work Order: 2675-2-0-101.

Note: This supplemental report was prepared to address the change in the gradient of the cut slope along Agoura Road from 2(h):1(v) to 1-1/2(h):1(v).

Report: Gorian and Associates, Inc., January 12, 2006, Revised Geotechnical Map, Improvements to Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, California. Work Order: 2675-2-0-102.

Note: This report was prepared to provide a revised geotechnical map for the reports dated December 2, 2005 and January 11, 2005 as requested by the geotechnical reviewer for the City of Agoura Hills.

The reports regarding the street improvements dated December 2, 2005, January 11, 2006, and January 12, 2006 were found acceptable in the city of Agoura Hills geotechnical review letter of January 19, 2006.

Gorian and Associates, Inc., January 25, 2006, Revised Geotechnical Map Showing 1-1/2(h):1(v) Cut Slope, Improvements to Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, California. Work Order: 2675-2-0-103.

Note: This report was prepared to provide a revised geotechnical map based on the revised grading plan from Development Resource Consultants.

Gorian and Associates, Inc., August 1, 2006, Pavement Structural Sections, Agoura Improvements and Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, California. Work Order: 2675-0-0-105.

Note: This report was prepared to provide pavement structural section recommendations for Agoura Road and within the project.

Gorian and Associates, Inc., August 14, 2008, Martin Teitelbaum Construction, Inc., Geotechnical Site Evaluation Update, Agoura Landmark, 29621 Agoura Road, City of Agoura Hills, California. Work Order: 2675-MT-0-100.

Petersen, M.D., Bryant., W.A., Cramer, C.H., Cao, T., Reicle, M.S. , Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic Seismic Hazard Assessment for the State of California. California Division of Mines and Geology Open-File Report 96-08.

Date: October 30, 2008
GDI #: 05.00103.0128

CITY OF AGOURA HILLS - GEOTECHNICAL REVIEW SHEET

To:	Valerie Darbouze
Project Location:	29621 Agoura Road, Agoura Hills, California.
Planning Case #:	08-SPR-011/08-OTP-021/08-SP-36/VTT Map 70707
Building & Safety #:	None
Geotechnical Report:	Gorian and Associates, Inc. (2008), "Geotechnical Site Evaluation Update, Agoura Landmark, 29621 Agoura Road, Agoura Hills, California," Work Order 2675-MT-0-100, dated August 14, 2008.
References:	see attached list
Plans:	WJG Consultants (2008), "Development Plan including Preliminary Grading and Drainage, Sheets 1 through 8, Agoura hills Office Park, 29621 Agoura Road, Agoura Hills, CA," Project No. 07-PAR-006, Signing date: August 14, 2008.
Previous Reviews:	None for this plan

Findings

Planning/Feasibility Issues

☐ Acceptable as Presented

☒ Response Required

Geotechnical Report

☐ Acceptable as Presented

☒ Response Required

Remarks

Gorian and Associates, Inc. (GAI; consultant) provided a "Geotechnical Site Evaluation Update" for the proposed Agoura Landmark Development at 29621 Agoura Road, City of Agoura Hills, California. The proposed development includes the construction of five two- and three-story buildings, and one-level subterranean parking structure. Parking and drive areas are also proposed adjacent the buildings.

Previously, a single 90,851 square foot, two-story, L-shaped building was proposed at the center of the site. The previously proposed development at the site was approved from a geotechnical standpoint by the City (GAI, 2008). However, the newly proposed development constitutes a new project with a new vesting tentative tract map.

The City of Agoura Hills – Planning Department reviewed the referenced reports from a geotechnical perspective for compliance with applicable codes, guidelines, and standards of practice. GeoDynamics, Inc. (GDI) performed the geotechnical review on behalf of the City. Based upon the City's review, the referenced reports remain acceptable as presented with regard to planning and feasibility issues. Planning Commission should consider approval of Case Nos. 08-SPR-011/08-OTP-021/08-SP-36/VTT Map 70707 from a geotechnical perspective. The Geotechnical Report Review comments should be addressed by the consultant prior to Building Plan-Check Approval. Plan-Check comments should be addressed in Building & Safety Plan Check, and a separate geotechnical submittal is not required for plan-check comments.

REPORT COMMENTS

1. The submitted update report appropriately references previous geotechnical reports prepared for the previously proposed development at the site and provides updated geotechnical recommendations. The consultant states on page 4 of the above-referenced report that "The logs of Test Borings in Appendix A contain more detailed descriptions of the soils and bedrock encountered." No boring logs or laboratory test data were included with the above-referenced geotechnical update report. Considering that the proposed development is a new project significantly different from the previously proposed one, the consultant should provide a stand-alone geotechnical report that incorporates and includes all previously obtained geotechnical data and laboratory test results. The report should address all the various aspects of the new development and provide additional geotechnical recommendations as necessary.
2. The consultant recommends on page 8 that footings adjacent to descending slopes should be setback from the descending slope per the requirements of the California Building Code (CBC). All foundations setback from slopes should be per the City of Agoura Hills building requirements, which is more stringent than the CBC requirements.
3. The recommended seismic earth pressure value of 15 pcf to be used in the design of retaining walls provided on page 11 appears to be low. The consultant should provide calculations to substantiate this value or revise the recommended value as necessary.
4. The consultant should evaluate the potential for settlement of foundations when development plans become available. Settlement estimate should be substantiated with site-specific geotechnical data and analyses. Mitigation measures should be recommended as necessary.
5. The consultant should evaluate the potential for lateral surcharge on subterranean retaining walls due to adjacent foundations/structures when foundation plans become available. Mitigation measures should be recommended as necessary.

Plan-Check Comments

6. The name, address, and phone number of the Project Geotechnical Consultant and a list of all the applicable geotechnical reports shall be included on the building/grading plans.
7. The grading plan should include the limits and depths of overexcavation of the building pad areas as recommended by the Consultant.
8. The following note must appear on the grading and foundation plans: "*Tests shall be performed prior to pouring footings and slabs to determine the expansion index of the supporting soils. If the expansion index is greater than 20, foundation and slab plans should be revised accordingly.*"
9. The following note must appear on the grading and foundation plans that states: "*Excavations shall be made in compliance with CAL/OSHA Regulations.*"
10. The following note must appear on the foundation plans that states: "*All foundation excavations must be observed and approved, in writing, by the Project Geotechnical Consultant prior to placement of reinforcing steel.*"
11. Foundation setback distances from ascending and descending slopes shall be in accordance with Section 1806.5 of the City of Agoura Hills Building Code, or the requirements of the Project Geotechnical Consultant's recommendations, whichever are more stringent. The required minimum foundation setback distances shall be clearly shown on the foundation plans, as applicable.
12. Foundation plans and foundation details shall clearly depict the embedment material and minimum depth of embedment for the foundations.
13. Drainage plans depicting all surface and subsurface non-erosive drainage devices, flow lines, and catch basins shall be included on the building plans.
14. Final grading, drainage, shoring, and foundation plans shall be reviewed, signed, and wet stamped by the project geotechnical consultant.

15. Provide a note on the grading and foundation plans that states: "*An as-built report shall be submitted to the City for review. This report prepared by the Geotechnical Consultant must include documentation of any foundation inspections, the results of all compaction tests as well as a map depicting the limits of fill, locations of all density tests, outline and elevations of all removal bottoms, keyway locations and bottom elevations, locations of all subdrains and flow line elevations, and location and elevation of all retaining wall backdrains and outlets. Geologic conditions exposed during grading must be depicted on an as-built geologic map.*"

If you have any questions regarding this review letter, please contact GeoDynamics, Inc. at (805) 216-6160.

Respectfully Submitted,

GeoDynamics, Inc.

Ali Abdel-Haq
Geotechnical Engineering Reviewer
GE 2308 (exp. 12/31/09)

Susan M. Berger
Engineering Geologic Reviewer
CEG 2069 (exp. 08/31/10)

REFERENCES

Gorian and Associates, Inc. (2006b), "Revised Geotechnical Map, Improvements to Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, CA," Work Order 2675-2-0-102, dated January 12, 2006.

Gorian and Associates, Inc. (2006a), "Geotechnical Site Investigation Supplement, Proposed 1-1/2(H):1(V) Cut Slope South Side of Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, CA," Work Order 2675-2-0-101, dated January 11, 2006.

Gorian and Associates, Inc. (2005d), "Geotechnical Site Investigation, Proposed Cut Slope South Side of Agoura Road, Agoura Oaks Plaza, 29621 Agoura Road, Agoura Hills, CA," Work Order 2675-2-0-10, dated December 2, 2005.

Gorian and Associates, Inc. (2005c), "Response to City of Agoura Hills – Geotechnical Review Sheet dated July 20, 2005, Agoura Oaks Plaza, 29857 Agoura Road, Agoura Hills, California," Work Order 2675-0-0-10, Log Number 24010, dated July 15, 2005 (revised August 11, 2005).

Gorian and Associates, Inc. (2005b), "Geotechnical Site Investigation Update, Agoura Oaks Plaza, 29857 Agoura Road, Agoura Hills, California," Work Order 2675-0-0-10, Log Number 23956, dated July 12, 2005.

Earth Systems Southern California (2005a), "Addendum Letter – Response to Geotechnical Reviewer, Proposed Commercial Development, Lot 3, PM Per BK 157 P 50-52 of PM, Vicinity of 29851 Agoura Road, Agoura Hills, California," PL-06405-01, dated June 1, 2005.

Earth Systems Southern California (2004), "Preliminary Geotechnical Engineering Report, Proposed Office Building, Lot 3, PM Per BK 157 P 50-52 of PM, Vicinity of 29851 Agoura Road, Agoura Hills, California," PL-06405-01, dated November 10, 2004.

Development Resource Consultants, Inc., "Conceptual Grading Plan, 4 Sheets", 30-scale, dated March 4, 2005.

APPENDIX A

LOGS OF EXPLORATORY BORINGS
(Earth Systems, 2004)

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNTOF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, 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
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGAINC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

UNIFIED SOIL CLASSIFICATION SYSTEM

PROPOSED COMMERCIAL DEVELOPMENT
AGOURA ROAD
AGOURA HILLS, CALIFORNIA

Earth Systems
Southern California

11-10-2004	PL-06405-01

SYMBOLS COMMONLY USED ON BORING LOGS


Modified California Split Barrel Sampler


Modified California Split Barrel Sampler - No Recovery


Standard Penetration Test (SPT) Sampler


Standard Penetration Test (SPT) Sampler - No Recovery


Perched Water Level


Water Level First Encountered


Water Level After Drilling


Pocket Penetrometer (tsf)


Vane Shear (ksf)

1. The location of borings were approximately determined by pacing and/or siting from visible features. Elevations of borings are approximately determined by interpolating between plan contours. The location and elevation of the borings should be considered accurate only to the degree implied by the method used.

2. The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. This data has been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, tides, temperature, and other factors at the time measurements were made.

BORING LOG SYMBOLS	
PROPOSED COMMERCIAL DEVELOPMENT AGOURA ROAD AGOURA HILLS, CALIFORNIA	
Earth Systems Southern California	
11-10-2004	PL-06405-01

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS

(Major Portion Retained on Number 200 Sieve)

Includes clean gravels and sands described as fine, medium or coarse, depending on distribution of grain sizes, and silty or clayey gravels and sands, condition is rated according to laboratory tests or estimated from resistance to sampler penetration.

Penetration Resistance* California Split Spoon (CSS) Blows/Ft		Penetration Resistance* Standard Pentrometer (SPT) Blows/Ft
0-5	Very Loose	0-4
5-15	Loose	5-10
15-40	Medium Dense	11-30
40-70	Dense	31-50
>70	Very Dense	>50

Fine Grained Soils

(Major Portion Passing the Number 200 Sieve)

Includes inorganic and organic silts and clays, gravelly, sandy or silty clays, and clayey silts. Consistency is rated according to laboratory tests or estimated from resistance to sampler penetration.

Penetration Resistance* California Split Spoon (CSS) Blows/Ft		Penetration Resistance* Standard Pentrometer (SPT) Blows/Ft
0-2	Very Soft	0-2
2-5	Soft	2-4
6-10	Medium Stiff	5-8
11-18	Stiff	9-15
19-36	Very Stiff	16-30
>36	Hard	>30

* Penetration resistance based on a 140 pound hammer falling approximately 30 inches.

SOIL CONSISTENCY TERMS

PROPOSED COMMERCIAL DEVELOPMENT
AGOURA ROAD
AGOURA HILLS, CALIFORNIA

Earth Systems
Southern California

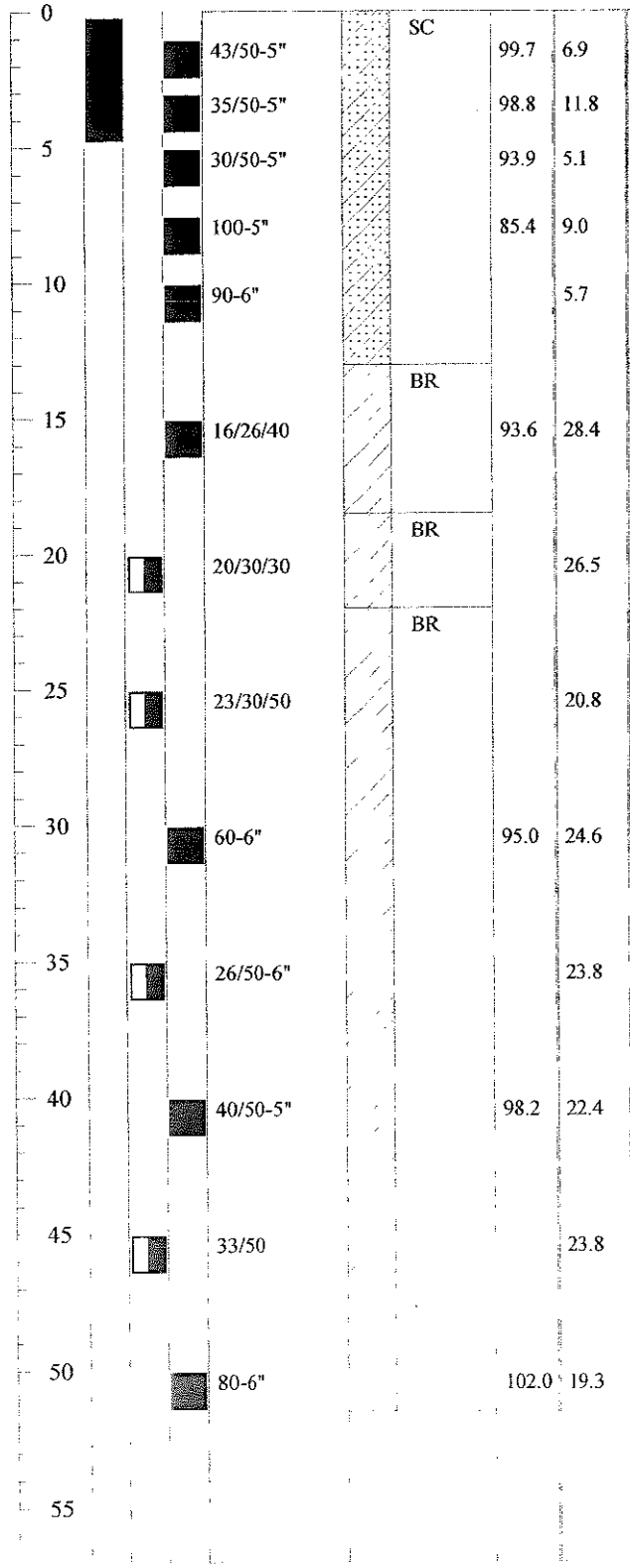
11-10-2004 | PL-06405-01

Earth Systems
Southern California

7949 Woodley Avenue, Van Nuys, CA
Phone (818) 779-1999, Fax (818) 779-1990

Boring No:Boring B1
Project Name: Agoura Hills Business Center
Project Number: PL-06405-01
Boring Location: see Site Sketch

Drilling Date: 9/22/2004
Drilling Method: Hollow Stem Auger
Drill Type: 8-inch diameter
Logged By: R. Ferguson



DESCRIPTION OF UNITS

ALLUVIUM: Brown clayey fine to coarse sand with gravel to 2 feet, dry, very dense.

BEDROCK: Olive brown clay shale, moist, soft rock.

Dark brown highly sheared clay shale, moist, soft rock.

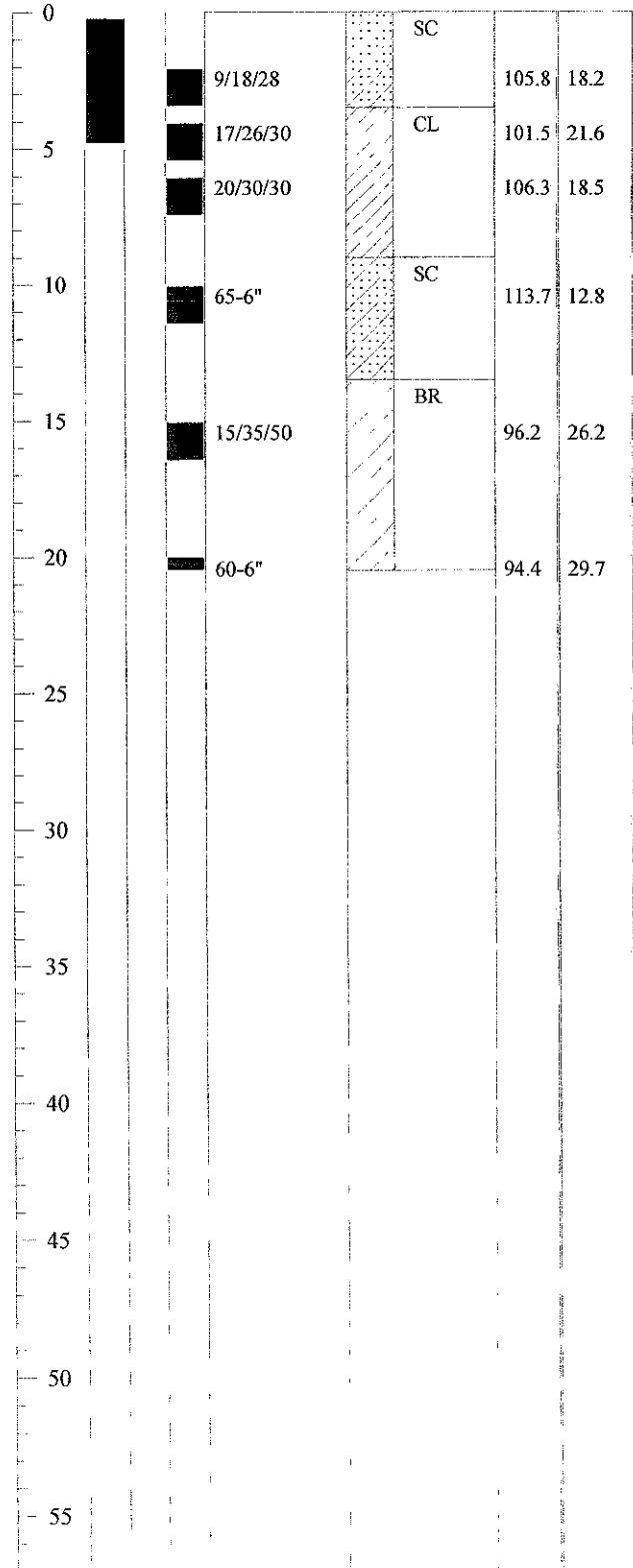
Dark brown clay shale thinnly laminated.

Total Depth = 51 feet.
No Free Groundwater Observed.
Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California
7949 Woodley Avenue, Van Nuys, CA
Phone (818) 779-1999, Fax (818) 779-1990

Boring No:Boring B2
Project Name: Agoura Hills Business Center
Project Number: PL-06405-01
Boring Location: see Site Sketch

Drilling Date: 9/22/04
Drilling Method: Hollow Stem Auger
Drill Type: 8 inch diameter
Logged By: R. Ferguson



DESCRIPTION OF UNITS

SC	FILL: Mottled brown clayey fine to coarse sand with silt, moist, compact. Sand sized particles composed of clay shale. Rock fragments.
CL	FILL: Mottled brown stiff clay with fine to coarse sand, moist, compact, gravel to 1 inch.
SC	ALLUVIUM: Dark brown to molted brown clayey fine to coarse sand with gravel to 1 inch, moist, dense.
BR	BEDROCK: Brown to olive brown clay shale, moist, soft rock.

Total Depth = 21 feet.

