AIR QUALITY ANALYSIS

NEWPORT BEACH COUNTRY CLUB PROJECT

CITY OF NEWPORT BEACH, CALIFORNIA

Prepared for:

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METEOROLOGICAL SETTING

The project site's climate, as with all Southern California, is dominated by the strength and position of the semi-permanent high pressure pattern over the Pacific Ocean near Hawaii. It creates cool summers, mild winters, and infrequent rainfall. It drives the cool daytime sea breeze, and it maintains comfortable humidities and ample sunshine after the frequent morning clouds dissipate. Unfortunately, the same atmospheric processes that create the desirable living climate combine to restrict the ability of the atmosphere to disperse the air pollution generated by the large population attracted in part by the desirable climate. Portions of the Los Angeles Basin therefore experience some of the worst air quality in the nation for certain pollutants.

Temperatures in the City of Newport Beach average 61 degrees annually. Daily and seasonal oscillations of temperature are small because of the moderating effects of the nearby oceanic thermal reservoir. In contrast to the steady temperature regime, rainfall is highly variable. Measurable precipitation occurs mainly from early November to mid-April, but total amounts are generally small. Newport Beach averages 12 inches of rain annually with January as the wettest month.

Winds in the project vicinity display several characteristic regimes. During the day, especially in summer, winds are from the south in the morning and from the west in the afternoon. Daytime wind speeds are 7 – 9 miles per hour on average. At night, especially in winter, the land becomes cooler than the ocean, and an off-shore wind of 3-5 miles per hour develops. Early morning winds are briefly from the south-east parallel to the coastline before the daytime on-shore flow becomes well established again. One other important wind regime occurs when high pressure occurs over the western United States that creates hot, dry and gusty Santa Ana winds from the north and northeast across Newport Beach.

The net effect of the wind pattern on air pollution is that any locally generated emissions will be carried offshore at night, and toward inland Orange County by day. Daytime ventilation is much more vigorous. Unless daytime winds rotate far into the north and bring air pollution from developed areas of the air basin into Newport Beach, warm season air quality is much better in the project vicinity than in inland valleys of the air basin. Both summer and winter air quality in the project area is generally good.

In addition to winds that control the rate and direction of pollution dispersal, Southern California is notorious for strong temperature inversions that limit the vertical depth through which pollution can be mixed. In summer, coastal areas are characterized by a sharp discontinuity between the cool marine air at the surface and the warm, sinking air aloft within the high pressure cell over the ocean to the west. This marine/subsidence inversion allows for good local mixing, but acts like a giant lid over the basin. Air starting onshore at the beach is relatively clean, but becomes progressively more polluted as sources continue to add pollution from below without any dilution from above. Because of Newport Beach's location relative to the ocean, the incoming marine air during warm season onshore flow contains little air pollution. Local air quality is not substantially affected by the regional subsidence inversions.

A second inversion type forms on clear, winter nights when cold air off the mountains sinks to the surface while the air aloft remains warm. This process forms radiation inversions. These inversions, in conjunction with calm winds, trap pollutants such as automobile exhaust near their source. During the long nocturnal drainage flow from land to sea, the exhaust pollutants continually accumulate within the shallow, cool layer of air near the ground. Some areas of Orange County thus may experience elevated levels of carbon monoxide and nitrogen oxides because of this winter radiation inversion condition. However, the coastal areas of Orange County have not substantially been affected by limited nocturnal mixing effects (no elevated levels of CO) in approximately 10 years. Both types of inversions occur throughout the year to some extent, but the marine inversions are very dominant during the day in summer, and radiation inversions are much stronger on winter nights when nights are long and air is cool. The governing role of these inversions in atmospheric dispersion leads to a substantially different air quality environment in summer in the South Coast Air Basin than in winter.

AIR QUALITY SETTING

AMBIENT AIR QUALITY STANDARDS (AAQS)

In order to gauge the significance of the air quality impacts of the proposed Newport Beach Country Club project, those impacts, together with existing background air quality levels, must be compared to the applicable ambient air quality standards. These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those people most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise, called "sensitive receptors." Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed. Recent research has shown, however, that chronic exposure to ozone (the primary ingredient in photochemical smog) may lead to adverse respiratory health even at concentrations close to the ambient standard.

National AAQS were established in 1971 for six pollution species with states retaining the option to add other pollutants, require more stringent compliance, or to include different exposure periods. The initial attainment deadline of 1977 was extended several times in air quality problem areas like Southern California. In 2003, the Environmental Protection Agency (EPA) adopted a rule which extended and established a new attainment deadline for ozone for the year 2021. Because the State of California had established AAQS several years before the federal action and because of unique air quality problems introduced by the restrictive dispersion meteorology, there is considerable difference between state and national clean air standards. Those standards currently in effect in California are shown in Table 1. Sources and health effects of various pollutants are shown in Table 2.

The Federal Clean Air Act Amendments (CAAA) of 1990 required that the U.S. Environmental Protection Agency (EPA) review all national AAQS in light of currently known health effects. EPA was charged with modifying existing standards or promulgating new ones where appropriate. EPA subsequently developed standards for chronic ozone exposure (8+ hours per day) and for very small diameter particulate matter (called "PM-2.5"). New national AAQS were adopted in 1997 for these pollutants.

Planning and enforcement of the federal standards for PM-2.5 and for ozone (8-hour) were challenged by trucking and manufacturing organizations. In a unanimous decision, the U.S. Supreme Court ruled that EPA did not require specific congressional authorization to adopt national clean air standards. The Court also ruled that health-based standards did not require preparation of a cost-benefit analysis. The Court did find, however, that there was some inconsistency between existing and "new" standards in their required attainment schedules. Such attainment-planning schedule inconsistencies centered mainly on the 8-hour ozone standard. EPA subsequently agreed to downgrade the attainment designation for a large number of communities to “non-attainment” for the 8-hour ozone standard.

Table 1
Ambient Air Quality Standards

Table 2
Health Effects of Criteria Pollutants

Because the South Coast Air Basin was far from attaining the 1-hour federal standard, the 8-hour ozone non-attainment designation did not substantially alter the attainment planning process. As noted above, the compliance deadline for meeting the 8-hour ozone standard has been extended to 2021.

Evaluation of the most current data on the health effects of inhalation of fine particulate matter prompted the California Air Resources Board (ARB) to recommend adoption of the statewide PM-2.5 standard that is more stringent than the federal standard. This standard was adopted in 2002. The State PM-2.5 standard is more of a goal in that it does not have specific attainment planning requirements like a federal clean air standard, but only requires continued progress towards attainment.

Similarly, the ARB extensively evaluated health effects of ozone exposure. A new state standard for an 8-hour ozone exposure was adopted in 2005, which mirrors the federal standard. The California 8-hour ozone standard of 0.07 ppm is more stringent than the federal 8-hour standard of 0.08 ppm. The state standard, however, does not have a specific attainment deadline. California air quality jurisdictions are required to make steady progress towards attaining state standards, but there are no hard deadlines or any consequences of non-attainment. As part of the same re-evaluation process, the ARB adopted an annual state standard for nitrogen dioxide ($NO_{2)}$ that is more stringent than the corresponding federal standard, and strengthened the state one-hour NO_2 standard.

As part of EPA's 2002 consent decree on clean air standards, a further review of airborne particulate matter (PM) and human health was initiated. A substantial modification of federal clean air standards for PM was promulgated in 2006. Standards for PM-2.5 were strengthened, a new class of PM in the 2.5 to 10 micron size was created, some PM-10 standards were revoked, and a distinction between rural and urban air quality was adopted.

Of the standards shown in Table 1, those for ozone (O_3), and particulate matter (PM-10 and PM-2.5) are exceeded at times in the South Coast Air Basin. They are called "non-attainment pollutants." Because of the variations in both the regional meteorology and in area-wide differences in levels of air pollution emissions, patterns of non-attainment have strong spatial and temporal differences.

BASELINE AIR QUALITY

Existing and probable future levels of air quality in Newport Beach can be best inferred from ambient air quality measurements conducted by the South Coast Air Quality Management District (SCAQMD) at its Costa Mesa and Mission Viejo monitoring stations. These stations measure both regional pollution levels such as dust (particulates) and smog, as well as levels of primary vehicular pollutants such as carbon monoxide.

Table 3 summarizes the last six years of the published data from a composite of gaseous species monitored at Costa Mesa and particulates at Mission Viejo (there are no particulate data available from Costa Mesa). The following conclusions can be drawn from these data:

a. Photochemical smog (ozone) levels only occasionally exceed standards. The former Federal one-hour standard has not been exceeded within the last six years, while the new 8-hour state ozone standard has been exceeded only 7 times in the past four years. The 1-hour state standard has been violated a total of 6 times for the last six years near Costa Mesa, none since 2004. Ozone levels are generally low near Orange County's central coastal areas.

b. Measurements of carbon monoxide have shown very low baseline levels in comparison to the most stringent one- and eight-hour standards.

c. Respirable dust (PM-10) levels periodically exceed the state standard, but the less stringent federal PM-10 standard has never been violated since PM-10 measurements began at El Toro/ Mission Viejo. There were three violations of the state PM-10 standard in 2007, the most since 2002.

d. No violations of the recently revoked federal ultra-fine particulate (PM-2.5) standard of 65 $\mu g/m^3$ have been recorded in six years of measurements. However, the recently adopted, more stringent standard of 35 $\mu g/m^3$ has been exceeded an average of 2 percent of all measurement days.

Although complete attainment of every clean air standard is not yet imminent, extrapolation of the steady improvement trend suggests that such attainment could occur within the reasonably near future.

Table 3

Air Quality Monitoring Summary (2002-2007)
(Number of Days Standards Were Exceeded, and
Maximum Levels During Such Violations)
(Entries shown as ratios = samples exceeding standard/samples taken)

Pollutant/Standard	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Ozone						
1-Hour > 0.09 ppm (S)	0	4	2	0	0	0
1-Hour > 0.12 ppm (F)*	0	0	0	0	0	0
8-Hour > 0.07 ppm (S)	-	-	5	0	0	2
8- Hour > 0.08 ppm (F)	0	1	1	0	0	0
Max. 1-Hour Conc. (ppm)	0.09	0.11	0.10	0.09	0.07	0.08
Carbon Monoxide						
1-hour > 20. ppm (S)	0	0	0	0	0	0
8- Hour > 9. ppm (S,F)	0	0	0	0	0	0
Max 1-hour Conc. (ppm)	5.0	7.0	5.0	5.0	4.0	5.0
Max 8-hour Conc. (ppm)	4.3	5.8	4.1	3.2	3.0	3.1
Inhalable Particulates (PM-10)						
24-hour > 50 $\mu g/m^3$ (S)	5/60	2/57	0/57	0/55	1/50	3/58
24-hour > 150 $\mu g/m^3$ (F)	0/60	0/57	0/57	0/55	0/50	0/58
Max. 24-Hr. Conc. ($\mu g/m^3$)	80.	64.	47.	31.	57.	74.
Ultra-Fine Particulates (PM-2.5)						
24-Hour > 65 $\mu g/m^3$ (F)	0/119	0/109	0/111	0/114	0/106	0/98
24-Hour > 35 $\mu g/m^3$ (F)**	4/119	3/109	3/111	0/114	1/106	2/98
Max. 24-Hr. Conc. ($\mu g/m^3$)	58.	51.	49.	35.	47.	47.

* standard revoked in 2006   ** revised standard adopted in 2006

Source: South Coast Air Quality Management District, Costa Mesa Station for gaseous species; Mission Viejo for particulates.

(S) = state standard, (F) = federal standard

AIR QUALITY PLANNING

The Federal Clean Air Act (1977 Amendments) required that designated agencies in any area of the nation not meeting national clean air standards must prepare a plan demonstrating the steps that would bring the area into compliance with all national standards. The SCAB could not meet the deadlines for ozone, nitrogen dioxide, carbon monoxide, or PM-10. In the SCAB, the agencies designated by the governor to develop regional air quality plans are the SCAQMD and the Southern California Association of Governments (SCAG). The two agencies first adopted an Air Quality Management Plan (AQMP) in 1979 and revised it several times as earlier attainment forecasts were shown to be overly optimistic.

The 1990 Federal Clean Air Act Amendment (CAAA) required that all states with air-sheds with "serious" or worse ozone problems submit a revision to the State Implementation Plan (SIP). Amendments to the SIP have been proposed, revised and approved over the past decade. The most current regional attainment emissions forecast for ozone precursors (ROG and NOx) and for carbon monoxide (CO) and for particulate matter are shown in Table 4. Substantial reductions in emissions of ROG, NOx and CO are forecast to continue throughout the next several decades. Unless new particulate control programs are implemented, PM-10 and PM-2.5 are forecast to slightly increase.

The Air Quality Management District (AQMD) adopted an updated clean air "blueprint" in August 2003. The 2003 AQMP was approved by the EPA in 2004. The Air Quality Management Plan (AQMP) outlined the air pollution measures needed to meet federal health-based standards for ozone by 2010 and for particulates (PM-10) by 2006. The 2003 AQMP was based upon the federal one-hour ozone standard which was revoked late in 2005 and replaced by an 8-hour federal standard. Because of the revocation of the hourly standard, a new air quality planning cycle was initiated.

With re-designation of the air basin as non-attainment for the 8-hour ozone standard, a new attainment plan was developed. This plan shifted most of the one-hour ozone standard attainment strategies to the 8-hour standard. As previously noted, the attainment date will "slip" from 2010 to 2021. The updated attainment plan also includes strategies for ultimately meeting the federal PM-2.5 standard.

Table 4

South Coast Air Basin Emissions Forecasts
(Emissions in tons/day)

Pollutant	2005[a]	2010[b]	2015[b]	2020[b]
NOx	985	742	580	468
ROG	735	576	526	505
CO	4124	2950	2476	2203
PM-10	281	286	297	307
PM-2.5	103	102	102	103

[a]2005 Base Year.
[b]With current emissions reduction programs and adopted growth forecasts.

Source: California Air Resources Board, The 2009 California Almanac of Emission & Air Quality.

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The 2007 AQMP was adopted in June 2007, after extensive public review. The 2007 AQMP recognizes the interaction between photochemical processes that create both ozone and the smallest airborne particulates (PM-2.5). The 2007 AQMP is therefore a coordinated plan for both pollutants. Key emissions reductions strategies in the updated air quality plan include:

- Ultra-low emissions standards for both new and existing sources (including on-and-off-road heavy trucks, industrial and service equipment, locomotives, ships and aircraft).
- Accelerated fleet turnover to achieve benefits of cleaner engines.
- Reformulation of consumer products.
- Modernization and technology advancements from stationary sources (refineries, power plants, etc.)

Development, such as the proposed Newport Beach Country Club project do not directly relate to the AQMP in that there are no specific air quality programs or regulations governing "general" development. Conformity with adopted plans, forecasts and programs relative to population, housing, employment and land use is the primary yardstick by which impact significance of master planned growth is determined. If a given project incorporates any available transportation control measures that can be implemented on a project-specific basis, and if the scope and phasing of a project are consistent with adopted forecasts as shown in the Regional Comprehensive Plan (RCP), then the regional air quality impact of project growth would not be significant because of planning inconsistency. The SCAQMD, however, while acknowledging that the AQMP is a growth-accommodating document, does not favor designating regional impacts as less-than-significant just because the proposed development is consistent with regional growth projections. Air quality impact significance for the proposed project has therefore been analyzed on a project-specific basis.

AIR QUALITY IMPACT

SIGNIFICANCE CRITERIA

Air quality impacts are considered "significant" if they cause clean air standards to be violated where they are currently met, or if they measurably contribute to an existing violation of standards. Any substantial emissions of air contaminants for which there is no safe exposure, or nuisance emissions such as dust or odors, would also be considered a significant impact.

Appendix G of the California CEQA Guidelines offer the following five tests of air quality impact significance. A project would have a potentially significant impact if it:

a. Conflicts with or obstructs implementation of the applicable air quality plan.

b. Violates any air quality standard or contributes substantially to an existing or projected air quality violation.

c. Results in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).

d. Exposes sensitive receptors to substantial pollutant concentrations.

e. Creates objectionable odors affecting a substantial number of people.

PRIMARY POLLUTANTS

Air quality impacts generally occur on two scales of motion. Near an individual source of emissions or a collection of sources such as a crowded intersection or parking lot, levels of those pollutants that are emitted in their already unhealthful form will be highest. Carbon monoxide (CO) is an example of such a pollutant. Primary pollutant impacts can generally be evaluated directly in comparison to appropriate clean air standards. Violations of these standards where they are currently met, or a measurable worsening of an existing or future violation, would be considered a significant impact. Many particulates, especially fugitive dust emissions, are also primary pollutants. Because of the non-attainment status of the South Coast Air Basin (SCAB) for PM-10, an aggressive dust control program is required to control fugitive dust.

SECONDARY POLLUTANTS

Many pollutants, however, require time to transform from a more benign form to a more unhealthful contaminant. Their impact occurs regionally far from the source. Their incremental regional impact is minute on an individual basis and cannot be quantified except through complex photochemical computer models. Analysis of the significance of such emissions is thus based on a specified amount of emissions (pounds, tons, etc.) even though there is no way to translate those emissions directly into a corresponding ambient air quality impact.

Because of the chemical complexity of primary versus secondary pollutants, the SCAQMD has designated significant emissions levels as surrogates for evaluating impact significance independent of chemical transformation processes. Projects within the SCAB with daily emissions that exceed any of the following emission thresholds are recommended by the SCAQMD to be considered significant:

SCAQMD Emissions Significance Thresholds (lbs/day)

Pollutant	Construction	Operations
ROG	75	55
NOx	100	55
CO	550	550
PM-10	150	150
PM-2.5	55	55
SOx	150	150
Lead	3	3

Source: SCAQMD CEQA Air Quality Handbook, November, 1993 Rev.

ADDITIONAL INDICATORS

In its CEQA handbook, the SCAQMD also states that additional indicators should be used as screening criteria to determine the need for further analysis with respect to air quality. The additional indicators are as follows:

- Project could interfere with the attainment of the federal or state ambient air quality standards by either violating or contributing to an existing or projected air quality violation.
- Project could result in population increases within the regional statistical area which would be in excess of that projected in the AQMP and in other than planned locations for the project's build-out year.
- Project could generate vehicle trips that cause a CO hot spot.

The SCAQMD CEQA Handbook also identifies various secondary significance criteria related to toxic, hazardous or odorous air contaminants. Hazardous air contaminants are contained within the small diameter particulate matter ("PM-2.5") fraction of diesel exhaust. Such exhaust will be generated by heavy off-road construction equipment and by diesel-powered delivery trucks delivering construction materials to the facility. Hazardous compounds may also be presenting older building materials that could be released during demolition. Prior to demolition detailed surveys will be conducted to ascertain the possible presence of asbestos, lead-based paint, etc. If any such materials are present, they will be remediated using mandatory procedures specified by the SCAQMD and state air toxics agencies. Other than diesel exhaust during construction, the project will create negligible air toxics emissions.

Health risks from toxic air contaminants (TAC's) are cumulative over an assumed 70-year lifespan. Measurable off-site public health risk from diesel TAC exposure would occur for only a brief portion of a project lifetime during facility construction, and only in dilute quantity because of substantial source-receiver separation.

SENSITIVE RECEPTORS

Air quality impacts are analyzed relative to those persons with the greatest sensitivity to air pollution exposure. Such persons are called "sensitive receptors". Sensitive population groups include young children, the elderly and the acutely and chronically ill (especially those with cardio-respiratory disease).

Residential areas are considered to be sensitive to air pollution exposure because they may be occupied for extended periods, and residents may be outdoors when exposure is highest. The nearest homes to the project site are considered sensitive receptors relative to the proposed project.

CONSTRUCTION ACTIVITY IMPACTS

Dust is typically the primary concern during construction of new buildings and infrastructure. Because such emissions are not amenable to collection and discharge through a controlled source, they are called "fugitive emissions." Emission rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). These parameters are not known with any reasonable certainty prior to project development and may change from day to day. Any assignment of specific parameters to an unknown future date is speculative and conjectural.

Because of the inherent uncertainty in the predictive factors for estimating fugitive dust generation, regulatory agencies typically use one universal "default" factor based on the area disturbed assuming that all other input parameters into emission rate prediction fall into midrange average values. This assumption may or may not be totally applicable to site-specific conditions on the proposed project site. As noted previously, emissions estimation for project-specific fugitive dust sources is therefore characterized by a considerable degree of imprecision.

Average daily PM-10 emissions during site grading and other disturbance are stated in the SCAQMD Handbook to be 26.4 pounds/acre. This estimate is based upon required dust control measures in effect in 1993 when the AQMD CEQA Air Quality Handbook was prepared. Rule 403 was subsequently strengthened to require use of a greater array of fugitive dust control on construction projects. All construction projects in the SCAQMD are required to use strongly enhanced control procedures. Use of enhanced dust control procedures such as continual soil wetting, use of supplemental binders, early paving, etc. can achieve a substantially higher PM-10 control efficiency. Daily emissions with use of reasonably available control measures (RACMs) for PM-10 can reduce emission levels to around ten (10) pounds per acre per day. With the use of best available control measures (BACMs) the California Air Resources Board URBEMIS2007 computer model predicts that emissions can be reduced to 1-2 pounds per acre per day.

The proposed project has two separate construction schedules; one for the tennis club property and one for the golf club property. The tennis club segment also includes the tennis clubhouse, villas and the golf and tennis bungalows. As the only available construction schedule was for the tennis club segment and therefore emissions for this phase were analyzed. Emissions from the golf club property are assumed to be similar.

The Air Resource Board URBEMIS2007 computer model predicts that the proposed tennis club project area is approximately 3 acres in size and that 0.7 acres could be under simultaneous heavy construction at some point during the build-out lifetime of the project. With the use of RACMs, daily PM-10 emissions during site grading (exclusive of demolition activities) would be 7 pounds per day (0.7 X 10.0 = 7 lb/day). The SCAQMD significance threshold of 150 pounds per day would not be exceeded. With the use of Best Available Control Measures (BACM), daily PM-10 emissions can be further reduced. Because of the PM-10 non-attainment status of the air basin, construction activity dust emissions are considered to have a cumulatively significant impact. Use of BACMs is thus required even if SCAQMD individual CEQA thresholds are not exceeded by use of RACMs.

Current research in particulate-exposure health suggests that the most adverse effects derive from ultra-small diameter particulate matter comprised of chemically reactive pollutants such as sulfates, nitrates or organic material. A national clean air standard for particulate matter of 2.5 microns or smaller in diameter (called "PM-2.5") was adopted in 1997. A limited amount of construction activity particulate matter is in the PM-2.5 range. PM-2.5 emissions are estimated by the SCAQMD to comprise 20.8 percent of PM-10. Other studies have shown that the fugitive dust fraction of PM-2.5 is closer to 10 percent. Daily PM-2.5 emissions during construction will be approximately 2 pound per day compared to the SCAQMD CEQA significance threshold of 55 pounds per day.

In addition to fine particles that remain suspended in the atmosphere semi-indefinitely, construction activities generate many larger particles with shorter atmospheric residence times. This dust is comprised mainly of large diameter inert silicates that are chemically non-reactive and are further readily filtered out by human breathing passages. These fugitive dust particles are therefore more of a potential soiling nuisance as they settle out on parked cars, outdoor furniture or landscape foliage rather than any adverse health hazard. The deposition distance of most soiling nuisance particulates is less than 100 feet from the source (EPA, 1995). There are few sensitive receptors within 100 feet from the project construction site perimeter.

Exhaust emissions will result from on and off-site heavy equipment. The types and numbers of equipment will vary among contractors such that such emissions cannot be quantified with certainty. Initial demolition and grading will gradually shift toward building construction and then for finish construction, paving, landscaping, etc. The URBEMIS2007 computer model was used to calculate emissions from the following prototype construction equipment fleet provided by the project applicant:

Demolition of Existing Tennis Club	2 Excavators
	2 Dozers
	1 Water Truck
Asphalt Demolition and Asphalt Crushing	1 Concrete Saw
	1 Crushing Equipment
	1 Generator Set
	1 Grader
	1 Scraper
	1 Skid Steer Loader
Mass Grading	1 Grader
	1 Dozer
	2 Tractor/Loader/Backhoe
	2 Scrapers
	1 Compactor
	1 Water Truck
Fine Grading	2 Tractor/Loader/Backhoes
	1 Paving Equipment
	1 Compactor
	1 Dozer
	1 Water Truck
Paving	4 Cement Mixers
	1 Paver
	1 Roller
	1 Tractor/Loader/Backhoe
Construction	1 Crane
	2 Excavators
	4 Forklifts
	1 Cement Pump
	2 Loaders
	2 Tractor/Loader/Backhoe
	4 Zoom Booms

Total project grading involves importation of 13,000 cubic yards of earth utilizing 12 cubic yard capacity trucks. One half of this earth works was assumed to take place during mass grading of the tennis club property (including villas, clubhouse and hotel). Additionally, 130,400 square feet of asphalt was assumed to be demolished and crushed. Finally, the existing tennis clubhouse of 3,725 square feet was assumed to be demolished. Utilizing these figures and above equipment fleet the following emissions are calculated by URBEMIS2007:

Construction Activity Emissions (pounds/day)

Activity	ROG	NOx	CO	SO_2	PM-10	PM-2.5	CO_2
Demolition of Structures							
No Mitigation	2.2	18.4	9.4	0.0	2.2	1.1	1,895.0
With Mitigation	2.2	15.9	9.4	0.0	1.4	0.4	1,895.0
Asphalt Demolition and Crushing/Reclamation							
No Mitigation	3.2	31.3	14.1	0.0	1.8	1.3	3,191.0
With Mitigation	3.2	26.7	14.1	0.0	0.8	0.3	3,191.0
Mass Grading							
No Mitigation	9.0	88.7	41.3	0.0	11.0	5.1	9,004.8
With Mitigation	9.0	79.3	41.3	0.0	2.3	1.6	9,004.8
Fine Grading							
No Mitigation	3.3	26.1	15.1	0.0	8.3	2.8	2,552.3
With Mitigation	3.3	22.2	15.1	0.0	0.9	0.3	2,552.3
Trenching							
No Mitigation	3.8	30.5	17.7	0.0	1.6	1.5	3,095.5
With Mitigation	3.8	25.9	17.7	0.0	0.3	0.2	3,095.5
Construction							
No Mitigation	2.7	19.0	13.1	0.0	1.4	1.2	2,070.0
With Mitigation	2.7	16.2	13.1	0.0	0.2	0.2	2,070.0
Construction and Painting							
No Mitigation	11.6	17.7	12.9	0.0	1.3	1.2	2,087.4
With Mitigation	10.7	15.1	12.9	0.0	0.2	0.2	2,087.4
SCAQMD Threshold	75	100	550	150	150	55	-

Source: URBEMIS2007 Model, Output in Appendix

With or without the use of mitigation, peak daily construction activity emissions will be below SCAQMD CEQA thresholds and will be further reduced by recommended mitigation. The recommended emissions mitigation measures are detailed in the "Mitigation" section of this report.

Construction equipment exhaust contains carcinogenic compounds within the diesel exhaust particulates. The toxicity of diesel exhaust is evaluated relative to a 24-hour per day, 365 days per year, 70-year lifetime exposure. Public exposure to heavy equipment emissions will be an extremely small fraction of the above dosage assumption. Diesel equipment is also becoming progressively "cleaner" in response to air quality rules on new off-road equipment. Any public health risk associated with project-related heavy equipment operations exhaust is therefore not quantifiable, but small.

Construction activity air quality impacts occur mainly in close proximity to the surface disturbance area. There may, however, be some "spill-over" into the surrounding community. That spill-over may be physical as vehicles drop or carry out dirt or silt is washed into public streets. Passing non-project vehicles then pulverize the dirt to create off-site dust impacts. “Spillover” may also occur via congestion effects. Construction may entail roadway encroachment, detours, lane closures and competition between construction vehicles (trucks and contractor employee commuting) and ambient traffic for available roadway capacity. Emissions controls require good housekeeping procedures and a construction traffic management plan that will maintain such "spill-over" effects at a less-than-significant level.