No Free Groundwater Observed.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

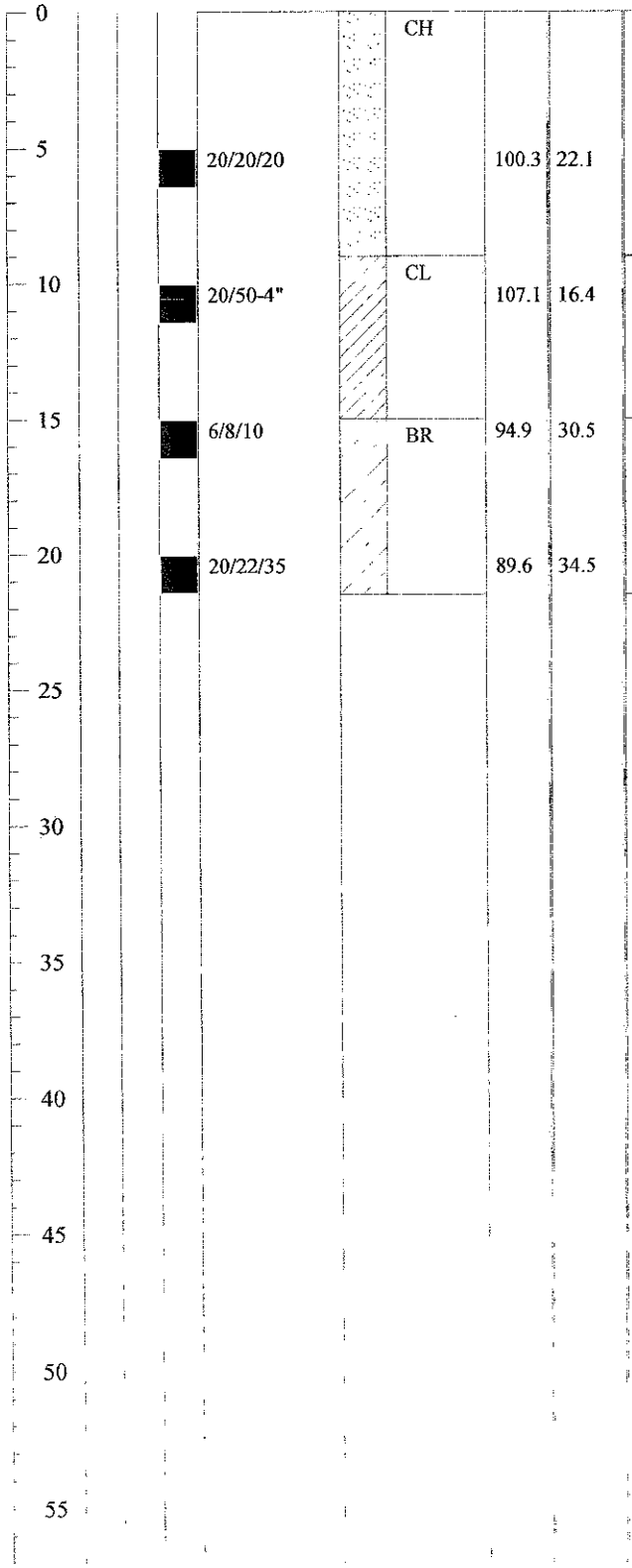
Earth Systems
Southern California

7949 Woodley Avenue, Van Nuys, CA
Phone (818) 779-1999, Fax (818) 779-1990

Boring No:Boring B3

Project Name: Agoura Hills Business Center
Project Number: PL-06405-01
Boring Location: Site Sketch

Drilling Date: 9/22/04
Drilling Method: Hollow Stem Auger
Drill Type: 8 inch diameter
Logged By: R. Ferguson



DESCRIPTION OF UNITS

FILL: Mottled brown silty clay, moist, compact.

ALLUVIUM: Brown silty clay with fine sand, very uniform, moist, hard.

BEDROCK: Brown to yellow brown severely weathered clay shale moist, soft.

Yellow brown, thin laminations.

Total Depth = 21 feet.

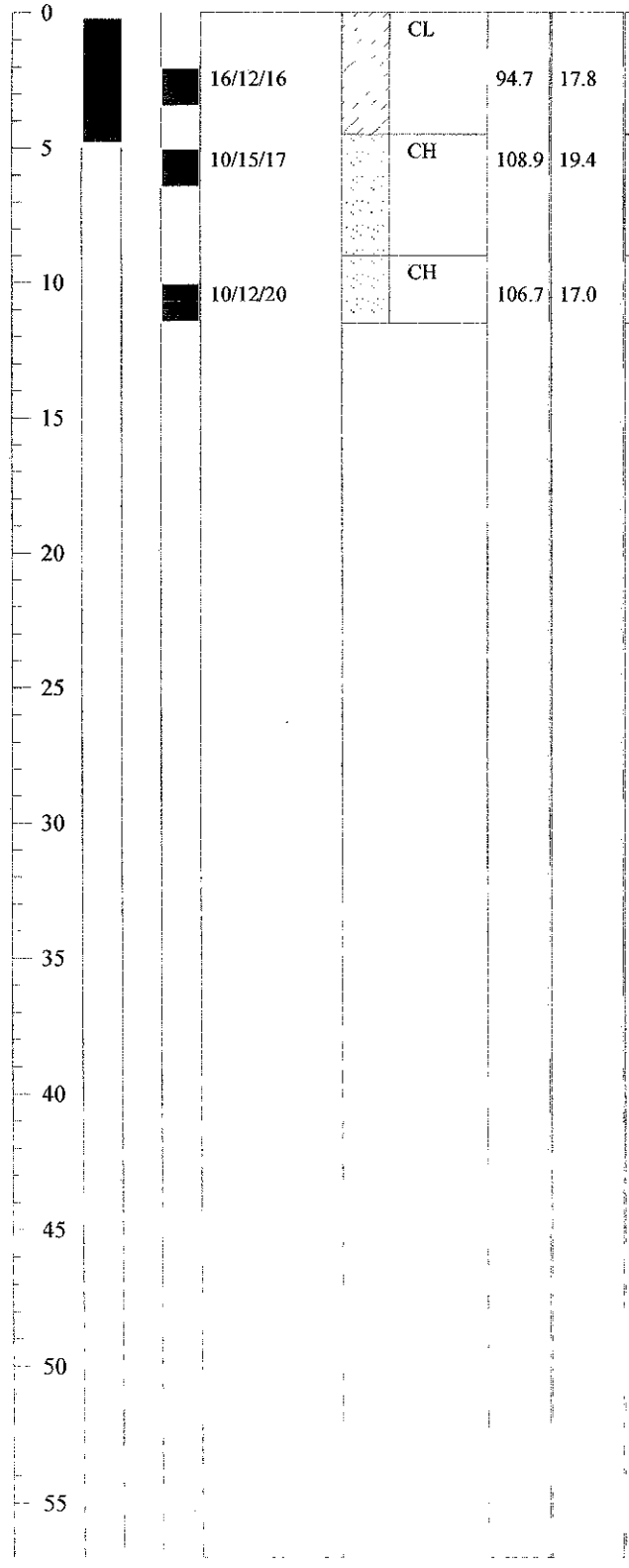
No Free Groundwater Observed.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California
7949 Woodley Avenue, Van Nuys, CA
Phone (818) 779-1999, Fax (818) 779-1990

Boring No:Boring B4
Project Name: Agoura Hills Business Center
Project Number: PL-06405-01
Boring Location: Site Sketch

Drilling Date: 9/22/04
Drilling Method: Hollow Stem Auger
Drill Type: 8 inch diameter
Logged By: R. Ferguson



DESCRIPTION OF UNITS

FILL: Mottled brown silty clay with sand, moist, compact. Lots of small shale rock fragments (to 1/4 inch).

FILL: Dark brown silty clay with fine sand, uniform color, moist, compact.

ALLUVIUM: Dark brown clay with some silt, moist, stiff, olive-brown inclusions.

Total Depth = 11 feet.

No Free Groundwater Observed.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

Earth Systems
Southern California

7949 Woodley Avenue, Van Nuys, CA
Phone (818) 779-1999, Fax (818) 779-1990

Boring No:Boring B5
Project Name: Agoura Hills Business Center
Project Number: PL-06405-01
Boring Location: see Site Sketch

Drilling Date: 9/22/04
Drilling Method: Hollow Stem Auger
Drill Type: 8 inch diameter
Logged By: R. Ferguson

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0				CH			FILL: Mottled brown silty clay with sand-sized shale rock fragments, slighlty moist, compact.
	MOD Calif.	12/17/30			106.0	15.8	
5	MOD Calif.	11/16/20			97.5	24.2	
				CL			ALLUVIUM: Dark brown to black silty clay, moist, stiff, uniform color.
10	MOD Calif.	10/11/16			95.6	26.1	
15							
20							
25							Total Depth = 11 feet.
							No Free Groundwater Observed.
30							Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.
35							
40							
45							
50							
55							

Earth Systems
Southern California
7949 Woodley Avenue, Van Nuys, CA
Phone (818) 779-1999, Fax (818) 779-1990

Boring No:Boring B6
Project Name: Agoura Hills Buisness Center
Project Number: PL-06405-01
Boring Location: see Site Sketch

Drilling Date: 9/22/04
Drilling Method: Hollow Stem Auger
Drill Type: 8 inch diameter
Logged By: R. Ferguson

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0				CL			FILL: Mottled light to dark brown silty clay with fine sand, moist, moderately compact.
	MOD Calif.	6/10/14			83.5	18.0	
5	MOD Calif.	12/20/22			94.5	15.1	Slightly Moist.
10				SC			ALLUVIUM: Light brown clayey fine to medium sand with silt, moist, dense.
	MOD Calif.	12/50-5"			95.1	23.1	
15							
20							
25							Total Depth = 11 feet.
							No Free Groundwater Observed.
30							Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.
35							
40							
45							
50							
55							

Earth Systems
Southern California
7949 Woodley Avenue, Van Nuys, CA
Phone (818) 779-1999, Fax (818) 779-1990

Boring No:Boring B7
Project Name: Agoura Hills Business Center
Project Number: PL-06405-01
Boring Location: see Site Sketch

Drilling Date: 9/22/04
Drilling Method: Hollow Stem Auger
Drill Type: 8 inch diameter
Logged By: R. Ferguson

DESCRIPTION OF UNITS

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	DESCRIPTION OF UNITS
0	Bulk			CL			FILL: Dark brown silty clay with fine sand, dry, very compact.
5	SPT	26/50-5"			102.6	11.1	
10	MOD Calif.	100-5"					rock stuck in sampler nose cone
15	MOD Calif.	11/25/30		BR	99.4	28.4	BEDROCK: Yellow brown to olive brown clay shale, moderately weathered soft rock, moist, thin laminations.
20	MOD Calif.	40/50-5"			102.6	24.0	slightly, weathered.
25							Total Depth = 21 feet.
							No Free Groundwater Observed.
							Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.
30							
35							
40							
45							
50							
55							

Earth Systems
Southern California
7949 Woodley Avenue, Van Nuys, CA
Phone (818) 779-1999, Fax (818) 779-1990

Boring No:Boring B8
Project Name: Agoura Hills Business Center
Project Number: PL-06405-01
Boring Location: see Site Sketch

Drilling Date: 9/22/04
Drilling Method: Hollow Stem Auger
Drill Type: 8 inch diameter
Logged By: R. Ferguson

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)
0				SC		
	MOD Calif.	12/27/35			114.2	16.5
5	MOD Calif.	18/24/34			104.7	18.0
10	MOD Calif.	35/50-5"			113.2	15.7
15						
20						
25						
30						
35						
40						
45						
50						
55						

DESCRIPTION OF UNITS

ALLUVIUM: Dark brown clayey fine sand, slightly moist, dense, uniform color.

Total Depth = 11 feet.

No Free Groundwater Observed.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradational.

APPENDIX B

LABORATORY TEST RESULTS
(Earth Systems, 2004)

General
A series of laboratory tests were conducted previously by Earth Systems Southern California (ESSC, November 10, 2004) on relatively undisturbed and bulk samples. The results of the previous testing are presented in this appendix.

Field Density and Moisture Tests
The previously obtained in situ dry density and moisture content are shown on the boring lots in the *Logs of Exploratory Borings*, Appendix A.

Maximum Density-Optimum Moisture
Two maximum density/optimum moisture tests (compaction characteristics) were performed and the results are presented graphically as attachments to this appendix.

Soil Expansion Test
Previous soil expansion index tests were performed on bulk samples of the upper soils in general accordance with ASTM test method D4829. The results are as follows:

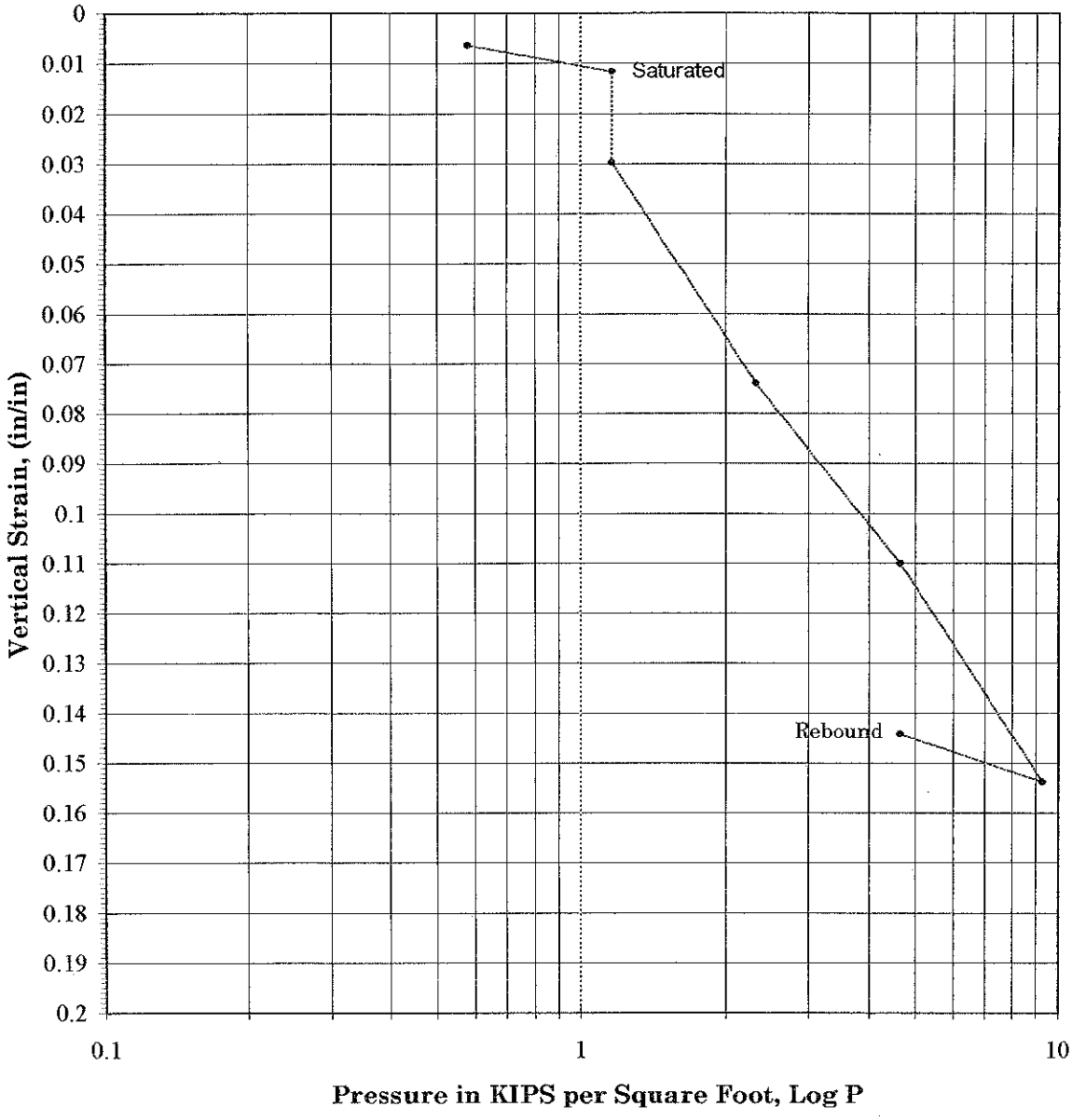
Sample	Expansion Index	Expansion Index Range
B-1 @ 0-5’	11	0 - 20
B-4 @0-5’	75	51 - 90

Direct Shear Tests
Direct shear testing was performed on three samples of the earth materials encountered during the Earth System exploratory program. The shear strength results are attached as graphic summaries.

Load Consolidation Tests
Load consolidation tests were conducted on two relatively undisturbed soil samples. The results are attached as graphic summaries.

Atterberg Limits

Sample	Liquid Limit	Plasticity Index
B-4 @ 10’	66	42



Sample Location: Boring B1 at 7.5 feet

Material: Clayey Sand (SC)

Initial Dry Density: 85.4 PCF

Moisture Content: 9.0%

Percent Hydroconsolidation: 1.8%

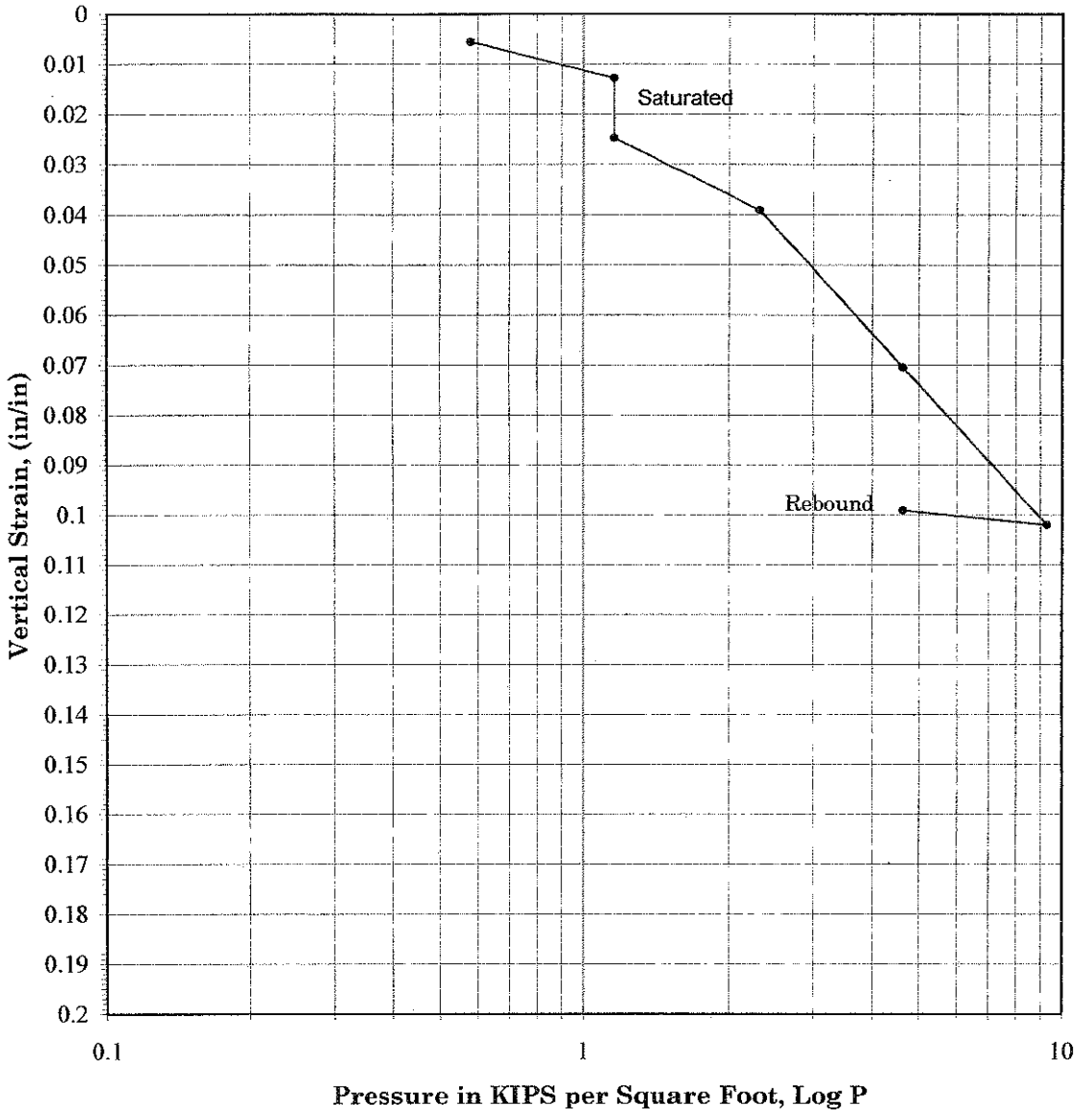
* Test Method: ASTM D-2435

Consolidation Test

Agoura Road
Agoura Hills, California

Earth Systems
Southern California

11/10/2004	PL-06405-01



Sample Location: Boring B7 at 5 feet

Material: Fill - Clay (CL)

Initial Dry Density: 102.6 PCF

Moisture Content: 11.1%

Percent Hydroconsolidation: 1.2%

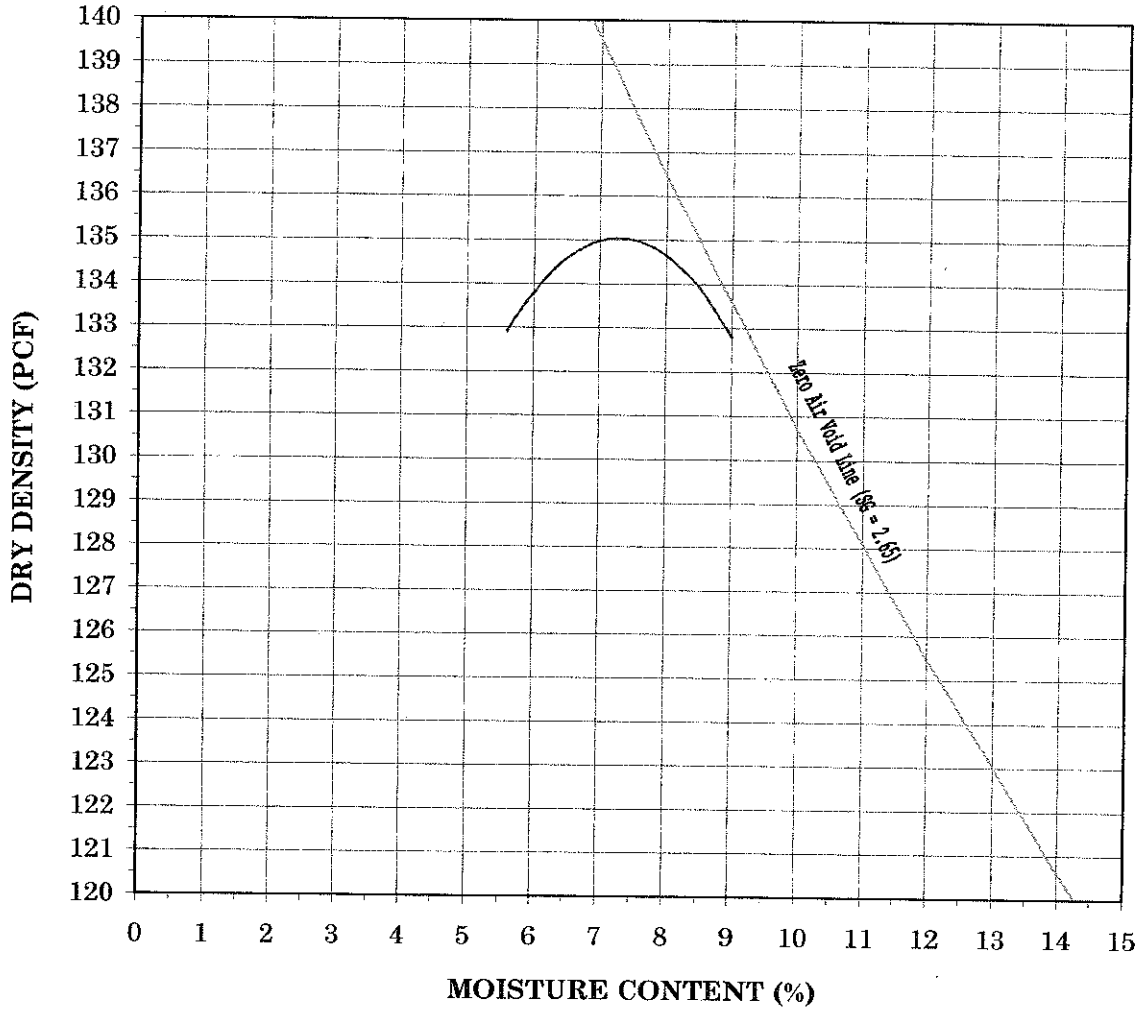
* Test Method: ASTM D-2435

Consolidation Test

Agoura Road
Agoura Hills, California

Earth Systems
Southern California

11/10/2004	PL-06405-01



Maximum Density - Optimum Moisture Characteristics*

Sample Location: Boring B1 at 0 to 5 feet

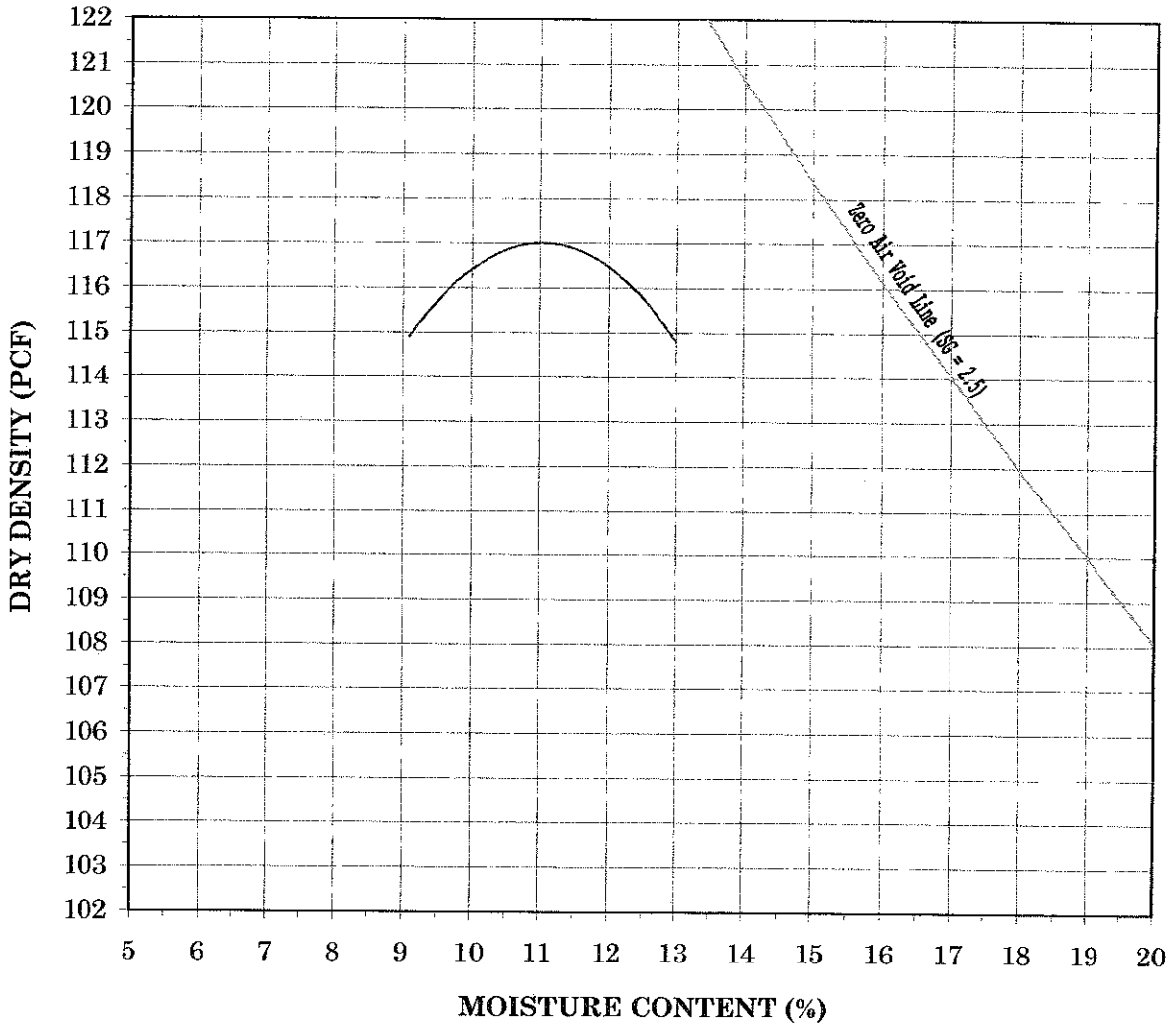
Material: Clayey Sand (SC)

Maximum Density (pcf): 135.0

Optimum Moisture: 7.5%

* Test Method: ASTM D-1557

MAXIMUM DENSITY - OPTIMUM MOISTURE	
Agoura Road Agoura Hills, California	
Earth Systems Southern California	
11/10/2004	PL-06405-01



Maximum Density - Optimum Moisture Characteristics*

Sample Location: Boring B4 at 0 to 5 feet

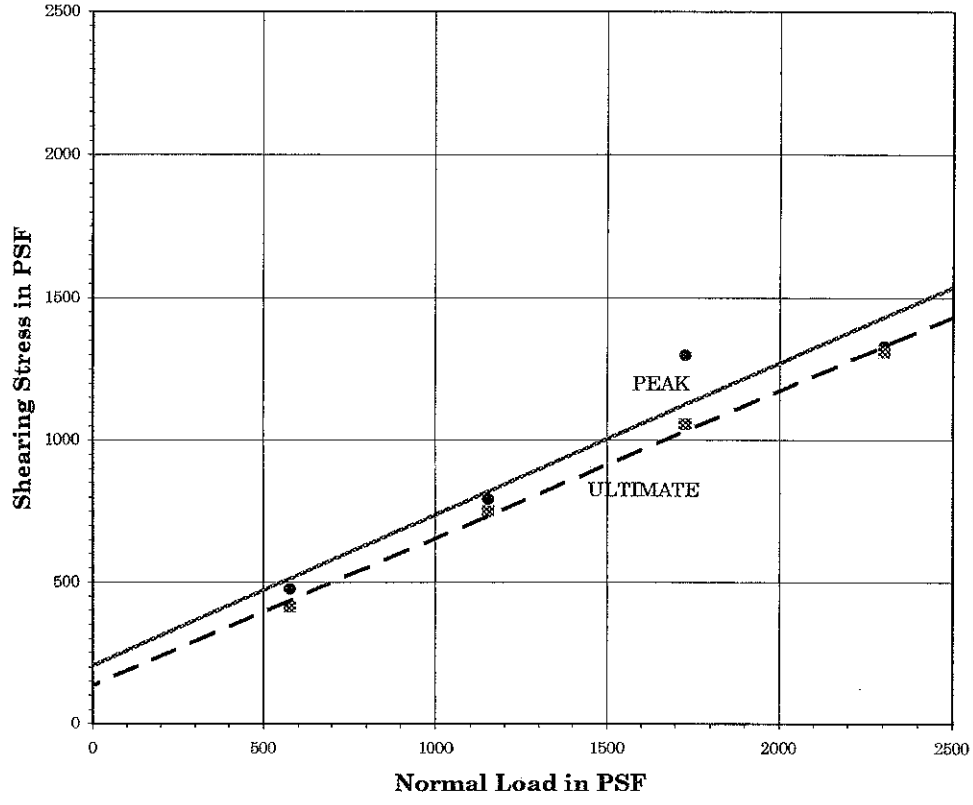
Material: Silty Clay with Sand (CL)

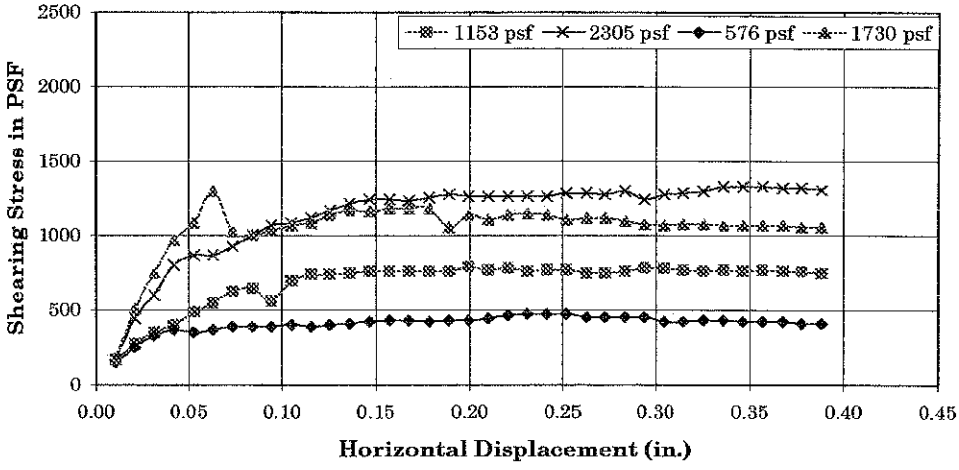
Maximum Density (pcf): 117.0

Optimum Moisture: 11.0%

* Test Method: ASTM D-1557

MAXIMUM DENSITY - OPTIMUM MOISTURE	
Agoura Road Agoura Hills, California	
Earth Systems Southern California	
11/10/2004	PL-06405-01





DIRECT SHEAR DATA*

Sample Location: Boring B1 at 5 feet

Material: Clayey Sand (SC)

		Peak	Ultimate
Dry Density (pcf):	93.9		
ϕ Angle of Friction (degrees):		28	27
c Cohesive Strength (psf):		200	130

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

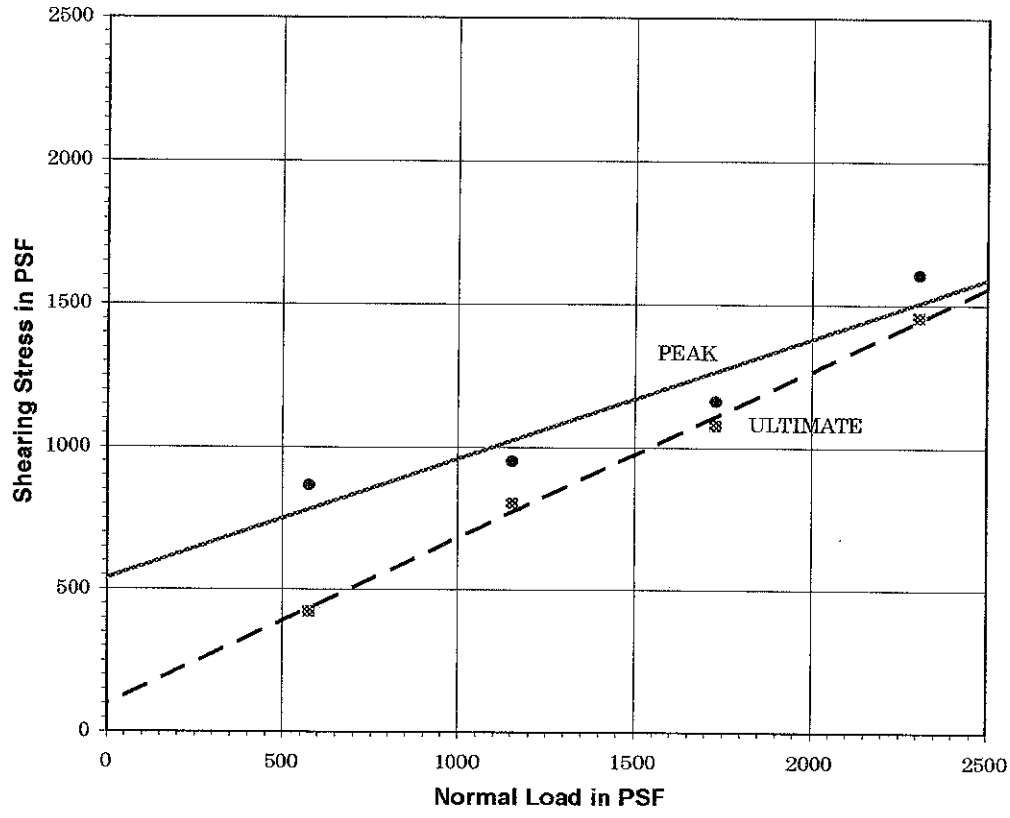
DIRECT SHEAR TEST

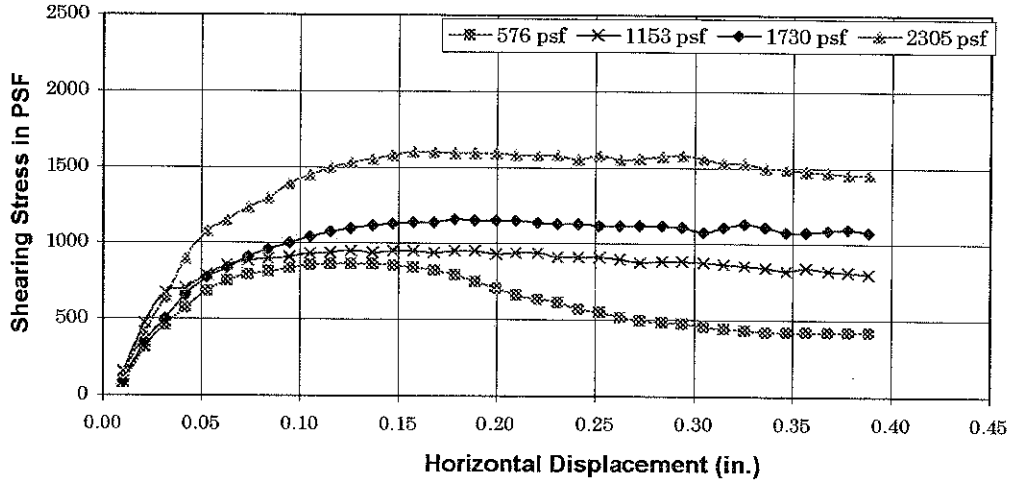
Agoura Road

Agoura Hills, California

Earth Systems
Southern California

11/10/2004	PL-06405-01





DIRECT SHEAR DATA*

Sample Location: Boring B1 at 15 feet

Material: Bedrock

		Peak	Ultimate
Dry Density (pcf):	93.6		
ϕ Angle of Friction (degrees):		23	32
c Cohesive Strength (psf):		530	90

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

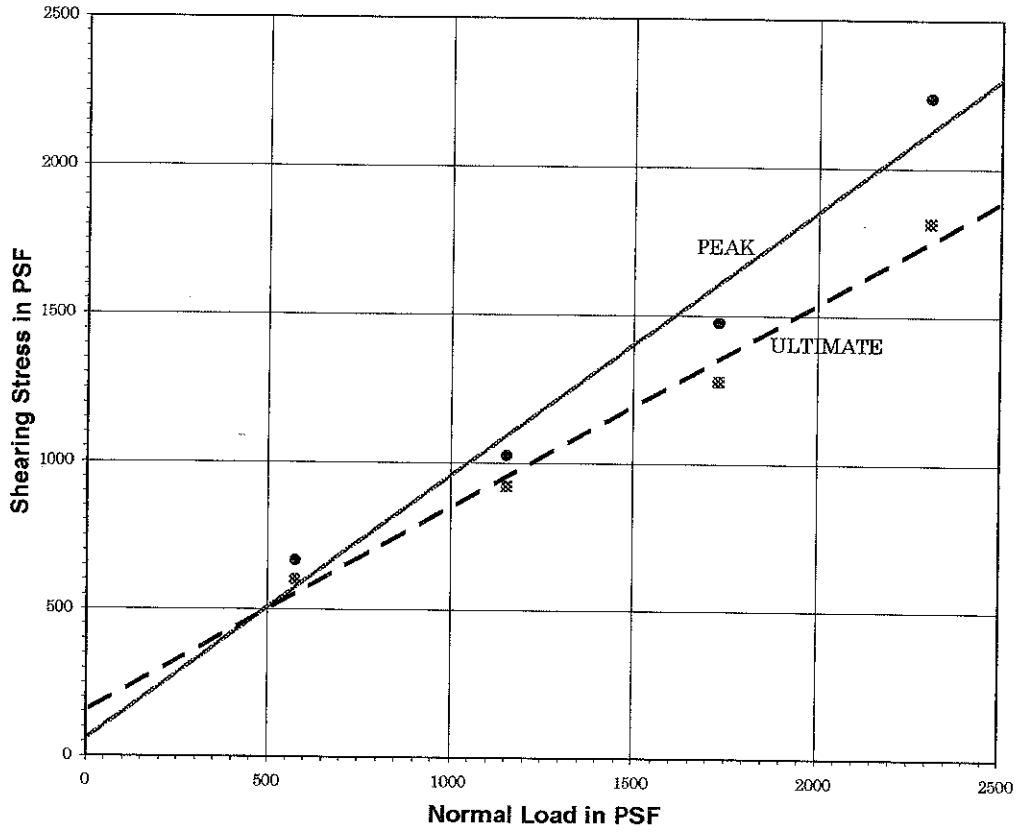
DIRECT SHEAR TEST

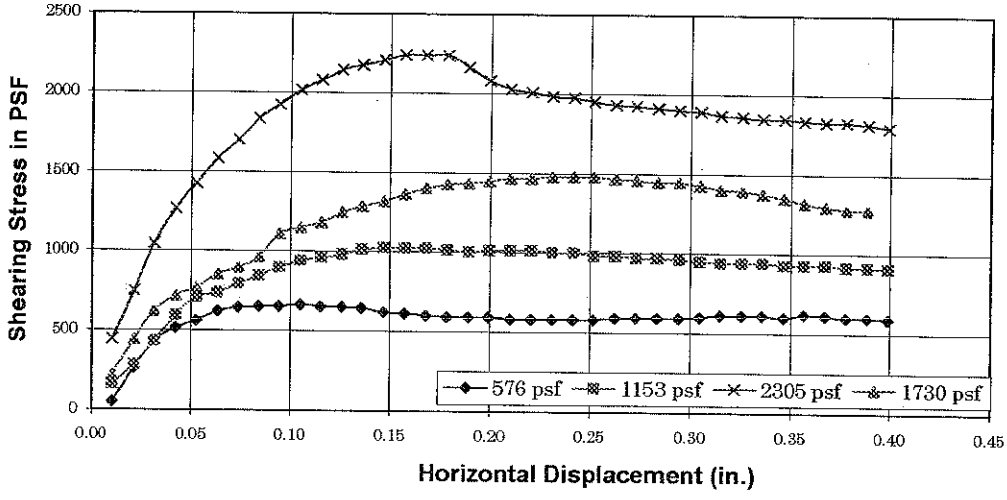
Agoura Road

Agoura Hills, California

Earth Systems
Southern California

11/10/2004	PL-06405-01





DIRECT SHEAR DATA*

Sample Location: B1 at 40 feet
Material: Bedrock

		Peak	Ultimate
Dry Density (pcf):	98.2		
ϕ Angle of Friction (degrees):		42	35
c Cohesive Strength (psf):		50	150

Test Type: Peak and Ultimate

* Test Method: ASTM D-3080

DIRECT SHEAR TEST

Agoura Road

Agoura Hills, California

Earth Systems
Southern California

11/10/2004 | PL-06405-01

APPENDIX C

SOIL CORROSIVITY STUDY

SCHIFF ASSOCIATES

www.schiffassociates.com
Consulting Corrosion Engineers – Since 1959

March 7, 2006 via fax: 805.375.9263

GORIAN & ASSOCIATES, INC.
3595 Old Conejo Road
Thousand Oaks, CA 91320

Attention: Mr. Jerome J. Blunck, GE 151

Re: Soil Corrosivity Study
Agoura Business Center
Agoura Hills, California
ES #PL-06405-01, SA #06-0381SCS

INTRODUCTION

Laboratory tests have been completed on one soil sample provided by Earth Systems and analyzed by Schiff Associates in September 2004 as a separate job order—MJS&A#04-1386LAB. The purpose of these tests was to determine if the soils might have deleterious effects on underground utility piping and concrete structures. Results from these preceding tests will be used to assess the current soil corrosivity and provide recommendations. We assume that the samples provided are representative of the most corrosive soils at the site.