Local Significance Thresholds

The SCAQMD has developed analysis parameters to evaluate ambient air quality on a local level in addition to the more regional emissions-based thresholds of significance. These analysis elements are called Local Significance Thresholds (LSTs). LSTs were developed in response to Governing Board's Environmental Justice Enhancement Initiative 1-4 and the LST methodology was provisionally adopted in October 2003 and formally approved by SCAQMD's Mobile Source Committee in February 2005.

Use of an LST analysis for a project is optional because they were derived for economically or socially disadvantaged communities. For residential and recreational developments, the only source of LST impact would be during construction. LSTs are only applicable to the following criteria pollutants: oxides of nitrogen (NOx), carbon monoxide (CO), and particulate matter (PM-10 and PM-2.5). LSTs represent the maximum emissions from a project that are not expected to cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard, and are developed based on the ambient concentrations of that pollutant for each source receptor area and distance to the nearest sensitive receptor.

The URBEMIS model estimates that the daily construction disturbance "footprint" will be 0.7 acres. LST pollutant concentration data is currently published for 1, 2 and 5 acre sites. Utilizing data for a 1 acre site and a source receptor distance of 50 meters, the following thresholds are determined (pounds per day):

North Coastal Orange County	**CO**	**NOx**	**PM-10**	**PM-2.5**
LST Threshold	528	163	13	5
Proposed Project				
Unmitigated	9-41	18-89	1-11	1-3
Mitigated	9-41	16-79	1-2	1-2

All mitigated emissions are below LST thresholds for construction.

Operational Impacts

Possible project-related air quality concerns will derive from the mobile source emissions that will be generated from the recreational and residential uses proposed for the project site. The proposed Newport Beach Country Club project replaces an existing facility and decreases existing tennis court facilities and adds a 27 room bungalow-style hotel and 5 single family residential units. It is anticipated that 389 fewer daily trips will be generated as a result of this project.

Operational emissions for existing and proposed project-related traffic were calculated using a computerized procedure developed by the California Air Resources Board (CARB) for urban growth mobile source emissions. The URBEMIS2007 model was run using the trip generation factors obtained from the traffic report for this project. The model was used to calculate area source emissions and the resulting vehicular operational emissions for an existing uses in 2009 and proposed uses in 2012. A comparison was made of the two scenarios and the results are shown in Table 5.

The few residential uses associated with the proposed project may generate small quantities of organic compounds from cleaning products, personal care products, landscape maintenance, cooking, etc. Because the existing project has no residential use component, the area source emissions are slightly higher for the proposed project than for existing uses. As seen in Table 5, mobile source emissions in 2009 are higher for existing uses than for the proposed project for an assumed 2012 build-out.

As the proposed project generates fewer trips than existing uses and since area source emissions are minimal compared to mobile source emissions, the SCAQMD's recommended threshold levels will not be exceeded. Operational emissions will be at a less-than-significant level.

Table 5
Project-Related Emissions Burden

Existing Uses	**Emissions (lbs/day)**						
Year 2009	**ROG**	**NOx**	**CO**	**SO2**	**PM-10**	**PM-2.5**	**CO2**
Area Sources	0.3	0.0	3.1	0.0	0.0	0.0	5.6
Mobile Sources	11.5	15.4	149.5	0.2	24.3	4.7	14,288.0
Total	**11.8**	**15.4**	**152.6**	**0.2**	**24.3**	**4.7**	**14,293.6**

Proposed Uses	**Emissions (lbs/day)**						
Year 2012	**ROG**	**NOx**	**CO**	**SO2**	**PM-10**	**PM-2.5**	**CO2**
Area Sources	0.8	0.4	5.1	0.0	0.0	0.0	372.0
Mobile Sources	6.8	9.0	87.8	0.1	18.4	3.6	10,829.9
Total	**7.6**	**9.4**	**92.9**	**0.1**	**18.4**	**3.6**	**11,201.9**

Net Difference	**Emissions (lbs/day)**						
Proposed-Existing	**ROG**	**NOx**	**CO**	**SO2**	**PM-10**	**PM-2.5**	**CO2**
Area Sources	+0.5	+0.4	+2.0	0.0	0.0	0.0	+366.4
Mobile Sources	-4.7	-6.4	-61.7	-0.1	-5.9	-1.1	-3458.1
Total	-4.2	-6	-59.7	-0.1	-5.9	-1.1	-3091.7
SCAQMD Threshold	55	55	550	150	150	55	-

GREENHOUSE GAS EMISSIONS

"Greenhouse gases" (so called because of their role in trapping heat near the surface of the earth) emitted by human activity are implicated in global climate change, commonly referred to as "global warming." These greenhouse gases contribute to an increase in the temperature of the earth's atmosphere by transparency to short wavelength visible sunlight, but near opacity to outgoing terrestrial long wavelength heat radiation. The principal greenhouse gases (GHGs) are carbon dioxide, methane, nitrous oxide, ozone, and water vapor. Fossil fuel consumption in the transportation sector (on-road motor vehicles, off-highway mobile sources, and aircraft) is the single largest source of GHG emissions, accounting for approximately half of GHG emissions globally. Industrial and commercial sources are the second largest contributors of GHG emissions with about one-fourth of total emissions.

California has passed several bills and the Governor has signed at least three executive orders regarding greenhouse gases. The Governor's Office of Planning and Research is in the process of developing CEQA significance thresholds for GHG emissions but thresholds have yet to be established. GHG statues and executive orders (EO) include AB 32, SB 1368, EO S-03-05, EO S-20-06 and EO S-01-07.

AB 32 is one of the most significant pieces of environmental legislation that California has adopted. Among other things, it is designed to maintain California's reputation as a "national and international leader on energy conservation and environmental stewardship." It will have wide-ranging effects on California businesses and lifestyles as well as far reaching effects on other states and countries. A unique aspect of AB 32, beyond its broad and wide-ranging mandatory provisions and dramatic GHG reductions are the short time frames within which it must be implemented. Major components of the AB 32 include:

- Require the monitoring and reporting of GHG emissions beginning with sources or categories of sources that contribute the most to statewide emissions.
- Requires immediate "early action" control programs on the most readily controlled GHG sources.
- Mandates that by 2020, California's GHG emissions be reduced to 1990 levels.
- Forces an overall reduction of GHG gases in California by 25-40%, from business as usual, over the next 13 years (by 2020).
- Must complement efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminants.

Statewide, the framework for developing the implementing regulations for AB 32 is under way. Additionally, through the California Climate Action Registry (CCAR), general and industry-specific protocols for assessing and reporting GHG emissions have been developed. GHG sources are categorized into direct sources (i.e. company owned) and indirect sources (i.e. not company owned). Direct sources include combustion emissions from on-and off-road mobile sources, and fugitive emissions. Indirect sources include off-site electricity generation and non-company owned mobile sources.

Greenhouse Gas Emissions Significance Thresholds

There are currently no adopted GHG significance thresholds for project CEQA clearance. The California Governor's Office of Planning and Research (OPR) has developed revisions to CEQA implementation guidelines to incorporate GHG. These were forwarded to the California National Resource Agency on April 13, 2009. They contain requirements to characterize the GHG setting, quantify the impacts resulting from the proposed project, determine impact significance, and mitigate as appropriate. They leave the determination of significance to the Lead Agency.

On December 5, 2008 the SCAQMD Governing Board adopted an Interim quantitative GHG Significance Threshold for industrial projects where the SCAQMD is the lead agency (e.g., stationary source permit projects, rules, plans, etc.) of 10,000 Metric Tons CO_2 equivalent/year. As part of the Interim GHG Significance Threshold development process for industrial projects, the SCAQMD established a working group of stakeholders that also considered thresholds for residential/commercial projects. As discussed in the Interim GHG Significance Threshold guidance document, the focus for residential/commercial projects is on performance standards and a screening level threshold. For discussion purposes, the SCAQMD's working group considered performance standards primarily focused on energy efficiency measures beyond Title 24 and a screening level of 3,000 metric tons (MT) CO_2 equivalent/year based on the relative GHG emissions contribution between residential/commercial sectors and stationary source (industrial) sectors. The working group and staff ultimately decided that additional analysis was needed to further define the performance standards and to coordinate with CARB staff's interim GHG proposal. Staff, therefore, did not recommend action for adopting an interim threshold for residential/commercial projects but rather recommended bringing this item back to the Board for discussion and possible action in March 2009 if the CARB board did not take its final action by February 2009. As of this date, no final action on a quantitative significance threshold has been taken, but 3,000 MT per year has become a *de facto* screening threshold.

Impacts - Greenhouse Gas Emissions

Implementation of the proposed project would contribute to long-term increases in greenhouse gases (GHGs) as a result of traffic increases (mobile sources) and minor secondary fuel combustion emissions from space heating, etc. Development occurring as a result of the proposed project would also result in secondary operational increases in GHG emissions as a result of electricity generation to meet project-related increases in energy demand. Electricity generation in California is mainly from natural gas-fired power plants. However, since California imports about 20 to 25 percent of its total electricity (mainly from the northwestern and southwestern states), GHG emissions associated with electricity generation could also occur outside of California. Space or water heating, water delivery, wastewater processing and solid waste disposal also generate GHG emissions. Short-term GHG emissions will also derive from construction activities.

The General Reporting Protocol (GRP) in the California Climate Action Registry (CCAR) divides project-related operational GHG emissions into three categories. These three sources include the following:

Source 1- On-site combustion of fossil fuels (space and water heating, fireplaces, landscape utility equipment, etc.)

Source 2- Consumption of purchased energy (electricity)

Source 3- Indirect emissions (transportation, solid waste disposal, fresh-and wastewater conveyance and treatment)

For general development projects such as the Newport Beach Country Club project, Source 3 is typically a much larger contributor to the GHG burden than Sources 1 and 2. For convenience, project related GHG emissions were aggregated into transportation and non-transportation sources. The transportation component is calculated and reported in the URBEMIS2007 computer model. The non-transportation sources require additional analysis, as shown below.

Construction Activity GHG Emissions

During project construction, the URBEMIS2007 computer model predicts that a peak activity day in the single worst case year of construction (2009 during demolition and grading) will generate the following CO_2 emissions:

Demolition and Mass Grading - 9,004.8 pounds/day

Equipment exhaust also contains small amounts of methane and nitric oxides which are also GHGs. Non-CO_2 GHG emissions represent approximately a three percent increase in CO_2-equivalent emissions from diesel equipment exhaust. For purposes of analysis, it was assumed that the non-CO_2 GHG emissions from construction equipment are negligible, and that the total project construction GHG burden can be characterized by 40 peak activity days. The estimated annual GHG impact is estimated as follows if all the above activities were to occur in a single year:

Grading = (9,005 lbs/day x 40 peak days/yr) / 2,000 lbs/ ton

Yearly Total = 180 “short” tons/yr = 164 MT/year

For screening purposes, the temporary construction activity GHG emissions were compared to the chronic operational emissions in the SCAQMD’s interim thresholds. The proposed industrial operational threshold is 10,000 metric tons (MT) of CO_2-equivalent (CO_2(e)) per year. Grading activities generating 164 MT are well below this threshold. Construction activity GHG emissions are also below the proposed operational screening criteria of 3,000 MT for non-industrial uses.

Project Operational GHG Emissions

The input assumptions for operational GHG emissions calculations, and the GHG conversion from consumption to annual regional CO_2(e) emissions are summarized in Table 8. Annual GHG emissions, from both the non-transportation and transportation components are shown in Tables 9. As shown in Table 9, the Newport Beach County Club project daily operational CO_2 emissions will be less than existing emissions from reduced project-site travel. The annual reduction of 574

MT (631"short" tons) of CO_2 equivalent (CO_2(e)) emissions will off-set the 196 MT (215 "short" tons) of "new" CO_2(e).

Greenhouse Gas Emissions Reduction Measures

Although there will be a project specific local GHG reduction, all GHG emissions are considered to have a cumulative global impact. Implementation of reasonably available control measures is recommended. GHG reduction options on a project-level basis are similar to those measures designed to reduce criteria air pollutants (those with ambient air quality standards). Measures that reduce trip generation or trip lengths, measures that optimize the transportation efficiency of a region, and measures that promote energy conservation within a development will reduce GHG emissions. Additionally, carbon sequestering can be achieved through urban forestry measures.

Reductions in the vehicular contribution are critical in achieving the goals of statewide/national GHG minimization programs. However, substantial mobile source trip/VMT reduction or increases in vehicular fuel efficiency are not achievable on a project-specific basis. State or national programs are in place to significantly upgrade fuel efficiencies. Most project-specific discretionary actions for GHG reduction must focus on energy conversation.

Recommended GHG reduction measures include:

- Construct new commercial buildings to LEED specification.

- Promote solid waste minimization and recycling.

- Incorporate fast-growing, low water use landscape to enhance carbon sequestration and reduce water use.

Table 8
Annual Non-Transportation Consumption/Generation

Land Use	*Unit*	*Electricity (MWHR)*	*Nat. Gas (10^6 cu ft)*	*Solid Waste (tons)*	*Water (10^6 gal)*
Residential	DU	5.63(a)	0.0481(b)	1.82(c)	0.155(d)
Clubhouse/Spa	1,000 Sq. ft.	9.95(a)	0.0576(b)	0.91(c)	0.114(d)

Conversion to CO_2(e) [tons/year]

Electricity	MWHR x 0.403 tons/MWHR (1)
Nat. Gas	10^6 cubic feet x 6.0 tons/10^6 cubic feet (2)
Solid Waste	tons x 0.46 tons/ton (3)
Water and Wastewater	10^6 gal(MG) x 5.12 tons/MG (4)

(1) California Climate Action Registry
(2) California Climate Action Registry
(3) Energy Information Admin., Voluntary Reporting of GHG
(4) California Energy Commission, Integrated Energy Policy Report (12.7 MWHR per MG conveyed, treated and disposed in Southern California)

(a) SCAQMD CEQA Air Quality Handbook, Table A9-11-A
(b) SCAQMD CEQA Air Quality Handbook, Table A9-12-A
(c) Los Angeles EIR Manual for Private Projects
(d) Calclimate.berkeley.edu, assume commercial = 74% of residential

Table 9

Project-Related GHG Emissions (2014)

Use	*Unit*	*Electricity (MWHR)*	*Nat.Gas (10^6 cu ft)*	*Solid Waste (tons)*	*Water (MG))*
Residential	**32 DU**	**180.2**	**1.54**	**58.2**	**4.96**
Clubhouse/ Spa	**15.28 KSF**	**152.0**	**0.88**	**13.9**	**1.74**
TOTAL		**332.2**	**2.42**	**72.1**	**6.7**
Conversion Factor (Table 8)		***0.403***	***6.0***	***0.46***	***5.12***
CO_2(e) tons/yr		**133.9**	**14.5**	**33.2**	**34.3**

Total Non-Transportation	**215.9 tons/year**
Total Transportation*	**631.1 tons/year**
Combined tons CO_2(e)/yr	**415.2 "short" tons**
	377.5 MT

MITIGATION

CONSTRUCTION EMISSIONS MITIGATION

Construction activity air pollution emissions are not anticipated to individually exceed SCAQMD CEQA thresholds. Regardless, the non-attainment status of the air basin requires that Best Available Control Measures (BACMs) be used where feasible. Recommended construction activity mitigation including BACM's includes:

Dust Control

- Apply soil stabilizers to inactive areas.
- Prepare a high wind dust control plan and implement plan elements and terminate soil disturbance when winds exceed 25 mph.
- Stabilize previously disturbed areas if subsequent construction is delayed.
- Water exposed surfaces 3 times/day.
- Cover all stock piles with tarps.
- Replace ground cover in disturbed areas as soon as feasible.

Exhaust Emissions

- Require 90-day low-NOx tune-ups for off-road equipment.
- Limit allowable idling to 5 minutes for trucks and heavy equipment.
- Utilize equipment whose engines are equipped with diesel oxidation catalysts if available.
- Utilize diesel particulate filter on heavy equipment where feasible.

Painting and Coatings

- Use low VOC coatings and high pressure-low volume sprayers.

OPERATIONAL EMISSIONS MITIGATION

Operational emissions will not exceed adopted significance thresholds.

GREENHOUSE GAS EMISSIONS

A net trip reduction will reduce project-related GHG emissions. However, all GHG emissions have a cumulative impact. Recommended GHG reduction measures include:

- Construct new commercial buildings to LEED specification.
- Promote solid waste minimization and recycling.
- Incorporate fast-growing, low water use landscape to enhance carbon sequestration and reduce water use.

APPENDIX

URBEMIS2007 Computer Model Output

JN 08-1681

PRELIMINARY HYDROLOGY REPORT
for
VESTING TENTATIVE TRACT MAP NO. 15347
Newport Beach, CA

Prepared For

Golf Realty Fund
One Upper Newport Plaza
Newport Beach, CA 92660

Prepared By

Adams-Streeter Civil Engineers Inc.
15 Corporate Park
Irvine, CA 92606
949-474-2330

July 13, 2009

TABLE OF CONTENTS

Appendices

Introduction

The Newport Beach Country Club Planned Community (Vesting Tentative Tract Map 15347) is approximately 145 acres located within the City of Newport Beach, California and includes the existing Tennis Club and Golf Club known as Newport Beach Country Club. It is generally bordered by Pacific Coast Highway to the south, Jamboree Road to the west, Santa Barbara Avenue and Newport Center Drive to the north and Corporate Plaza West to the east and south

The emphasis of this report is on the area of improvement over the existing Tennis Club and the existing Golf Club property. The existing Tennis Club and tennis courts will be improved and/or replaced with a new tennis clubhouse, center court, 27 bungalows and 5 semi-custom villas. The existing Golf Club will be improved and/or replaced with a new golf clubhouse and parking lot.

Existing Conditions

Currently, the site’s drainage patterns are split into five tributary drainage zones. For the purpose of this report, they will be noted as Area “A”, Area “B”, Area “C”, Area "D", and Area "E".

Area A & B are on the westerly portion of the property, consisting of 11.59 acres. Area A is comprised of a large parking lot and an existing clubhouse building facility. Area B is comprised of a grassy portion between the golf course facilities and the tennis courts. Storm flows from the parking lot and golf club area sheet flow in a south westerly direction towards a curb and gutter which empties into a catch basin in the southerly corner of the parking lot. This catch basin is connected to an 18" RCP pipe which connects to a 24" RCP pipe that runs parallel to Pacific Coast Highway. Area B, comprised of a portion of the grassy golf course, sheet flows towards the site's entry, Irvine Terrace Road, and into a cross gutter. From the cross gutter, flows enter two catch basins on Irvine Terrace Road that ultimately connect to the same existing 24" RCP pipe. Said 24" RCP connects to the same 69" RCP storm drain as in Area C, D, and E. It has been found in the calculations of this report that the existing 24" RCP pipe is currently deficient and cannot adequately convey storm flows under existing conditions.

Area C is on the easterly portion of the property, consisting of about 5.62 acres, and is comprised of the existing tennis courts, tennis club house, and parking lot. The drainage pattern for Area C sheet flow's over the tennis courts and onto the parking lot; storm flows then sheet flow over the parking lot, through a curb cut-out and into a drainage sump consisting of an 18" square inlet. Flows travel from the inlet, via a 8" PVC pipe. This 8" PVC pipe was designed as a 12" PVC pipe but was field verified at the Brooks box grate inlet to be a 8" PVC pipe. This PVC pipe connects to a 69" RCP storm drain system. It has been found that the existing 8" PVC pipe installed by the adjacent land owner during the Corporate Plaza West Extension is deficient in size and cannot efficiently convey storm flows under existing or proposed conditions. Even the originally designed 12" PVC pipe would be deficient.

Area D is a small portion of site in the south east corner of the property. Area D consists of just 0.19 acres. Consisting of only an AC driveway/ramp, storm flows travel towards the adjacent parking lot, located to the south of the property.

Area E is on the easterly portion of the property, consisting of 1.24 acres. Area E is comprised of the remaining tennis courts and entry to the parking lot. The drainage pattern for Area E sheet flows over the existing tennis courts, into concrete a v-ditch, into a curb and gutter and finally into a 12" inlet. Flows travel from the inlet, via a 12" PVC pipe, to an 18" RCP storm drain, which ultimately connects to the same 69" RCP storm drain as the previous areas.

Developed Conditions

The developed condition of the site is primarily broken into five separate sub-areas. For the purpose of this report, those sub-areas will be noted as Area "A", Area "B", Area "C", Area "D", and Area "E".

Areas A & B combine for a total of 11.68 acres. Areas A & B will be comprised of the newly designed Golf Clubhouse, parking lot and an existing grassy portion of the golf course. Storm flows from Areas A & B will be captured using a storm system comprised of catch basins and pipes ranging in size from 8" to 24". The proposed storm drain system will be installed within the site's parking lot and within the site's entry westerly parkway and will connect to the existing 24" RCP storm drain, which then connects to the existing 69" RCP storm drain. It is recommended that the existing 24" RCP storm drain be upsized to an adequately sized pipe. The existing 24” RCP is not sized adequately for either the existing or proposed developed condition.

Area C is 6.16 acres. Area C will be comprised of existing tennis courts, a new center court, tennis club house, pool, bungalows and semi-custom villas; along with interior street and paths. Storm flows for Area C will be captured using a storm drain system comprised of catch basins and pipes ranging in size from 8" to 30". Since; inadequate storm drain stubs were provided to the project area (one 12" PVC pipe and one 8" PVC pipe) a 30" RCP will need to be constructed in the adjacent land owner's parking lot. To minimize disturbance to the parking lot, the above mentioned storm drain construction should be coordinated with the project's proposed water and sewer lines being constructed in the same area.

Area D is 0.63 acres. Area D will consist of the newly designed and /or reconfigured parking lot for the Tennis Club. Storm flows from Area D will travel south to the existing parking lot located adjacent to the site. Once in the parking lot, flows will sheet flow into existing catch basins and into the existing 69" RCP storm drain.

Area E is 0.19 acres. Area E will consist of a newly designed parking lot servicing the pool. Storm flows from Area E will travel to the south west corner and be picked up by a catch basin which will tie into an existing 8" PVC pipe. This 8" PVC pipe was designed as a 12" PVC pipe but was field verified at the Brooks box grate inlet to be a 8" PVC pipe. This PVC pipe connects to a 69" RCP storm drain system.

Hydrology Summary

All hydrology calculations were performed in accordance with the requirements of the Orange County Hydrology Manual utilizing the appropriate AES software. Rational Method Hydrology calculations were performed for the 25-year frequency storm under the existing, pre-developed conditions (see Section 1) and developed conditions (see Section 2).

The following tables show rational method peak flow rates for the existing and developed conditions.

Existing Condition Summary

Sub-Area	Area (acres)	Flow, Q (cfs)
A & B	11.59	26.56
C	5.62	14.27
D	0.19	0.82
E	1.24	4.16
TOTAL	**18.64**	**45.81**

Developed Condition Summary

Sub-Area	Area (acres)	Flow, Q (cfs)
A & B	11.68	27.82
C	6.16	20.74
D	0.63	2.64
E	0.19	0.81
TOTAL	**18.66**	**52.01**

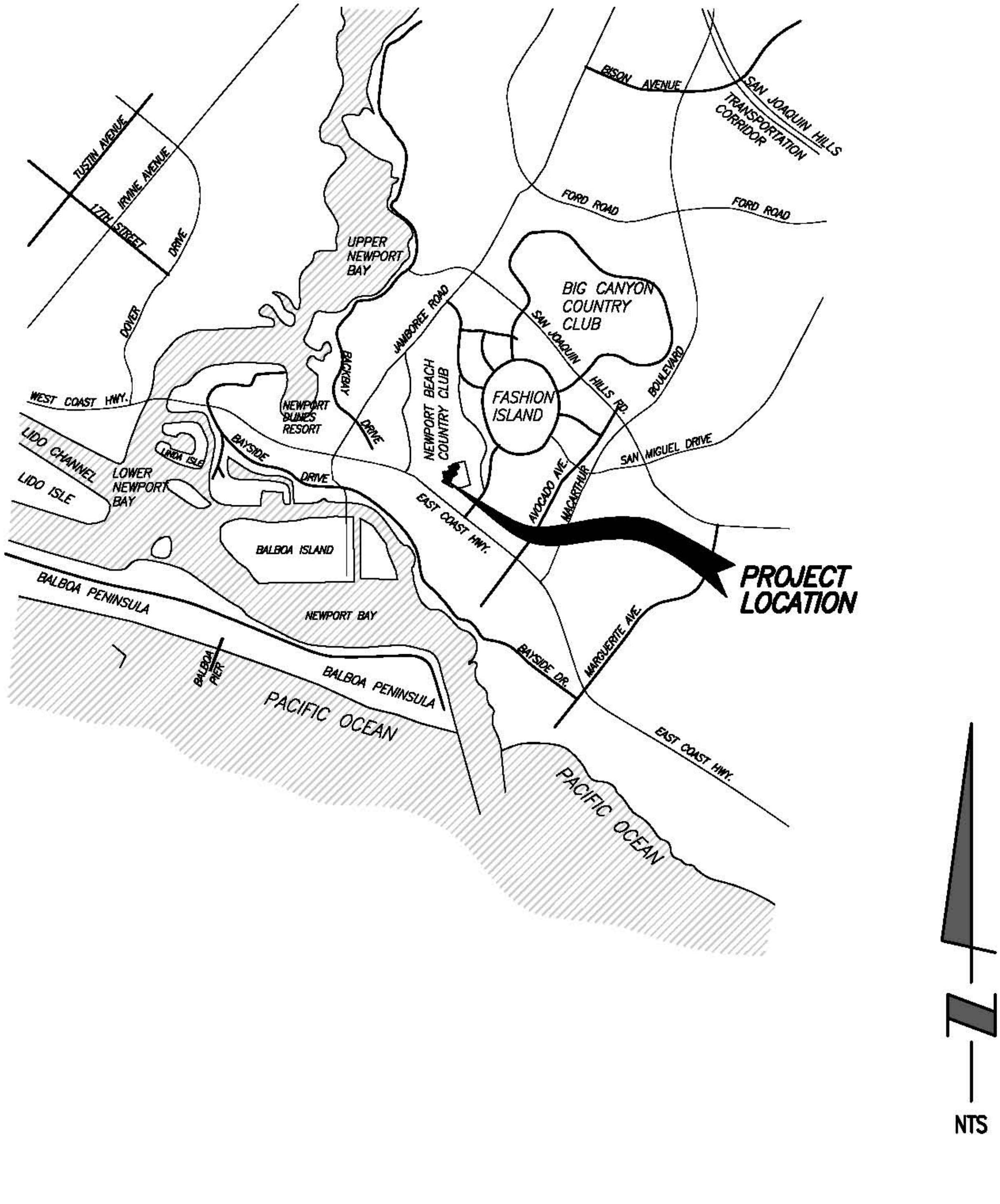
The following table shows the pre-development and post-development impact on the existing 69" RCP Storm Drain.

CONDITION	SUB-AREA	TOTAL FLOW TO EXISTING STORM DRAIN, Q_{25} (cfs)
PRE-DEVELOPMENT	A, B, C, D, & E	45.81
POST-DEVELOPMENT	A, B, C, D, & E	52.01
	INCREASE OF	**6.20**

Footnote: Please note that even though the land use for the “proposed” development has a lower runoff coefficient than the existing condition the overall flow volumes have Increased. This is due to the lower time of concentration which occurs when the storm flows are routed in a pipe verses the current condition of sheet flow.

As shown in the table above, the impact of the post-development site on the existing storm drain system is increased by 6.20 cfs. Due to an existing flow of 462 cfs within the 69" RCP storm drain, there will be only an increase of 1.3%. Due to the fact that the time of concentration within the 69" RCP pipe is much larger than the site's contributing flow, the impact the site's increase has on the 69" RCP is negligible; therefore, the development of the site will not have a negative impact on the capacity of the existing system being connected to.

As seen in Exhibit 3, the site is located within the Flood Insurance Rate Map’s Zone “X”. Zone “X” is described as an area of 1% annual chance flood with average depths of less than 1 foot. Additional 100-year frequency flow calculations are provided for developed conditions and are enclosed in this study (see Section 3). During a 100-year storm, the site will be protected from flooding, as the water surface for all street flow stays within the gutter and street; average depth of flow for entire site is less than 1 foot. Secondary overflow for the site is provided by outleting through the site’s interior streets to the exit on Pacific Coast Highway. Site is not subject to Tsunamis and/or mudslides.