The proposed business structure will be at grade with conventional footings and slab on-grade. It is located in the Agoura Business Center in Agoura Hills, California. Reportedly, no free groundwater was encountered during the field testing performed September 22, 2004.

The scope of this study is limited to a determination of soil corrosivity and general corrosion control recommendations for materials likely to be used for construction. Our recommendations do not constitute, and are not meant as a substitute for, design documents for the purpose of construction. If the architects and/or engineers desire more specific information, designs, specifications, or review of design, we will be happy to work with them as a separate phase of this project.

LABORATORY SOIL CORROSIVITY TESTS

The electrical resistivity of the sample was measured in a soil box per ASTM G57 in its as-received condition and again after saturation with distilled water. Resistivities are at about their lowest value when the soil is saturated. The pH of the saturated sample was measured. A 5:1 water:soil extract from the sample was chemically analyzed for the major soluble salts commonly found in soils and for ammonium and nitrate. Test results are shown in Table 1.

SOIL CORROSIVITY

A major factor in determining soil corrosivity is electrical resistivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and soluble salt contents and indicate corrosive soil.

A correlation between electrical resistivity and corrosivity toward ferrous metals is:

Soil Resistivity in ohm-centimeters			Corrosivity Category
over		10,000	mildly corrosive
2,000	to	10,000	moderately corrosive
1,000	to	2,000	corrosive
below		1,000	severely corrosive

Other soil characteristics that may influence corrosivity towards metals are pH, soluble salt content, soil types, aeration, anaerobic conditions, and site drainage.

The electrical resistivity was in the mildly corrosive category with as-received moisture. When saturated, the resistivity was in the corrosive category. The resistivity dropped considerably with added moisture because the sample was dry as-received. The wide variation in soil resistivity can create concentration type corrosion cells that increase corrosion rates above what would be expected from the chemical characteristics alone.

The soil pH value was 7.9. This is moderately alkaline.

The soluble salt content of the sample was moderate.

Ammonium was detected in low concentrations.

Tests were not made for sulfide and negative oxidation-reduction (redox) potential because these samples did not exhibit characteristics typically associated with anaerobic conditions.

Variation in soil resistivity of an order of magnitude or more can create differential-aeration corrosion cells that would affect all metals.

This soil is classified as corrosive to ferrous metals.

CORROSION CONTROL RECOMMENDATIONS

The life of buried materials depends on thickness, strength, loads, construction details, soil moisture, etc., in addition to soil corrosivity, and is, therefore, difficult to predict. Of more practical value are corrosion control methods that will increase the life of materials that would be subject to significant corrosion.

Steel Pipe

Abrasive blast underground steel piping and apply a dielectric coating such as polyurethane, extruded polyethylene, a tape coating system, hot applied coal tar enamel, or fusion bonded epoxy intended for underground use.

Bond underground steel pipe with rubber gasketed, mechanical, grooved end, or other nonconductive type joints for electrical continuity. Electrical continuity is necessary for corrosion monitoring and cathodic protection.

Electrically insulate each buried steel pipeline from dissimilar metals and metals with dissimilar coatings (cement-mortar vs. dielectric), and above ground steel pipe to prevent dissimilar metal corrosion cells and to facilitate the application of cathodic protection.

Apply cathodic protection to steel piping as per NACE International Standard RP0169-2002. The amount of cathodic protection current needed can be minimized by coating the pipe.

As an alternative to dielectric coating and cathodic protection, apply a ¾-inch cement mortar coating or encase in concrete 3 inches thick, using any type of cement.

Some steel piping systems, such as for gas and oil, have special corrosion and cathodic protection requirements that must be evaluated for each specific application.

Iron Pipe

Pressurized Pipe:

Encase pressurized cast and ductile iron piping per AWWA Standard C105, coat with epoxy or polyurethane intended for underground use, or with wax tape per AWWA C217. The thin factory-applied asphaltic coating applied to ductile iron pipe for transportation and aesthetic purposes does not constitute a corrosion control coating. Electrically insulate underground iron pipe from dissimilar metals and from above ground iron pipe with insulating joints per NACE International Standard RP0286-2002. Bond all nonconductive type joints for electrical continuity. Apply cathodic protection to cast and ductile iron piping as per NACE International Standard RP0169-2002.

Non-Pressurized Pipe (Select one of the following alternatives for protection):

1. Polyethylene encase cast- and ductile-iron piping per AWWA Standard C105. Electrically insulate underground pipe from dissimilar metals and from above ground iron pipe with insulating joints per NACE International Standard RP0286-2002. Protect all non-cast iron and non-ductile iron fittings and valves with wax tape per AWWA Standard C217-99 after assembly.

2. Concrete encase all buried portions of metallic piping so that there is a minimum of 3-inches of concrete cover provided over and around surfaces of pipe, fittings, and valves.
3. Apply cathodic protection to cast and ductile iron piping as per NACE International Standard RP0169-2002. The amount of cathodic protection current needed can be minimized by coating the piping.

Copper Tubing

Wrap copper tubing for cold water in 12-mil polyethylene pipe wrapping tape with butyl rubber mastic over suitable low volatile organic carbon primer, bed and backfill in cement slurry at least 2 inches thick surrounding the tubing, or protect the same as copper tubing for hot water. Hot water tubing may be subject to a higher corrosion rate. Protect hot copper by applying cathodic protection per NACE International Standard RP0169-2002 or by preventing soil contact. Soil contact may be prevented by placing the tubing above ground or inside a plastic pipe. The amount of cathodic protection current needed can be minimized by coating the tubing.

Plastic and Vitrified Clay Pipe

No special precautions are required for plastic and vitrified clay piping placed underground from a corrosion viewpoint. Protect all metallic fittings and valves with wax tape per AWWA Standard C217-99 or epoxy.

All Pipe

On all pipes, appurtenances, and fittings not protected by cathodic protection, coat bare metal such as valves, bolts, flange joints, joint harnesses, and flexible couplings with wax tape per AWWA Standard C217-99 after assembly.

Where metallic pipelines penetrate concrete structures such as building floors, vault walls, and thrust blocks use plastic sleeves, rubber seals, or other dielectric material to prevent pipe contact with the concrete and reinforcing steel.

Concrete

Any type of cement may be used for concrete structures and pipe because the sulfate concentration is negligible, 0 to 0.1 percent, per 1997 Uniform Building Code (UBC) Table 19-A-4 and American Concrete Institute (ACI-318) Table 4.3.1.

Standard concrete cover over reinforcing steel may be used for concrete structures and pipe in contact with these soils.

CLOSURE

Our services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions.

Respectfully Submitted,
SCHIFF ASSOCIATES

Brien Clark, EIT

Reviewed by,

John W. French, P. E.

REGISTERED PROFESSIONAL ENGINEER
JOHN W. FRENCH
No. CR001023
12/31/07
CORROSION
STATE OF CALIFORNIA

Enc: Table 1

M. J. Schiff & Associates, Inc.

Consulting Corrosion Engineers - Since 1959
431 W. Baseline Road
Claremont, CA 91711

Phone: (909) 626-0967 Fax: (909) 626-3316
E-mail lab@mjschiff.com
website: mjschiff.com

Table 1 - Laboratory Tests on Soil Samples

Agoura Buisness Center, Agoura Hills, CA
Your #PL-06405-01, MJS&A #04-1386LAB
30-Sep-04

Sample ID			B1 @ 0-5' (CL / SC)
Resistivity		**Units**	
as-received		ohm-cm	180,000
saturated		ohm-cm	1,100
pH			7.9
Electrical Conductivity		mS/cm	0.34
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	100
magnesium	Mg^{2+}	mg/kg	114
sodium	Na^{1+}	mg/kg	5
Anions			
carbonate	CO_3^{2-}	mg/kg	ND
bicarbonate	HCO_3^{1-}	mg/kg	519
chloride	Cl^{1-}	mg/kg	50
sulfate	SO_4^{2-}	mg/kg	225
Other Tests			
ammonium	NH_4^{1+}	mg/kg	7.4
nitrate	NO_3^{1-}	mg/kg	ND
sulfide	S^{2-}	qual	na
Redox		mV	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

LEGEND:

- FIRE HYDRANT
- TRANSFORMER
- STORMWATER BMP
- RETAINING WALL
- [2] RETAINING WALL HEIGHT
- DAYLIGHT LINE

BMP	BEST MANAGEMENT PRACTICES
FF	FINISH FLOOR EL
FG	FINISHED GRADE
FL	FLOW LINE
TW	TOP OF WALL

EARTHWORK QUANTITY:

CUT	9,045	CY
FILL	11,280	CY

Geotechnical Explanation

af	Artificial Fill
Qal	Alluvium
Tt	Topanga Formation

Approximate Contact Between Geologic Units, Queried Where Uncertain

B-8 Approximate Location of Exploratory Boring (Earthsystems, 2004)

Cross Section A-A'

Geotechnical Map

Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 2675-MT-0-101		Date: Dec. 2014
Scale: 1" = 30'	Drawn by:	PLATE 1
	Approved by:	

SCALE: 1"=30'

30 15 0 30 60 90

SCALE: 1"=30'

REVISION #	SYMBOL	DESCRIPTION OF CHANGE	APPROVED	DATE

SAVE DATE: 11/21/14 CSOLIS

PREPARED BY:
DELANE ENGINEERING
1726 BEVERLEY STREET, SANTA MONICA, CA 90404
PHONE: 310.396.5711 WWW.DELANEENGINEERING.COM
SCOTT D. UHLES DATE

CITY OF AGOURA HILLS APPROVAL

REVIEWED BY DATE

ROMIRO ADEVA, CITY ENGINEER — DATE — 66865 RCE NO. — 9/30/14 EXP DATE

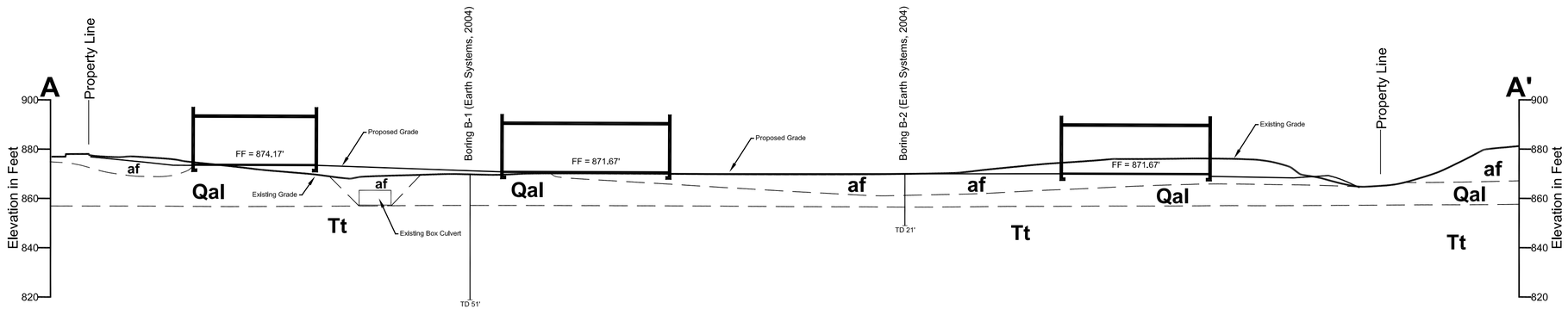
CITY OF AGOURA HILLS

AGOURA LANDMARK PRELIMINARY DESIGN GRADING PLAN

SHEET 1 OF 2

CITY OF AGOURA HILLS DWG. NO.

PLOT DATE: 11/21/14 4:34 PM FILE NAME: H:\PDATA\01\0068\CAD\LAND\GLV\CGP\0685-CGP-SP-01.DWG



Geotechnical Cross Section

Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 2675-MT-0-101		Date: Dec. 2014
Scale: 1" = 30'	Drawn by:	PLATE 2
	Approved by:	

Drainage Report

APPENDIX H

Preliminary
Drainage and
Best Management Practices
Report

FOR

AGOURA LANDMARK
AGOURA HILLS, CALIFORNIA

Prepared for:

AGOURA LANDMARK, LTD
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Camarillo, CA 93012
(805) 383-2221

Architect:

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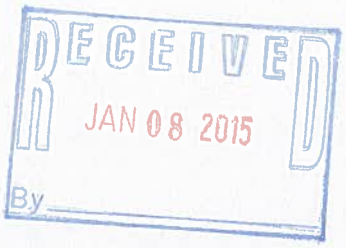
p 310 479-4775 ext 104
c 310 968-8245

Prepared by:

1738 Berkeley Street
Santa Monica, CA 90404

Contact Person:
Scott Uhles, P.E., Project Manager
JN 01-100066



December 11, 2014

TABLE OF CONTENTS

LIST OF EXHIBITS

PURPOSE OF REPORT

The purpose of this report is to outline the existing drainage conditions of the project site and present a description of the post-project drainage conditions, drainage impacts, and proposed drainage improvements. Describe and analyze any significant on-site and off-site facilities, as applicable, in this report. Calculate the Peak 10-year storm water runoff, and analyze any potential 100-year flood impacts for the project. Analyze and review proposed storm drain facilities for compliance with local design criteria.

This report shall discuss how the proposed grading and drainage improvements for the project site will be in accordance with the requirements of the City of Agoura Hills and Los Angeles County storm water regulations. The scope of this study is limited to the drainage improvements within the subject area and the existing storm drain system on the site.

LOCATION

The subject project is located at 29621 Agoura Road, located between Reyes Adobe Road and Kanan Road off-ramps within the City of Agoura Hills.

BACKGROUND

The applicant proposes to develop an existing vacant lot that is approximately 5.2 acres in size for Commercial/Industrial Purposes. The proposed Improvement will consist of 4 to 5 buildings and parking lot that will create impervious areas covering 80% of the site.

Presently, the site generally slopes from the south to the northeast corner. Total relief across the project site is approximately 13 feet, ranging from elevation 875 to 862. There is an existing 20' Reinforced Concrete Culvert that traverses the site from west to east. Approximately 3.2 acres of the site enters an existing inlet to that County Storm drain. The rest of the site discharges onto adjacent properties to the east and west.

METHOD OF ANALYSIS

The hydrologic analysis was based on research that included on-site investigations, review of available approved off-site storm drain plans, and review of aerial and field-surveyed topography. Hydraulic analysis of all drainage facilities began with a definition of drainage patterns and design flows based on the design criteria for those specific facilities.

Based on the research the project site was found to be located on the Thousand Oaks 50-Year 24-hour Isohyet Map, 1-H1.24 as found in the Los Angeles County Public Works Hydrology Manual, 2006 (Hydrology Manual).

Detailed watershed subarea boundaries were defined based on proposed drainage patterns and drainage system layouts. The tributary area of each subarea was calculated to the nearest hundredth of an acre. Site characteristics such as soil number, rainfall zone, and land use were identified based on information taken from the Hydrology manual.

The 50-year storm information was calculated using the Rational Method with the use of the County HydroCalc software. Site properties were inputs into the program which generated Peak runoff values for the 50-year storm event. The site soil type is 028 and is within 7.4" 50yr- isohyets. The program also generates the storm hydrograph which was then used to size the detention basin.

Hydraulic information was requested from the County of Los Angeles and they provided us with the allowable Q for the project. The allowable Q for the project is 1.55 cfs/acre and this translates into an allowable Q(50) of 8 cfs. The hydrology calculations resulted in a Peak Q(50) of 13.9 cfs, therefore detention of runoff will be required.

DETENTION

The detention basin proposed for the project is an underground pipe system. Analysis was performed using Hydroflow Hydrographs software by ACAD. The hydrograph output from HydroCalc was exported as a .cvs file and imported into the Hydroflow Hydrographs software. The software was then used to run various configurations of underground pipe layout and outflow structures until an optimal design was achieved. Once a required detention size was determined, Contech Engineered Solutions was consulted to obtain an actual product to concretely define the size of the detention basin.

A flow-thru system is proposed where by all site runoff is captured by inlets and conveyed to a diversion structure that uses an orifice plate to limit the outflow. The first diversion manhole limits the outflow to 8.5 cfs where it continues down the main storm drain line and the rest of the flow is diverted to the underground detention basin. The outflow of the detention basin converges with the main pipe at a conversion manhole that is also fitted with an orifice plate that limits the

allowable outflow to 10.4 cfs. This ensures that the outflow from the site is no more than 10.4 cfs. The design volume of the underground structure is 1,684 cubic feet of storage and is then size required to hold the excess runoff during a 50-year storm event.

STORMWATER QUALITY

The City of Agoura Hills requires all new development within the city is subject to design guidelines of the Urban Runoff requirements of the City of Agoura Hills and the Los Angeles County Public Works Department requirements for Standard Urban Stormwater Mitigation Plan (SUSMP).

The project is a new development that is greater than 1 acre in size and proposes to add more than 10,000 square feet of impervious surface area and therefore falls into one of the categories making it applicable to comply with conditioning approval for the design and implementation of post-construction stormwater management control measure. The water quality leaving the site for the developed condition must be treated to remove the pollutants of concern. The level of protection shall be that required to mitigate trash and sediment.

Best Management Practice (BMP) devices for this project have been designed per the Los Angeles County SUSMP, 2002. The Peak Mitigation Flow Rate (Qpm) and Mitigation Volume (Vm) is defined as that from a 3/4" storm event . Design worksheets and calculations from the Los Angeles County SUSMP Manual were used.

The overall design concept was established to allow water to be treated through a combination of Point Source and Treatment Train treatment methods. The site has been divided into smaller manageable areas where cost effective BMPs can be installed or constructed to capture pollutants at the source. The "treatment train" allows for improved levels of pollutant removals by providing more than one method of removing pollutants and providing them in successive order. Providing more than one treatment method to treat runoff ensures that pollutants are captured with a higher success rate. The treatment train process begins with routine maintenance on the grounds. Some drainage areas drain to grated inlets with filter inserts which prevent large trash from entering the storm drain system and are visible and accessible to maintenance crews. A CDS unit is proposed upstream of the underground detention basin to serve a dual purpose of treating

CONCLUSIONS

As shown in the proposed grading and utility plans, storm water drainage will be routed via gutters and swales to drainage inlets and underground pipe facilities to a storm drain.

The proposed grading and drainage infrastructure shown on the Site Plan(s) should provide for adequate drainage from the site. Secondary overland escape has also been provided at the rear of the site which mimic existing conditions in the event that the primary drainage pathways are blocked or fail. This is to ensure that the proposed onsite structures are protected from flooding during a 100-year storm event.

Proposed drainage control facilities will improve stormwater water quality by treating approximately 95% of the site area runoff prior to discharge from the site. The remaining 5% are landscape areas located at the perimeter of the site. The use of filter inserts, underground detention and infiltration, in addition to proprietary products employing screening technology to remove gross pollutants, allows the project to meet required standards.

Drainage from the project site will be controlled in a manner, which will allow the project to occur as intended without conflicting with any applicable State, County, or City of Agoura Hills regulations and without adversely affecting adjacent properties and/or the project itself.

REFERENCES

- Los Angeles County Department of Public Works Hydrology Manual, 2006
- FEMA, National Flood Insurance Rate Maps
- Federal Highway Administration Publication No. FHWA-NHI-06-086 Hydraulic Engineering Circular No. 14, 3rd Edition. July 2006
- Development Planning for Storm Water Management by Los Angeles County Department of Public Works (SUSMP), 2002.

the Qpm and as a pretreatment to the underground detection basin to extend its service life.

The proposed CDS unit is a model CDS2015-4-C and will treat that Qpm = 0.23 cfs up to a max treatment flow of 0.7 cfs. An internal bypass system allows high flows to pass through.

100-YR FLOOD PROTECTION

Overall, the 100-yr overflow path matches existing conditions, where flows are in the northeast direction towards the 1010 Freeway to the adjacent site to the east. Review of FEMA's NFIP Flood Insurance Rate Maps shows the project within Map Number 06037C1244F, Effective Date September 26,2008. Site is located in Zone X. Zone X areas are defined as areas with a 0.2% annual chance of flood; and a 1% annual chance of flood with depths less than 1 foot. See Appendix for FEMA Firmettes.

EXHIBIT A

HYDROLOGY MAPS

DELANE ENGINEERING

www.DelaneEngineering.com | Info@DelaneGroup.com

1738 Berkeley Street, Santa Monica, CA 90404 | P. 310.546.5711 | F. 866.579.6415

EXHIBIT A: EXISTING CONDITION

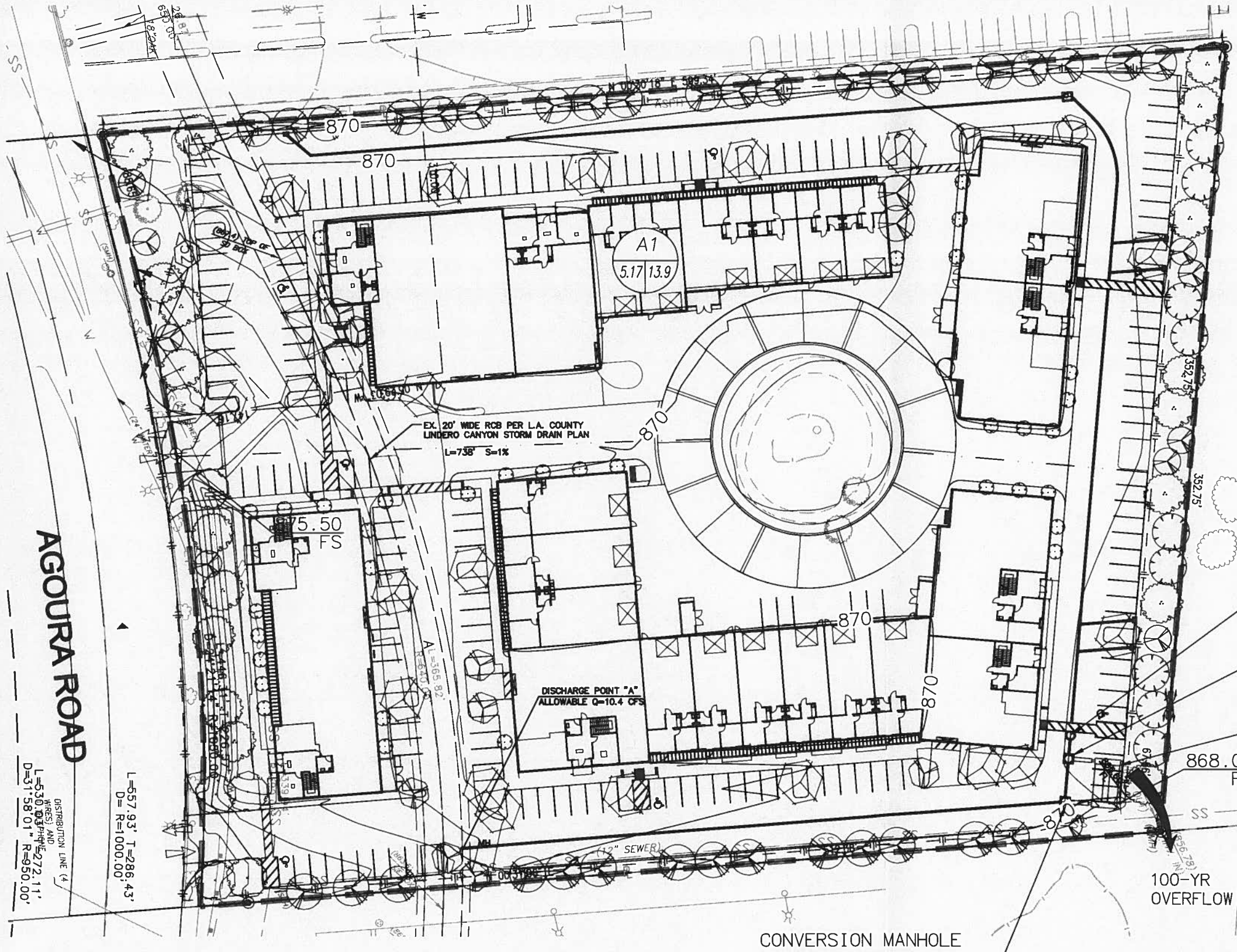
PREPARED BY
DELANE ENGINEERING
1338 BERKELEY STREET, SANTA MONICA, CA 90404
PHONE: 310.566.5711 EMAIL: DELANEENGINEERING.COM

HYDROLOGY MAP

DRN BY: CS	DES BY: SU/CS	CK'D BY: SU	1
PROJ. NUMBER 10-10066			OF 1

SAVE DATE: 12/1/14 CSOLIS

PLOT DATE: 12/1/14 3:02 PM FILE NAME: H:\PDATA\0110066\CAD\LAND\EXHIBITS\066-HYD-EX.DWG



LEGEND

- SUB-AREA BOUNDARY
- X — SUB-AREA DESIGNATION
- XX.X | XX.X — Q50 (CFS)
- AREA (AC)
- FLOW DIRECTION

EXHIBIT B: PROPOSED CONDITION

PREPARED BY
DELANE ENGINEERING
1338 BERKELEY STREET, SANTA MONICA, CA 90404
PHONE: 310.949.5711 WWW.DELANEENGINEERING.COM

HYDROLOGY MAP

DRN BY: CS	DES BY: SU/CS	CK'D BY: SU	1
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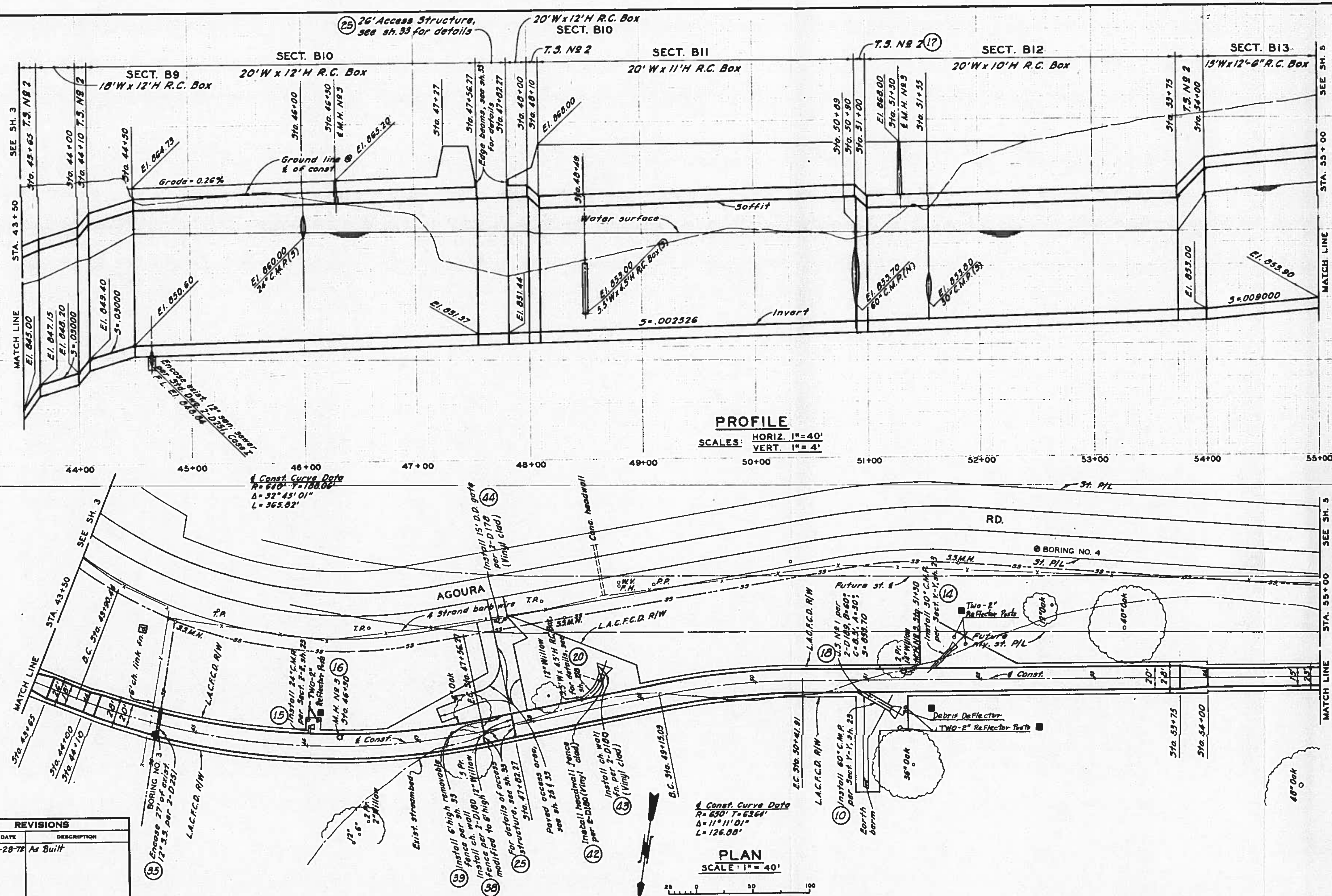


NOTES:

1. For general notes, see sh. 1.
2. For structural sections and notes, see sh. 17.
3. For earth grading plan, see sheet 25.

DRAWN BY	MARK	DATE	DESCRIPTION
A.E.	■	2-28-72	As Built
CHECKED BY R.D.Q.			
DESIGNED BY R.D.Q.			
SUBMITTED BY R.B.R.			

REVISIONS

LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT

LINDERO CANYON

AGOURA RD. TO LAKE LINDERO DR.
CONCRETE CONDUIT

PLAN AND PROFILE
STA. 43+50 TO STA. 55+00

RECOMMENDED BY: DIVISION ENGINEER
APPROVAL RECOMMENDED BY: ASS'T CHIEF DEPUTY ENGINEER 1/29/71
APPROVED BY: A.E. Bruington, CHIEF ENGINEER

SCALE	DATE	DWG. NO.
AS SHOWN	JAN. '71	421-D2.4 SHEET 4 OF 33

EXHIBIT B

LA COUNTY HYDROLOGY

DELANE ENGINEERING

www.DelaneEngineering.com | Info@DelaneGroup.com
1738 Berkeley Street, Santa Monica, CA 90404 | P. 310.546.5711 | F. 866.579.6415

Peak Flow Hydrologic Analysis

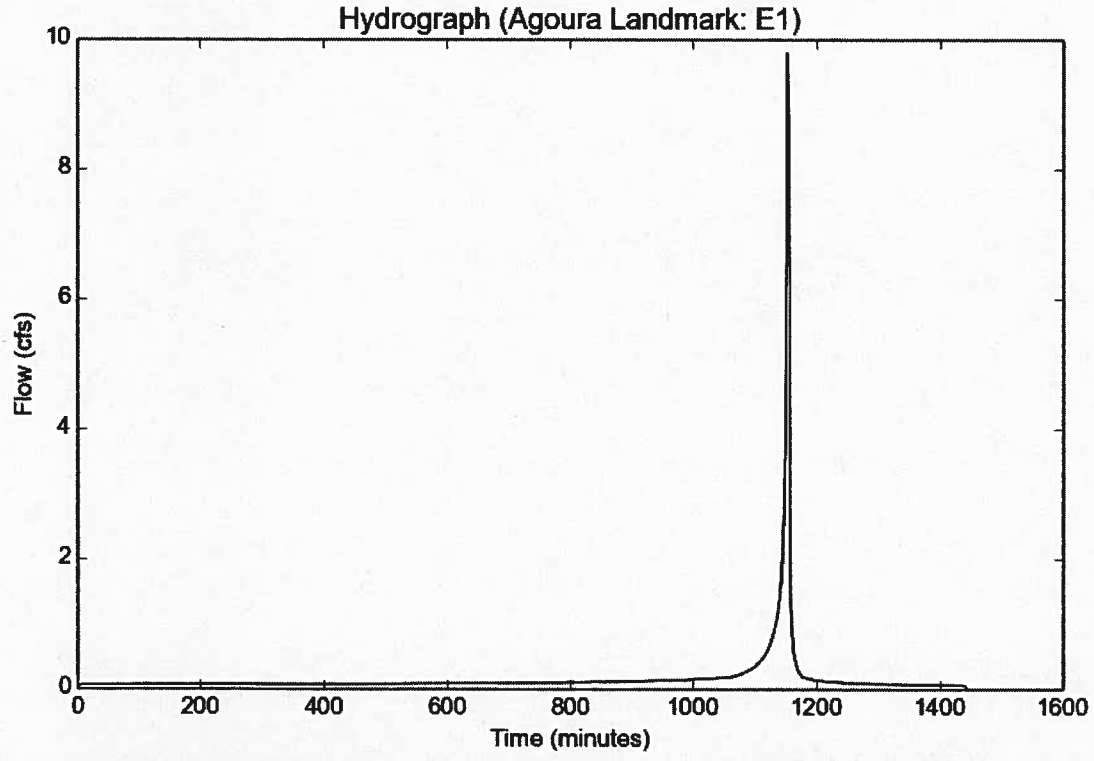
File location: H:/Pdata/0110066/Calcs/Strmwater/Hydrology/Agoura Landmark Report-EXISTING.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Agoura Landmark
Subarea ID	E1
Area (ac)	3.19
Flow Path Length (ft)	393.0
Flow Path Slope (vft/hft)	0.0265
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.01
Soil Type	28
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.4
Peak Intensity (in/hr)	4.415
Undeveloped Runoff Coefficient (Cu)	0.693
Developed Runoff Coefficient (Cd)	0.6951
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	9.7896
Burned Peak Flow Rate (cfs)	9.7896
24-Hr Clear Runoff Volume (ac-ft)	0.3225
24-Hr Clear Runoff Volume (cu-ft)	14046.3185



Peak Flow Hydrologic Analysis

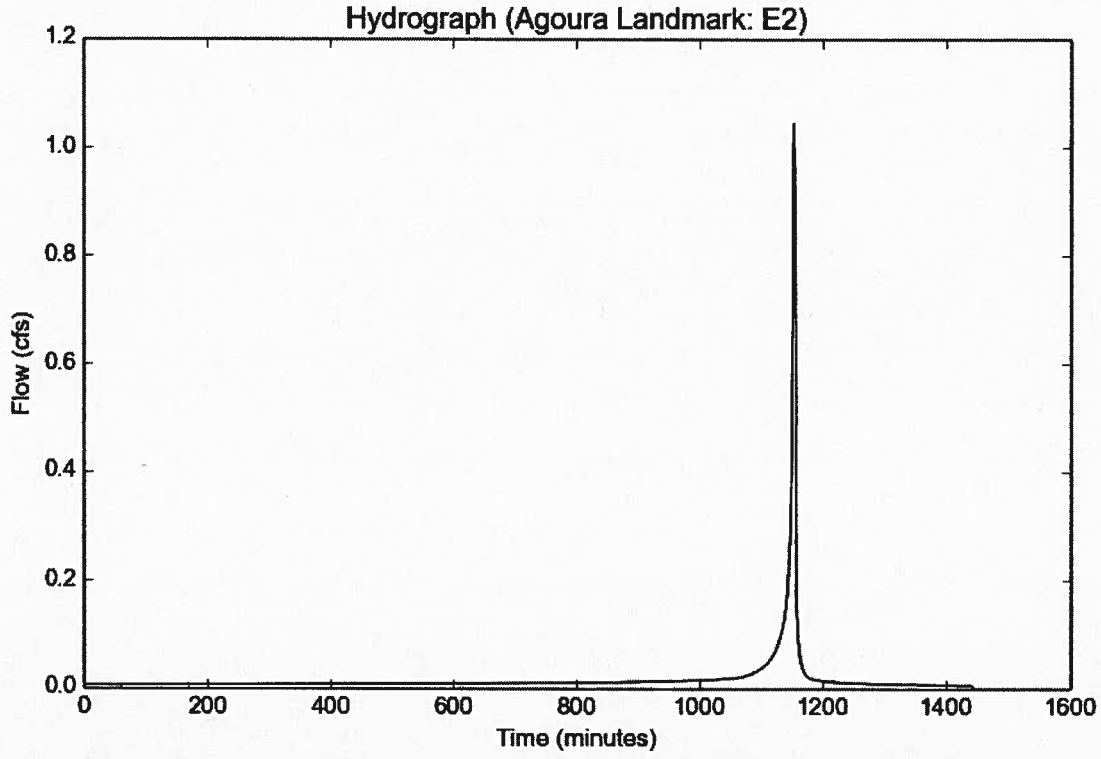
File location: H:/Pdata/0110066/Calcs/Strmwater/Hydrology/Agoura Landmark Report-EXISTING.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Agoura Landmark
Subarea ID	E2
Area (ac)	0.34
Flow Path Length (ft)	126.0
Flow Path Slope (vft/hft)	0.09459
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.01
Soil Type	28
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.4
Peak Intensity (in/hr)	4.415
Undeveloped Runoff Coefficient (Cu)	0.693
Developed Runoff Coefficient (Cd)	0.6951
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.0434
Burned Peak Flow Rate (cfs)	1.0434
24-Hr Clear Runoff Volume (ac-ft)	0.0344
24-Hr Clear Runoff Volume (cu-ft)	1497.0998



Peak Flow Hydrologic Analysis

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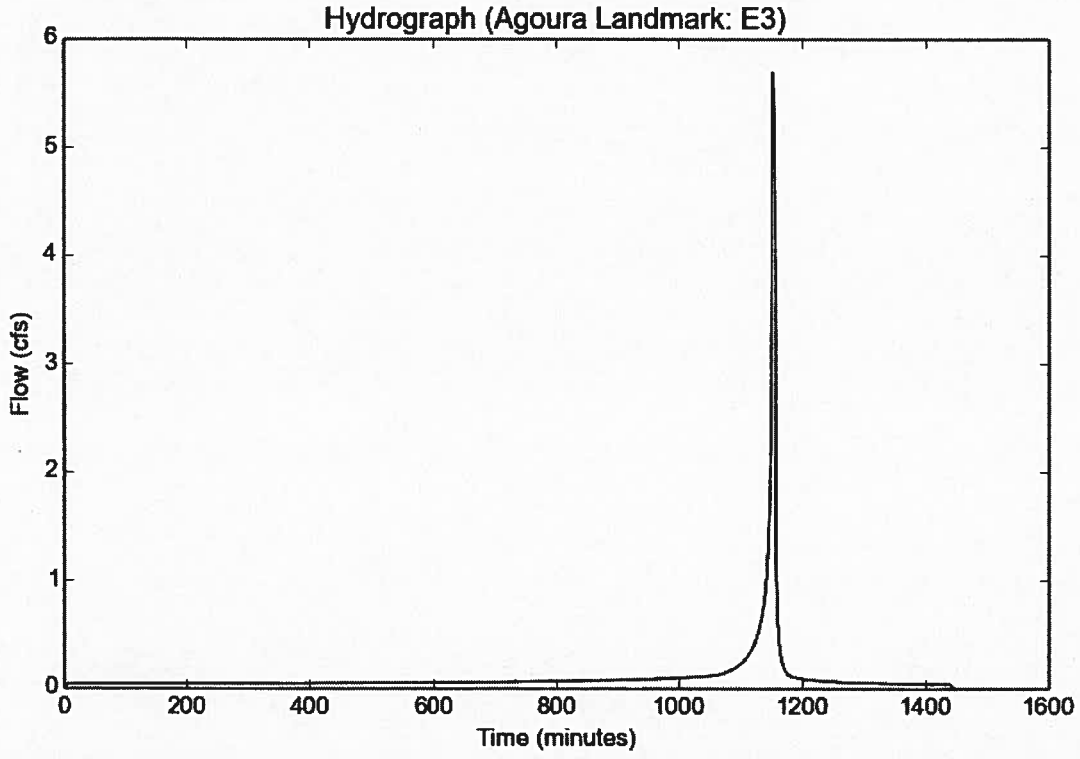
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Agoura Landmark
Subarea ID	E3
Area (ac)	2.08
Flow Path Length (ft)	500.0
Flow Path Slope (vft/hft)	0.0346
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.01
Soil Type	28
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.4
Peak Intensity (in/hr)	4.0525
Undeveloped Runoff Coefficient (Cu)	0.6727
Developed Runoff Coefficient (Cd)	0.675
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	5.6897
Burned Peak Flow Rate (cfs)	5.6897
24-Hr Clear Runoff Volume (ac-ft)	0.2099
24-Hr Clear Runoff Volume (cu-ft)	9144.033