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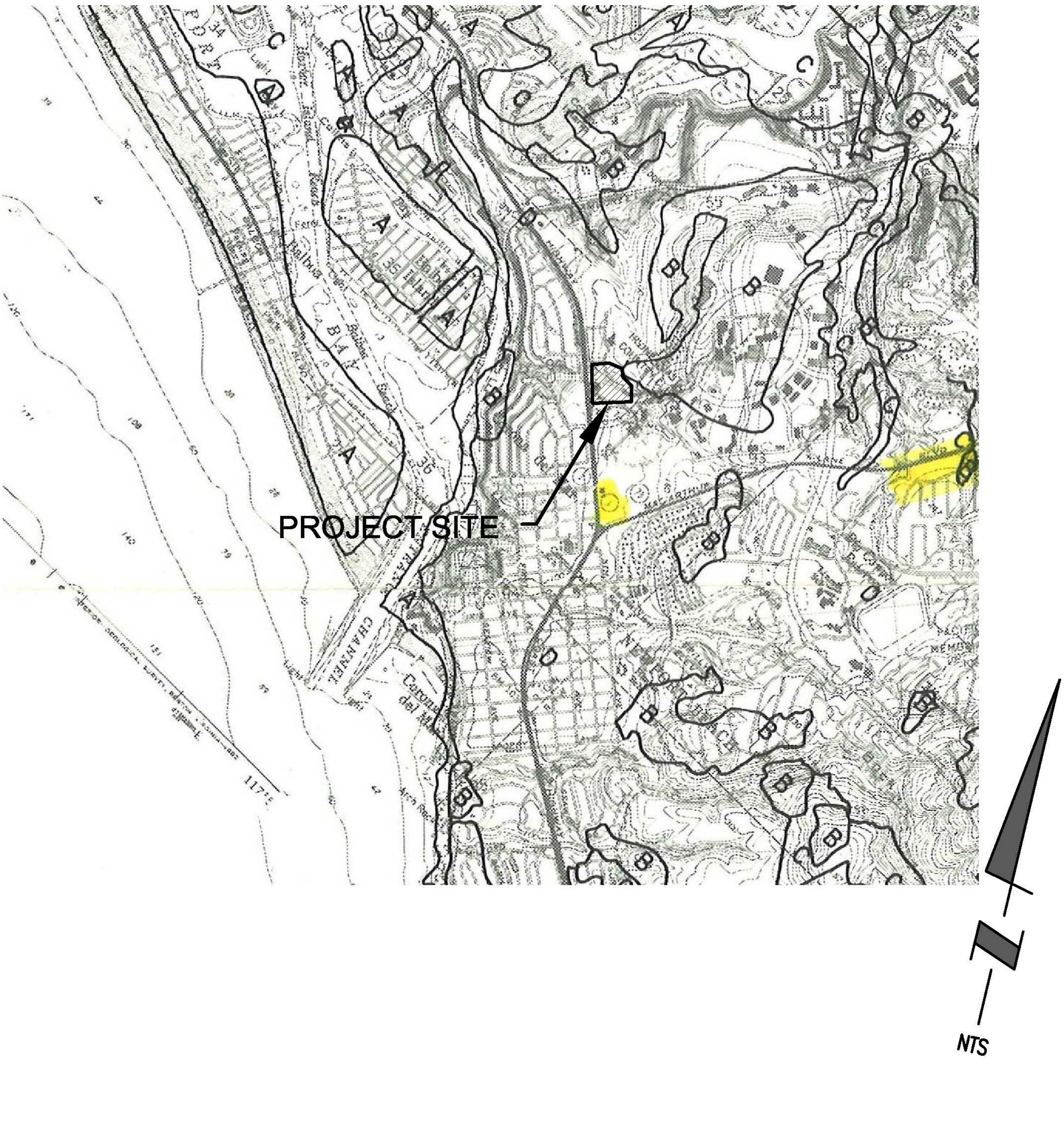
VICINITY MAP

EXHIBIT 1



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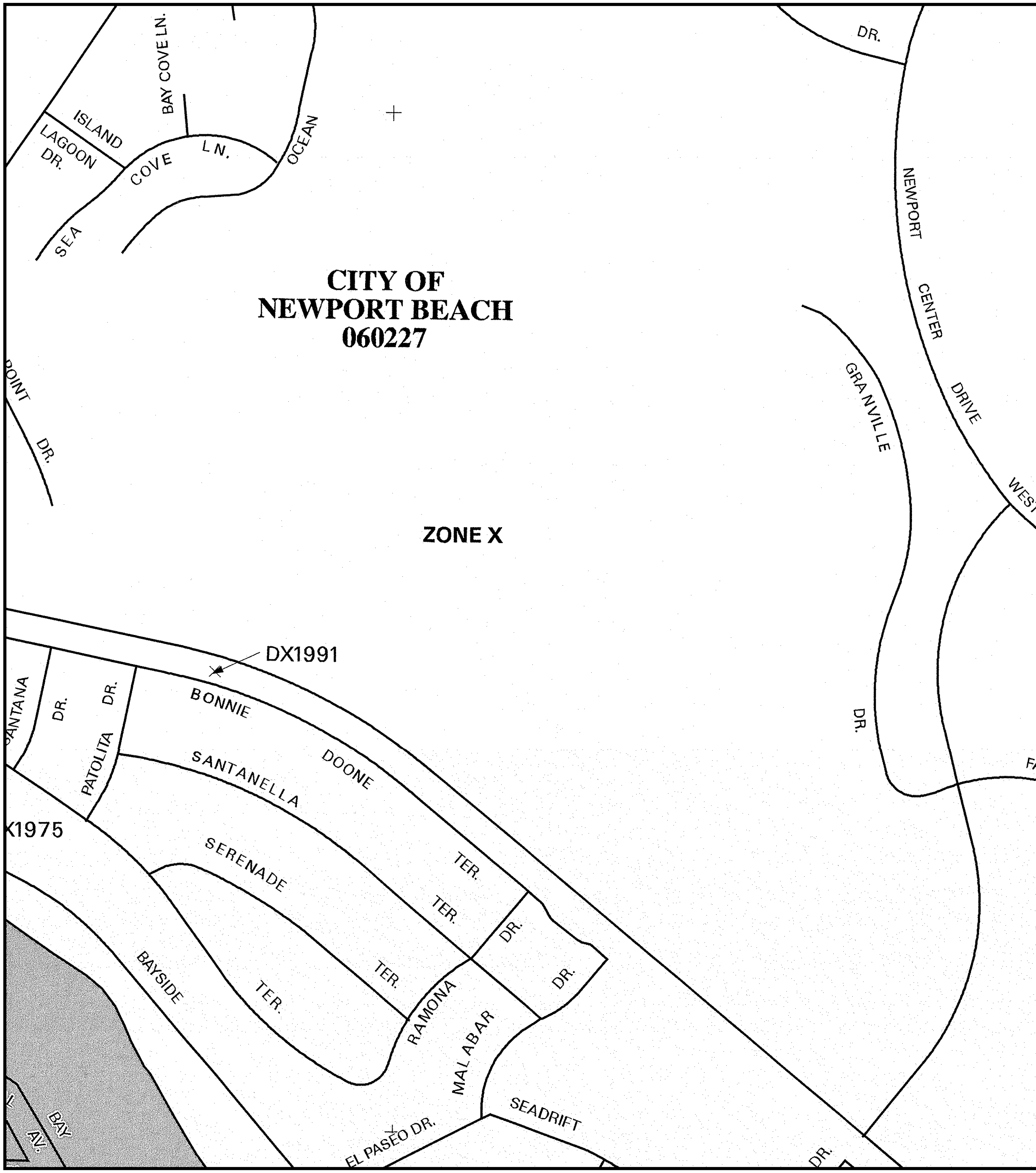
SOIL INDEX

PLATE D



PANEL 0382H

FIRM

FLOOD INSURANCE RATE MAP

ORANGE COUNTY,
CALIFORNIA
AND INCORPORATED AREAS

PANEL 382 OF 550

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NEWPORT BEACH, CITY OF	060227	0382	H

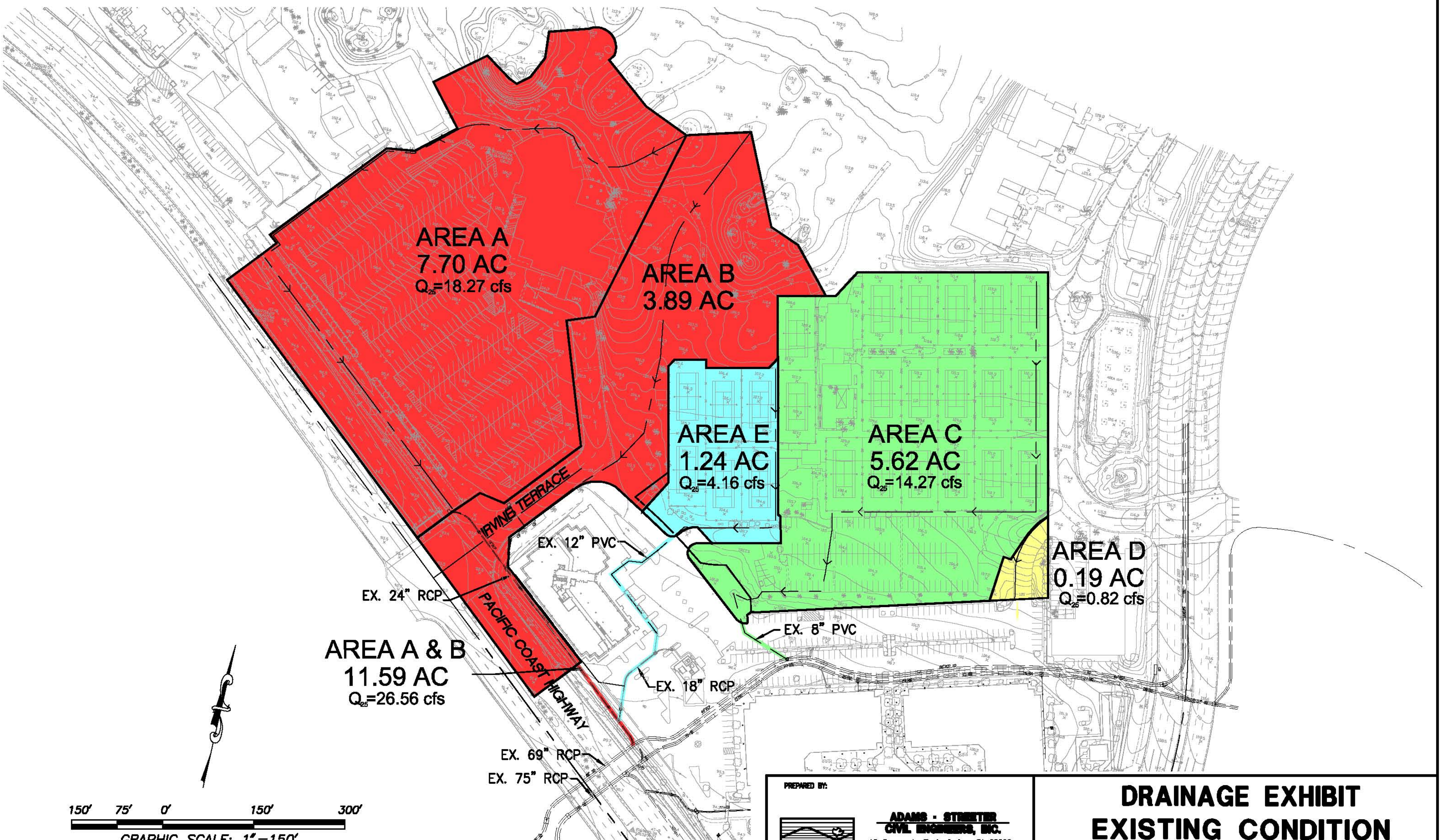
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06059C0382H

MAP REVISED:
FEBRUARY 18, 2004

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



PLOT DATE: 7-13-2009

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DRAINAGE EXHIBIT
EXISTING CONDITION
Vesting Tentative Tract map No. 15347
IN THE CITY OF NEWPORT BEACH
COUNTY OF ORANGE, CALIFORNIA

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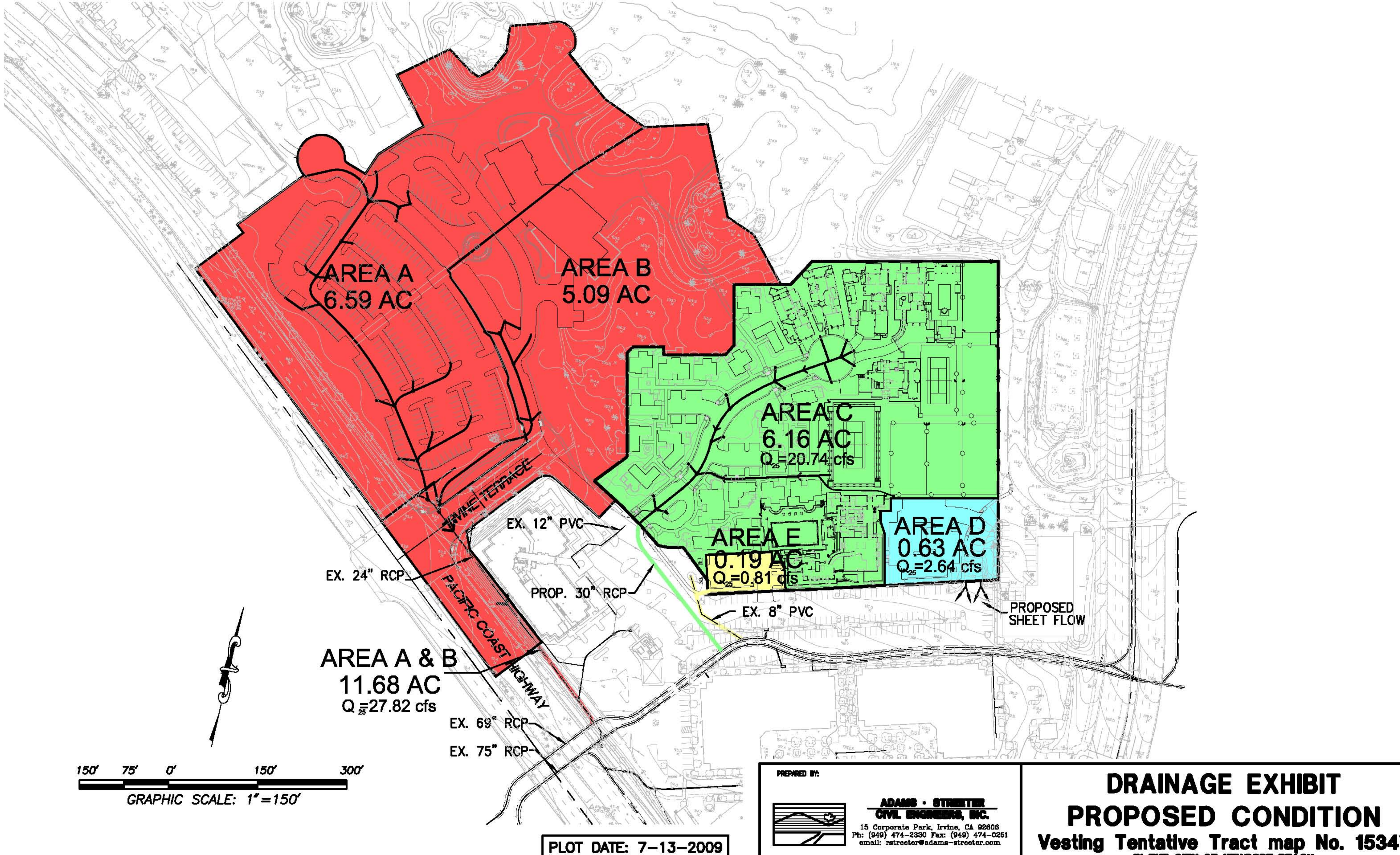

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DRAINAGE EXHIBIT
PROPOSED CONDITION
Vesting Tentative Tract map No. 15347
IN THE CITY OF NEWPORT BEACH
COUNTY OF ORANGE, CALIFORNIA

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Section 1

Pre-Development Condition Rational Method Hydrology Calculations
25-year Frequency

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____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2008 Advanced Engineering Software (aes)
             Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                           Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
 * VESTING TENTATIVE TRACT MAP NO. 15347                                    *
 * EXISTING CONDITION HYDROLOGY                                             *
 * 25-YEAR FREQUENCY                                                        *
 **************************************************************************

  FILE NAME: C:\AES2008\NBCC-EX.DAT
  TIME/DATE OF STUDY: 17:06 07/08/2009
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

+--------------------------------------------------------------------------+
|   SUB-AREA A                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   337.00
  ELEVATION DATA: UPSTREAM(FEET) =    115.90  DOWNSTREAM(FEET) =    106.40
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.822
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.292
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        1.24      0.20     0.800    75    9.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      3.49
  TOTAL AREA(ACRES) =      1.24   PEAK FLOW RATE(CFS) =      3.49

****************************************************************************
  FLOW PROCESS FROM NODE      1.11 TO NODE      1.12 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    106.40
  DOWNSTREAM NODE ELEVATION(FEET) =     94.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   781.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.031   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.925
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        3.14      0.20     0.800    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.72
  AVERAGE FLOW DEPTH(FEET) =   0.64   FLOOD WIDTH(FEET) =    5.18
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =   12.10
  SUBAREA AREA(ACRES) =    3.14       SUBAREA RUNOFF(CFS) =    7.81
  EFFECTIVE AREA(ACRES) =    4.38     AREA-AVERAGED Fm(INCH/HR) =   0.16
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.80
  TOTAL AREA(ACRES) =        4.4         PEAK FLOW RATE(CFS) =      10.90

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.72   FLOOD WIDTH(FEET) =    6.87
  FLOW VELOCITY(FEET/SEC.) =   6.07   DEPTH*VELOCITY(FT*FT/SEC) =   4.40
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.12 =    1118.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.12 TO NODE      1.13 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     94.80
  DOWNSTREAM NODE ELEVATION(FEET) =     94.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   232.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.031   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.779
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
 RESIDENTIAL
 "1 DWELLING/ACRE"          D        2.51      0.20     0.800    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     13.86
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.36
 AVERAGE FLOW DEPTH(FEET) =   0.97   FLOOD WIDTH(FEET) =   11.85
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =   13.25
 SUBAREA AREA(ACRES) =    2.51       SUBAREA RUNOFF(CFS) =    5.92
 EFFECTIVE AREA(ACRES) =    6.89     AREA-AVERAGED Fm(INCH/HR) =   0.16
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.80
 TOTAL AREA(ACRES) =        6.9         PEAK FLOW RATE(CFS) =      16.24

        ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
            NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
            AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
            ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.00   FLOOD WIDTH(FEET) =   12.38
 FLOW VELOCITY(FEET/SEC.) =   3.65   DEPTH*VELOCITY(FT*FT/SEC) =   3.65
 LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.13 =    1350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      1.13 TO NODE      1.13 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.25
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.779
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.82      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.82      SUBAREA RUNOFF(CFS) =    2.04
 EFFECTIVE AREA(ACRES) =      7.71   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.73
 TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =      18.27

****************************************************************************
 FLOW PROCESS FROM NODE      1.13 TO NODE      6.10 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    89.50  DOWNSTREAM(FEET) =    88.00
 FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.93
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
  AT DEPTH = 0.82 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.27
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   13.58
 LONGEST FLOWPATH FROM NODE      1.10 TO NODE      6.10 =    1486.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.10 TO NODE      6.10 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
```

```
============================================================================

+--------------------------------------------------------------------------+
|   SUB-AREA B                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      2.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   605.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.10  DOWNSTREAM(FEET) =    101.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.187
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.786
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        2.55      0.20     0.800    75   13.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      6.03
  TOTAL AREA(ACRES) =      2.55   PEAK FLOW RATE(CFS) =      6.03

****************************************************************************
  FLOW PROCESS FROM NODE      2.11 TO NODE      2.12 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    101.50
  DOWNSTREAM NODE ELEVATION(FEET) =     94.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   213.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.031   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.731
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        0.54      0.20     0.800    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.56
  AVERAGE FLOW DEPTH(FEET) =   0.54   FLOOD WIDTH(FEET) =    3.24
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.47   Tc(MIN.) =   13.66
  SUBAREA AREA(ACRES) =    0.54       SUBAREA RUNOFF(CFS) =    1.25
  EFFECTIVE AREA(ACRES) =    3.09     AREA-AVERAGED Fm(INCH/HR) =   0.16
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.80
  TOTAL AREA(ACRES) =        3.1         PEAK FLOW RATE(CFS) =       7.15

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.56   FLOOD WIDTH(FEET) =    3.49
  FLOW VELOCITY(FEET/SEC.) =   7.75   DEPTH*VELOCITY(FT*FT/SEC) =   4.30
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.12 =     818.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      2.12 TO NODE      6.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    90.00  DOWNSTREAM(FEET) =    88.00
  FLOW LENGTH(FEET) =    51.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.48
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        7.15
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   13.74
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      6.10 =     869.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.10 TO NODE      6.10 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        7.15   13.74    2.722  0.20( 0.16) 0.80       3.1       2.10
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      6.10 =     869.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       18.27   13.58    2.741  0.20( 0.15) 0.73       7.7       1.10
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      6.10 =    1486.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       25.39   13.58    2.741  0.20( 0.15) 0.75      10.8       1.10
     2       25.30   13.74    2.722  0.20( 0.15) 0.75      10.8       2.10
    TOTAL AREA(ACRES) =        10.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       25.39  Tc(MIN.) =   13.577
  EFFECTIVE AREA(ACRES) =     10.76  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       10.8
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      6.10 =    1486.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.10 TO NODE      6.11 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    88.00  DOWNSTREAM(FEET) =    86.00
  FLOW LENGTH(FEET) =   206.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.88
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       25.39
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   14.01
```

```
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      6.11 =    1692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.11 TO NODE      6.11 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.01
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.692
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.80      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    1.92
  EFFECTIVE AREA(ACRES) =     11.56   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.70
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      26.56

+--------------------------------------------------------------------------+
|   SUB-AREA C                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      3.10 TO NODE      3.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   377.00
  ELEVATION DATA: UPSTREAM(FEET) =    113.50  DOWNSTREAM(FEET) =    110.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.465
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.581
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.54      0.20     0.100    75    8.47
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.73
  TOTAL AREA(ACRES) =      0.54   PEAK FLOW RATE(CFS) =      1.73

****************************************************************************
  FLOW PROCESS FROM NODE      3.11 TO NODE      3.12 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    110.30
  DOWNSTREAM NODE ELEVATION(FEET) =    105.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   336.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.031   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.328
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                 D        2.88      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.80
  AVERAGE FLOW DEPTH(FEET) =   0.60   FLOOD WIDTH(FEET) =    9.50
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =    9.63
  SUBAREA AREA(ACRES) =    2.88       SUBAREA RUNOFF(CFS) =    8.57
  EFFECTIVE AREA(ACRES) =    3.42     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =      10.18

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.67   FLOOD WIDTH(FEET) =   17.38
  FLOW VELOCITY(FEET/SEC.) =   4.41   DEPTH*VELOCITY(FT*FT/SEC) =   2.98
  LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.12 =     713.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.12 TO NODE      3.13 IS CODE =  54
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    105.60  DOWNSTREAM(FEET) =    100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   285.00   CHANNEL SLOPE =  0.0196
  CHANNEL BASE(FEET) =  200.00   "Z" FACTOR =  99.990
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.846
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        2.19      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.55
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   3.07
  Tc(MIN.) =   12.70
  SUBAREA AREA(ACRES) =     2.19       SUBAREA RUNOFF(CFS) =    5.57
  EFFECTIVE AREA(ACRES) =      5.61     AREA-AVERAGED Fm(INCH/HR) =   0.02
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        5.6         PEAK FLOW RATE(CFS) =      14.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   1.63
  LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.13 =     998.00 FEET.