Peak Flow Hydrologic Analysis

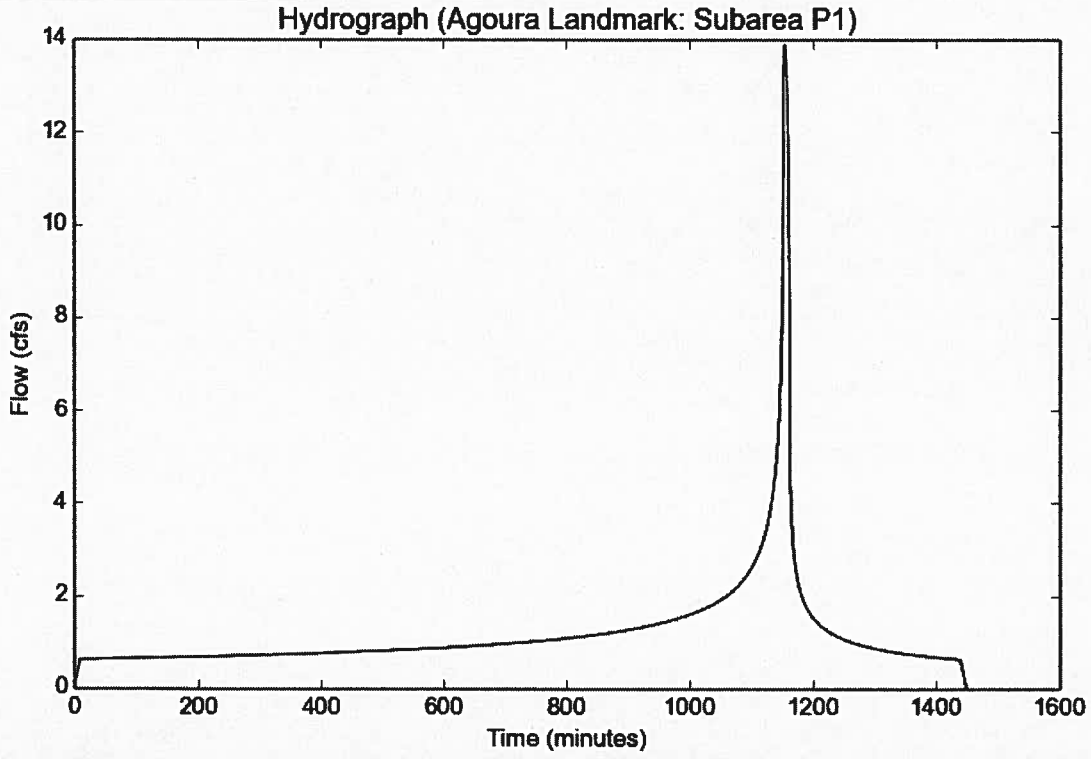
File location: H:/Pdata/0110066/Calcs/Strmwater/Hydrology/AGOURA LANDMARK - Subarea P1.pdf
Version: HydroCalc 0.3.0-beta

Input Parameters

Project Name	Agoura Landmark
Subarea ID	Subarea P1
Area (ac)	5.17
Flow Path Length (ft)	1094.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.4
Percent Impervious	0.8
Soil Type	28
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.4
Peak Intensity (in/hr)	3.1875
Undeveloped Runoff Coefficient (Cu)	0.6137
Developed Runoff Coefficient (Cd)	0.8427
Time of Concentration (min)	10.0
Clear Peak Flow Rate (cfs)	13.8878
Burned Peak Flow Rate (cfs)	13.8878
24-Hr Clear Runoff Volume (ac-ft)	2.3754
24-Hr Clear Runoff Volume (cu-ft)	103474.0429



DETENTION DESIGN

DELANE ENGINEERING

www.DelaneEngineering.com | Info@DelaneGroup.com
1738 Berkeley Street, Santa Monica, CA 90404 | P. 310.546.5711 | F. 866.579.6415

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION
Hydraulic Analysis Unit
OFFICIAL RECORD DOCUMENT
Issued By:
Date:
Public Service That Works

Office Use Only
☐ Sent Initials:
☐ Fax ☑ Email ☐ Other:
Date: Time:

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DESIGN DIVISION ▯HYDRAULIC ANALYSIS UNIT

INFORMATION REQUEST SUMMARY

INFORMATION REQUESTED BY
Requester's Name: CHRISTOPHER SOLIS
Company: DELONG ENGINEERING
Phone Number: (805)614-3565 Fax Number:
Email: CSOLIS@DELONEGROUP.COM

Method of Contact: ☐ Walk-in ☐ Phone ☐ Fax ☑ Email ☐ Prelim. Mtg. Date:

Intended Use: STORM DRAIN DESIGN

Proposed Project Type: COMMERCIAL Acreage Involved: 4.9

Will information be used in any litigation? ☐ YES ☑ NO
Case Info Name: No: Location:

Requester's Signature:

INFORMATION REQUESTED (Attach site map if available)
LACFCD Facility: Name: LINDERO CANYON CHANNEL STORM DRAIN (RCB)
Unit: Line: Station:
City: AGOURA HILLS
Street/Cross-street: AGOURA RD / KANAN RD
Thomas Guide: Page: 557 Grid: J6 ☐ Site Map/Plans Submitted
Info. Requested: ALLOWABLE Q FOR DEVELOPMENT

BELOW SECTION TO BE COMPLETED BY THE HYDRAULIC ANALYSIS UNIT

INFORMATION PROVIDED: Allowable q per acre.

REFERENCES SEARCHED: 2004 Hydrology study.

COMMENTS, ETC: Allowable q per acre = 2.00 cfs.

FOLLOW-UP REQUIRED:

INFORMATION PROVIDED BY: Ambrose Ajaelo PE Date: 12/11/2014

INFORMATION REVIEWED BY: Date:

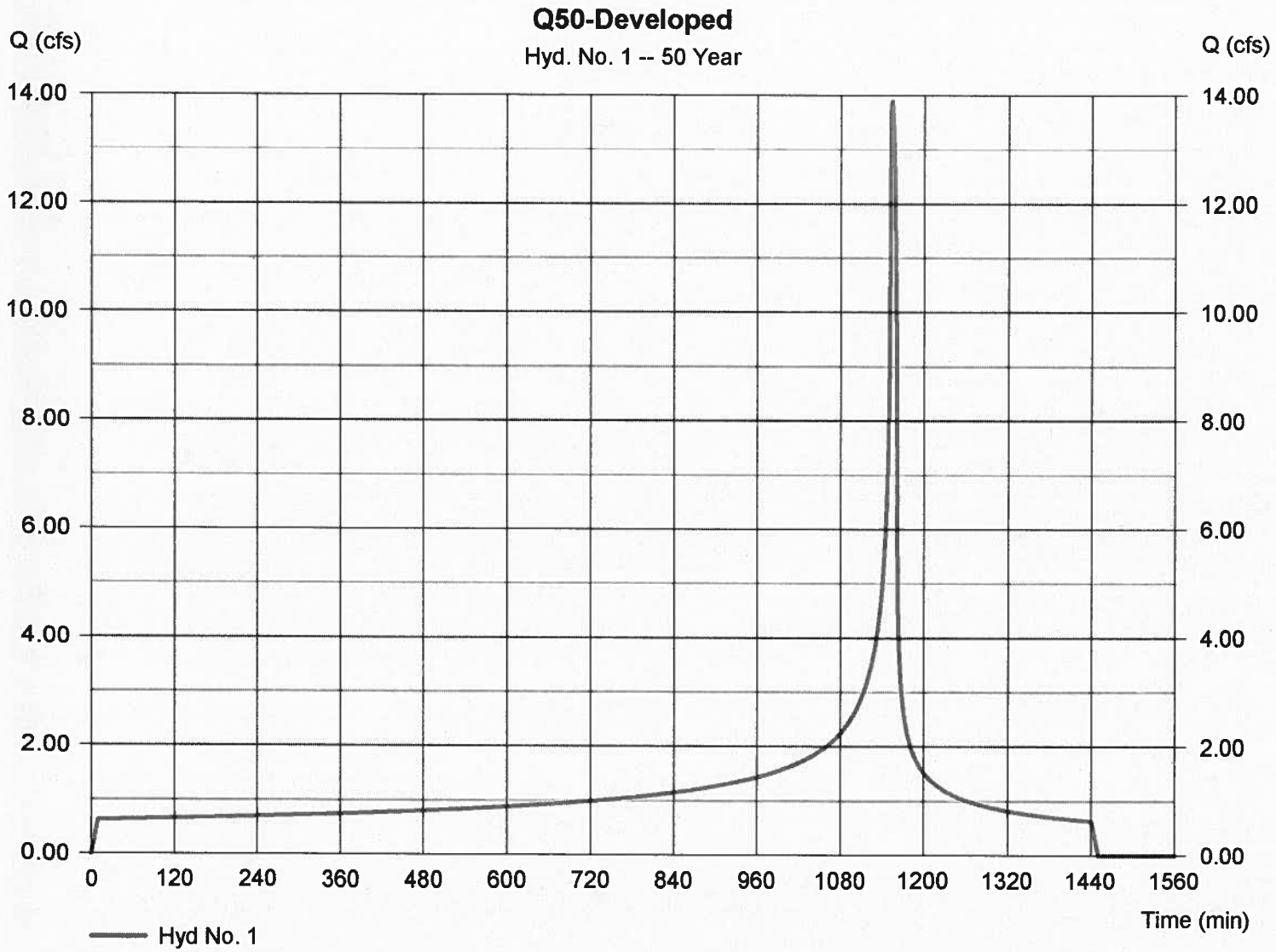
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Thursday, 12 / 11 / 2014

Hyd. No. 1

Q50-Developed

Hydrograph type	= Manual	Peak discharge	= 13.89 cfs
Storm frequency	= 50 yrs	Time to peak	= 1154 min
Time interval	= 1 min	Hyd. volume	= 103,471 cuft



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Thursday, 12 / 11 / 2014

Hyd. No. 1

Q50-Developed

Hydrograph type	= Manual	Peak discharge	= 13.89 cfs
Storm frequency	= 50 yrs	Time to peak	= 19.23 hrs
Time interval	= 1 min	Hyd. volume	= 103,471 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp. Print interval = 10)

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
0.05	0.190	3.55	0.690	7.05	0.770	10.55	0.910
0.22	0.630	3.72	0.690	7.22	0.780	10.72	0.910
0.38	0.630	3.88	0.690	7.38	0.780	10.88	0.920
0.55	0.630	4.05	0.700	7.55	0.790	11.05	0.930
0.72	0.640	4.22	0.700	7.72	0.790	11.22	0.940
0.88	0.640	4.38	0.700	7.88	0.800	11.38	0.950
1.05	0.640	4.55	0.710	8.05	0.800	11.55	0.960
1.22	0.640	4.72	0.710	8.22	0.810	11.72	0.970
1.38	0.650	4.88	0.720	8.38	0.820	11.88	0.980
1.55	0.650	5.05	0.720	8.55	0.820	12.05	0.990
1.72	0.650	5.22	0.720	8.72	0.830	12.22	1.000
1.88	0.650	5.38	0.730	8.88	0.830	12.38	1.010
2.05	0.660	5.55	0.730	9.05	0.840	12.55	1.020
2.22	0.660	5.72	0.740	9.22	0.850	12.72	1.040
2.38	0.660	5.88	0.740	9.38	0.850	12.88	1.050
2.55	0.670	6.05	0.740	9.55	0.860	13.05	1.060
2.72	0.670	6.22	0.750	9.72	0.870	13.22	1.070
2.88	0.670	6.38	0.750	9.88	0.870	13.38	1.090
3.05	0.680	6.55	0.760	10.05	0.880	13.55	1.100
3.22	0.680	6.72	0.760	10.22	0.890	13.72	1.120
3.38	0.680	6.88	0.770	10.38	0.900	13.88	1.130

Continues on next page...

Hydrograph Discharge Table

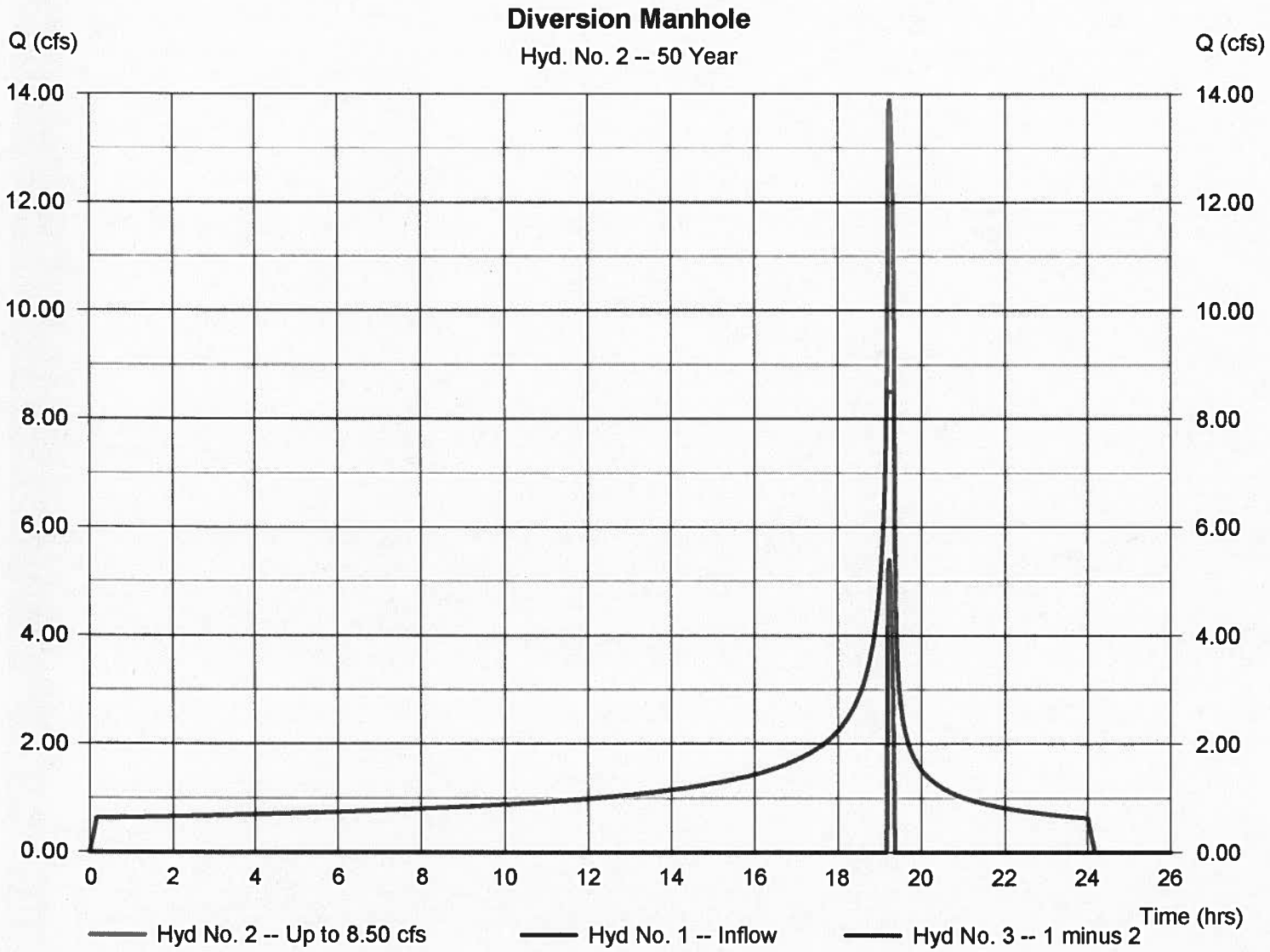
Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
14.05	1.150	18.55	2.960	23.05	0.700
14.22	1.170	18.72	3.380	23.22	0.690
14.38	1.190	18.88	4.040	23.38	0.670
14.55	1.210	19.05	5.360	23.55	0.660
14.72	1.230	19.22	13.74	23.72	0.650
14.88	1.250	19.38	4.550	23.88	0.640
15.05	1.270	19.55	2.480	24.05	0.440
15.22	1.300	19.72	1.940		
15.38	1.320	19.88	1.670	*...End*	
15.55	1.350	20.05	1.480		
15.72	1.380	20.22	1.350		
15.88	1.410	20.38	1.250		
16.05	1.440	20.55	1.170		
16.22	1.480	20.72	1.100		
16.38	1.520	20.88	1.050		
16.55	1.560	21.05	1.000		
16.72	1.610	21.22	0.960		
16.88	1.660	21.38	0.920		
17.05	1.720	21.55	0.890		
17.22	1.780	21.72	0.860		
17.38	1.850	21.88	0.830		
17.55	1.940	22.05	0.810		
17.72	2.030	22.22	0.790		
17.88	2.150	22.38	0.770		
18.05	2.280	22.55	0.750		
18.22	2.460	22.72	0.730		
18.38	2.670	22.88	0.720		

Hydrograph Report

Hyd. No. 2

Diversion Manhole

Hydrograph type	= Diversion1	Peak discharge	= 8.500 cfs
Storm frequency	= 50 yrs	Time to peak	= 19.18 hrs
Time interval	= 1 min	Hyd. volume	= 100,996 cuft
Inflow hydrograph	= 1 - Q50-Developed	2nd diverted hyd.	= 3
Diversion method	= Constant Q	Constant Q	= 8.50 cfs



Hydrograph Report

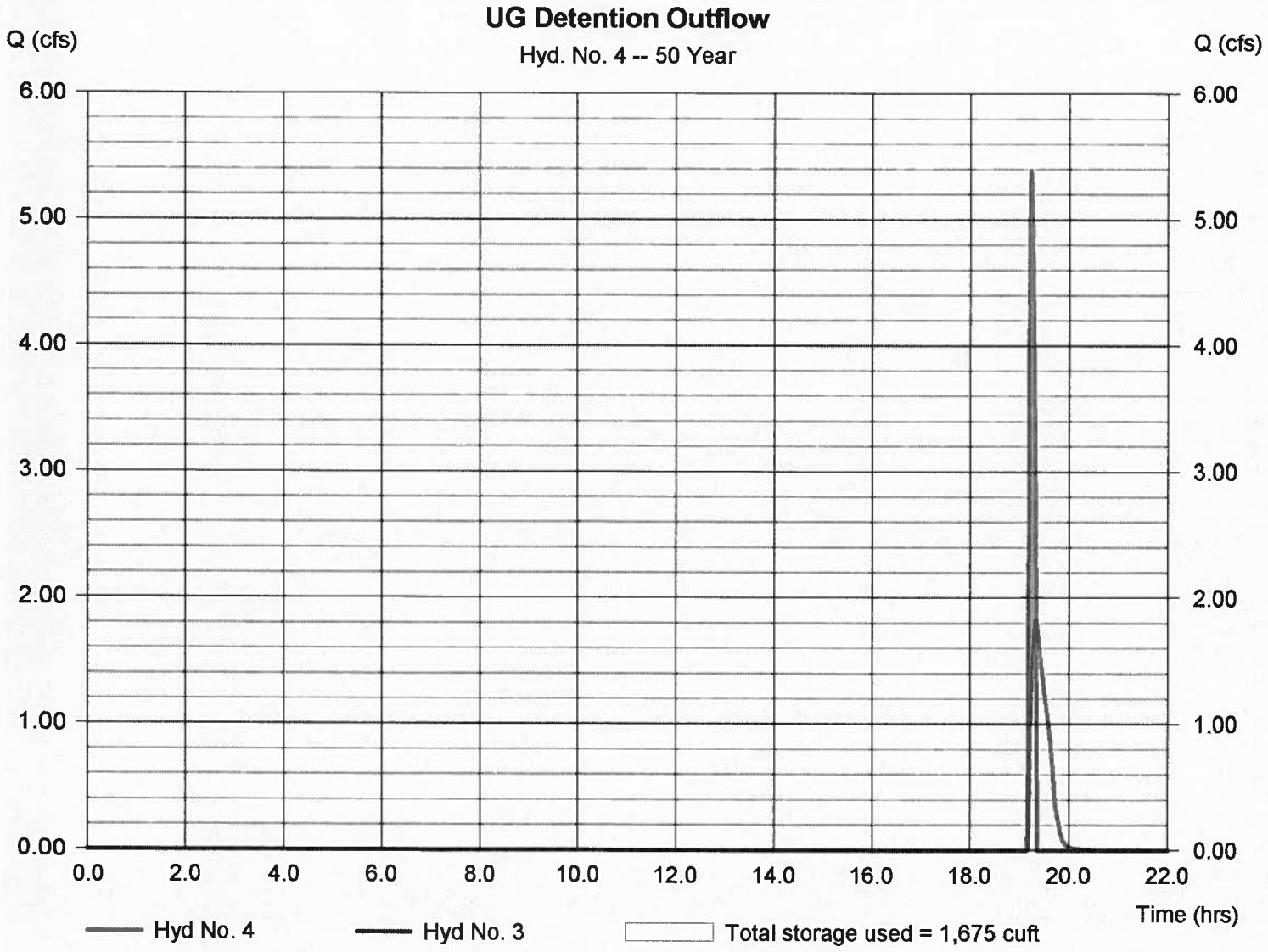
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Thursday, 12 / 11 / 2014