+--------------------------------------------------------------------------+
|   SUB-AREA D                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      4.10 TO NODE      4.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   153.00
  ELEVATION DATA: UPSTREAM(FEET) =    115.00  DOWNSTREAM(FEET) =    104.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.19      0.20     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.82
  TOTAL AREA(ACRES) =      0.19   PEAK FLOW RATE(CFS) =      0.82

+--------------------------------------------------------------------------+
|   SUB-AREA E                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      5.10 TO NODE      5.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
  ELEVATION DATA: UPSTREAM(FEET) =    107.30  DOWNSTREAM(FEET) =    103.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.375
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.871
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.41      0.20     0.100    75    7.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.42
  TOTAL AREA(ACRES) =      0.41   PEAK FLOW RATE(CFS) =      1.42

****************************************************************************
  FLOW PROCESS FROM NODE      5.11 TO NODE      5.12 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  103.40  DOWNSTREAM ELEVATION(FEET) =  102.60
  STREET LENGTH(FEET) =    70.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 26.50

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.81
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.61
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    7.81
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.749
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.83      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.79
  EFFECTIVE AREA(ACRES) =      1.24    AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       4.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.30
  FLOW VELOCITY(FEET/SEC.) =  2.98   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE      5.10 TO NODE      5.12 =     390.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.2  TC(MIN.) =      7.81
  EFFECTIVE AREA(ACRES) =      1.24  AREA-AVERAGED Fm(INCH/HR)=  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =      4.16
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Section 2

Post-Development Condition Rational Method Hydrology
25-Year Frequency

```
____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2008 Advanced Engineering Software (aes)
             Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                           Analysis prepared by:

                    Adams-Streeter Civil Engineers, Inc.
                             15 Corporate Park
                              Irvine, CA 92606
                                949-474-2330

 ************************* DESCRIPTION OF STUDY **************************
 * VESTING TENTATIVE TRACTMAP NO. 15347                                   *
 * DEVELOPED CONDITION HYDROLOGY                                          *
 * 25-YEAR FREQUENCY                                                      *
 **************************************************************************

  FILE NAME: C:\AES2008\NBCC-P.DAT
  TIME/DATE OF STUDY: 12:29 07/07/2009
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

+--------------------------------------------------------------------------+
|   SUB-AREA A                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      1.10 TO NODE      1.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   265.00
  ELEVATION DATA: UPSTREAM(FEET) =    115.90  DOWNSTREAM(FEET) =    108.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.086
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.440
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                D        0.70      0.20     0.850    75    9.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      2.06
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.06

****************************************************************************
  FLOW PROCESS FROM NODE      1.11 TO NODE      1.12 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    108.00  DOWNSTREAM(FEET) =    106.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.0200
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.06
  FLOW VELOCITY(FEET/SEC) =   2.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =    9.77
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.12 =     365.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.12 TO NODE      1.12 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.77
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.302
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       D        0.77      0.20     0.500    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.77      SUBAREA RUNOFF(CFS) =    2.22
  EFFECTIVE AREA(ACRES) =      1.47   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       4.19

****************************************************************************
  FLOW PROCESS FROM NODE      1.12 TO NODE      1.13 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    106.00
  DOWNSTREAM NODE ELEVATION(FEET) =    103.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.032   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.163
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.24      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.97
  AVERAGE FLOW DEPTH(FEET) =   0.60   FLOOD WIDTH(FEET) =   15.35
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.77   Tc(MIN.) =   10.54
  SUBAREA AREA(ACRES) =    0.24       SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =    1.71     AREA-AVERAGED Fm(INCH/HR) =   0.12
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.59
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       4.69

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.60   FLOOD WIDTH(FEET) =   16.08
  FLOW VELOCITY(FEET/SEC.) =   3.91   DEPTH*VELOCITY(FT*FT/SEC) =   2.35
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.13 =     549.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.13 TO NODE      1.14 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    98.00  DOWNSTREAM(FEET) =    97.00
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.11
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.69
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.67
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.14 =     603.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.14 TO NODE      1.14 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.15 TO NODE      1.16 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   233.00
  ELEVATION DATA: UPSTREAM(FEET) =    108.00  DOWNSTREAM(FEET) =    105.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.425
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.186
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.48      0.20     0.100    75    6.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =       1.80
  TOTAL AREA(ACRES) =       0.48   PEAK FLOW RATE(CFS) =      1.80

****************************************************************************
  FLOW PROCESS FROM NODE      1.16 TO NODE      1.17 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.00  DOWNSTREAM(FEET) =    97.50
```

```
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.34
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.80
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.50
  LONGEST FLOWPATH FROM NODE      1.15 TO NODE      1.17 =     273.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.17 TO NODE      1.17 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.156
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.10      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.37
  EFFECTIVE AREA(ACRES) =      0.58   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       2.16

****************************************************************************
  FLOW PROCESS FROM NODE      1.17 TO NODE      1.14 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    97.50  DOWNSTREAM(FEET) =    97.00
  FLOW LENGTH(FEET) =    52.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.53
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.16
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    6.70
  LONGEST FLOWPATH FROM NODE      1.15 TO NODE      1.14 =     325.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.14 TO NODE      1.14 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.17 TO NODE      1.18 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   170.00
  ELEVATION DATA: UPSTREAM(FEET) =    102.50  DOWNSTREAM(FEET) =    101.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.108
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.307
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.20      0.20     0.100    75    6.11
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =       0.77
  TOTAL AREA(ACRES) =       0.20   PEAK FLOW RATE(CFS) =       0.77

****************************************************************************
  FLOW PROCESS FROM NODE      1.18 TO NODE      1.14 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    96.00  DOWNSTREAM(FEET) =    95.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.02
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.77
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =    6.88
  LONGEST FLOWPATH FROM NODE      1.17 TO NODE      1.14 =     310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.14 TO NODE      1.14 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        0.77    6.88    4.026  0.20( 0.02) 0.10       0.2       1.17
  LONGEST FLOWPATH FROM NODE      1.17 TO NODE      1.14 =     310.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.69   10.67    3.142  0.20( 0.12) 0.59       1.7       1.10
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.14 =     603.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.68    6.88    4.026  0.20( 0.10) 0.51       1.3       1.17
      2        5.29   10.67    3.142  0.20( 0.11) 0.54       1.9       1.10
    TOTAL AREA(ACRES) =         1.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        5.29  Tc(MIN.) =   10.666
  EFFECTIVE AREA(ACRES) =       1.91  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =        1.9
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.14 =     603.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.14 TO NODE      1.14 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.68    6.88    4.026  0.20( 0.10) 0.51       1.3       1.17
      2        5.29   10.67    3.142  0.20( 0.11) 0.54       1.9       1.10
```

```
 LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.14 =     603.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        2.16    6.70    4.089  0.20( 0.02) 0.10       0.6       1.15
 LONGEST FLOWPATH FROM NODE      1.15 TO NODE      1.14 =     325.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        6.79    6.70    4.089  0.20( 0.08) 0.38       1.8       1.15
     2        6.81    6.88    4.026  0.20( 0.08) 0.39       1.9       1.17
     3        6.94   10.67    3.142  0.20( 0.09) 0.43       2.5       1.10
   TOTAL AREA(ACRES) =         2.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =        6.94  Tc(MIN.) =   10.666
 EFFECTIVE AREA(ACRES) =      2.49  AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =        2.5
 LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.14 =     603.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      0.00 TO NODE      0.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      0.00 TO NODE      0.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      1.14 TO NODE      1.19 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    95.00  DOWNSTREAM(FEET) =    94.30
 FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.85
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.94
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   10.90
 LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.19 =     685.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      1.19 TO NODE      1.19 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.90
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.103
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.27      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =    0.27      SUBAREA RUNOFF(CFS) =    0.75
  EFFECTIVE AREA(ACRES) =      2.76   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.51

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.51    6.93    4.010  0.20( 0.07) 0.35       2.1       1.15
      2        7.52    7.12    3.950  0.20( 0.07) 0.35       2.2       1.17
      3        7.51   10.90    3.103  0.20( 0.08) 0.40       2.8       1.10
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =       7.52  Tc(MIN.) =    7.12
  AREA-AVERAGED Fm(INCH/HR) =  0.07  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.35  EFFECTIVE AREA(ACRES) =       2.15

****************************************************************************
  FLOW PROCESS FROM NODE      1.19 TO NODE      1.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    94.30  DOWNSTREAM(FEET) =    92.20
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.62
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.52
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    7.24
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.20 =     755.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.24
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.913
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                D        0.22      0.20     0.100    75
  COMMERCIAL                D        0.10      0.20     0.100    75
  COMMERCIAL                D        0.18      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.75
  EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.30
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       9.20

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.21    7.05    3.970  0.20( 0.06) 0.30       2.6       1.15
      2        9.20    7.24    3.913  0.20( 0.06) 0.30       2.7       1.17
      3        8.84   11.02    3.084  0.20( 0.07) 0.36       3.3       1.10
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =       9.21  Tc(MIN.) =    7.05
  AREA-AVERAGED Fm(INCH/HR) =  0.06  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.30  EFFECTIVE AREA(ACRES) =       2.62

****************************************************************************
```

```
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.21 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    92.20  DOWNSTREAM(FEET) =    91.70
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.28
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.21
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.20
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.21 =     810.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.21 TO NODE      1.21 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.20
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.925
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.09      0.20     0.100    75
  COMMERCIAL                 D        0.18      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.27      SUBAREA RUNOFF(CFS) =    0.95
  EFFECTIVE AREA(ACRES) =      2.89   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =        3.5       PEAK FLOW RATE(CFS) =      10.06

****************************************************************************
  FLOW PROCESS FROM NODE      1.21 TO NODE      1.22 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    91.70  DOWNSTREAM(FEET) =    91.00
  FLOW LENGTH(FEET) =   215.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.77
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.06
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =    8.15
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.22 =    1025.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.22 TO NODE      1.22 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.659
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.17      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =    0.17      SUBAREA RUNOFF(CFS) =    0.56
  EFFECTIVE AREA(ACRES) =      3.06   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =        3.7       PEAK FLOW RATE(CFS) =      10.06
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      1.22 TO NODE      1.22 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.23 TO NODE      1.24 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   135.00
  ELEVATION DATA: UPSTREAM(FEET) =    103.00  DOWNSTREAM(FEET) =    100.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.24      0.20     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.04
  TOTAL AREA(ACRES) =      0.24   PEAK FLOW RATE(CFS) =      1.04

****************************************************************************
  FLOW PROCESS FROM NODE      1.24 TO NODE      1.25 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    95.00  DOWNSTREAM(FEET) =    92.00
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.04
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    5.24
  LONGEST FLOWPATH FROM NODE      1.23 TO NODE      1.25 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.25 TO NODE      1.25 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.24
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.696
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.19      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.80
  EFFECTIVE AREA(ACRES) =      0.43   AREA-AVERAGED Fm(INCH/HR) =  0.02
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.81

****************************************************************************
  FLOW PROCESS FROM NODE      1.25 TO NODE      1.22 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    92.00  DOWNSTREAM(FEET) =    91.00
  FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.94
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.81
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    5.36
  LONGEST FLOWPATH FROM NODE      1.23 TO NODE      1.22 =     262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.22 TO NODE      1.22 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.81    5.36    4.637  0.20( 0.02) 0.10       0.4       1.23
  LONGEST FLOWPATH FROM NODE      1.23 TO NODE      1.22 =     262.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       10.06    8.15    3.659  0.20( 0.05) 0.27       3.1       1.15
      2       10.03    8.34    3.612  0.20( 0.05) 0.27       3.1       1.17
      3        9.52   12.12    2.923  0.20( 0.07) 0.33       3.7       1.10
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.22 =    1025.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       10.22    5.36    4.637  0.20( 0.05) 0.24       2.4       1.23
      2       11.48    8.15    3.659  0.20( 0.05) 0.25       3.5       1.15
      3       11.44    8.34    3.612  0.20( 0.05) 0.25       3.5       1.17
      4       10.65   12.12    2.923  0.20( 0.06) 0.30       4.1       1.10
    TOTAL AREA(ACRES) =         4.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       11.48  Tc(MIN.) =    8.149
  EFFECTIVE AREA(ACRES) =       3.49  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =        4.1
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.22 =    1025.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      0.00 TO NODE      0.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.22 TO NODE      1.26 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    91.00  DOWNSTREAM(FEET) =    89.50
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.05
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.48
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    8.36
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.26 =    1125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.26 TO NODE      1.26 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.607
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.28      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.90
  EFFECTIVE AREA(ACRES) =      3.77   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =        4.4       PEAK FLOW RATE(CFS) =      12.07

****************************************************************************
  FLOW PROCESS FROM NODE      1.26 TO NODE      1.26 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.27 TO NODE      1.28 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    83.00
  ELEVATION DATA: UPSTREAM(FEET) =    100.80  DOWNSTREAM(FEET) =     98.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.11      0.20     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE      1.28 TO NODE      1.29 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    93.20  DOWNSTREAM(FEET) =    90.20
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.48
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    5.36
  LONGEST FLOWPATH FROM NODE      1.27 TO NODE      1.29 =     178.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.29 TO NODE      1.29 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.638
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.11      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.46
  EFFECTIVE AREA(ACRES) =      0.22   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.2       PEAK FLOW RATE(CFS) =       0.91

****************************************************************************
  FLOW PROCESS FROM NODE      1.29 TO NODE      1.26 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    90.20  DOWNSTREAM(FEET) =    89.50
  FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.79
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.91
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.41
  LONGEST FLOWPATH FROM NODE      1.27 TO NODE      1.26 =     196.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.26 TO NODE      1.26 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        0.91    5.41    4.613  0.20( 0.02) 0.10       0.2       1.27
  LONGEST FLOWPATH FROM NODE      1.27 TO NODE      1.26 =     196.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       11.00    5.57    4.537  0.20( 0.05) 0.23       2.7       1.23
     2       12.07    8.36    3.607  0.20( 0.05) 0.24       3.8       1.15
     3       12.03    8.54    3.562  0.20( 0.05) 0.24       3.8       1.17
     4       11.26   12.33    2.894  0.20( 0.06) 0.29       4.4       1.10
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.26 =    1125.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       11.78    5.41    4.613  0.20( 0.04) 0.22       2.9       1.27
      2       11.90    5.57    4.537  0.20( 0.04) 0.22       2.9       1.23
      3       12.78    8.36    3.607  0.20( 0.05) 0.23       4.0       1.15
      4       12.73    8.54    3.562  0.20( 0.05) 0.23       4.0       1.17
      5       11.83   12.33    2.894  0.20( 0.06) 0.28       4.6       1.10
    TOTAL AREA(ACRES) =         4.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       12.78  Tc(MIN.) =    8.356
  EFFECTIVE AREA(ACRES) =      3.99  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        4.6
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.26 =    1125.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      0.00 TO NODE      0.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.26 TO NODE      1.26 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.607
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.18      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.18      SUBAREA RUNOFF(CFS) =    0.58
  EFFECTIVE AREA(ACRES) =      4.17   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      13.36

****************************************************************************
  FLOW PROCESS FROM NODE      1.26 TO NODE      1.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    89.50  DOWNSTREAM(FEET) =    89.00
  FLOW LENGTH(FEET) =    68.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.66
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.36
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    8.56
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.30 =    1193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.30 TO NODE      1.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =    8.56
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.559
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.21      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.21      SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =      4.38   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.22
  TOTAL AREA(ACRES) =        5.0       PEAK FLOW RATE(CFS) =      13.85

****************************************************************************
  FLOW PROCESS FROM NODE      1.30 TO NODE      1.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.31 TO NODE      1.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   175.00
  ELEVATION DATA: UPSTREAM(FEET) =    101.00  DOWNSTREAM(FEET) =     95.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.643
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.794
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                D        0.44      0.20     0.850    75    7.64
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.43
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.43

****************************************************************************
  FLOW PROCESS FROM NODE      1.32 TO NODE      1.33 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =     95.60
  DOWNSTREAM NODE ELEVATION(FEET) =     93.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   525.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.032   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
  MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.910
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.27      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.92
  AVERAGE FLOW DEPTH(FEET) =   0.63   FLOOD WIDTH(FEET) =   20.81
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   4.56   Tc(MIN.) =   12.21
```

```
  SUBAREA AREA(ACRES) =    1.27       SUBAREA RUNOFF(CFS) =    3.30
  EFFECTIVE AREA(ACRES) =    1.71     AREA-AVERAGED Fm(INCH/HR) =   0.06
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.29
  TOTAL AREA(ACRES) =        1.7         PEAK FLOW RATE(CFS) =       4.39

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.66   FLOOD WIDTH(FEET) =   27.02
  FLOW VELOCITY(FEET/SEC.) =   1.84   DEPTH*VELOCITY(FT*FT/SEC) =   1.21
  LONGEST FLOWPATH FROM NODE      1.31 TO NODE      1.33 =     700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.33 TO NODE      1.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    87.20  DOWNSTREAM(FEET) =    87.00
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.82
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.39
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE      1.31 TO NODE      1.30 =     754.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.30 TO NODE      1.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.39   12.44    2.879  0.20( 0.06) 0.29       1.7       1.31
  LONGEST FLOWPATH FROM NODE      1.31 TO NODE      1.30 =     754.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       13.11    5.61    4.519  0.20( 0.04) 0.20       3.3       1.27
      2       13.21    5.77    4.447  0.20( 0.04) 0.20       3.3       1.23
      3       13.85    8.56    3.559  0.20( 0.04) 0.22       4.4       1.15
      4       13.79    8.74    3.516  0.20( 0.04) 0.22       4.4       1.17
      5       12.72   12.53    2.868  0.20( 0.05) 0.27       5.0       1.10
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.30 =    1193.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       16.24    5.61    4.519  0.20( 0.04) 0.22       4.0       1.27
      2       16.38    5.77    4.447  0.20( 0.04) 0.22       4.1       1.23
      3       17.60    8.56    3.559  0.20( 0.05) 0.24       5.6       1.15
      4       17.57    8.74    3.516  0.20( 0.05) 0.24       5.6       1.17
      5       17.13   12.44    2.879  0.20( 0.05) 0.27       6.7       1.31
      6       17.09   12.53    2.868  0.20( 0.05) 0.27       6.7       1.10
    TOTAL AREA(ACRES) =         6.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       17.60  Tc(MIN.) =    8.557
  EFFECTIVE AREA(ACRES) =       5.55  AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =        6.7
```

```
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.30 =    1193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      0.00 TO NODE      0.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.30 TO NODE      1.30 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
|   SUB-AREA B                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      2.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   170.00
  ELEVATION DATA: UPSTREAM(FEET) =    107.50  DOWNSTREAM(FEET) =    103.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.020
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.813
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        0.67      0.20     0.100    75    5.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.89
  TOTAL AREA(ACRES) =      0.67   PEAK FLOW RATE(CFS) =      2.89

****************************************************************************
  FLOW PROCESS FROM NODE      2.11 TO NODE      2.12 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    98.50  DOWNSTREAM(FEET) =    97.50
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.40
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.89
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    5.15
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.12 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.12 TO NODE      2.12 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.743
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.10      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.43
  EFFECTIVE AREA(ACRES) =      0.77   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.8      PEAK FLOW RATE(CFS) =       3.27

****************************************************************************
  FLOW PROCESS FROM NODE      2.12 TO NODE      2.13 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    97.50  DOWNSTREAM(FEET) =    95.50
  FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.59
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.27
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =    5.63
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.13 =     380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.13 TO NODE      2.13 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.63
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.512
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.13      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.53
  EFFECTIVE AREA(ACRES) =      0.90   AREA-AVERAGED Fm(INCH/HR) =  0.02
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9      PEAK FLOW RATE(CFS) =       3.64

****************************************************************************
  FLOW PROCESS FROM NODE      2.13 TO NODE      1.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    95.50  DOWNSTREAM(FEET) =    87.00
  FLOW LENGTH(FEET) =   237.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.41
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.64
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =    6.10
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.30 =     617.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.30 TO NODE      1.30 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
```

```
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.64    6.10    4.312  0.20( 0.02) 0.10       0.9       2.10
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      1.30 =     617.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       16.24    5.61    4.519  0.20( 0.04) 0.22       4.0       1.27
      2       16.38    5.77    4.447  0.20( 0.04) 0.22       4.1       1.23
      3       17.60    8.56    3.559  0.20( 0.05) 0.24       5.6       1.15
      4       17.57    8.74    3.516  0.20( 0.05) 0.24       5.6       1.17
      5       17.13   12.44    2.879  0.20( 0.05) 0.27       6.7       1.31
      6       17.09   12.53    2.868  0.20( 0.05) 0.27       6.7       1.10
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.30 =    1193.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       19.75    5.61    4.519  0.20( 0.04) 0.20       4.9       1.27
      2       19.93    5.77    4.447  0.20( 0.04) 0.20       5.0       1.23
      3       20.16    6.10    4.312  0.20( 0.04) 0.20       5.2       2.10
      4       20.60    8.56    3.559  0.20( 0.04) 0.22       6.5       1.15
      5       20.53    8.74    3.516  0.20( 0.04) 0.22       6.5       1.17
      6       19.55   12.44    2.879  0.20( 0.05) 0.25       7.6       1.31
      7       19.50   12.53    2.868  0.20( 0.05) 0.25       7.6       1.10
    TOTAL AREA(ACRES) =         7.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       20.60  Tc(MIN.) =    8.557
  EFFECTIVE AREA(ACRES) =      6.45  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.22
  TOTAL AREA(ACRES) =        7.6
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.30 =    1193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      0.00 TO NODE      0.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.30 TO NODE      1.34 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    87.00  DOWNSTREAM(FEET) =    86.00
  FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.63
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.60
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    8.80
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.34 =    1303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.34 TO NODE      1.34 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
```

```
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      2.14 TO NODE      2.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   418.00
  ELEVATION DATA: UPSTREAM(FEET) =    114.10  DOWNSTREAM(FEET) =    106.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.884
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                D        2.13      0.20     0.850    75   11.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      5.34
  TOTAL AREA(ACRES) =      2.13   PEAK FLOW RATE(CFS) =      5.34

****************************************************************************
  FLOW PROCESS FROM NODE      2.15 TO NODE      2.16 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    106.00  DOWNSTREAM(FEET) =    100.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   203.00   CHANNEL SLOPE =  0.0276
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.34
  FLOW VELOCITY(FEET/SEC) =   3.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.95   Tc(MIN.) =   12.83
  LONGEST FLOWPATH FROM NODE      2.14 TO NODE      2.16 =     621.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.16 TO NODE      2.16 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.83
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.829
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        0.76      0.20     0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.76      SUBAREA RUNOFF(CFS) =    1.82
  EFFECTIVE AREA(ACRES) =      2.89   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        2.9       PEAK FLOW RATE(CFS) =       6.92

****************************************************************************
  FLOW PROCESS FROM NODE      2.16 TO NODE      2.17 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    100.40
  DOWNSTREAM NODE ELEVATION(FEET) =     94.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   197.00
  "V" GUTTER WIDTH(FEET) =   2.00   GUTTER HIKE(FEET) =  0.500
```

```
 PAVEMENT LIP(FEET) =  0.032   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) =   1.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.750
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.45      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.47
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.01
 AVERAGE FLOW DEPTH(FEET) =   0.62   FLOOD WIDTH(FEET) =   19.37
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   13.49
 SUBAREA AREA(ACRES) =    0.45       SUBAREA RUNOFF(CFS) =    1.11
 EFFECTIVE AREA(ACRES) =    3.34     AREA-AVERAGED Fm(INCH/HR) =   0.15
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   0.75
 TOTAL AREA(ACRES) =        3.3        PEAK FLOW RATE(CFS) =       7.82

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.62   FLOOD WIDTH(FEET) =   20.10
 FLOW VELOCITY(FEET/SEC.) =   5.00   DEPTH*VELOCITY(FT*FT/SEC) =   3.11
 LONGEST FLOWPATH FROM NODE      2.14 TO NODE      2.17 =     818.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      2.17 TO NODE      1.34 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    88.00  DOWNSTREAM(FEET) =    86.00
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.81
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.82
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   13.57
 LONGEST FLOWPATH FROM NODE      2.14 TO NODE      1.34 =     868.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      1.34 TO NODE      1.34 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        7.82   13.57    2.742  0.20( 0.15) 0.75       3.3       2.14
 LONGEST FLOWPATH FROM NODE      2.14 TO NODE      1.34 =     868.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       19.75    5.85    4.413  0.20( 0.04) 0.20       4.9       1.27
     2       19.93    6.01    4.346  0.20( 0.04) 0.20       5.0       1.23
     3       20.16    6.34    4.218  0.20( 0.04) 0.20       5.2       2.10
     4       20.60    8.80    3.504  0.20( 0.04) 0.22       6.5       1.15
     5       20.53    8.98    3.462  0.20( 0.04) 0.22       6.5       1.17
     6       19.55   12.68    2.848  0.20( 0.05) 0.25       7.6       1.31
     7       19.50   12.77    2.837  0.20( 0.05) 0.25       7.6       1.10
 LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.34 =    1303.00 FEET.
```

```
** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc   Intensity  Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      25.30    5.85    4.413  0.20( 0.07) 0.33      6.3       1.27
    2      25.54    6.01    4.346  0.20( 0.07) 0.33      6.5       1.23
    3      25.89    6.34    4.218  0.20( 0.07) 0.33      6.8       2.10
    4      27.15    8.80    3.504  0.20( 0.07) 0.35      8.6       1.15
    5      27.15    8.98    3.462  0.20( 0.07) 0.35      8.7       1.17
    6      27.16   12.68    2.848  0.20( 0.08) 0.40     10.7       1.31
    7      27.13   12.77    2.837  0.20( 0.08) 0.40     10.8       1.10
    8      26.65   13.57    2.742  0.20( 0.08) 0.40     11.0       2.14
  TOTAL AREA(ACRES) =        11.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       27.16  Tc(MIN.) =   12.685
EFFECTIVE AREA(ACRES) =     10.74  AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.40
TOTAL AREA(ACRES) =       11.0
LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.34 =    1303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      0.00 TO NODE      0.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      1.34 TO NODE      1.35 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    86.00  DOWNSTREAM(FEET) =    85.00
  FLOW LENGTH(FEET) =   206.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.57
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.82 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.16
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   13.30
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.35 =    1509.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      1.35 TO NODE      1.35 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.30
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.773
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.72      0.20     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.72      SUBAREA RUNOFF(CFS) =    1.78
  EFFECTIVE AREA(ACRES) =     11.46   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      27.82

****************************************************************************
  FLOW PROCESS FROM NODE      0.00 TO NODE      0.00 IS CODE =  13
```

```
 ----------------------------------------------------------------------------
   >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
 ============================================================================

+--------------------------------------------------------------------------+
|   SUB-AREA C                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

 ****************************************************************************
  FLOW PROCESS FROM NODE      3.10 TO NODE      3.11 IS CODE =  21
 ----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   315.00
  ELEVATION DATA: UPSTREAM(FEET) =    113.50  DOWNSTREAM(FEET) =    110.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.380
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.601
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 D        0.60      0.20     0.200    75    8.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      1.92
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.92

 ****************************************************************************
  FLOW PROCESS FROM NODE      3.11 TO NODE      3.12 IS CODE =  62
 ----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
 ============================================================================
  UPSTREAM ELEVATION(FEET) =  110.30  DOWNSTREAM ELEVATION(FEET) =  108.00
  STREET LENGTH(FEET) =   178.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.59
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.25
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
  STREET FLOW TRAVEL TIME(MIN.) =   1.32   Tc(MIN.) =    9.70
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.315
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.86      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.86      SUBAREA RUNOFF(CFS) =    2.54
  EFFECTIVE AREA(ACRES) =      1.46    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       4.30

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   8.91
  FLOW VELOCITY(FEET/SEC.) =  2.39   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
  LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.12 =     493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.12 TO NODE      3.13 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   103.00  DOWNSTREAM(FEET) =   102.00
  FLOW LENGTH(FEET) =    20.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.04
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.30
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    9.73
  LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.13 =     513.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.13 TO NODE      3.13 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      3.14 TO NODE      3.15 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   140.00