Hyd. No. 4

UG Detention Outflow

Hydrograph type	= Reservoir	Peak discharge	= 1.824 cfs
Storm frequency	= 50 yrs	Time to peak	= 19.33 hrs
Time interval	= 1 min	Hyd. volume	= 2,472 cuft
Inflow hyd. No.	= 3 - To UG Detention	Max. Elevation	= 863.00 ft
Reservoir name	= Underground Detention	Max. Storage	= 1,675 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Thursday, 12 / 11 / 2014

Pond No. 1 - Underground Detention

Pond Data

UG Chambers -Invert elev. = 860.00 ft, Rise x Span = 2.50 x 4.28 ft, Barrel Len = 20.00 ft, No. Barrels = 2, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 859.00 ft, Width = 10.00 ft, Height = 4.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	859.00	n/a	0	0
0.40	859.40	n/a	128	128
0.80	859.80	n/a	128	256
1.20	860.20	n/a	169	425
1.60	860.60	n/a	209	634
2.00	861.00	n/a	206	840
2.40	861.40	n/a	200	1,040
2.80	861.80	n/a	191	1,231
3.20	862.20	n/a	177	1,408
3.60	862.60	n/a	148	1,556
4.00	863.00	n/a	128	1,684

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	Inactive	Inactive	Inactive
Span (in)	= 6.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 859.00	0.00	0.00	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	Inactive	Inactive	Inactive
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	859.00	0.00	---	---	---	---	---	---	---	---	---	0.000
0.04	13	859.04	0.01 ic	---	---	---	---	---	---	---	---	---	0.005
0.08	26	859.08	0.02 ic	---	---	---	---	---	---	---	---	---	0.020
0.12	38	859.12	0.04 ic	---	---	---	---	---	---	---	---	---	0.043
0.16	51	859.16	0.07 ic	---	---	---	---	---	---	---	---	---	0.074
0.20	64	859.20	0.11 ic	---	---	---	---	---	---	---	---	---	0.112
0.24	77	859.24	0.16 ic	---	---	---	---	---	---	---	---	---	0.156
0.28	90	859.28	0.19 oc	---	---	---	---	---	---	---	---	---	0.193
0.32	102	859.32	0.23 oc	---	---	---	---	---	---	---	---	---	0.230
0.36	115	859.36	0.26 oc	---	---	---	---	---	---	---	---	---	0.264
0.40	128	859.40	0.29 oc	---	---	---	---	---	---	---	---	---	0.295
0.44	141	859.44	0.32 oc	---	---	---	---	---	---	---	---	---	0.320
0.48	154	859.48	0.33 oc	---	---	---	---	---	---	---	---	---	0.334
0.52	166	859.52	0.36 oc	---	---	---	---	---	---	---	---	---	0.361
0.56	179	859.56	0.42 oc	---	---	---	---	---	---	---	---	---	0.417
0.60	192	859.60	0.47 oc	---	---	---	---	---	---	---	---	---	0.467
0.64	205	859.64	0.51 oc	---	---	---	---	---	---	---	---	---	0.511
0.68	218	859.68	0.55 oc	---	---	---	---	---	---	---	---	---	0.552
0.72	230	859.72	0.59 oc	---	---	---	---	---	---	---	---	---	0.590
0.76	243	859.76	0.63 oc	---	---	---	---	---	---	---	---	---	0.626
0.80	256	859.80	0.66 oc	---	---	---	---	---	---	---	---	---	0.660
0.84	273	859.84	0.69 oc	---	---	---	---	---	---	---	---	---	0.692
0.88	290	859.88	0.72 oc	---	---	---	---	---	---	---	---	---	0.723
0.92	307	859.92	0.75 oc	---	---	---	---	---	---	---	---	---	0.753
0.96	324	859.96	0.78 oc	---	---	---	---	---	---	---	---	---	0.781
1.00	341	860.00	0.81 oc	---	---	---	---	---	---	---	---	---	0.808
1.04	357	860.04	0.83 oc	---	---	---	---	---	---	---	---	---	0.835
1.08	374	860.08	0.86 oc	---	---	---	---	---	---	---	---	---	0.861
1.12	391	860.12	0.88 ic	---	---	---	---	---	---	---	---	---	0.882
1.16	408	860.16	0.90 ic	---	---	---	---	---	---	---	---	---	0.902
1.20	425	860.20	0.92 ic	---	---	---	---	---	---	---	---	---	0.921
1.24	446	860.24	0.94 ic	---	---	---	---	---	---	---	---	---	0.941

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Underground Detention

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
1.28	467	860.28	0.96 ic	---	---	---	---	---	---	---	---	---	0.959
1.32	488	860.32	0.98 ic	---	---	---	---	---	---	---	---	---	0.978
1.36	509	860.36	1.00 ic	---	---	---	---	---	---	---	---	---	0.996
1.40	530	860.40	1.01 ic	---	---	---	---	---	---	---	---	---	1.014
1.44	551	860.44	1.03 ic	---	---	---	---	---	---	---	---	---	1.031
1.48	571	860.48	1.05 ic	---	---	---	---	---	---	---	---	---	1.048
1.52	592	860.52	1.07 ic	---	---	---	---	---	---	---	---	---	1.065
1.56	613	860.56	1.08 ic	---	---	---	---	---	---	---	---	---	1.082
1.60	634	860.60	1.10 ic	---	---	---	---	---	---	---	---	---	1.098
1.64	655	860.64	1.11 ic	---	---	---	---	---	---	---	---	---	1.114
1.68	675	860.68	1.13 ic	---	---	---	---	---	---	---	---	---	1.130
1.72	696	860.72	1.15 ic	---	---	---	---	---	---	---	---	---	1.146
1.76	716	860.76	1.16 ic	---	---	---	---	---	---	---	---	---	1.162
1.80	737	860.80	1.18 ic	---	---	---	---	---	---	---	---	---	1.177
1.84	758	860.84	1.19 ic	---	---	---	---	---	---	---	---	---	1.192
1.88	778	860.88	1.21 ic	---	---	---	---	---	---	---	---	---	1.207
1.92	799	860.92	1.22 ic	---	---	---	---	---	---	---	---	---	1.222
1.96	819	860.96	1.24 ic	---	---	---	---	---	---	---	---	---	1.236
2.00	840	861.00	1.25 ic	---	---	---	---	---	---	---	---	---	1.251
2.04	860	861.04	1.26 ic	---	---	---	---	---	---	---	---	---	1.265
2.08	880	861.08	1.28 ic	---	---	---	---	---	---	---	---	---	1.279
2.12	900	861.12	1.29 ic	---	---	---	---	---	---	---	---	---	1.293
2.16	920	861.16	1.31 ic	---	---	---	---	---	---	---	---	---	1.306
2.20	940	861.20	1.32 ic	---	---	---	---	---	---	---	---	---	1.320
2.24	960	861.24	1.33 ic	---	---	---	---	---	---	---	---	---	1.333
2.28	980	861.28	1.35 ic	---	---	---	---	---	---	---	---	---	1.347
2.32	1,000	861.32	1.36 ic	---	---	---	---	---	---	---	---	---	1.360
2.36	1,020	861.36	1.37 ic	---	---	---	---	---	---	---	---	---	1.373
2.40	1,040	861.40	1.39 ic	---	---	---	---	---	---	---	---	---	1.386
2.44	1,059	861.44	1.40 ic	---	---	---	---	---	---	---	---	---	1.399
2.48	1,078	861.48	1.41 ic	---	---	---	---	---	---	---	---	---	1.412
2.52	1,097	861.52	1.42 ic	---	---	---	---	---	---	---	---	---	1.424
2.56	1,116	861.56	1.44 ic	---	---	---	---	---	---	---	---	---	1.437
2.60	1,135	861.60	1.45 ic	---	---	---	---	---	---	---	---	---	1.449
2.64	1,154	861.64	1.46 ic	---	---	---	---	---	---	---	---	---	1.461
2.68	1,174	861.68	1.47 ic	---	---	---	---	---	---	---	---	---	1.474
2.72	1,193	861.72	1.49 ic	---	---	---	---	---	---	---	---	---	1.486
2.76	1,212	861.76	1.50 ic	---	---	---	---	---	---	---	---	---	1.498
2.80	1,231	861.80	1.51 ic	---	---	---	---	---	---	---	---	---	1.510
2.84	1,249	861.84	1.52 ic	---	---	---	---	---	---	---	---	---	1.521
2.88	1,266	861.88	1.53 ic	---	---	---	---	---	---	---	---	---	1.533
2.92	1,284	861.92	1.54 ic	---	---	---	---	---	---	---	---	---	1.545
2.96	1,302	861.96	1.56 ic	---	---	---	---	---	---	---	---	---	1.556
3.00	1,319	862.00	1.57 ic	---	---	---	---	---	---	---	---	---	1.568
3.04	1,337	862.04	1.58 ic	---	---	---	---	---	---	---	---	---	1.579
3.08	1,355	862.08	1.59 ic	---	---	---	---	---	---	---	---	---	1.590
3.12	1,372	862.12	1.60 ic	---	---	---	---	---	---	---	---	---	1.601
3.16	1,390	862.16	1.61 ic	---	---	---	---	---	---	---	---	---	1.613
3.20	1,408	862.20	1.62 ic	---	---	---	---	---	---	---	---	---	1.624
3.24	1,423	862.24	1.63 ic	---	---	---	---	---	---	---	---	---	1.635
3.28	1,437	862.28	1.65 ic	---	---	---	---	---	---	---	---	---	1.645
3.32	1,452	862.32	1.66 ic	---	---	---	---	---	---	---	---	---	1.656
3.36	1,467	862.36	1.67 ic	---	---	---	---	---	---	---	---	---	1.667
3.40	1,482	862.40	1.68 ic	---	---	---	---	---	---	---	---	---	1.678
3.44	1,496	862.44	1.69 ic	---	---	---	---	---	---	---	---	---	1.688
3.48	1,511	862.48	1.70 ic	---	---	---	---	---	---	---	---	---	1.699
3.52	1,526	862.52	1.71 ic	---	---	---	---	---	---	---	---	---	1.709
3.56	1,541	862.56	1.72 ic	---	---	---	---	---	---	---	---	---	1.720
3.60	1,556	862.60	1.73 ic	---	---	---	---	---	---	---	---	---	1.730
3.64	1,568	862.64	1.74 ic	---	---	---	---	---	---	---	---	---	1.740
3.68	1,581	862.68	1.75 ic	---	---	---	---	---	---	---	---	---	1.751
3.72	1,594	862.72	1.76 ic	---	---	---	---	---	---	---	---	---	1.761
3.76	1,607	862.76	1.77 ic	---	---	---	---	---	---	---	---	---	1.771
3.80	1,620	862.80	1.78 ic	---	---	---	---	---	---	---	---	---	1.781
3.84	1,632	862.84	1.79 ic	---	---	---	---	---	---	---	---	---	1.791
3.88	1,645	862.88	1.80 ic	---	---	---	---	---	---	---	---	---	1.801
3.92	1,658	862.92	1.81 ic	---	---	---	---	---	---	---	---	---	1.811
3.96	1,671	862.96	1.82 ic	---	---	---	---	---	---	---	---	---	1.821
4.00	1,684	863.00	1.83 ic	---	---	---	---	---	---	---	---	---	1.831

...End

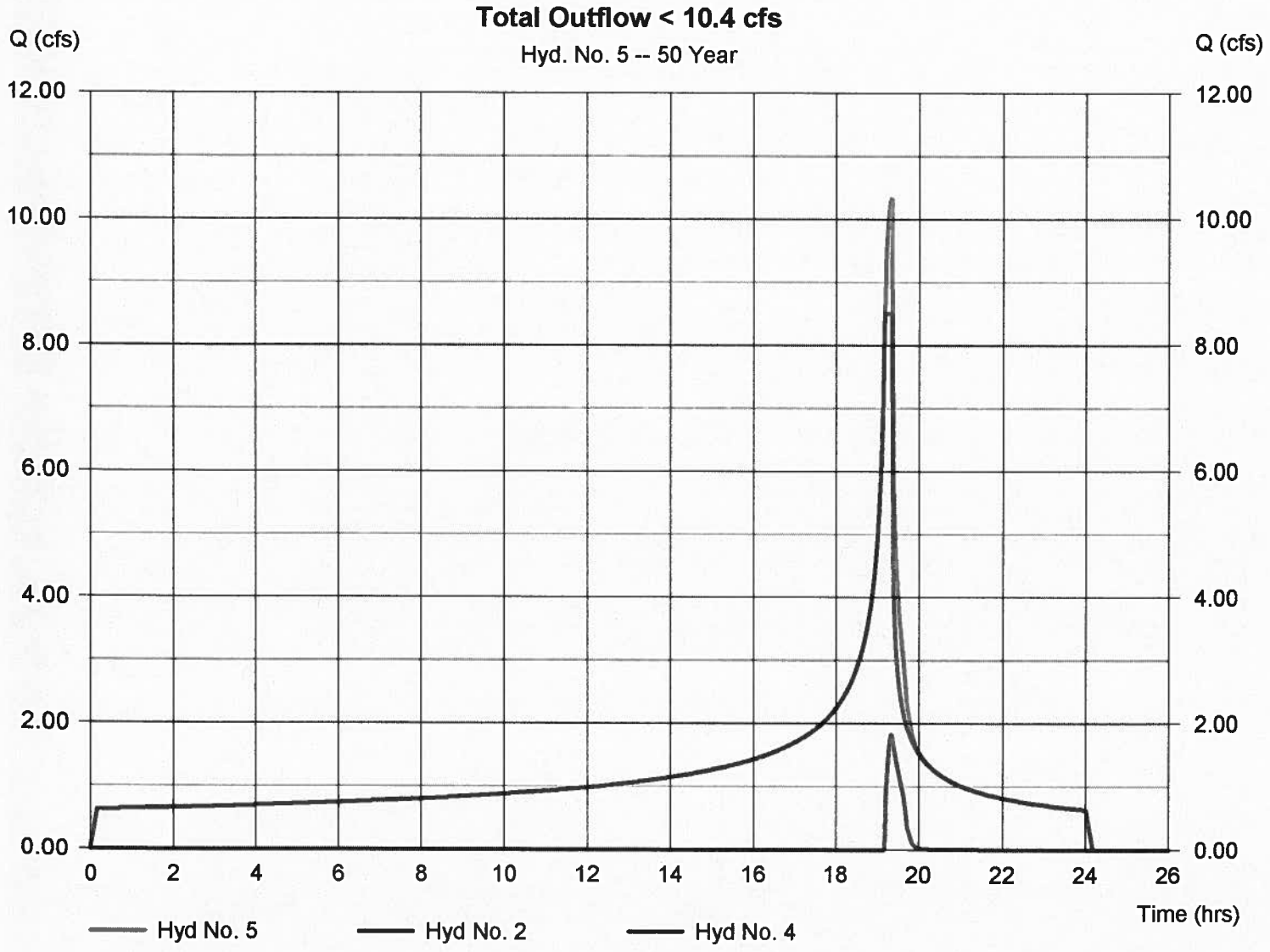
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Thursday, 12 / 11 / 2014

Hyd. No. 5

Total Outflow < 10.4 cfs

Hydrograph type	= Combine	Peak discharge	= 10.32 cfs
Storm frequency	= 50 yrs	Time to peak	= 19.33 hrs
Time interval	= 1 min	Hyd. volume	= 103,469 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 0.000 ac

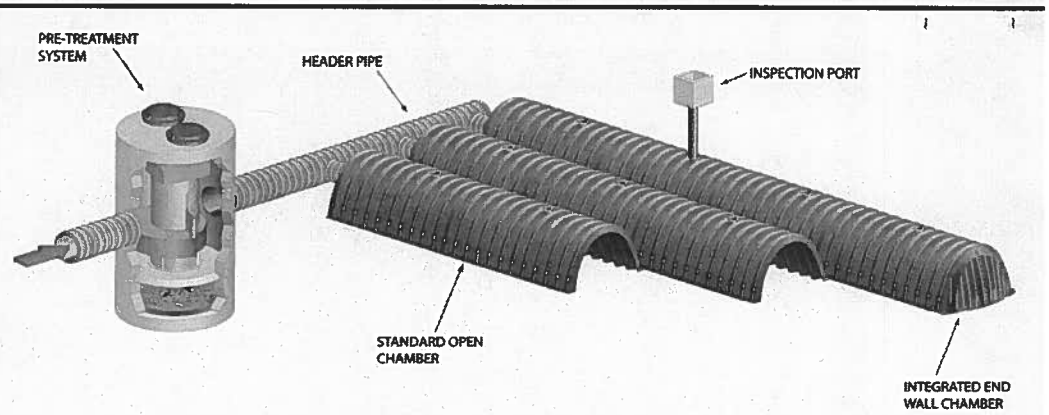


DYODS™
Design Your Own Detention System

CHAMBERMaxx™

CONTECH CONSTRUCTION PRODUCTS INC.

For design assistance, drawings, and pricing send completed worksheet to:
dyods@contech-cpi.com



Project Summary

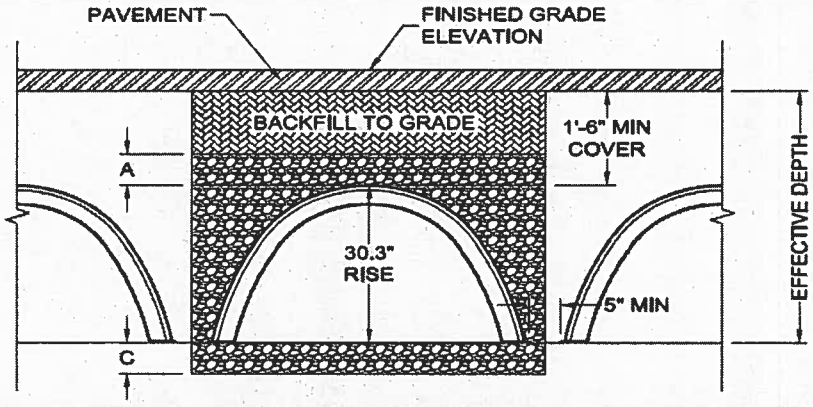
Date:	12/11/2014
Project Name:	Agoura Landmark
City, State:	Agroua Hills, California
County:	USA
Designed By:	Christopher Solis
Company:	Delane Engineering
Telephone:	805-814-3565

Enter Information in Blue Cells

ChamberMaxx Calculator

Storage Volume Required (cf):	1,684
Chamber Invert Depth Below Asphalt (ft):	5.00
Limiting Width (ft):	18
Porous Stone Backfill Included For Storage:	Yes
Depth A: Porous Stone Above Chamber (in):	6
Depth C: Porous Stone Below Chamber (in):	12
Stone Porosity (0 to 40%):	40

Waterway Area (ft^2) 11.72



System Sizing

Use Custom Layout (at right) for layout adjustment

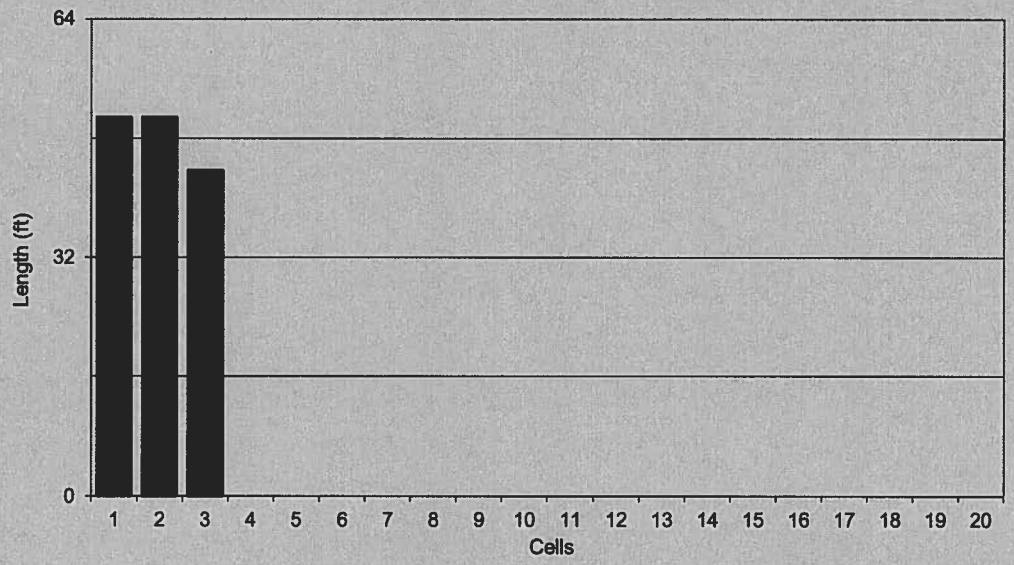
Required Chambers:	20	Chambers	
Chamber Storage:	993	cf	
Porous Stone Storage:	913	cf	
Total Storage Provided:	1,906	cf	113.2% of Req'd Storage
Rectangular Footprint (W x L):	15.7 ft x 57.3 ft		

Additional Units Required = 0

Custom Layout

To adjust layout, select the appropriate number of chambers in the light blue boxes below.