  ELEVATION DATA: UPSTREAM(FEET) =    112.00  DOWNSTREAM(FEET) =    109.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.367
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.634
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                D        0.22      0.20     0.200    75    5.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.91
  TOTAL AREA(ACRES) =      0.22   PEAK FLOW RATE(CFS) =      0.91

****************************************************************************
  FLOW PROCESS FROM NODE      3.15 TO NODE      3.16 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  109.80  DOWNSTREAM ELEVATION(FEET) =  108.10
  STREET LENGTH(FEET) =    96.50   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.57
  STREET FLOW TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =    5.93
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.382
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D        0.14      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =      0.36    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.4        PEAK FLOW RATE(CFS) =       1.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.22   HALFSTREET FLOOD WIDTH(FEET) =   3.09
  FLOW VELOCITY(FEET/SEC.) =  2.52   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
  LONGEST FLOWPATH FROM NODE      3.14 TO NODE      3.16 =     236.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.16 TO NODE      3.13 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   103.00  DOWNSTREAM(FEET) =   102.00
  FLOW LENGTH(FEET) =    20.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.45
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.41
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    5.97
  LONGEST FLOWPATH FROM NODE      3.14 TO NODE      3.13 =     257.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.13 TO NODE      3.13 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.41    5.97    4.363  0.20( 0.04) 0.20       0.4       3.14
  LONGEST FLOWPATH FROM NODE      3.14 TO NODE      3.13 =     257.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
    1        4.30    9.73    3.309  0.20( 0.04) 0.20       1.5       3.10
  LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.13 =     513.50 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1        4.90    5.97    4.363  0.20( 0.04) 0.20       1.3       3.14
    2        5.37    9.73    3.309  0.20( 0.04) 0.20       1.8       3.10
   TOTAL AREA(ACRES) =         1.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        5.37  Tc(MIN.) =    9.732
  EFFECTIVE AREA(ACRES) =      1.82  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.13 =     513.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      0.00 TO NODE      0.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      3.13 TO NODE      3.17 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   102.00  DOWNSTREAM(FEET) =   100.20
  FLOW LENGTH(FEET) =    89.40   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.61
  GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.37
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.93
  LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.17 =     602.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.17 TO NODE      3.17 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.93
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.272
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 D       0.18      0.20     0.200    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.18      SUBAREA RUNOFF(CFS) =    0.52
  EFFECTIVE AREA(ACRES) =      2.00   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       5.82

****************************************************************************
  FLOW PROCESS FROM NODE      3.17 TO NODE      3.18 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   100.20  DOWNSTREAM(FEET) =    99.60
```

```
 FLOW LENGTH(FEET) =     6.40   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   5.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.75
 GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.82
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    9.94
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.18 =     609.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.18 TO NODE      3.18 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.94
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.270
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D        0.27      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.27      SUBAREA RUNOFF(CFS) =    0.78
 EFFECTIVE AREA(ACRES) =      2.27   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =       6.60

****************************************************************************
 FLOW PROCESS FROM NODE      3.18 TO NODE      3.19 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    99.60  DOWNSTREAM(FEET) =    98.30
 FLOW LENGTH(FEET) =    60.60   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.17
 GIVEN PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.60
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   10.06
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.19 =     669.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.19 TO NODE      3.19 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.06
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.248
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D        0.37      0.20     0.200    75
 COMMERCIAL                 D        1.03      0.20     0.100    75
 COMMERCIAL                 D        0.36      0.20     0.100    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.121
 SUBAREA AREA(ACRES) =    1.76      SUBAREA RUNOFF(CFS) =    5.11
 EFFECTIVE AREA(ACRES) =      4.03   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =        4.0       PEAK FLOW RATE(CFS) =      11.66

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       13.10    6.30    4.231  0.20( 0.03) 0.16       3.5       3.14
     2       11.66   10.06    3.248  0.20( 0.03) 0.17       4.0       3.10
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      13.10  Tc(MIN.) =    6.30
 AREA-AVERAGED Fm(INCH/HR) =  0.03  AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.16  EFFECTIVE AREA(ACRES) =      3.47

****************************************************************************
 FLOW PROCESS FROM NODE      3.19 TO NODE      3.20 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    98.30  DOWNSTREAM(FEET) =    97.00
 FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
 (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
  AT DEPTH = 0.82 * DIAMETER)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.10
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    6.49
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.20 =     759.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.20 TO NODE      3.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.49
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.161
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 D       0.53      0.20     0.200    75
 APARTMENTS                 D       1.59      0.20     0.200    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    2.12      SUBAREA RUNOFF(CFS) =    7.86
 EFFECTIVE AREA(ACRES) =      5.59   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      20.74

****************************************************************************
 FLOW PROCESS FROM NODE      3.20 TO NODE      3.21 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    97.00  DOWNSTREAM(FEET) =    91.50
 FLOW LENGTH(FEET) =   298.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.29
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.74
 PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =    6.97
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.21 =    1057.90 FEET.
```

```
+--------------------------------------------------------------------------+
|   SUB-AREA D                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

 ****************************************************************************
   FLOW PROCESS FROM NODE      4.10 TO NODE      4.11 IS CODE =  21
 ----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   263.00
   ELEVATION DATA: UPSTREAM(FEET) =    114.50  DOWNSTREAM(FEET) =    103.10

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.290
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.672
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
   COMMERCIAL                 D        0.63      0.20     0.100    75    5.29
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
   SUBAREA RUNOFF(CFS) =      2.64
   TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.64

+--------------------------------------------------------------------------+
|   SUB-AREA E                                                             |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

 ****************************************************************************
   FLOW PROCESS FROM NODE      5.10 TO NODE      5.11 IS CODE =  21
 ----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   141.00
   ELEVATION DATA: UPSTREAM(FEET) =    103.30  DOWNSTREAM(FEET) =    101.20

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.105
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.768
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
   COMMERCIAL                 D        0.19      0.20     0.100    75    5.10
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
   SUBAREA RUNOFF(CFS) =      0.81
   TOTAL AREA(ACRES) =      0.19   PEAK FLOW RATE(CFS) =      0.81
 ============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =        0.2  TC(MIN.) =      5.10
   EFFECTIVE AREA(ACRES) =      0.19  AREA-AVERAGED Fm(INCH/HR)=  0.02
   AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 0.100
   PEAK FLOW RATE(CFS)   =       0.81
 ============================================================================
 ============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

Traffic and Parking Evaluation

for:

Newport Beach Country Club
Clubhouse / Tennis Improvement Project

In the City of Newport Beach

Prepared for:

City of Newport Beach

August, 2009

TRAFFIC AND PARKING EVALUATION
FOR
NEWPORT BEACH COUNTRY CLUB
CLUBHOUSE / TENNIS IMPROVEMENT PROJECT

IN THE CITY OF NEWPORT BEACH

Prepared for:

City of Newport Beach

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August, 200

TRAFFIC AND PARKING EVALUATION
FOR THE
NEWPORT BEACH COUNTRY CLUB
CLUBHOUSE / TENNIS IMPROVEMENT PROJECT
IN THE CITY OF NEWPORT BEACH

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FOR THE
NEWPORT BEACH COUNTRY CLUB
CLUBHOUSE / TENNIS IMPROVEMENT PROJECT
IN THE CITY OF NEWPORT BEACH

INTRODUCTION

This report has been prepared to provide a traffic and parking evaluation for the proposed Newport Beach Country Club Clubhouse and Tennis Improvement Project. Newport Beach Country Club (NBCC) is an existing private golf and tennis club located on East Coast Highway in the City of Newport Beach. The NBCC owner proposes to remodel the facility to remove or reduce the size of some of the site facilities, increase others, and to add residential and resort lodging components. Information for this report has been taken from the Newport Beach Country Club Planned Community District Plan (the PCD Plan), which provides details about the proposed changes to the NBCC site, and provides parking and development standards for the proposed project.

This report will provide a review of the proposed changes to the site uses, site access, and on-site circulation; and will provide an estimate of the change in traffic generation that would result from the proposed site changes. This report will also provide an evaluation of the proposed parking standards and the adequacy of the parking supply.

PROJECT DESCRIPTION

Existing Project

The Newport Beach Country Club is located on the north side of East Coast Highway, between Jamboree Road and Newport Center Drive, in the City of Newport Beach. The site is comprised of private golf club and tennis club facilities, totaling approximately 145 acres.

The golf club portion of the site consists of an 18-hole championship golf course, putting green, golf clubhouse, and golf accessory buildings. The clubhouse contains dining and drinking areas for members, a pro shop, and men's and women's locker rooms. Golf accessory buildings include a golf cart storage barn, a greens-keeper building, restroom facilities, a snack shack, and a starter shack. The tennis club portion of the site consists of a pro shop and lounge, locker rooms, and 24 tennis courts.

The primary access to the Newport Beach Country Club is provided via a drive aisle that connects to the end of Irvine Terrace, which in turn connects to East Coast Highway (State Highway 1). Irvine Terrace also provides access to the adjacent Corporate Plaza West development. The intersection of Irvine Terrace at East Coast Highway is signalized.

The main NBCC drive aisle (labeled Country Club Drive on the site plan) splits in both directions from the end of Irvine Terrace, with the drive aisle to the left leading to the main parking area in front of the golf clubhouse, and the drive aisle to the right leading to the parking for the tennis courts. On the far side of the tennis parking area is a driveway connection to Granville Drive, which provides a direct connection to Newport Center Drive.

Parking for NBCC consists of a large surface parking lot in front of the golf clubhouse building with 420 parking spaces, and a surface lot adjacent to the tennis courts with 125 parking spaces.

Proposed Project

The proposed project involves the remodel or replacement of some of the site facilities, the removal of some facilities, and the construction of a number of new facilities. Upon completion, the site will consist of the 18-hole golf course, 7 tennis courts, 27 rental bungalows, and 5 custom single-family homes. A copy of the proposed project site plan is provided on **Figure 1**. A summary of the existing site uses and the proposed site changes is provided on **Table 1**.

TABLE 1
NEWPORT BEACH COUNTRY CLUB
SUMMARY OF EXISTING AND PROPOSED USES

		Quantity		
Land Use	**Units**	**Existing**	**Proposed**	**Change**
Golf Course	Holes	18	18	0
Tennis Courts	Courts	24	7	-17
Bungalows	Rooms	0	27	27
Villas	Dwelling Units	0	5	5

The site plan indicates that the project entry and circulation through the site will be modified, and the parking areas will be reconfigured. A total of 413 parking spaces will be provided to serve the new site uses.

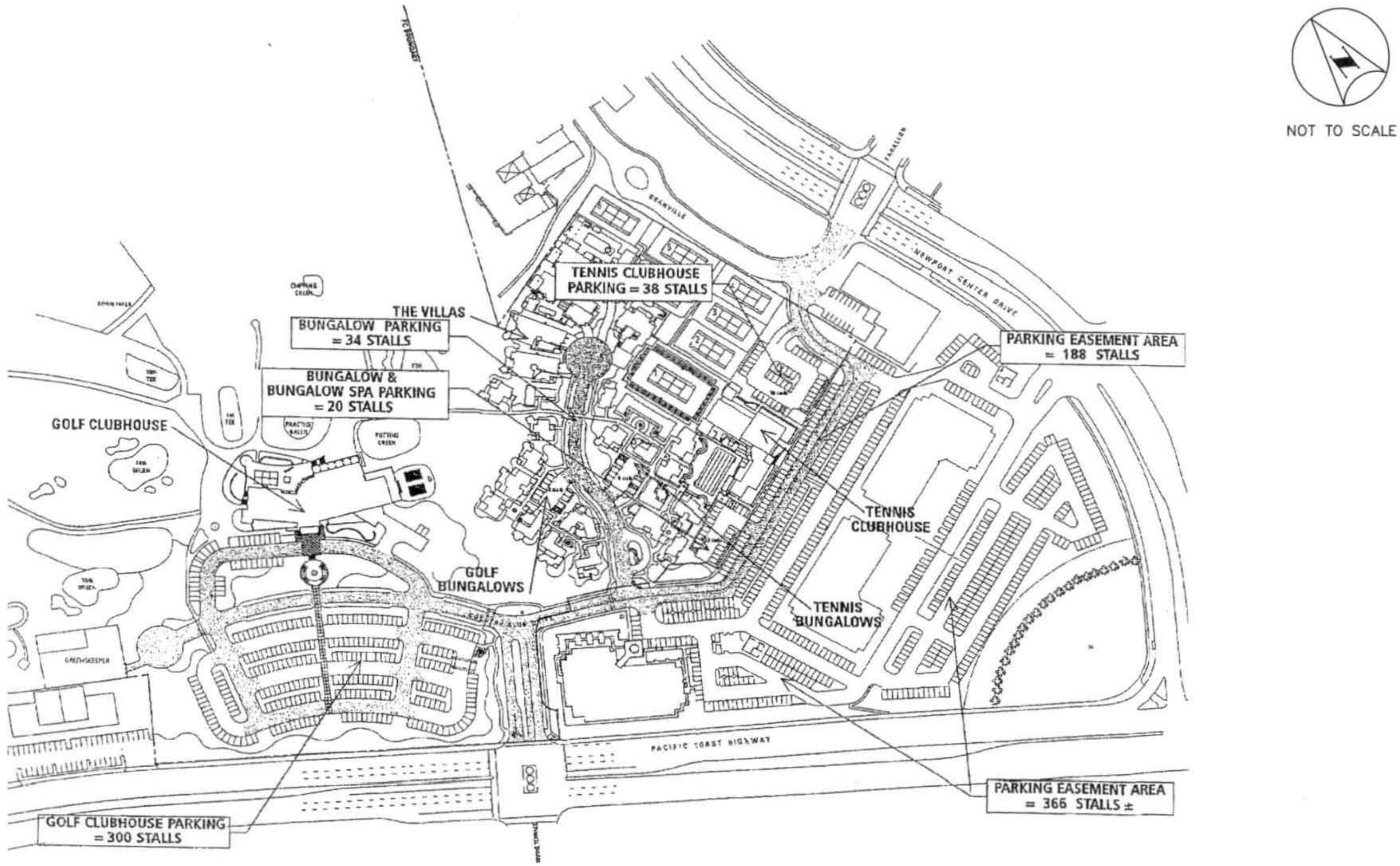

FIGURE 1
PROPOSED SITE PLAN

FILENAME: Aug 13, 2009 – 10:15am K:\ORA_TPTO\ZSAC\Projects\Newport Beach Country Club\NBCC Plan Owner's Plan – O'Hill\2nd Submittal – OHill Owner\CADD\Figures.dwg

Kimley-Horn and Associates, Inc.

PROJECT TRAFFIC

Project Trip Generation

Trip generation estimates for the proposed Newport Beach Country Club project were derived from the Institute of Transportation Engineers (ITE) Trip Generation, (8th Edition) publication. Based on the existing and proposed land uses at the project site, four ITE Land Use Categories were used for this analysis:

- Golf Course (Category 430),
- Racquet / Tennis Club (Category 491),
- Hotel (Category 310), and
- Single-Family Residential (Category 210).

The daily and peak hour trip generation rates used for each category are shown on **Table 2**.

TABLE 2
NEWPORT BEACH COUNTRY CLUB
SUMMARY OF PROJECT TRIP GENERATION

			Trip Generation Rates [1]						
	ITE			AM Peak Hour			PM Peak Hour		
Land Use	**Code**	**Unit**	**Daily**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Golf Course	430	Hole	35.74	1.76	0.47	2.23	1.23	1.51	2.74
Tennis Courts	491	Court	38.70	0.66	0.66	1.32	1.68	1.68	3.36
Hotel	310	Room	8.17	0.34	0.22	0.56	0.31	0.28	0.59
Single-Family Residential	210	DU	9.57	0.19	0.56	0.75	0.640	0.370	1.01

			Trip Generation Estimates						
				AM Peak Hour			PM Peak Hour		
Land Use	**Units**		**Daily**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Existing Uses									
Golf Course	18	Holes	643	32	8	40	22	27	49
Tennis Courts	24	Courts	929	16	16	32	40	40	80
Total Trips - Existing Uses			**1,572**	**48**	**24**	**72**	**62**	**67**	**129**
Proposed Uses									
Golf Course	18	Holes	643	32	8	40	22	27	49
Tennis Courts	7	Courts	271	5	5	10	12	12	24
Hotel (Golf and Tennis Bungalows)	27	Rooms	221	9	6	15	8	8	16
Single-Family Residential (The Villas)	5	DU	48	1	3	4	3	2	5
Total Trips - Proposed Uses			**1,183**	**47**	**22**	**69**	**45**	**49**	**94**
Net New Trips			**-389**	**-1**	**-2**	**-3**	**-17**	**-18**	**-35**

[1] Source: Institute of Transportation Engineers (ITE) Trip Generation publication (8th Edition)

DU = Dwelling Unit

Trip generation for the existing and the proposed project uses are based on the land use quantities for each land use, as shown on Table 2. Trips generated by the existing land uses were calculated and subtracted from the trips that will be generated by the proposed development.

Table 2 shows that with the removal of 17 tennis courts, and the addition of 27 hotel rooms (The Bungalows) and 5 custom homes (The Villas), the proposed Newport Beach Country Club project is estimated to generate 389 fewer trips per day than the existing uses, with 3 fewer trips in the morning peak hour, and 35 fewer trips in the evening peak hour.

Since the proposed Newport Beach Country Club project will generate less daily and peak hour traffic than the existing development on the site, no analysis of the project's traffic impact on the surrounding street system is necessary.

SITE ACCESS AND CIRCULATION

The project site plan reflects proposed on-site changes to the main parking area in front of the Golf Clubhouse, including landscaping and beautification of the area, and minor changes to the site circulation. The site's access to the public street system at East Coast Highway (via Irvine Terrace) and at Granville Drive will remain.

A copy of the proposed improvements on Irvine Terrace is provided on **Figure 2**. Irvine Terrace will be improved to provide a landscaped median, and will be striped to delineate two inbound lanes and two outbound lanes. It is recommended that the left-turn pocket at the intersection of E. Coast Highway be lengthened to provide a minimum of 100 feet plus the transition.

Access to the golf clubhouse will be improved as follows:

- A new drive aisle with a drop-off area will be added to the front of the clubhouse. A second internal entry point to the main parking lot will be added at the northwest corner of the lot. The parking rows in the main body of the parking lot will be reconfigured to an east-west orientation, with access aisles provided on both ends of parking lot. Each of the drive aisles is shown to be 26 feet in width, which provides adequate room for circulation, turning, and backing for 90-degree parking spaces.

- The secondary entrance to the golf course parking lot which is located immediately adjacent to the Irvine Terrace / East Coast Highway intersection, as well as the external drive aisle that runs parallel to East Coast Highway between the parking lot and East Coast Highway, will be eliminated, and the affected area will be incorporated into the parking area.

- Pedestrian access from the golf course parking lot will be improved by a pedestrian walkway with enhanced paving through the center of the parking lot, connecting directly to the golf clubhouse.

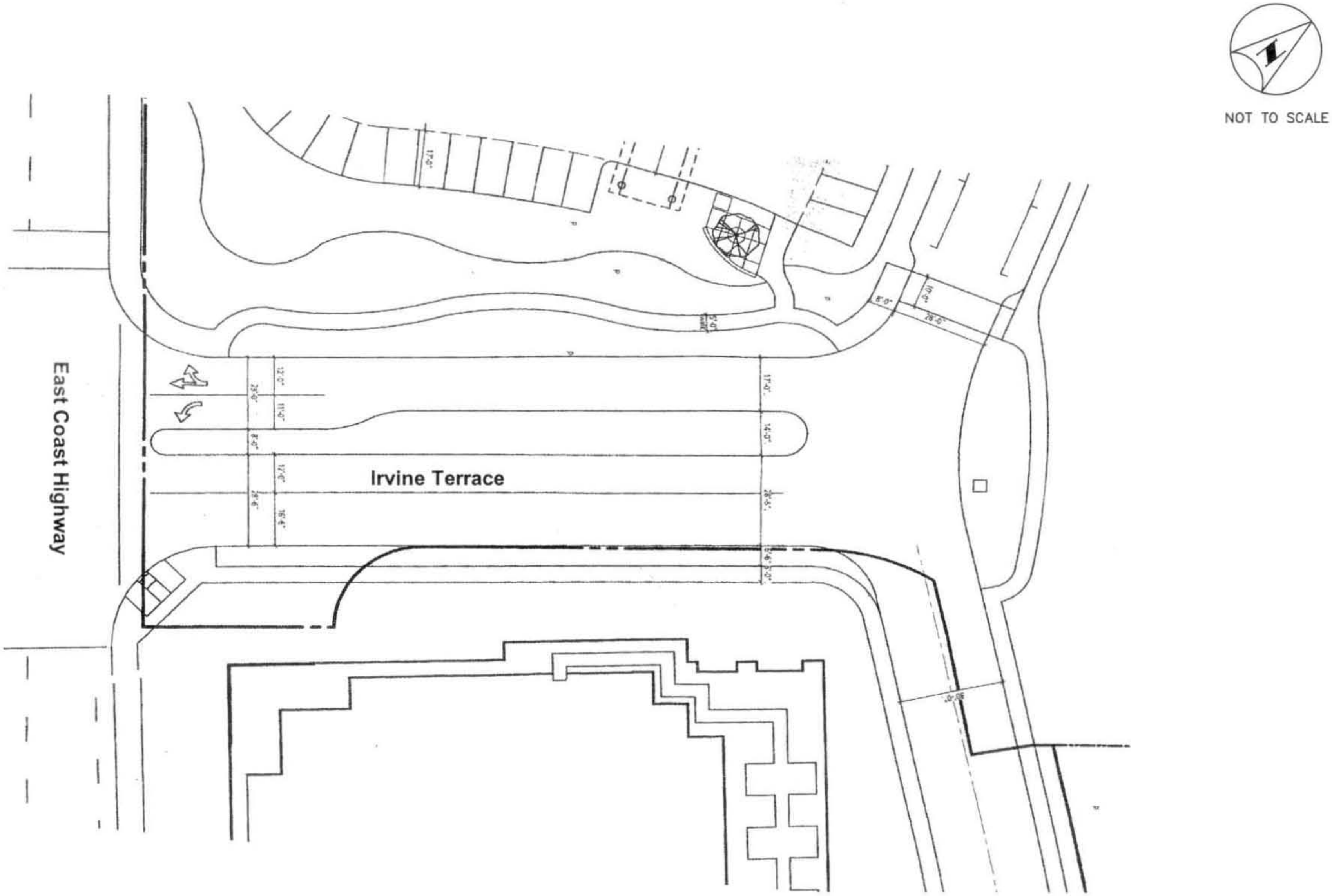

FIGURE 2
PROPOSED CIRCULATION MODIFICATIONS

FILENAME: Aug 13, 2009 - 10:24am K:\ORA_TPTO\ZSAC\Projects\Newport Beach Country Club\NBCC Plan Owner's Plan - O'Hill\2nd Submittal - OHill Owner\CADD\Figures.dwg

Access to the tennis area and new development will be improved as follows:

- The drive aisle leading to the tennis area will be shifted slightly to the south (closer to East Coast Highway) to accommodate the new development.
- A new access road and cul-de-sac will provide access to The Bungalows and to The Villas, which will be constructed on a portion of the area now developed with tennis courts. Parallel parking will be allowed along the road, but not on the cul-de-sac.
- Small parking areas will be added by the tennis courts, tennis clubhouse, and bungalows, to provide convenient access for each of these uses.

SITE PARKING

The development standards in the Newport Beach Country Club Planned Community District Plan (PCD Plan) include parking requirements for each of the proposed site uses. A summary of the parking rates specified in the Planned Community District Plan, compared to the parking code requirements specified in the City of Newport Beach Zoning Code is provided on **Table 3**.

TABLE 3
NEWPORT BEACH COUNTRY CLUB
SUMMARY OF PARKING RATES

	Parking Requirement	
Land Use	**NBCC PCD Plan**	**Newport Beach Zoning Code**
Golf Course	244 total	As specified by the Planning Director
Tennis Club	4 per court	4 per court
Tennis Spa	4 per 1,000 SF	4 per 1,000 SF
Bungalows (Bed & Breakfast)	1 per rental unit	1 per guest room, plus 2
Villas (Single-Family Residence)	2 covered and 2 off-street per home	2 enclosed per unit

As reflected on Table 3, the parking standards proposed in the PCD Plan are generally similar to the City's parking code requirements, with the exception of the parking requirement for the Golf Course. The PCD Plan has established a parking requirement of 244 parking spaces for the Golf Course and the Golf Clubhouse. The City's Zoning Code does not specify a parking rate for golf courses, but rather indicates that the parking requirement for "other commercial recreation uses" will be "As specified by the Planning Director".

Although the PCD Plan does not provide a breakdown of how the 244-space requirement was derived, it appears to be reasonable, based on the following analysis:

The Institute of Transportation Engineers (ITE) Parking Generation publication contains parking rates for golf courses, based on empirical data collected at a number of golf course facilities, including 18-hole golf courses. The ITE data indicates that the parking demand for an 18-hole golf course ranged from 8.33 to 10.33 parking spaces per hole. The average of each of the peak parking demands for all golf courses studied was 8.68 spaces per hole. If the highest parking rate of 10.33 spaces per hole is applied, the parking requirement for the NBCC golf course would be 186 spaces (18 holes x 10.33 spaces per hole = 185.9 spaces).

Assuming a worst-case condition during golf course operations, 4 of the 10.33 spaces per hole would account for a foursome on every hole, if every golfer drove their own vehicle to the golf course. This would leave 6.33 spaces per hole for other people waiting for their tee time, plus people on the driving range, at the putting green, in the lounge, or in the restaurant.

The parking requirement of 244 parking spaces suggested by the PCD Plan would provide an additional 58 spaces for parking demand that might occur above and beyond the 10.33 per hole (244 spaces required by the PCD Plan – 186 spaces required using ITE maximum rates = 58 additional spaces). A parking requirement of 244 spaces appears reasonable for the NBCC Golf Course and Clubhouse. The project site plan (Figure 1, previously presented) indicates that a total of 300 parking spaces are proposed for the golf course parking lot.

The parking required for all of the uses proposed for the NBCC project is summarized on **Table 4**. Based on the parking requirements established by the PCD Plan, the proposed site uses would require 341 parking spaces.

TABLE 4
NEWPORT BEACH COUNTRY CLUB
SUMMARY OF PARKING REQUIRED AND PROVIDED

Land Use	Quantity	Unit	Parking Rate [1]	Parking Required	Parking Provided	Surplus (Deficit)
Golf Course	18	Hole	NA	244	300	56
Tennis Club	7	Court	4	28	58	8
Tennis Spa	5.56	KSF	4	22		
Bungalows	27	Room	1	27	34	7
Villas	5	DU	4	20	21	1
Total				**341**	**413**	**72**

[1] Source: Newport Beach Country Club Planned Community District Plan Development Standards

The project site plan indicates that a total of 413 parking spaces will be provided, resulting in a parking supply that exceeds the parking requirement by 72 spaces. Moreover, the parking supply provided specifically for each individual use exceeds the parking required for that use. Most notably, the golf course parking lot will provide 300 spaces, which exceeds the 244-space requirement established by the PCD Plan by 56 spaces.

The proposed parking supply of 413 spaces will be adequate to meet the day-to-day parking needs of the proposed NBCC project.

In addition to the on-site parking supply, the site plan indicates that the NBCC has a parking easement with the adjacent Corporate Plaza West development. A parking analysis prepared for the NBCC project (Newport Beach Country Club Parking Supply Analysis, LSA, August 20, 2008) indicates that through this parking easement, an additional 554 parking spaces would be available to the NBCC in the evenings and on weekends and holidays, if needed for parking overflow during tennis and golf events. The parking analysis also indicates that in the event that a large gathering occurs during weekday business hours, which would cause the parking demand to exceed the parking supply on a typical weekday, a separate Parking Management Plan would be required to address off-site parking needs.

NOISE IMPACT ANALYSIS

NEWPORT BEACH COUNTRY CLUB PROJECT

CITY OF NEWPORT BEACH, CALIFORNIA

Prepared for:

Keeton Kreitzer Consulting
Attn: Keeton Kreitzer
17291 Irvine Blvd., Ste 305
Tustin, California 92780

Date:

July 23, 2009

Project No.: P09-026 N

NOISE SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally considered to be unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level.

The decibel (dB) scale is used to quantify sound pressure levels. Although decibels are most commonly associated with sound, "dB" is a generic descriptor that is equal to ten times the logarithmic ratio of any physical parameter versus some reference quantity. For sound, the reference level is the faintest sound detectable by a young person with good auditory acuity.

Since the human ear is not equally sensitive to all sound frequencies within the entire auditory spectrum, human response is factored into sound descriptions by weighting sounds within the range of maximum human sensitivity more heavily in a process called “A-weighting,” written as dB(A). Any further reference in this discussion to decibels written as "dB" should be understood to be A-weighted.

Time variations in noise exposure are typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called LEQ), or alternately, as a statistical description of the sound pressure level that is exceeded over some fraction of a given observation period. Finally, because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Ldn (day-night) or the Community Noise Equivalent Level (CNEL). The CNEL metric has gradually replaced the Ldn factor, but the two descriptors are essentially identical.

CNEL-based standards are generally applied to transportation-related sources because local jurisdictions are pre-empted from exercising direct noise control over vehicles on public streets, aircraft, trains, etc. The City of Newport Beach therefore regulates the traffic noise exposure of the receiving property through land use controls.

Noise/land use compatibility standards for various classes of land uses are generally expressed in the Noise Element of the General Plan to insure that noise exposure is considered in any development decisions. The City of Newport Beach has guidelines for noise exposure standards which are shown in Table 1. For proposed residential uses at the project site, the City recommends an interior noise exposure of 55 dB CNEL with open windows and 45 dB CNEL with closed windows. The City recommends an exterior residential noise exposure of 65 dB CNEL.

For “stationary” noise sources, the City has legal authority to establish noise performance standards designed to not adversely impact adjoining residential uses. These standards are typically articulated in the jurisdictional Municipal Code. These standards recognize the varying noise sensitivity of both transmitting and receiving land uses. The property line noise performance standards are normally structured according to land use and time-of-day.

Table 1

City of Newport Beach Interior and Exterior Noise Standards

Land Use Category	Uses	Energy Average CNEL	
		Interior[a]	Exterior[b]
RESIDENTIAL	Single Family, Two-Family, Multiple Family	45[c] 55[d]	65
	Mobile Home	-	65[e]
Commercial, Industrial, Institutional	Hotel, Motel, Transient Lodging	45	65[f]
	Commercial Retail, Bank Restaurant	55	-
	Office Building, Research and Development, Professional Offices, City Office Building	50	-
	Amphitheatre, Concert Hall Auditorium, Meeting Hall	45	-
	Gymnasium (Multipurpose)	50	-
	Sports Club	55	-
	Manufacturing, Warehousing, Wholesale, Utilities	65	-
	Movie Theatres	45	-
INSTITUTIONAL	Hospital, Schools' Classroom	45	65
	Church, Library	45	-
Open Space	Parks	-	65

[a]Indoor environment excluding: Bathrooms, toilets, closets, corridors.

[b]Outdoor environment limited to:

- Private yard of single family
- Multi-family private patio or balcony which is served by a means of exit from inside
- Mobile home park
- Hospital patio
- Park's picnic area
- School's playground
- Hotel and motel recreation area

[c]Noise level requirement with closed windows. Mechanical ventilating system or other means of natural ventilation shall be provided as of Chapter 12, Section 1205 of UBC.

[d]Noise level requirement with open windows, if they are used to meet natural ventilation requirement.

[e]Exterior noise level should be such that interior noise level will not exceed 45 CNEL.

[f]Except those areas around the airport within the 65 CNEL contour.

City of Newport Beach Noise Standards

The Newport Beach Municipal Code (section 10.26.025 Exterior Noise Standards) limits the noise level generated on a property that may cross to a neighboring residential property. The City's noise ordinance limits are stated in terms of a 15-minute limit with allowable deviations from this 50th percentile standard. This noise level describes the noise level that is exceeded during a certain percentage of the measurement period. For example, the L_{25} is the level exceeded 25% of the measurement period or thirty minutes in an hour. The larger the deviation, the shorter the allowed duration up to a never-to-exceed 20 dB increase above the 25th percentile standard.

Ordinance limits generally apply to "stationary" sources such as mechanical equipment, or vehicles operating on private property. Noise from the proposed Newport Beach Country Club site must meet the City of Newport Beach Residential Noise Standards at the nearest residential property line, as shown in Table 2. The applicable requirement is a function of the time of day with an L_{25} daytime standard of 55 dB and L_{25} nighttime of 50 dB.

The City's Noise Ordinance (section 10.28.040 Construction Activity-Noise Regulations) exempts noise generated by construction activities from the Noise Ordinance standards if construction is restricted to the hours of 7 a.m. and 6:30 p.m. on weekdays and 8 a.m. and 6 p.m. on Saturdays. Construction is not permitted on any national holiday or on any Sunday.

The Newport Beach Noise Ordinance also provides limitations on the installation of new HVAC equipment as follows:

- New permits for heating, venting and air conditioning (HVAC) equipment in or adjacent to residential areas shall be issued only where installations can be shown by computation, based on the sound rating of the proposed equipment, not to exceed an A-weighted sound pressure level of fifty (50) dBA or not to exceed an A-weighted sound pressure level of fifty-five (55) dBA and be installed with a timing device that will deactivate the equipment during the hours of ten p.m. to seven a.m.

Table 2

NEWPORT BEACH NOISE STANDARDS

Noise Zone	Type of Land Use	Allowable Exterior Noise Level (Equivalent Noise Level, Leq) 7 a.m. to 10 p.m.	Allowable Exterior Noise Level (Equivalent Noise Level, Leq) 10 p.m. to 7 a.m.
I	Single-, two-or multiple-family residential	55 dBA	50 dBA
II	Commercial	65 dBA	60 dBA
III	Residential portions of mixed-use properties	60 dBA	50 dBA
IV	Industrial or manufacturing	70 dBA	70 dBA

It is unlawful for any person at any location within the incorporated area of the City to create any noise, or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level when measured on any other property, to exceed either of the following:

1. The noise standard for the applicable zone for any fifteen-minute period;

2. A maximum instantaneous noise level equal to the value of the noise standard plus twenty (20) dBA for any period of time (measured using A-weighted slow response).

Notes:

- In the event the ambient noise level exceeds the noise standard, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.
- The Noise Zone III standard shall apply to that portion of residential property falling within one hundred (100) feet of a commercial property, if the intruding noise originates from that commercial property.
- If the measurement location is on boundary between two different noise zones, the lower noise level standard applicable to the noise zone shall apply. (Ord. 95-53 § 1, 1995; Ord. 95-38 § 11 (part), 1995)

BASELINE NOISE LEVELS

Existing noise levels on the proposed project site derive mainly from vehicular sources on the adjacent arterial roadways. The proposed project site is currently a functioning Tennis and Golf Country Club. The surrounding area is developed with residential uses to the northeast and southwest. The site is bound by Newport Center Drive to the east, Pacific Coast Highway to the south and Santa Barbara Drive to the north.

Noise measurements were made in order to document existing baseline levels in the area. These help to serve as a basis for projecting noise exposure from ambient noise activity upon the proposed project as well as noise from the project upon the surrounding community. Noise measurements were conducted in June 18th through 19th, 2009, for 24-hours at two on-site locations. The location and resultant CNEL for each of the monitors is shown in Figure 2. The meters were placed in the vicinity of the proposed bungalow residences to determine the existing noise level. The detailed results of the measurements including the hourly Leqs for each monitoring location are provided in Table 3.

As seen in Table 3, on-site CNELs in the vicinity of the future on-site residential uses are in the 55-60 dB range. Such levels are well within Newport Beach residential noise standards of 65 dB CNEL. There are no existing ambient noise constraints to residential project development as proposed.

Figure 1

Noise Monitor Locations

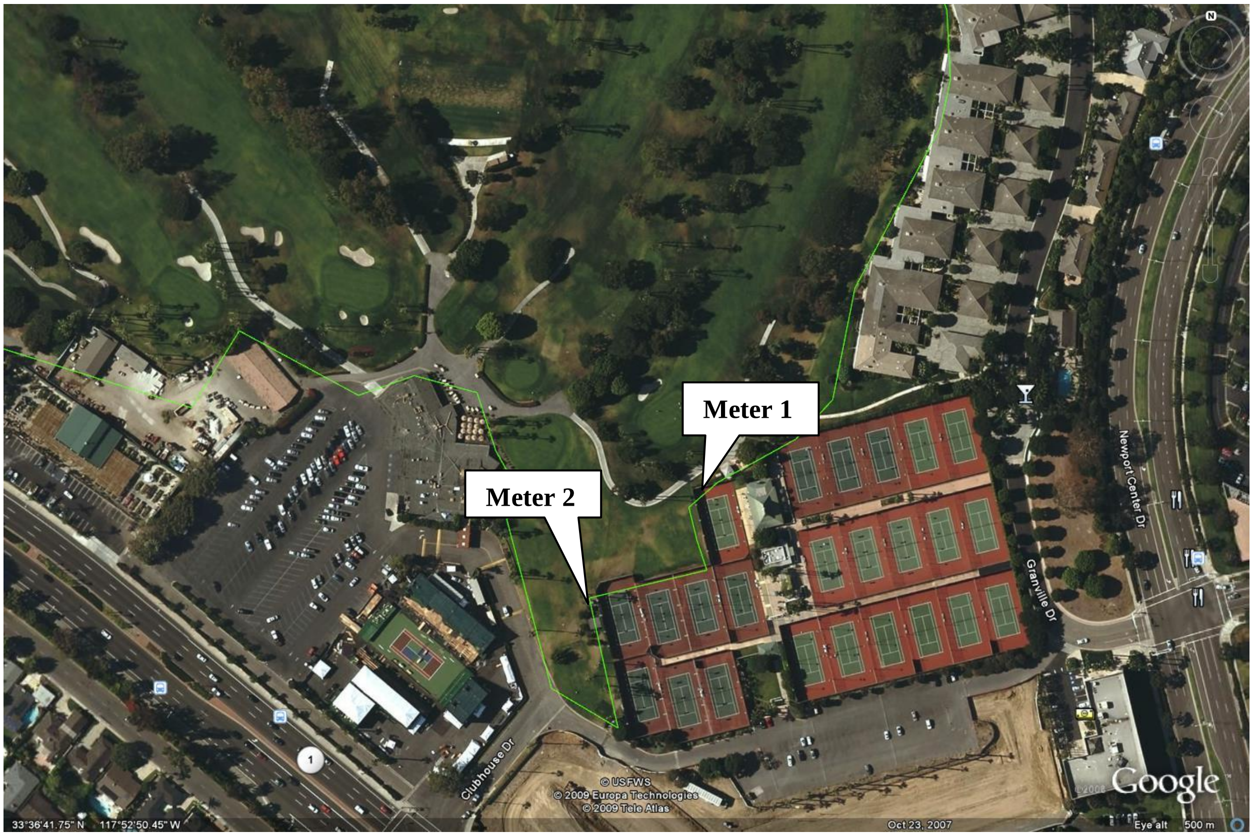

Table 3
NBCC
Existing On-Site Hourly Leq's and CNEL

Time Interval	Site 1	Site 2
17:00-18:00	53.8	55.2
18:00-19:00	53.9	55.2
19:00-20:00	53.0	49.0
20:00-21:00	52.1	51.9
21:00-22:00	51.3	56.8
22:00-23:00	47.6	59.2
23:00-24:00	45.2	52.1
0:00-1:00	41.4	45.5
1:00-2:00	37.6	41.1
2:00-3:00	41.4	43.2
3:00-4:00	39.0	42.5
4:00-5:00	37.2	50.4
5:00-6:00	42.0	49.8
6:00-7:00	47.1	50.0
7:00-8:00	52.5	54.6
8:00-9:00	55.9	56.8
9:00-10:00	57.5	56.7
10:00-11:00	54.0	56.3
11:00-12:00	55.0	56.9
12:00-13:00	55.4	55.9
13:00-14:00	56.5	57.5
14:00-15:00	56.2	57.1
15:00-16:00	56.2	57.2
16:00-17:00	55.3	58.4

Noise levels are "penalized" by +5 dB in the evening from 7 p.m. to 10 p.m., and by +10 dB at night from 10 p.m. to 7 a.m. in the CNEL calculations (a weighted average)**.**

Resultant CNEL

Measurement Parameter	Site 1	Site 2
24-Hour CNEL	55.1	59.5

NOISE IMPACTS

NOISE SIGNIFICANCE CRITERIA

Noise impacts are considered significant if they result in:

a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

SOURCES OF IMPACT

There are several characteristic noise sources are typically identified with general development such as proposed at the Newport Beach Country Club. Construction activities, especially heavy equipment, will create short-term noise increases near the project sites. Vehicular traffic volumes on area roadways around the proposed project will slightly decrease as a result of conversion of 17 tennis courts to less traffic-intrusive residential use. This will result in a very small area-wide traffic noise reduction. However, vehicular noise impacts on proposed on-site residential uses were examined.

Project activities will entail outdoor activities and limited indoor activities. Outdoor recreational activities at the Country Club are generally very low key (tennis and golf) and represent a continuation of existing activities. No impact analysis was therefore conducted for outdoor recreation. The primary noise sources for off-site uses that would be of possible concern would be any changes in the parking lot activity noise. Additionally, any new HVAC equipment installed on the project site would be required to meet noise standards as outlined in the City of Newport Beach Municipal Code.

CONSTRUCTION NOISE IMPACTS

Temporary construction noise impacts will vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used and its activity level. Short-term construction noise impacts tend to occur in discrete phases dominated initially by demolition of existing structures and large earth-moving sources, then by foundation and parking lot construction, and finally for finish construction. The demolition and earth-moving sources are the noisiest, with equipment noise typically ranging from 75 to 90 dBA at 50 feet from the source.

Figure 2 shows the range of noise emissions for various pieces of construction equipment. Point sources of noise emissions are typically attenuated by a factor of 6 dB per doubling of distance through geometrical (spherical) spreading of sound waves. The quieter noise sources will drop to a 65 dBA exterior/45 dBA interior noise level by about 200 feet from the source. For typical construction scenario, the louder noise sources may require over 1,000 feet from the source to reduce the 90+ dBA source strength to a generally acceptable 65 dBA exterior exposure level.

There are two proposed grading alternatives for the Newport Beach Country Club Project construction. Alternative 1 involves importation of 13,000 cubic yards of earth. At a 12 cubic yards per truck capacity, this would necessitate 1,083 round trips (a full truck in and an empty truck out), or 2,166 one way trips (1,083 x 2). Grading is assumed to take place over a six week period. A longer schedule would result in lesser impacts (fewer truck trips per day) but would require longer to complete. Utilizing a six week time frame, there would be 72 truck trips per day associated with dirt haul. The noise level from 72 truck passages per day at 45 mph is 55 dB CNEL at 50 feet from the roadway centerline. Though it is unlikely that all the trucks will travel the same route, as a worst case analysis this was assumed. This noise signature was overlaid on the existing traffic noise on area roadways as shown below. Traffic volumes were provided by the City of Newport Beach traffic engineering department.

Roadway	**Existing ADT (vehicle count)**	**Existing Noise at 50 feet from centerline**	**Noise from Earthworks Trucks**	**Noise Increase from Trucks**
MacArthur S of San Miguel	33,027	73.0 dB CNEL	55 dB CNEL	0.1 dB CNEL
PCH -Jamboree to Newport Center Dr.	35,660	73.4 dB CNEL	55 dB CNEL	0.1 dB CNEL
Jamboree S of Santa Barbara	30,629	72.7 dB CNEL	55 dB CNEL	0.1 dB CNEL
Newport Center Dr. S of Anacapa	10,791	68.2 dB CNEL	55 dB CNEL	0.2 dB CNEL

In reality, trucks will likely utilize several routes and thereby dilute the maximum noise impacts shown above. However, even if all trucks were to utilize the same route the maximum noise impact associated with truck haul from grading activities is much less than significant.

Figure 3

Typical Construction Equipment Noise Generation Levels

Alternative 2 for grading involves a recycling the 14,583 cubic yards of removed hardscape to implement the proposed project. This hardscape would be removed and then crushed on-site to be utilized as fill material rather than require importation of fill dirt. Analysis of this scenario involves quantifying noise from crushing equipment that would operate on site.

Rock crusher noise depends upon the type of material processed. Hard rock with large individual pieces is noisier than recycled asphalt. Asphalt is very soft material with the bulk of the noise coming from the screens and not the crusher. Noise impacts from the crushing operations that would occur within the project site are associated with the processing of broken asphalt with some concrete rubble as the bulk of the material processed by the on-site crusher. The debris crushed on-site is considered a "soft" material.

Sound decays at a rate of 6 dB per doubling of source-receiver distance for propagation across a smooth, hard surface. The drop-off rate across irregular, vegetated surfaces is somewhat faster. If there are obstructions to the direct line-of-sight, the drop-off rate is much faster. Placement of a large barrier along the line-of-sight can reduce levels by 15-20 dB from their unimpeded transmission. Audibility will also depend upon background conditions. The closest off-site residence to possible crusher operations is approximately 500 feet.

The noise impact form the crusher therefore depends on a very large number of variables:

- Type of material crushed
- Character of the underlying surface
- Source receiver distance
- Presence of any physical obstructions
- Masking effects of background levels

The noise envelope for a prototype crusher as a function of various variables is as follows (dBA):

Source Receiver Distance (feet)	**Soft rock Soft[1] Surface**
50	85
100	78
200	70
400	63
500	60
800	57

[1]Unpaved, vegetated and irregular surface.

The Noise Code identifies a desirable L_{25} noise exposure of 55 dB and L_{25} nighttime of 50 dB. Under direct line of sight conditions, crusher noise could slightly exceed the City's noise standard at the closest residences. Interruption of the line of sight would reduce noise levels by 10 dB or more and would readily meet the noise ordinance. Use of a stockpile of rubble, or a temporary sound blanket as a barrier between the crusher and the closest home(s), is required if the on-site recycling is selected

According to the City of Newport Beach Municipal Code, permissible hours of construction are 7 a.m. and 6:30 p.m. on weekdays and 8 a.m. and 6 p.m. on Saturdays. Construction is not permitted on any national holiday or on any Sunday. This exclusion from numerical standards ordinance compliance is presumed applicable to any mobile construction equipment, but not to a possible rock crusher. These hours are included as conditions on any project construction permits and these limits will serve to minimize any adverse construction noise impact potential.

ON-SITE NOISE EXPOSURE

The proposed project includes a residential component. These villas and bungalows will be exposed to traffic along surrounding roadways. The projects residential component lies approximately 2,900 feet from the Jamboree Road centerline and 2,700 feet from the MacArthur Blvd. centerline. There are numerous intervening buildings separating the site from these roadways. Given the setback distance and noise attenuation provided by existing building structures, noise from these roadways was not considered to provide a significant impact upon the proposed project residential uses. Pacific Coast Highway (PCH) is approximately 450 feet from the closest proposed on-site residential use and as such provides the largest potential traffic noise impact. Although other roadways will add to the project noise exposure level, they will not dominate the noise environment.

As discussed, noise meters placed in the approximate location of the proposed on-site residential units demonstrated existing CNELs of 55 dB CNEL in the center of the proposed residential area and 60 dB CNEL at the approximate location of the closest residential unit. Existing office and Country Club buildings assist in shielding the proposed residential area from traffic noise from PCH.

As discussed earlier in this report, in year 2009, the section of PCH closest to the project site (between Jamboree Road and Newport Center Drive) had a traffic count of 35,660 vehicles per day equating to a noise level of 73.5 dB CNEL at 50 feet from the centerline. At 450 from the centerline, at the approximate location of the closest proposed on-site residence, this noise level decays to 59 dB CNEL due to distance spreading losses utilizing soft-site conditions. Several intervening buildings afford a partial shielding accounting for approximately -3 dB CNEL. The predicted on-site CNEL is approximately 56 dB. The measured CNEL's were 55 and 59 dB. CNELs, as calculated from both modeling and measurements are similar.

Newport Beach Traffic Engineering estimates a 1% growth rate per year for traffic along PCH. Assuming area build-out occurs in 2020, there would be almost 40,000 vehicles along PCH each day, a +0.4 dB increase over existing. Therefore the future noise level for proposed on-site residential uses would be indistinguishable from existing CNEL levels in the upper 50 dB range.

This noise level is well below the City of Newport Beach recommended exterior compatibility noise level of 65 dB CNEL for residential uses. Typical exterior to interior noise attenuation with open windows is at least -10 dB CNEL, and in modern construction, 20-30 dB CNEL with closed windows. This translates into interior levels of less than 51 dB CNEL with open windows and less than 41 dB CNEL with closed windows. Interior levels will readily meet the 45 dB CNEL standard for habitable rooms. There is no siting conflict for planned residential uses within the project site.

ON-SITE NOISE GENERATION

Parking Lot Activity

The project's primarily parking lot will remain along PCH and will accommodate 300 cars. Smaller lots are scattered in the tennis court area and accommodate 20-38 cars each. Total parking capacity for the NBCC is approximately 545 vehicles. On-site proposed parking will accommodate 413 vehicles with a parking easement with the adjacent Corporate Plaza West development. Parking lot activities are sporadic but with a morning and evening peak hour volume. Existing peak hour traffic volume is 129 vehicles per hour. Proposed peak hour traffic volume will be 94 vehicles per hour. Noise emanating from vehicles entering and exiting the proposed project site improvements will be less than from existing site operations and will be spread over several areas. Parking lot noise is not anticipated to be a noise nuisance.

Center Activity Noise Generation

The uses planned for the NBCC are a continuation of existing uses and do not represent any new noise source and as such is not anticipated to generate noise that will affect off-site uses.

SUMMARY

Short-term construction noise intrusion and vibration impacts will be limited by conditions on construction permits requiring compliance with the City of Newport Beach Noise Ordinance. The allowed hours of construction are 7 a.m. and 6:30 p.m. on weekdays and 8 a.m. and 6 p.m. on Saturdays. Construction is not permitted on any national holiday or on any Sunday. In addition the following construction practices are recommended:

- Stockpiling and staging activities must be located as far as practicable from dwellings.
- All mobile equipment shall have properly operating and maintained mufflers.

Noise levels at the proposed on-site residential uses will be within the City of Newport Beach recommended exterior compatibility threshold of 65 dB CNEL and interior noise thresholds, even at area build-out.

Maximum on-site traffic and parking during peak hour will represent a decrease over existing levels and are therefore less-than-significant.

On-site crushing of demolition debris to be used for fill could cause the City of Newport Beach noise ordinance to be exceeded by several decibels at the closest off-site homes. A temporary barrier using a pile of accumulated demolition debris or a sound blanket must be used if a direct line of sight exists between the crusher and any off-site homes.

Any HVAC equipment at the NBCC must meet the following noise standard at the nearest off-site sensitive use:

- (HVAC) equipment in or adjacent to residential areas shall be shown by computation, based on the sound rating of the proposed equipment, not to exceed an A-weighted sound pressure level of fifty (50) dBA or not to exceed an A-weighted sound pressure level of fifty-five (55) dBA and be installed with a timing device that will deactivate the equipment during the hours of ten p.m. to seven a.m.

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PLANNING DEPARTMENT

AUG 22 2008

CITY OF NEWPORT BEACH

August 20, 2008

Mr. Robert O Hill
Golf Realty Fund
One Upper Newport Plaza
Newport Beach, CA 92660

Subject: Newport Beach Country Club Parking Supply Analysis

Dear Mr. O Hill:

LSA Associates, Inc. (LSA) is pleased to provide this analysis of the parking supply for The Bungalows, The Villas, Tennis Club, and Golf Course/Clubhouse proposed as part of the Newport Beach Country Club (NBCC) Master Plan. This analysis has been prepared using project description information provided by Golf Realty Fund, site plans prepared by Stearns Architecture, and parking rates from the City of Newport Beach (City) Zoning Code and the Institute of Transportation Engineers (ITE) *Parking Generation*, 3rd Edition.

The project evaluated herein includes a boutique hotel with a total of 27 rental bungalows (one- and two-bedroom), including a pool and spa; five for-sale Villas (two- and four-bedroom); renovations to the existing Tennis Club to include seven tennis courts, a new Tennis Clubhouse, and fitness area; and an expanded Golf Clubhouse. The site plan is shown in Figure 1 (attached). The overall parking demand and supply is shown in Table A (attached). Each component of the project, along with the anticipated parking demand and supply, is described below.

The Bungalows

A total of 27 bungalows are proposed on the east side of the NBCC in the area near the existing Tennis Club. The Bungalows will be a high-end boutique hotel and will cater to guests of members, families, corporate guests, and couples. Twenty-two of The Bungalows will be one bedroom, while the remaining five will be two bedrooms. The Bungalows will include a pool for use by bungalow guests only. Adjacent to the pool and attached to the Tennis Clubhouse will be a spa. The spa will primarily be an amenity for guests of The Bungalows; however, members of the Tennis Club will also be able to schedule spa treatments when the spa is not being utilized by bungalow guests. A 20-space parking lot is adjacent to the spa to accommodate the demand for its use; however, it is anticipated that most of the patrons will walk from the bungalow units.

The parking requirement for The Bungalows was determined using the parking requirement for bed and breakfast inns from the Newport Beach Zoning Code, which requires one space per guest room plus two spaces. Review of the ITE Parking Generation Manual shows that parking demand rates for hotels and motels range from 0.64 to 1.1 spaces per room, less than that required by the City's bed and breakfast parking rate. Using ITE parking demand rates for hotels or motels, the parking requirement for The Bungalows would be between 17.2 and 29.7 parking spaces. As a result, the bed and breakfast rate provides a conservative estimate of parking demand for The Bungalows.

Many of the two-bedroom bungalows may be occupied by a family or group traveling together and therefore would not typically require two parking spaces. However, the additional parking supply could be utilized by visitors and maintenance and housekeeping personnel. In addition, because the spa and pool are amenities for The Bungalow hotel guests, no additional parking would be required, as The Bungalow guests will already be parked in the spaces provided for those uses.

Application of the bed and breakfast rate to the 27 Bungalows would result in a parking requirement of 34 parking spaces. Based on review of the project site plan, a total of 54 parking spaces (22 one-bedroom units at one space per unit, plus 5 two-bedroom units at two spaces per unit, plus 20 spaces adjacent to the spa, plus two additional spaces) will be provided adjacent to The Bungalows and along the roadway providing access to The Bungalows. As a result, adequate parking will be provided for bungalow residents and visitors, with a surplus of 20 spaces.

The Villas

Five Villas are proposed adjacent to The Bungalows. The Villas are intended to be single-family vacation homes. Plans A and B would have two bedrooms, Plan E would have three bedrooms, and Plans C and D would have three bedrooms plus a one-bedroom guesthouse. Plans A and B will have a two-car garage plus one guest parking space located in the driveway. In addition, Plan B will have a small garage that could be used for a golf cart or other small vehicle. Plan E will have a two-car garage and a two-car auto court for guest parking. Plans C and D will have a three-car garage and a three-car auto court, plus a small garage for a golf cart or other small vehicle. The Newport Beach Zoning Code requires two parking spaces per single-family residential unit. The Villas would provide at least two garage parking spaces per unit and would therefore meet the City's Code requirement. Additional parking for visitors or housekeeping and maintenance personnel could be accommodated in the auto courts.

The Tennis Club

The Tennis Club will include seven courts, including one stadium court. A 3,544-square-foot (sf) tennis clubhouse will be constructed for the use of tennis club members. The Tennis Clubhouse will provide amenities such as changing rooms/lockers, restrooms, and a pro shop.

A fitness area will be provided adjacent and connected to the Tennis Clubhouse. The fitness area is primarily for use by members and guests of The Bungalows, but may also be used by members of the Tennis Club, and will not be available for use by the general public.

The Newport Beach Zoning Code requires parking to be provided at a rate of four parking spaces per court for tennis clubs. This is more conservative than the average peak parking demand rate of 3.56 vehicles per court in the ITE Parking Generation Manual. It should be noted that a tennis club, as defined by the ITE, includes ancillary facilities, such as swimming pools, whirlpools, saunas, weight rooms, snack bars, and retail stores. As a result, the rate of four parking spaces per court would include parking for the amenities such as the lockers and pro shop. Because the fitness area is an amenity for The Bungalow hotel guests and the Tennis Club members only, no additional parking would be required, as The Bungalow guests and the Tennis Club members will already be parked in the spaces provided for this use. Based on City Code, 28 parking spaces would be required for the Tennis Club. Per the project site plan, a total of 38 spaces will be provided, resulting in a surplus of 10 spaces.

In addition to the parking surplus, the Tennis Club land has a parking easement with the adjacent Corporate Plaza West office buildings to use the office parking on evenings, weekends, and holidays. This provides an additional 554 parking spaces, 188 of which are adjacent to the project, and would fulfill any overflow parking needs during charitable Tennis Tournaments (i.e. Hoag's Team Tennis, The Adoption Guild, and Top Gun) for evenings, weekends, and holidays.

The Golf Clubhouse

Newport Beach Country Club includes an existing championship 18-hole Golf Course and proposed new Golf Clubhouse (approximately 40,000 sf). The project will redesign the current parking and circulation adjacent to the course and construct a larger Clubhouse facility for its members and guests. The Clubhouse will include a grille, locker rooms, a pro shop, a 19th Hole bar, and meeting rooms. These amenities are only available for use by Golf Course patrons. The Newport Beach Zoning Code does not provide a specific parking rate for golf courses. Per discussions with City staff, parking rates for golf facilities are at the discretion of the City Planning Director and vary by location. Therefore, LSA utilized the parking rates in the ITE Parking Generation Manual to derive the required number of parking spaces needed for the Golf Course, or 8.68 vehicles per hole. Based on this, 157 parking spaces would be required for the Golf Course. This is a conservative rate, as four players per hole would result in 72 players. If each player drove to the course, it would result in 72 spaces for a typical day. "Shotgun" golf tournaments at NBCC typically have 128 players, which would also be accommodated in the new parking lot. The residual spaces would be used by employees.

Preliminary plans for the project also include a 3,034 sf dining room and a 2,567 sf banquet room to be located within the Clubhouse. These amenities may be available for residents of The Villas, The Bungalows, and members of the Tennis Club. The dining and banquet rooms may be available on a very limited basis for private events sponsored by a golf member. Parking rates for restaurants are at the discretion of the City Planning Director and vary by type and nature of the facility. According to the Newport Beach Zoning Code, restaurants have a parking rate between 1 per 30 sf and 1 per 50 sf for full-service restaurants, and 1 per 75 sf for full-service, small-scale restaurants. LSA utilized the one per 50 sf because it fell between the highest and lowest parking rates listed in the City Code. In addition, review of the ITE Parking Generation Manual shows that parking demand rates for a quality restaurant are 15.4 spaces per 1,000 sf, or 1 space per 65 sf. As a result, the parking rate of 1 space per 50 sf provides a more conservative estimate of parking demand for the dining and banquet rooms than that of the nationwide average. Based on this rate, 113 parking spaces would be required for the dining (61 spaces) and banquet (52 spaces) rooms for a typical day. The total maximum required parking for the Golf Course/Clubhouse, including the dining and banquet rooms, is 270 parking spaces. Per the project site plan, a total of 300 spaces will be provided for the Golf Course/Clubhouse as well as the dining and banquet rooms, resulting in a surplus of 30 spaces.

Conclusion

As discussed in the analysis and shown in Table A, 54 spaces will be provided for The Bungalows, with 22 spaces for The Villas, 38 spaces for the Tennis Club, and 300 spaces for the Golf Course and Golf Clubhouse, totaling 414 spaces. Based on the analysis of each use discussed above, 344 parking spaces will be required. The project would provide 70 surplus spaces on site on a typical day.

In addition to the on-site surplus, NBCC has a parking easement with the adjacent Corporate Plaza West office buildings to use the office parking on evenings, weekends, and holidays. This easement would provide an additional 554 parking spaces, 188 of which are adjacent to the Tennis Club. While it is not anticipated that these additional spaces would be required on a regular basis, the additional parking is available for use during large events at the Golf Course or Tennis Club. In the event that a large gathering occurs during weekday business hours, which would cause the parking supply to be exceeded on a typical weekday, or during the weekend (i.e., the Toshiba Classic Golf Tournament), a separate Parking Management Plan will be required to address off-site parking needs.

LSA trusts this information will be useful in your planning efforts. If you have any questions, please call me at (949) 553-0666.

Sincerely,

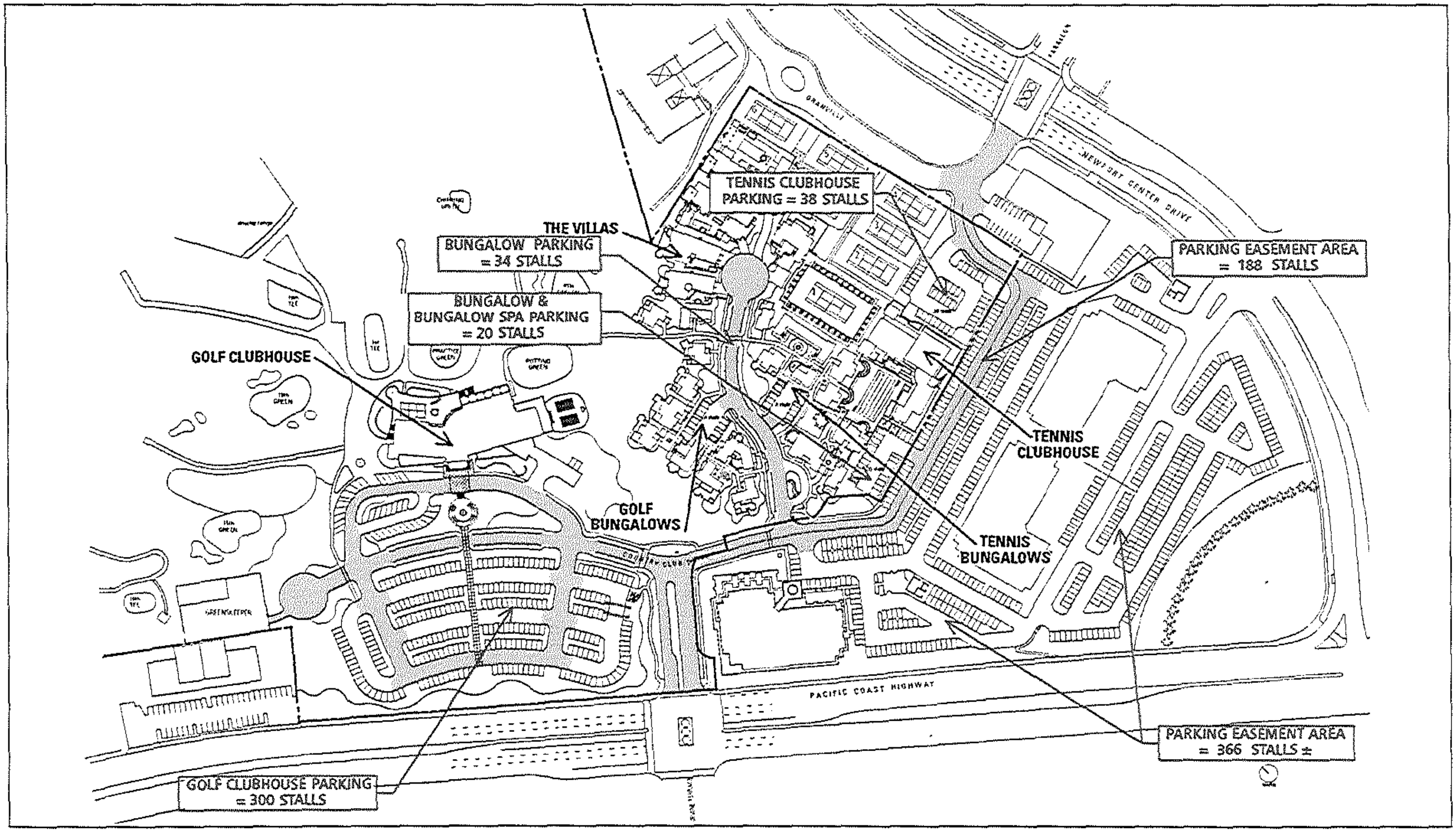
LSA ASSOCIATES, INC.

Ken Wilhelm

Ken Wilhelm
Principal

cc: Leland Stearns, Stearns Architecture
Byron de Arakal
Jerry Johnstone, Adams-Streeter

Attachments: Figure 1: Site Plan
Table A: Parking Requirement



LSA

FIGURE 1

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Newport Beach Country Club

Site Plan

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Table A: Newport Beach Country Club Master Plan Parking Requirement

Land Use	Units	Parking Requirement Per Unit	Parking Requirement Spaces	Parking Provided
Bungalows[1]				
One Bedroom	22 DU	1	22	
Two Bedroom	5 DU	2	10	
Additional spaces required by Code			2	34
Spa and Pool[2]				20
Total Bungalows			34	54
Surplus for Bungalows				*20*
Villas[3]				
A	1 DU	2	2	3
B	1 DU	2	2	3
C	1 DU	3	3	6
D	1 DU	3	3	6
E	1 DU	2	2	4
Total Villas			12	22
Surplus for Villas				*10*
Tennis Club				
Tennis Courts[4]	7 Courts	4	28	38
Surplus for Tennis Club				*10*
Subtotal (Bungalows, Villas, and Tennis Club)			74	114
Surplus Subtotal				*40*
Golf Course and Clubhouse[5]	18 Holes	8.68	157	
Dining Room	3.034 TSF	20	61	
Banquet Room	2.567 TSF	20	52	300
Subtotal			270	300
Surplus Subtotal				*30*
Total Parking Required				344
Total Parking Provided				414
Total Parking Surplus				*70*

[1] City of Newport Beach Zoning Code, Chapter 20.66 Off-Street Parking and Loading Regulations, Bed and Breakfast Inns.

[2] Spa, Pool, and Fitness Area are only available for use by Bungalow guests and members of the Tennis Club, and therefore would not create additional parking demand.

[3] City of Newport Beach Zoning Code, Chapter 20.66 Off-Street Parking and Loading Regulations, Single Family Residential.

[4] City of Newport Beach Zoning Code, Chapter 20.66 Off-Street Parking and Loading Regulations, Tennis Club

[5] City of Newport Beach Zoning Code does not contain parking rates for golf courses. Therefore, the parking rate was referenced from the Institute of Transportation Engineers *Parking Generation*, 3rd Edition (2003). Land Use 430 - Golf Course.

NPDES Technical Study

For:

NEWPORT BEACH COUNTRY CLUB PLANNED COMMUNITY DISTRICT PLAN

Prepared for:

Golf Realty Fund
One Upper Newport Plaza
Newport Beach, California 92660

(949) 251-2025

Prepared by:

Adams • Streeter
Civil Engineers, Inc.

15 Corporate Park
Irvine, California 92606
Phone: 949.474.2330
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Preparation/Revision Date:

Prep: January 14, 2009

Table of Contents

I. Project Description

The Planned Community District is intended to provide for the classification and development of parcels of land as coordinated, comprehensive large-scale planning projects. NBCC Planned Community (NBCCPC) is approximately 145 acres located within the City of Newport Beach, California and includes the existing Tennis Club and Golf Club known as Newport Beach Country Club. It is generally bordered by Pacific Coast Highway to the south, Jamboree Road to the west, Santa Barbara Avenue and Newport Center Drive to the north, and Corporate Plaza West to the east and south.

The Tennis Clubhouse & Center Court: The new Tennis Clubhouse will contain state-of-the-art locker rooms with steam rooms. 6 of the existing tennis courts will remain, and the addition of the new center tennis court will result in a total of 7 tennis courts. The final plans will specify California materials and the use of California artisans.

The Bungalows: The Bungalows will be located on a portion of the existing tennis courts and will consist of 27 guest rental units, patterned after Casa Palmero in Pebble Beach, California and Rancho Valencia Tennis Club in Rancho Santa Fe, California. The Bungalows will be rented on a short term basis to members of The Tennis Club and The Golf Club and their respective guests and to tennis players taking tennis clinics, golfers taking golf clinics and as a venue for association meetings and/or educational retreats. In addition, there will be a reciprocal arrangement with other tennis, golf and beach clubs allowing their members to stay at The Bungalows. Accommodations will also be provided to tour pros and celebrities participating in the Toshiba Classic at The Golf Club, or the Davis Cup or other events at The Tennis Club. Ancillary uses include a concierge office and guest center, swimming pool, fitness center, spa (massage and treatment rooms), and a small bar serving juices, smoothies, etc.

The Villas: The Villas consist of 5 semi-custom homes located on a portion of the existing tennis courts and are adjacent to The Tennis Club and the 9th green.

The Villa homes have a classical California Mediterranean style reminiscent of the Wallace Neff homes built in the West Side areas of Los Angeles, San Marino, and Pasadena in the 1920s, '30s and '40s. Although The Villa homes are all very similar in materials and design theme, each will be unique in some way from the other, and each will have different interior finishes and detailing and, to an extent, be customized to the buyer's specifications.

The Golf Parking Lot & Entry: The new golf parking lot and entry will provide extensive landscaping and berming to aesthetically enhance the entry and significantly improve the aesthetics of The Golf Club parking lot, including landscape berming for approximately 900 feet along Pacific Coast Highway.

The Golf Clubhouse: The permitted Golf Clubhouse will match the architectural style of the other Permitted Uses consistent with the design goals of being respectful to the classical design of the golf course and its coastal Newport Beach/Southern California environment and its location near Fashion Island. To that end, the new Golf Clubhouse shall be in the classical California Mediterranean style of architecture as exemplified by the work of architect Wallace Neff.

Parking: Consistent with the development standards contained in the NBCCPC, the following parking is provided within the PCD:

a) **Tennis Clubhouse Parking:** 68 stalls
b) **Bungalow Parking:** 41 stalls for the 27 short-term rental units
c) **Weekend & Holiday Parking:** Approximately 556 stalls within Corporate Plaza West are available on weekends and holidays through a recorded parking easement, with 188 of these parking stalls available after office business hours

d) **Golf Clubhouse Parking:** 325 stalls

e) **The Villas Parking:** The Villas and the additional Golf Bungalow adjacent to the West Villas have offstreet covered and uncovered parking.

Phasing: The initial phases will all involve the redevelopment of the Tennis Club area and will consist of the following phases:

a) **Phase 1**
- i) Construction by The Irvine Company (TIC) of private street improvements connecting Country Club Drive with Farallon, a bonded obligation of Parcel Map 94-102, with access points per the Master Plan and TIC agreement.
- ii) Construction of access driveway from Farallon to Tennis Club parking lot.
- iii) Demolition and removal of 14 tennis courts, kiosk, pro shop and locker rooms.
- iv) Installation of temporary modular pro shop and locker rooms.
- v) Construction of Tennis Clubhouse.
- vi) Construction of initial Tennis Club parking lot.
- vii) Construction of private street improvements from Country Club Drive to the Villas
- viii) Construction of 3 Villas.
- ix) Construction of east half of the Golf Clubhouse parking lot.

b) **Phase 2**
- i) Construction of 2 Villas.
- ii) Removal of temporary pro shop and locker rooms.
- iii) Construction of new Center Court.
- iv) Construction of pool.
- v) Construction of second Tennis Club parking lot.
- vi) Construction of west half of Golf Clubhouse parking lot.

c) **Phase 3**
- i) Construction of 13 Golf Bungalows.
- ii) Construction of 14 Tennis Bungalows and Guest Center.

d) **Phase 4**
- i) Construction of temporary Golf Clubhouse.
- ii) Construction of new Golf Clubhouse.

e) **Phase 5.**
- i) Greenskeeper area and golf course modifications.
- ii) Lake separating 16th and 18th greens.
- iii) Porte cochere and additional parking.

Anticipated activities for this site that will generate waste are as follows:

Site Waste Table

Activities that Generate Waste:	Waste Generated by Activity:
• Landscape maintenance	• Nutrients, Oxygen Demanding Substances, Pesticides, Sediment/Turbidity, etc.
• Automobile maintenance	• Oil and Grease, solvents, etc.
• Home repair/improvements	• Solvents, Construction Material, Trash and Debris, etc.
• Pet Ownership	• Bacteria and Viruses

Project Owner: Golf Realty Fund
One Upper Newport Plaza
Newport Beach, California 92660
Telephone: (949) 251-2025

Preparer: Adams Streeter Civil Engineers, Inc.
2900 Adams Street, Suite A-400
Riverside, California 92504
Telephone: (951) 352-4100
J. Scott Petersen, Associate Engineer

Project Site Address: 1600 E. Pacific Coast Highway
Newport Beach, California 92660

Planning Area/
Community Name: PA 2008-044

APN Number(s): 442-011-35, 442-011-62 and 442-011-63

Thomas Bros. Map: Los Angeles, Page 919, Grid E1 (2009)

Project Watershed: Lower Santa Ana River (801.10)

Sub-watershed: East Coastal Plain (801.11)

Project Site Size: 4.1 acres

Formation of Home Owners' Association (HOA) or Property Owners Association (POA):

Y ☒ N ☐

Additional Permits/Approvals required for the Project

AGENCY	Permit required
State Department of Fish and Game, 1602 Streambed Alteration Agreement	Y ☐ N ☒
State Water Resources Control Board, Clean Water Act (CWA) section 401 Water Quality Certification	Y ☐ N ☒
US Army Corps of Engineers, CWA section 404 permit	Y ☐ N ☒
US Fish and Wildlife, Endangered Species Act section 7 biological opinion	Y ☐ N ☒
Other *(please list in the space below as required)* Statewide General Construction Permit (Order No. 99-08-DWQ)	Y ☒ N ☐

Appendix A of this Assessment includes:

1. A Vicinity Map identifying the project site and surrounding planning areas in sufficient detail to allow the project site to be plotted on Co-Permittee base mapping; and
2. A Receiving Waters Exhibit identifying the path of travel of the discharge waters of the Project from the Project's discharge point to the Pacific Ocean; and

II. Site Characterization

Current Property Use:	Planned Community - Mixed Use Horizontal 3, Parks and Recreation
Proposed Property Use:	Single Family Residential, Bungalows, Open Space/Landscape and Community Recreation
Availability of Soils Report:	Y ☒ N ☐
Phase 1 Site Assessment:	Y ☐ N ☒

Receiving Waters for Urban Runoff from Site

The table below summarizes the Receiving Waters for the Urban Runoff from the project site:

Receiving Waters[a]	303(d) List Impairments4'[b]	Designated Beneficial Uses3	Project Proximity to Receiving Water[a]
Lower Newport Bay (801.14)[4]	Nutrients (TMDL, 1999), Pathrogens (TMDL, 2000), Pesticides (TMDL, 2004), Chlordane (proposed TMDL completion by 2019), Copper (proposed TMDL completion by 2007), DDT (proposed TMDL completion by 2019), PCBs (proposed TMDL completion by 2019) and Sediment Toxicity (proposed TMDL completion by 2019)	NAV, REC1, REC2, COMM, WILD, RARE, SPWN, MAR, SHEL	0.5 mi
Pacific Ocean			1.9 mi

[a] See Exhibit B, Receiving Waters Map (attached herein).
[b] See Appendices for TMDL documents.

III. Pollutants of Concern

The pollutants of concern are pollutants that are expected to be generated by the completed project for which downstream receiving waters are also currently impaired. Note that expected pollutants generated by land use have been excerpted from Table 7.II-2 of the Drainage Area Management Plan (DAMP) for Orange County (see References). For this project, the pollutants of concern are sediment, nutrients, pathogens (bacteria/viruses), and pesticides (see table on pages 9-10).

- Sediment/Turbidity

  Sediments are soils or other surficial materials eroded and then transported or deposited by the action of wind, water, ice or gravity. Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Other detrimental effects of an increased sediment load include increased turbidity, clogged fish gills, a reduction in spawning habitat, a lowered survival rate among young aquatic organisms, smothered bottom dwelling organisms, and a suppression of aquatic vegetation growth. Sediment can transport other pollutants that attach to it including nutrients, tract metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water body analytical parameter.

- Nutrients

  Nutrients are inorganic substances, such as nitrogen and phosporus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in Urban Runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.

- Bacteria and Viruses

  Pathogens (bacteria and viruses) are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water, containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.

- <u>Oil and Grease</u>

  Oil and grease are characterized as high-molecular weight organic compounds. Primary sources of oil and grease are petroleum hydrocarbon compounds, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies are very possible due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.

- <u>Metals</u>

  The primary source of metal pollution in Urban Runoff is typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, nickel, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. Metals are also raw material components in non-metal products such as fuels, adheasives, paints, and other coatings. At low concentrations naturally occurring in soil, metals may not be toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish and shellfish), and have the potential to contaminate drinking water supplies. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications.

- <u>Organics</u>

  Organic compounds are carbon-based. Commercially available or naturally occurring organic compounds are found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to the Municipal Storm Sewer System. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life.

- Pesticides

  Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.

- Oxygen Demanding Substances

  This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.

- Gross Pollutants

  Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash and debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. In addition, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.

Urban Runoff Pollutants

Pollutants	Potential Source	303(d) Listing[4]
Sediment/Turbidity	Landscape Activities	Lower Newport Bay (801.14) (Sediment)
Nutrients	Fertilizers	Lower Newport Bay (801.14) (Nutrients)
Bacteria and Viruses	Animal Waste	Lower Newport Bay (801.14) (Coliform Bacteria)

Oil and Grease	Automobiles	N/A
Oxygen Demanding Substances	Landscape Activities	N/A
Trash and Debris	Human Waste	N/A
Pesticides	Landscape Activities	Lower Newport Bay (801.14) (Chlordane, DDT, Organophosphate pesticides)

Legacy Pollutants

At the time of this report's issuance, the Phase I Environmental Assessment was not available for review.

IV. Best Management Practices (BMPs)

IV.1 Construction Phase BMPs

In accordance with the Water Quality Management Plan (WQMP) and Storm Water Pollution Prevention Plan (SWPPP) requirements, BMPs are going to be required as part of this project's development in order to mitigate the Pollutants of Concern during the construction phase of the project. Please refer to the construction phase BMP fact sheets within Appendix B for examples of the options available for construction phase water quality control.

IV.2 Post-Construction Phase BMPs

In accordance with the Water Quality Management Plan (WQMP) and Storm Water Pollution Prevention Plan (SWPPP) requirements, BMPs are going to be required as part of this project's development in order to mitigate the Pollutants of Concern during the post-construction phase of the project. The following is a brief description of the main post-construction phase BMPs that can be incorporated into this project's design to mitigate the water quality impacts related to the project's development. For a more thorough discussion and design details regarding these BMPs, please refer to the post-construction phase BMP fact sheets within Appendix B:

1. <u>Grassy Swales</u>

   A grassy swale is a wide, shallow densely vegetated channel that treats stormwater runoff as it is slowly conveyed into a downstream system. These swales have very shallow slopes in order to allow maximum contact time with the vegetation. The depth of water of the design flow should be less than the height of the vegetation. Contact with vegetation improves water quality by plant uptake of pollutants, removal of sediment, and an increase in infiltration. Overall the effectiveness of a grass swale is limited and it is recommended that they are used in combination with other BMPs.

   This BMP is not appropriate for industrial sites or locations where spills occur. Important factors to consider when using this BMP include: natural channelization should be avoided to maintain this BMPs effectiveness, large areas must be divided and treated with multiple swales, thick cover is required to function properly, impractical for steep topography, and not effective with high flow velocities.

   - <u>Sizing Criteria</u>

     See Appendix B for the sizing criteria, sizing criteria calculations, and a further discussion of these types of facilities.

2. <u>Detention Basins</u>

   Dry extended detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, extended detention ponds) are basins whose outlets have been designed to detain the stormwater runoff from a water quality design storm for some minimum time (e.g., 48 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool. They can also be used to provide flood control by including additional flood detention storage.

- Sizing Criteria

  See Appendix B for the sizing criteria, sizing criteria calculations, and a further discussion of these types of facilities.

3. **Infiltration Basins**

An infiltration basin is a shallow impoundment that is designed to infiltrate stormwater. Infiltration basins use the natural filtering ability of the soil to remove pollutants in stormwater runoff. Infiltration facilities store runoff until it gradually exfiltrates through the soil and eventually into the water table. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems. Infiltration basins can be challenging to apply on many sites, however, because of soils requirements. In addition, some studies have shown relatively high failure rates compared with other management practices.

- Sizing Criteria

  See Appendix B for the sizing criteria, sizing criteria calculations, and a further discussion of these types of facilities.

4. **Infiltration Trenches**

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stomwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

- Sizing Criteria

  See Appendix B for the sizing criteria, sizing criteria calculations, and a further discussion of these types of facilities.

5. **Porous Pavement**

Porous Pavement is an infiltration BMP that consists of porous pavement blocks placed over a shallow recharge bed of sand and gravel. It is typically restricted to low volume parking areas that do not receive significant offsite runoff. The modular pavement blocks allow water to seep into the recharge bed, where the sand and gravel layers percolate the design volume into the natural surrounding soils. Porous pavement can be used for areas of up to 10 acres.

- Sizing Criteria

  See Appendix B for the sizing criteria, sizing criteria calculations, and a further discussion of these types of facilities.

6. **Media Filter**

Stormwater media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering media into the second chamber. There are a number of design variations, including the Austin sand filter, the Delaware sand filter, and the multi-chambered treatment train (MCTT).

- Sizing Criteria

  See Appendix B for the sizing criteria, sizing criteria calculations, and a further discussion of these types of facilities.

7. **Water Quality Inlets**

A water quality inlet is a device that removes oil and grit from Urban Runoff before the water enters the MS4. It consists of one or more chambers that promote sedimentation of coarse materials and separation of free oil from Urban Runoff. Manufacturers have created a variety of configurations to accomplish this. A specific model can be selected from the manufacturer based on the design flow rate. A water quality inlet is generally used for pretreatment before discharging into another type of BMP.

Water quality inlet (WQI) maintenance is site-specific due to variations in sediment and hydrocarbon by-products, which may require disposal as hazardous waste. Establishment of a maintenance schedule is helpful for ensuring proper maintenance, because the WQIs are underground and can easily be neglected. High sediment loads can interfere with the ability of the WQI to effectively separate oil and grease from the runoff.

- Sizing Criteria

  See Appendix B for the sizing criteria, sizing criteria calculations, and a further discussion of these types of facilities.

8. **Hydrodynamic Separator Systems**

Vortex separators: (alternatively, swirl concentrators) are gravity separators, and in principle are essentially wet vaults. The difference from wet vaults, however, is that the vortex separator is round, rather than rectangular, and the water movies in a centrifugal fashion before exiting. By having the water move in a circular fashion, rather than a straight line as is the case with a standard wet vault, it is possible to obtain significant removal of suspended sediments and attached pollutants with less space. Vortex separators were originally developed for combined sewer overflows (CSOs), where it is used primarily to remove coarse inorganic solids. Vortex separation has been adapted to stormwater treatment by several manufacturers.