7	7	6																			



CONTECH Materials

ChamberMaxx Middle Units:	14	Chambers @ 7'1" installed length
ChamberMaxx Start Units:	3	Chambers @ 8' installed length
ChamberMaxx End Units:	3	Chambers @ 7'5" installed length
Manifold Fittings (1 manifold):	2	ea Tees and 1ea Elbow
Scour Protection Netting:	16	ft long x 7.5' wide
Approximate Truckloads:	1	Trucks

Construction Quantities

Total Excavation:	211	cy (assumes 4" asphalt)
Stone Backfill:	85	cy stone
Remaining Backfill To Asphalt:	79	cy backfill per specifications
Non-Woven Geotextile:	182	sy for top and sides of excavation

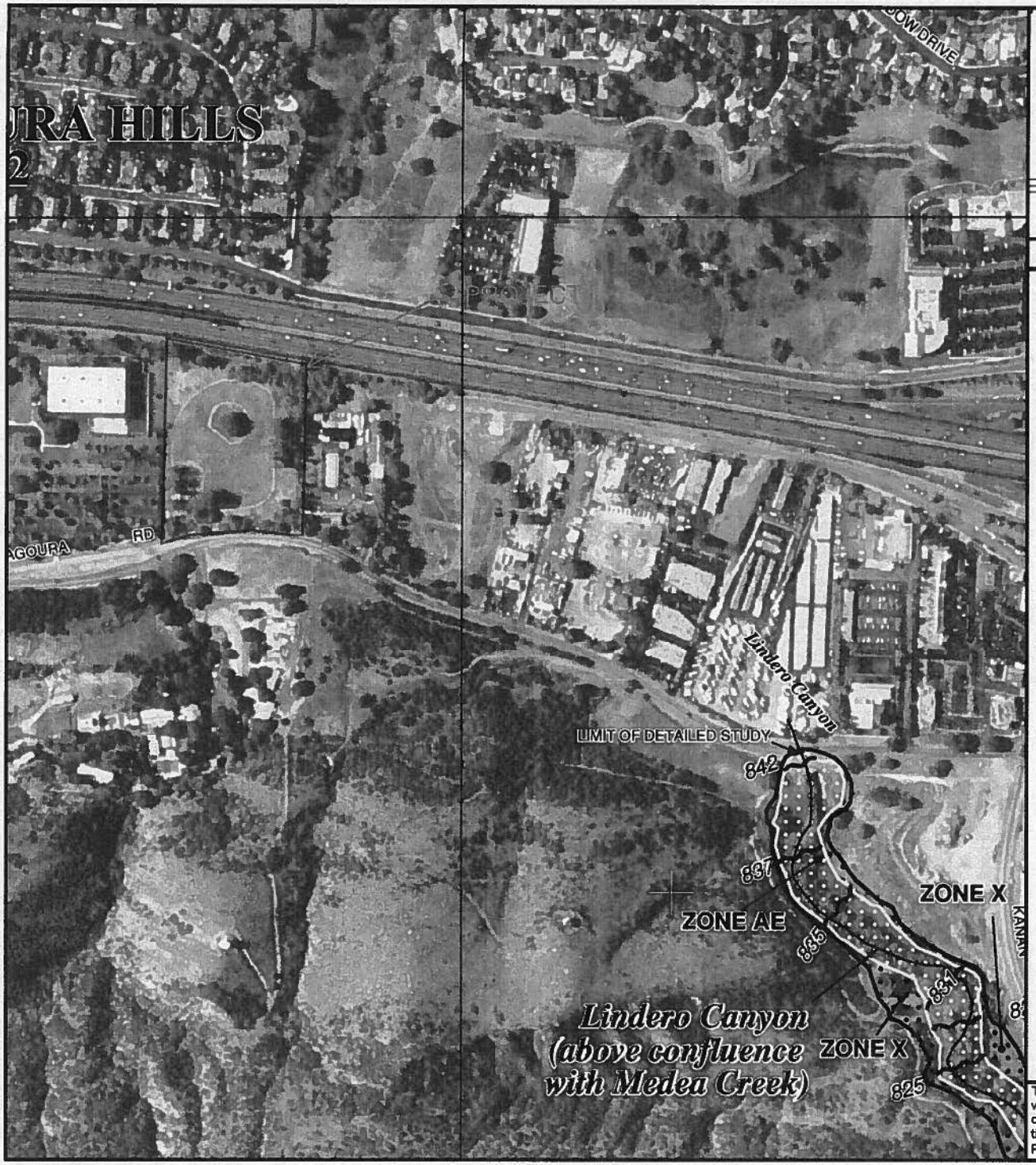
***Construction Quantities are approximate and should be verified upon final design*

EXHIBIT C

FEMA MAPS

DELANE ENGINEERING

www.DelaneEngineering.com | Info@DelaneGroup.com
1738 Berkeley Street, Santa Monica, CA 90404 | P. 310.546.5711 | F. 866.579.6415



MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1244F

FIRM

FLOOD INSURANCE RATE MAP

LOS ANGELES COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 1244 OF 2350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LOS ANGELES COUNTY	065043	1244	F
AGOURA HILLS, CITY OF	065072	1244	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06037C1244F

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

EXHIBIT D

LA COUNTY SUSMP

DELANE ENGINEERING

www.DelaneEngineering.com | Info@DelaneGroup.com

1738 Berkeley Street, Santa Monica, CA 90404 | P. 310.546.5711 | F. 866.579.6415

APPENDIX A VOLUME & FLOW RATE CALCULATIONS

A.1 METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

PROJECT NAME

AGOURA LANDMARK

APPENDIX A VOLUME & FLOW RATE CALCULATIONS

NOMENCLATURE

A_I = Impervious Area (acres)
A_P = Pervious Area (acres)
A_U = Contributing Undeveloped Upstream Area (acres)
A_{Total} = Total Area of Development and Contributing Undeveloped Upstream Area (acres)
C_D = Developed Runoff Coefficient
C_U = Undeveloped Runoff Coefficient
I_X = Rainfall Intensity (inches / hour)
Q_{PM} = Peak Mitigation Flow Rate (cfs)
T_C = Time of Concentration (minutes, must be between 5-30 min.)
V_M = Mitigation Volume (ft^3)

EQUATIONS

$A_{Total} = A_I + A_P + A_U$
$A_I = (A_{Total} * \%$ of Development which is Impervious)
$A_P = (A_{Total} * \%$ of Development which is Pervious)
$A_U = (A_{Total} * \%$ of Contributing Undeveloped Upstream Area***)

$C_D = (0.9 * Imp.) + [(1.0 - Imp.) * C_U]$ If $C_D < C_U$, use $C_D = C_U$

$Q_{PM} = C_D * I_X * A_{Total} * (1$ hour / 3,600 seconds) * (1 ft / 12 inches) * (43,560 ft^2 / 1 acre)
$= C_D * I_X * A_{Total} * (1.008333\ ft^3$-hour / acre-inches-seconds)

$T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * Length^{0.483} * Slope^{-0.135}$

$V_M = (0.75$ inches) * $[(A_I)(0.9) + (A_P + A_U)(C_U)]$ * (1 ft / 12 inches) * (43,560 ft^2 / 1 acre)
$= (2{,}722.5\ ft^3$ / acre) * $[(A_I)(0.9) + (A_P + A_U)(C_U)]$

***** Contributing Undeveloped Upstream Area is an area where stormwater runoff from an undeveloped upstream area will flow directly or indirectly to the Post-Construction Best Management Practices (BMPs) proposed for the development. This additional flow must be included in the flow rate and volume calculations to appropriately size the BMPs.**

PROVIDE PROPOSED PROJECT CHARACTERISTICS

A_{Total}	5.17	Acres
Type of Development	COMMERCIAL	
Predominate Soil Type #	28	
% of Project Impervious	80	
% of Project Pervious	20	
% of Project Contributing Undeveloped Area	0	
A_I	4.14	Acres
A_P	1.03	Acres
A_U	0	Acres

DETERMINING THE PEAK MITIGATED FLOW RATE (Q_{PM}):

In order to determine the peak mitigated flow rate (Q_{PM}) from the new development, use the Los Angeles County Department of Public Works *Hydrology Manual*. Use the Modified Rational Method for calculating the peak mitigation Q_{PM} for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached **Table 1** for all maximum intensity (I_X) values used.

By trial and error, determine the time of concentration (T_C), as shown below:

CALCULATION STEPS:

1. Assume an initial T_C value between 5 and 30 minutes.

T_C 5 minutes

2. Using Table 1, look up the assumed T_C value and select the corresponding I_X intensity in inches/hour.

I_X 0.497 inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, C_U, using the runoff coefficient curve corresponding to the predominant soil type.

C_U 0.1

4. Calculate the Developed Runoff Coefficient, $C_D = (0.9 * \text{Imp.}) + [(1.0 - \text{Imp.}) * C_U]$

C_D 0.74

5. Calculate the value for $C_D * I_X$

$C_D * I_X$ 0.3308

6. Calculate the time of concentration, $T_C = 10^{-0.507} * (C_D * I_X)^{-0.519} * \text{Length}^{0.483} * \text{Slope}^{-0.135}$

Calculated T_C 9 minutes

7. Calculate the difference between the initially assumed T_C and the calculated T_C, if the difference is greater than 0.5 minutes. Use the calculated T_C as the assumed initial T_C in the second iteration. If the T_C value is within 0.5 minutes, round the acceptable T_C value to the nearest minute.

TABLE FOR ITERATIONS:

Iteration No.	Initial T_C (min)	I_X (in/hr)	C_U	C_D	$C_D * I_X$ (in/hr)	Calculated T_C (min)	Difference (min)
1	9	0.339	0.1	0.74	0.2508	10.4	1.4
2	11	0.309	0.1	0.74	0.2287	10.9	-0.1
3							
4							
5							
6							
7							
8							
9							
10							

Acceptable T_C value 11 minutes

8. Calculate the Peak Mitigation Flow Rate,
   $Q_{PM} = C_D * I_X * A_{Total} * (1.008333\ ft^3\text{-hour / acre-inches-seconds})$

Q_{PM} 0.23 cfs

$$V_M = (2{,}722.5\ ft^3/acre) * [(A_1)(0.9) + (A_P + A_4)(C_U)]$$

$$= (2{,}722.5) * [(4.19)(0.9) + (1.03 + 0)(0.1)]$$

$$= 10{,}424.45\ cf$$

TABLE 1

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL
FOR ALL RAINFALL ZONES

Duration, T_C (min)	Rainfall Intensity, I_X (in/hr)
IMTIAL → 5	0.447
6	0.411
7	0.382
8	0.359
#1 → 9	0.339
10	0.323
# 2 → 11	0.309
12	0.297
13	0.286
14	0.276
15	0.267
16	0.259
17	0.252
18	0.245
19	0.239
20	0.233
21	0.228
22	0.223
23	0.218
24	0.214
25	0.210
26	0.206
27	0.203
28	0.199
29	0.196
30	0.193

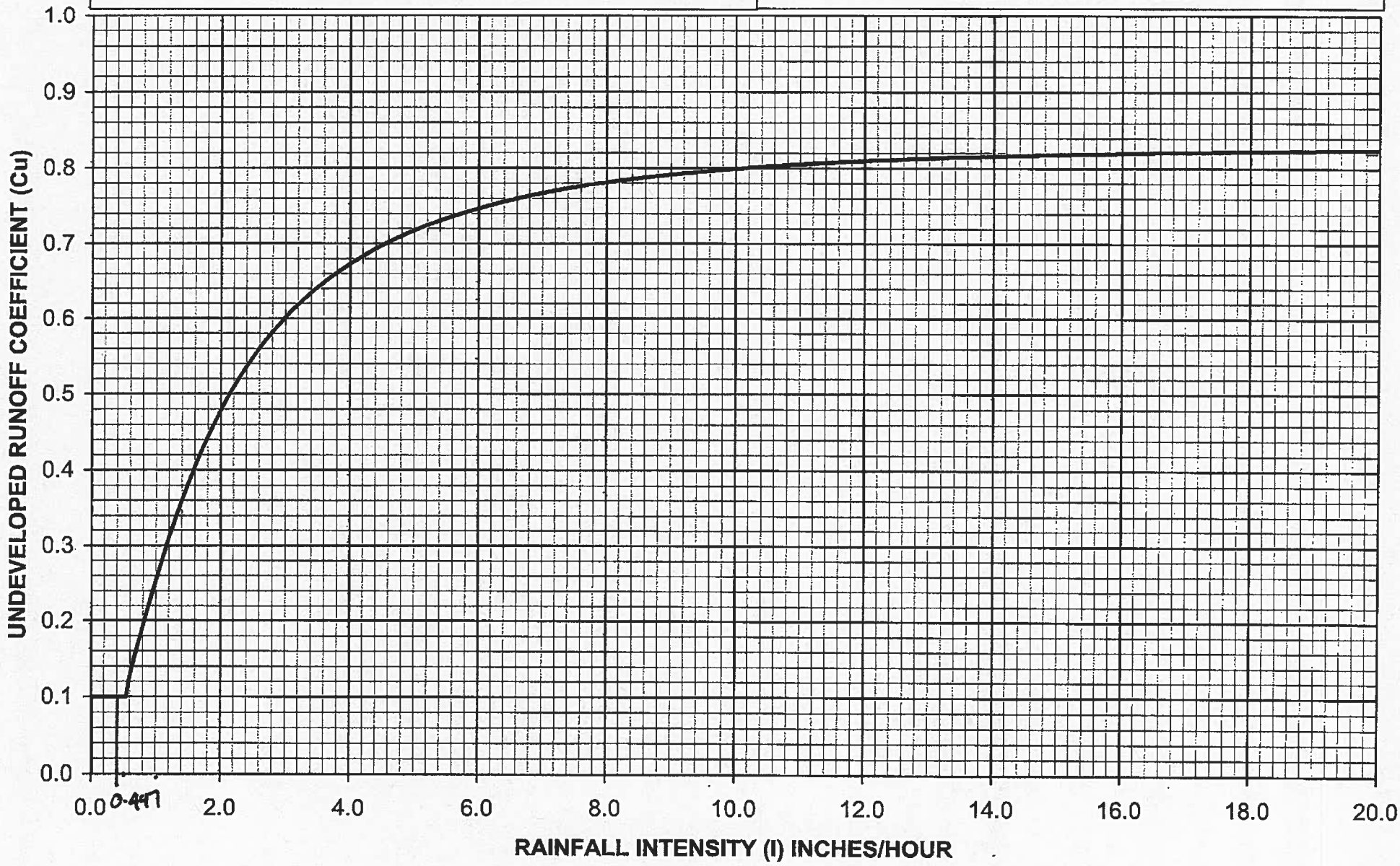
DETERMINING THE VOLUME (V_M)

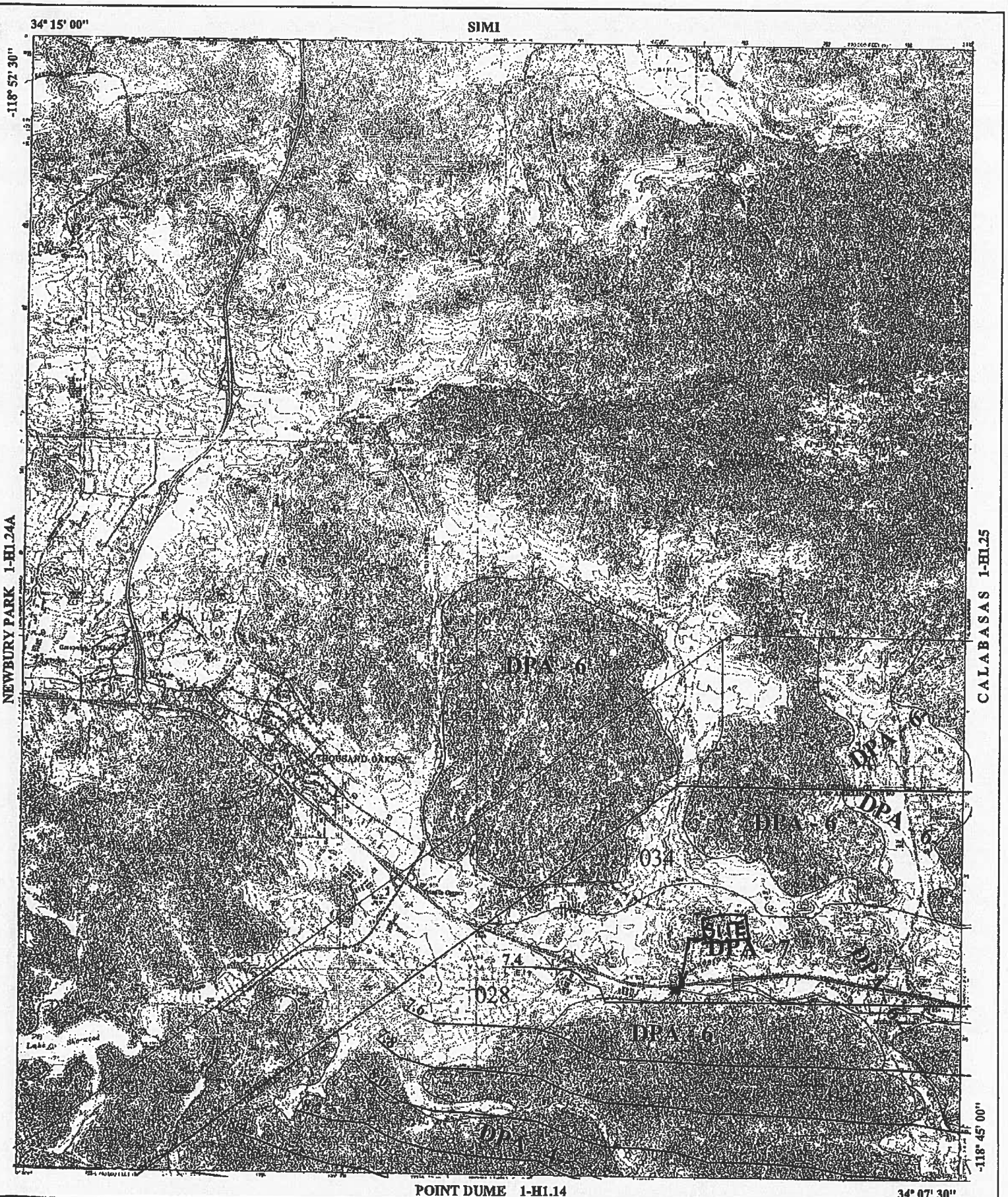
$C_D = (0.9 * IMP) + (1.0 - IMP) * C_U$

Where: C_D = Developed Runoff Coefficient
IMP = Proportion Impervious
C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 028





016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

THOUSAND OAKS
50-YEAR 24-HOUR ISOHYET

1-H1.24

LOS ANGELES COUNTY PUBLIC WORKS
Public Service That Works