- Sizing Criteria

  See Appendix B for the sizing criteria, sizing criteria calculations, and a further discussion of these types of facilities.

9. Porous Landscape Detention (PLD)/Bioretention

Porous Landscape Detention (PLD) consists of a low-lying vegetated area underlain by a sand bed with an underdrain pipe. A shallow surcharge zone exists above the PLD for temporary storage of the water quality design volume. During a storm, accumulated runoff ponds in the vegetated zone and gradually infiltrates into the underlying sand bed, filling the void spaces of the sand. The underdrain gradually dewaters the sand bed and discharges the runoff to a nearby channel, swale or storm drain.

- Sizing Criteria

  See Appendix B for the sizing criteria, sizing criteria calculations, and a further discussion of these types of facilities.

Supporting engineering calculations for Q_{MP} and/or V_M, and Treatment Control BMP design details are included in Appendix B.

Different BMPs provide varying levels of efficiency for treatments of various pollutant types (for pollutants of concern for this project, see Urban Runoff Pollutants Table on page 10 of this report). Note that all pollutants which are identified as Pollutants of Concern for the project will need to be mitigated with a post-construction BMP that has a medium or high effectiveness removal level for that pollutant. See Table 3 below for the BMP selection criteria to be utilized for this project.

Table 3: Treatment Control BMP Selection Matrix

Pollutant of Concern	Treatment Control BMP Categories[9]							
	Veg. Swale /Veg. Filter Strips[2]	Detention Basins[3]	Infiltration Basins & Trenches/Porous Pavement[4][9]	Wet Ponds or Wetlands[5]	Sand Filter or Filtration (6)	Water Quality Inlets	Hydrodynamic Separator Systems [7]	Manufactured/ Proprietary Devices[8]
Sediment/Turbidity Y ☒ N ☐	H/M ☐	M ☐	H/M ☐	H/M ☐	H/M ☐	L ☐	H/M (L for turbidity) ☐	U ☐
Nutrients Y ☒ N ☐	L ☐	M ☐	H/M ☐	H/M ☐	L/M ☐	L ☐	L ☐	U ☐
Organic Compounds Y ☐ N ☒	U ☐	U ☐	U ☐	U ☐	H/M ☐	L ☐	L ☐	U ☐
Trash & Debris Y ☐ N ☒	L ☐	M ☐	U ☐	U ☐	H/M ☐	M ☐	H/M ☐	U ☐
Oxygen Demanding Substances Y ☐ N ☒	L ☐	M ☐	H/M ☐	H/M ☐	H/M ☐	L ☐	L ☐	U ☐
Bacteria & Viruses Y ☒ N ☐	U ☐	U ☐	H/M ☐	U ☐	H/M ☐	L ☐	L ☐	U ☐
Oils & Grease Y ☐ N ☒	H/M ☐	M ☐	U ☐	U ☐	H/M ☐	M ☐	L/M ☐	U ☐
Pesticides (non-soil bound) Y ☒ N ☐	U ☐	U ☐	U ☐	U ☐	U ☐	L ☐	L ☐	U ☐
Metals Y ☐ N ☒	H/M ☐	M ☐	H ☐	H ☐	H ☐	L ☐	L ☐	U ☐

Abbreviations:

L: Low removal efficiency H/M: High or medium removal efficiency U: Unknown removal efficiency

Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.

(2) Includes grass swales, grass strips, wetland vegetation swales, and bioretention.

(3) Includes extended/dry detention basins with grass lining and extended/dry detention basins with impervious lining. Effectiveness based upon minimum 36-48-hour drawdown time.

(4) Includes infiltration basins, infiltration trenches, and porous pavements.

(5) Includes permanent pool wet ponds and constructed wetlands.

(6) Includes sand filters and media filters.

(7) Also known as hydrodynamic devices, baffle boxes, swirl concentrators, or cyclone separators.

(8) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP, or newly developed/emerging stormwater treatment technologies.

(9) Project proponents should base BMP designs on the Manual for the Standard Urban Storm Water Mitigation Plan or California Stormwater BMP Handbook – New Development and Redevelopment (www.cabmphandbooks.com). The Handbook contains additional information on BMP operation and maintenance.

IV.3 Equivalent Treatment Control Alternatives

Not applicable

IV.4 Regionally-Based Treatment Control BMPs

Not applicable.

V. Closing

V.1 Limitations

The services provided under the purview of this assessment have been provided in accordance with generally accepted engineering principals and standards of practice for this area. The comments and recommendations presented are professional opinions based on observations and our best estimation of project conditions and requirements as indicated by presently available information and data. No further warranty, express or implied, is intended by issuance of this report. This report should be reviewed and updated if the site project concept changes from that described herein.

This report has not been prepared for use by parties or projects other than those named or described herein. It may not contain sufficient information for other parties or purposes, and any such use is performed at no risk to the report preparer.

V.2 References and Resources

1. CASQA, 2003, *California Stomwater BMP Handbook, New Development and Redevelopment.*

2. Orange County Stormwater Program, 2003, *Model Water Quality Management Plan*, Orange County, California.

3. Regional Water Quality Control Board, State Water Resources Control Board, 1994, *Water Quality Control Plan, Santa Ana River Basin.*

4. United States Environmental Protection Agency, 2007, *2006 CWA Section 303(d) List of Water Quality Limited Segments.*

5. California Regional Water Quality Control Board, Santa Ana Region, 1994, *Basin Plan Total Maximum Daily Load for Sediment in the Newport Bay/San Diego Creek Watershed.*

6. California Regional Water Quality Control Board, Santa Ana Region, 1998, *Revisions to the Basin Plan Amendment Establishing a Total Maximum Daily Load (TMDL) for Nutrients in the Newport Bay/San Diego Creek Watershed.*

7. California Regional Water Quality Control Board, Santa Ana Region, 1999, *Resolution No. 99-10: Amendment to the Santa Ana Region Basin Plan – Implementation Plan for Bacterial Contamination of the Newport Bay/San Diego Creek Watershed.*

8. U.S. Environmental Protection Agency, Region 9, 2002, *Total Maximum Daily Loads for Toxic Pollutants – San Diego Creek and Newport Bay, California.*

9. California Regional Water Quality Control Board, Santa Ana Region, 2002, *Order No. R8-2002-0010, NPDES No. CAS618030: Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and The Incorporated Cities of Orange County Within the Santa Ana Region Areawide Urban Storm Water Runoff Orange County.*

10. CASQA, 2003, *California Stomwater BMP Handbook, Construction.*

April 3, 2009

PHASE I
ENVIRONMENTAL SITE ASSESSMENT

NEWPORT BEACH COUNTY CLUB PLANNED COMMUNITY
1600 & 1602 East Coast Highway
Newport Beach, California 92260

Partner Project No. 81138

Prepared for

GOLF REALTY FUND
One Upper Newport Plaza
Newport Beach, California 92660

Prepared By

PARTNER
Engineering and Science, Inc.
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El Segundo, California 90245
(214) 9087-9982

EXECUTIVE SUMMARY

Partner Engineering and Science, Inc. (Partner) has performed a Phase I Environmental Site Assessment (ESA) in general accordance with the scope of work and limitations of ASTM Standard Practice E1527-05, the Environmental Protection Agency Standards and Practices for All Appropriate Inquiries (AAI) (40 CFR Part 312) and set forth by Golf Realty Fund for the property located at 1600 & 1602 East Coast Highway in the City of Newport Beach, Orange County, California (the "subject property"). The Phase I Environmental Site Assessment is designed to provide Golf Realty Fund with an assessment concerning environmental conditions (limited to those issues identified in the report) as they exist at the subject property.

Property Description

The subject property is located on the north side of East Coast Highway; southwest side of Granville Drive; south side of Santa Barbara Drive and southeast side of Jamboree Road in a mixed commercial and residential area of Newport Beach, California. Please refer to the table below for further description of the subject property:

Addresses:	1600 (The Golf Club at Newport Beach County Club) & 1602 (The Tennis Club aka Balboa Bay Club Racquet Club) East Coast Highway
Assessor's Parcel Number (APN):	Not reported
Nature of Use:	Golf Course and Tennis Club
Number of Buildings:	Golf Course: Two; Tennis Club: Two
	Total: Four
Number of Floors:	One
Type of Construction:	Wood Frame
Building Square Footage (SF):	Not reported
Land Acreage (Ac):	Golf Course: approximately 140 Ac; Tennis Club: approximately 10 Ac
	Total: 150 Ac
Date of Construction:	1964
Current Tenants:	Newport Beach County Club, Inc. & Balboa Bay Club

The subject property is currently occupied by the Newport Beach County Club, a golf club and The Tennis Club formerly known the Balboa Bay Racquet Club. On-site operations consist of recreational activities. In addition to the current structures, the golf course is also improved with two ponds, two snack bars within the course and eighteen holes consisting of fairways and greens. The tennis club is improved with twenty-two tennis courts, a stadium court and gate house. The subject property is also improved with asphalt-paved parking areas and associated landscaping.

The immediately surrounding properties consist of East Coast Highway to the southwest beyond which are residential structures, Armstrong Garden Center and residential structures immediately to the south; Granville Drive and office buildings immediately to the southeast; residential structures immediately to the west and Jamboree Road to the northwest beyond which are residential structures; residential structures to the west; The Newport Beach Chamber of Commerce immediately to the north; Santa Barbara Drive to the northeast beyond which is the Newport Beach Fire Department; and, The Marriot Hotel and residential structures to the west.

According to available historical sources, the subject property was formerly undeveloped from as early as 1938 until the construction of the current subject property buildings in 1964. The subject property has been used with its current use from 1964.

According to the Gregg's Drilling Online and Topographical Map Interpretation, the depth and direction of groundwater in the vicinity of the subject property is inferred to be present at approximately 70 feet below ground surface (bgs) and flow to the northwest.

Findings

A *recognized environmental condition (REC)* refers to the presence or likely presence of any hazardous substance or petroleum product on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term REC includes hazardous substances and petroleum products even under conditions that might be in compliance with laws. The term is not intended to include "de minimis" conditions that do not present a threat to human health and/or the environment and that would not be subject to an enforcement action if brought to the attention of appropriate governmental agencies. The following was identified during the course of this investigation:

- Partner did not identify any recognized environmental conditions during the course of this investigation.

A *historical recognized environmental condition (HREC)* refers to an environmental condition which would have been considered a REC in the past, but which may or may not be considered a REC currently. The following was identified during the course of this investigation:

- According to historical sources and regulatory database, the subject property (1600 East Coast Highway) was previously equipped with a 550-gasoline underground storage tank which was reportedly installed in 1965 and removed in 1987. On March 18, 1987, a *Summary of Remedial Operations* Report was prepared for the Newport Beach County Club for the former 550-gallon gasoline underground storage tank located on the southwestern portion of the subject property. According to building department records, this tank was installed in 1965. According to the report, a dime-sized hole was observed in the bottom of the tank. Subsequent sampling and laboratory analyses indicated elevated levels of hydrocarbon, including aromatic constituents' benzene, were present in the subsurface soil below the excavation pit. According to the report, the concentrations of hydrocarbons were highest in the samples collected from a depth of 15 feet below ground surface (bgs) and 18 feet bgs. On February 10, 1987, the soil surrounding the former tank location was excavated (approximately 600-700 cubic yards) and stockpiled. Verification soil sampling occurred. Four soil samples were collected at a depth of 10-12 feet bgs of the excavation pit and were analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, xylene and ethylbenzene. Analytical results indicated that the constituents analyzed were non-detect and closure was granted by the Orange County Health Authority. Based on the results of the previous investigation and regulatory closure, the former 550-gallon UST on the southwestern portion of the subject property is not expected to represent a significant environmental concern.

An *environmental issue* refers to environmental concerns identified by Partner, which do not qualify as RECs; however, require discussion. The following was identified during the course of this investigation:

- The subject property has been used as a golf course since 1964. The nature of use at the subject property involves the application, storage, and mixing of pesticides and herbicides at the subject property. A weed and feed storage shed was located adjacent to the maintenance building. The weed and feed storage shed was locked during Partner's site reconnaissance. The chemicals are reportedly utilized to service the golf greens/fairways located on the subject property. Based on the duration of use as a golf course and the tendency of these constituents to remain in near surface soil, the use and storage of pesticides and herbicides at the subject property may have impacted the subject property. However based on the planned continued use as a golf course, no further investigation is likely warranted at this time. Soil sampling would be recommended prior to any redevelopment of the subject property.
- Partner observed two (2) 55-gallon drums of waste oil within the maintenance area of the golf course. These drums were used to store waste oil during golf cart repair activities and were stored over secondary containment. No spills, leaks or drains were observed near the vicinity of the drains. Based on the good housekeeping practices and lack of direct conduit to the subsurface of the subject property near the waste oil drums, these drums are not expected to represent a significant environmental concern.

Conclusions, Opinions, and Recommendations

Partner has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E1527-05 of 1600 & 1602 East Coast Highway in the City of Newport Beach, Orange County, California (the "subject property"). Any exceptions to or deletions from this practice are described in Section 1.4 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the subject property. Based on the conclusions of this assessment, Partner recommends no further investigation of the subject property at this time.

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APPENDICES

1.0 INTRODUCTION

Partner has performed a Phase I Environmental Site Assessment in general conformance with the scope and limitations of ASTM Standard Practice E1527-05 and AAI for the property located at 1600 & 1602 East Coast Highway in the City of Newport Beach, Orange County, California. Any exceptions to, or deletions from, this scope of work are described in the report.

1.1 Purpose

The purpose of this Phase I Environmental Site Assessment ("ESA") is to identify existing or potential Recognized Environmental Conditions (as defined by ASTM Standard E-1527-05) affecting the subject property that: 1) constitute or result in a material violation or a potential material violation of any applicable environmental law; 2) impose any material constraints on the operation of the subject property or require a material change in the use thereof; 3) require clean-up, remedial action or other response with respect to Hazardous Substances or Petroleum Products on or affecting the subject property under any applicable environmental law; 4) may affect the value of the subject property, and; 5) may require specific actions to be performed with regard to such conditions and circumstances. The information contained in the ESA Report will be used by Client to: 1) evaluate its legal and financial liabilities for transactions related to foreclosure, purchase, sale, loan origination, loan workout or seller financing, 2) evaluate the subject property's overall development potential, the associated market value and the impact of applicable laws that restrict financial and other types of assistance for the future development of the subject property, and/or; 3) determine whether specific actions are required to be performed prior to the foreclosure, purchase, sale, loan origination, loan workout or seller financing of the subject property.

This ESA was performed to permit the *User* to satisfy one of the requirements to qualify for the innocent landowner, contiguous property owner, or bona fide prospective purchaser limitations on scope of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. §9601) liability (hereinafter, the "*landowner liability protections*," or "*LLPs*"). ASTM Standard E-1527-05 constitutes "*all appropriate inquiry* into the previous ownership and uses of the *property* consistent with good commercial or customary practice" as defined at 42 U.S.C. §9601(35)(B).

1.2 Scope of Work

The scope of work for this ESA is in general accordance with the requirements of ASTM Standard E 1527-05. This assessment included: 1) a property and adjacent site reconnaissance; 2) interviews with key personnel; 3) a review of historical sources; 4) a review of regulatory agency records; and 5) a review of a regulatory database report provided by a third-party vendor.

If requested by Client, this report may also include the identification, discussion of, and/or limited sampling of asbestos-containing materials (ACMs), lead-based paint (LBP), mold, and/or radon.

1.3 Limitations

Partner warrants that the findings and conclusions contained herein were accomplished in accordance with the methodologies set forth in the Scope of Work. These methodologies are described as representing good commercial and customary practice for conducting an ESA of a property for the purpose of identifying recognized environmental conditions. There is a possibility that even with the proper application of these methodologies there may exist on the subject property conditions that could not be identified within the scope of the assessment or which were not reasonably identifiable from the available information. Partner believes that the information obtained from the record review and the interviews concerning the site is reliable. However, Partner cannot and does not warrant or guarantee that the information provided by these other sources is accurate or complete. The conclusions and findings set forth in this report are strictly limited in time and scope to the date of the evaluations. The conclusions presented in the report are based solely on the services described therein, and not on scientific tasks or procedures beyond the scope of agreed-upon services or the time and budgeting restraints imposed by the Client. No other warranties are implied or expressed.

Some of the information provided in this report is based upon personal interviews, and research of available documents, records, and maps held by the appropriate government and private agencies. This report is subject to the limitations of historical documentation, availability, and accuracy of pertinent records, and the personal recollections of those persons contacted.

This practice does not address requirements of any state or local laws or of any federal laws other than the all appropriate inquiry provisions of the LLPs. Further, this report does not intend to address all of the safety concerns, if any, associated with the subject property.

Environmental concerns, which are beyond the scope of a Phase I ESA as defined by ASTM include the following: asbestos-containing materials, lead-based paint, radon, and lead in drinking water. These issues may affect environmental risk at the subject property and may warrant discussion and/or assessment; however, are considered non-scope issues. If specifically requested by the Client, these non-scope issues are discussed in Section 6.3.

1.4 User Reliance

All reports, both verbal and written, are for the sole use and benefit of Golf Realty Fund. This report has no other purpose and may not be relied upon by any other person or entity without the written consent of Partner.

1.5 Limiting Conditions

The findings and conclusions contain all of the limitations inherent in these methodologies that are referred to in ASTM E1527-05.

Specific limitations and exceptions to this ESA are more specifically set forth below:

- Due to the time constraints associated with this report, Partner was not able to obtain records from the Orange County Health Care Authority (OCHA) and Newport Beach Fire Department (NBFD). However, based on the detailed information gathered from other historical sources, such as aerial photographs and building department records, the absence of this information is not expected to alter the overall findings of this investigation. If additional findings are encountered during Partner's review of files, Partner will issue an addendum to this report.

- Interviews with past owners and occupants regarding historical onsite operations were not reasonably ascertainable and therefore, this constitutes a data gap. However, based on information obtained from other sources including, building department records, aerial photographs, client provided information and previous environmental reports, this data gap is not expected to significantly alter the overall findings of this investigation.

- Due to the size of the subject property, Partner was unable to physically inspect the entire facility. However, Partner was able to inspect a representative area of the subject property.

- Pursuant to ASTM E1527-05, in order to qualify for one of the Landowner Liability Protections offered by the Small Business Liability Relief and Brownfield's Revitalization Act of 2001, the report User must provide the information (if available) presented in the ASTM User Questionnaire to the environmental professional. Failure to provide this information could result in a determination that "all appropriate inquiry" was not complete.

2.0 SITE DESCRIPTION

2.1 Site Location and Legal Description

The subject property is located on the north side of East Coast Highway; southwest side of Granville Drive; south side of Santa Barbara Drive and southeast side of Jamboree Road. Please refer to the table below for further description of the subject property:

Addresses:	1600 (The Golf Club at Newport Beach County Club) & 1602 (The Tennis Club aka Balboa Bay Club Racquet Club) East Coast Highway
Assessor's Parcel Number (APN):	Not reported
Nature of Use:	Golf Course and Tennis Club
Number of Buildings:	Golf Course: Two; Tennis Club: Two
	Total: Four
Number of Floors:	One
Type of Construction:	Wood Frame
Building Square Footage (SF):	Not reported
Land Acreage (Ac):	Golf Course: approximately 140 Ac; Tennis Club: approximately 10 Ac
	Total: 150 Ac
Date of Construction:	1964
Current Tenants:	Newport Beach County Club, Inc. & Balboa Bay Club

In addition to the current structures, the golf course is also improved with two ponds, two snack The subject property is also improved with asphalt-paved parking areas and associated landscaping.

The subject property was identified in the regulatory database report as a UST and LUST site as further discussed in Section 4.2.

Please refer to Figure 1: Site Location Map, Figure 2: Site Plan, and Appendix A: Site Photographs.

2.2 Current Property Use

The subject property is currently occupied by the Newport Beach County Club, a golf club and The Tennis Club formerly known the Balboa Bay Racquet Club. On-site operations consist of recreational activities.

2.3 Current Use of Adjoining Properties

The subject property is located in a mixed commercial and residential area of Newport Beach, California. During the vicinity reconnaissance, Partner observed the following land use on properties in the immediate vicinity of the subject property:

Immediately surrounding properties

Direction	Adjacent Property
North	The Newport Beach Chamber of Commerce
Northwest	Jamboree Road, beyond which are residential structures and residential structures
Northeast	Santa Barbara Drive, beyond which is the Newport Beach Fire Department and San Clemente Drive
South	Armstrong Garden Center and residential structures
Southwest	East Coast Highway, beyond which are residential structures
Southeast	Granville Drive, beyond which is Citibank and office buildings
West	Residential Structures
East	The Marriot Hotel and residential structures

The adjacent site to the northeast was identified in the regulatory database as a LUST and UST site and is further discussed in Section 4.2.

2.4 Physical Setting Sources

2.4.1 Topography

The United States Geological Survey (USGS), *Newport Beach OES, California* Quadrangle 7.5-minute series topographic map was reviewed for this ESA. According to the contour lines on the topographic map, the subject property is located at approximately 136 feet above mean sea level (MSL). The contour lines in the area of the subject property indicate the area is sloping gently to the northwest.

Please refer to Figure 1: Site Location Map.

2.4.2 Hydrology

According to the Gregg's Drilling Online and Topographical Map Interpretation, the depth and direction of groundwater in the vicinity of the subject property is inferred to be present at approximately 70 feet below ground surface (bgs) and flow to the northwest. The nearest surface water in the vicinity of the subject property is the Newport Bay located approximately 0.53 miles to the northwest of the subject property. No settling ponds, lagoons, surface impoundments, wetlands or natural catch basins were observed at the subject property during this investigation.

2.4.3 Soils/Geology

According to the United States Department of Agriculture Natural Resources Conservation Service Websoil Survey of Orange County, the soils in the vicinity of the subject property are of the San Emigdio series. The San Emigdio series consists of very deep, somewhat well drained soils that formed in alluvial material from mixed, but dominantly sedimentary rocks. San Emigdio soils are on toeslope, flat plains, and alluvial fans and have slopes of 0 to 2 percent.

The mean annual precipitation is about 12 to 81 inches and the mean annual air temperature is about 63 degrees F. The soil is usually dry and frost-free for approximately 270 to 350 days of the year.

The soil is characterized with the following textural sections: (0 to 7 inches) fine sandy loam; (7 to 40 inches) stratified gravelly loamy coarse sand to very find sandy loam; (40 to 44 inches) silty clay loam; and (44 to 61 inches) stratified gravelly loamy coarse sand to very fine sandy loam. The soil is further characterized with minor components that consist of 5 percent each and are identified as Metz loamy sand; Hueneme find sandy loam; and Sorrento sandy loam.

3.0 HISTORICAL USE INFORMATION

Partner obtained historical use information about the subject property from a variety of sources. A chronological listing of the historical data found is summarized in the table below:

Historical Use Information

Period/Date	Source	Description/Use
1938-1964	Aerial Photographs	The subject property was vacant undeveloped land.
1964 - 2007	Aerial Photographs, City Directories, Building Department Records, On-Site Reconnaissance	The subject property is developed with the current use as a golf course and tennis club.

According to historical sources and regulatory database, the subject property (1600 East Coast Highway) was previously equipped with a 550-gasoline underground storage tank which was reportedly installed in 1965 and removed in 1987. On March 18, 1987, a *Summary of Remedial Operations* Report was prepared for the Newport Beach County Club for the former 550-gallon gasoline underground storage tank located on the southwestern portion of the subject property. According to building department records, this tank was installed in 1965. According to the report, a dime-sized hole was observed in the bottom of the tank. Subsequent sampling and laboratory analyses indicated elevated levels of hydrocarbon, including aromatic constituents' benzene, were present in the subsurface soil below the excavation pit. According to the report, the concentrations of hydrocarbons were highest in the samples collected from a depth of 15 feet below ground surface (bgs) and 18 feet bgs. On February 10, 1987, the soil surrounding the former tank location was excavated (approximately 600-700 cubic yards) and stockpiled. Verification soil sampling occurred. Four soil samples were collected at a depth of 10-12 feet bgs below the excavation pit and were analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, xylene and ethylbenzene. Analytical results indicated that the constituents analyzed were non-detect and closure was granted by the Orange County Health Authority. Based on the results of the previous investigation and regulatory closure, the former 550-gallon UST on the southwestern portion of the subject property is not expected to represent a significant environmental concern.

The subject property has been used as a golf course since 1964. The nature of use at the subject property involves the application, storage, and mixing of pesticides and herbicides at the subject property. A weed and feed storage shed was located adjacent to the maintenance building. The weed and feed storage shed was locked during Partner's site reconnaissance. The chemicals are reportedly utilized to service the golf greens/fairways located on the subject property. Based on the duration of use as a golf course and the tendency of these constituents to remain in near surface soil, the use and storage of pesticides and herbicides at the subject property may have impacted the subject property. However based on the planned continued use as a golf course, no further investigation is likely warranted at this time. Soil sampling would be recommended prior to any redevelopment of the subject property.

3.1 Aerial Photograph Review

On April 1, 2009, Partner reviewed available aerial photographs of the subject property and surrounding area for indications of previous uses. The aerial photographs are discussed below:

Date: 1938 **Scale:** 1:20,000

The subject property and adjacent properties to the north, east and west are vacant undeveloped land. East Coast Highway is located to the southwest beyond which is vacant undeveloped land.

Date: 1947 **Scale:** 1:24,000

The subject property and adjacent properties remain relatively unchanged from the previous aerial photograph.

Date: 1952 **Scale:** 1:20,000

The subject property and adjacent properties remain relatively unchanged from the previous aerial photograph.

Date: 1968 **Scale:** 1:28,000

The subject property appears to be developed with the current use as a golf course and tennis club. East Coast Highway is located to the southwest, beyond which are residential dwellings; and, Jamboree Road is visible to the northwest, beyond which is vacant undeveloped land. The adjacent properties to the southwest, north, east and southeast appear to be vacant undeveloped land.

Date: 1977 **Scale:** 1:24,000

The subject property and adjacent properties remain relatively unchanged from the previous aerial photograph.

Date: 1983 **Scale:** 1:36,000

The subject property and adjacent properties southeast and southwest remain relatively unchanged from the previous aerial photograph. The adjacent property to the west and southeast appear to be developed for residential purposes. Santa Barbara Drive is visible to the northeast, beyond which are structures presumably associated with commercial purposes; and, Granville Drive is located to the southeast, beyond which are commercial structures.

Date: 1994 **Scale:** 1:40,000

The subject property remains relatively unchanged from the previous aerial photograph.

Date: 2002 **Scale:** 1:40,000

The subject property and adjacent properties to the north, east and southwest appear relatively unchanged from the previous aerial photograph. The adjacent property to the southeast appears to be developed for commercial purposes.

Copies of selected aerial photographs are included as Figure 3 of this report.

3.2 Sanborn Fire Insurance Maps

Sanborn maps were originally created in the late 1800s and early 1900s for assessing fire insurance liability in urbanized areas of the United States. These maps include detailed town and building information.

A search was made of Seattle Public Library's collection of Sanborn Fire Insurance maps on March 31, 2009. Sanborn map coverage was not available for the subject property.

3.3 City Directories

City directories have been produced for most urban and some rural areas since the late 1800s. The directories are generally not comprehensive and may contain gaps in time periods.

Historical city directories were reviewed at Haines & Company and the Sherman Library & Gardens on April 1, 2009 for past names and businesses that were listed for the subject property. The findings are presented in the following table:

City Directory Search for 1600 & 1602 East Coast Highway

Year(s)	Occupant Listed
1954, 1958	No Listings
1967, 1971, 1976, 1981, 1986,	Irvine County Club (1600); Balboa Bay Club (1602)
1991, 1998, 2003, 2007	Newport Beach County Club (1600), Balboa Bay Club (1602)

According to the city directory review, the subject property has been used as a golf course and tennis club from as early as 1967 until the present.

4.0 REGULATORY RECORDS REVIEW

4.1 Regulatory Agencies

Partner contacted local agencies, such as environmental health departments, fire departments and building departments in order to determine any current and/or historic hazardous materials usage, storage and/or releases of hazardous substances on the subject property. Additionally, Partner researched information on the presence of activity and use limitations (AULs) at these agencies. As defined by ASTM E1527-05, AULs are the legal or physical restrictions or limitations on the use of, or access to, a site or facility: 1) to reduce or eliminate potential exposure to hazardous substances or petroleum products in the soil or groundwater on the subject property; or 2) to prevent activities that could interfere with the effectiveness of a response action, in order to ensure maintenance of a condition of no significant risk to public health or the environment. These legal or physical restrictions, which may include institutional and/or engineering controls (IC/ECs), are intended to prevent adverse impacts to individuals or populations that may be exposed to hazardous substances and petroleum products in the soil or groundwater on the property.

4.1.1 Health Department

Partner requested records from the Orange County Health Care Authority (OCHA) on March 31, 2009 for the subject property. These records may contain evidence indicating current and/or historical hazardous materials usage, storage or releases as well as the presence of underground storage tanks.

Due to the time constraints associated with this report, Partner was not able to obtain records from the OCHA. However, based on the detailed information gathered from other historical sources, such as aerial photographs and building department records, the absence of this information is not expected to alter the overall findings of this investigation. If additional findings are encountered during Partner's review of files, Partner will issue an addendum.

4.1.2 Fire Department

Partner requested records from the Newport Beach Fire Department (NBFD) on March 31, 2009 for the subject property. These records may contain evidence indicating current and/or historical hazardous materials usage, storage or releases as well as the presence of underground storage tanks.

Due to the time constraints associated with this report, Partner was not able to obtain records from the NBFD. However, based on the detailed information gathered from other historical sources, such as aerial photographs and building department records, the absence of this information is not expected to alter the overall findings of this investigation. If additional findings are encountered during Partner's review of files, Partner will issue an addendum.

4.1.3 Air Quality Management District

Partner researched the Air Quality Management District (AQMD) online database (FINDS) on March 31, 2009 for information regarding any Permits to Operate (PTO), Notices of Violation (NOV), or Notices to Comply (NTC) records for the subject property related to air emission equipment, which may include dry cleaning machines and underground storage tanks.

The findings are presented in the following table:

Date	Type/Statis	Information
6/7/1982	PTO/Inactive	A PTO to operate a Service Station and Dispensing of Gasoline; Ethylene Oxide Sterilization was granted to Irvine Country Club

According to records reviewed at the AQMD, the subject property was granted a PTO to operate a gasoline service station in 1982. Environmental concerns associated with the previous UST located at the site are further discussed in Section 4.1.6 and 4.2.

4.1.4 Regional Water Quality Control Board

Partner researched the Regional Water Quality Control Board (RWQCB) online database (Geotracker) on March 31, 2009 for information regarding any releases to the subsurface which may have impacted or threatened a body of water.

No records regarding a release or the presence of AULs on the subject property were on file with the RWQCB.

4.1.5 Department of Toxic Substances Control

Partner researched the Department of Toxic Substances Control (DTSC) online database (EnviroStor) on March 31, 2009 for the subject property. These records may contain evidence indicating current and/or historical hazardous materials usage, storage or releases.

No records regarding a release or the presence of AULs on the subject property were on file with the DTSC.

4.1.6 Building Department

Partner visited the Newport Beach Building Department (NBBD) on March 31, 2009 for information regarding historical tenants and property use of the subject property. The following table contains a listing of permits reviewed:

Building Records Reviewed

Year(s)	Owner/Applicant	Description
1964	Irvine County Club	Building Permit / Enlarge existing stairway from lobby to bar (1600)

1964	Irvine County Club	Building Permit / Enlarge dressing room and alter adjacent restrooms and stairs (1600)
1965	Irvine Company	Building Permit / Application to install one 550-gallon gasoline storage tank (1600)
1968	Irvine Coast County Club	Building Permit / Application to add additions to Pro Shop (1600)
1971	Balboa Bay Club	Building Permit / Application to construct a gate house (1602)
1971	Newport Beach County Club	Building Permit / Application to demolish storage shed (1600)
1976	Balboa Bay Club	Building Permit / Application to install seven new tennis courts (1602)
1987	Newport Beach County Club	Building Permit / Application to remove existing fuel storage tanks (1600)
1987	Newport Beach County Club	Building Permit / Application to construct a new maintenance building (1600)

Summary of Remedial Operations Newport Beach County Club, Geo-Etka, Inc. (March 18, 1987)

On March 18, 1987, a *Summary of Remedial Operations* Report was prepared for the Newport Beach County Club for the former 550 gallon gasoline underground storage tank located on the southwestern portion of the subject property. According to building department records, this tank was installed in 1965. According to the report, a dime-sized hole was observed in the bottom of the north the tank. Subsequent sampling and laboratory analyses indicated elevated levels of hydrocarbon, including aromatic constituents benzene, were present in the subsurface soil below the excavation pit. According to the report, the concentrations of hydrocarbons were highest in the samples collected from a depth of 15 feet below ground surface (bgs) and 18 feet bgs. On February 10, 1987, the soil surrounding the former tank location was excavated (approximately 600-700 cubic yards) and stockpiled. Verification soil sampling occurred. Four soil samples were collected at a depth of 10-12 feet bgs below the excavation pit and were analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, xylene and ethylbenzene. Analytical results indicated that the constituents analyzed were non-detect and closure was granted by the Orange County Health Authority. Based on the results of the previous investigation and regulatory closure, the former 550-gallon UST on the southwestern portion of the subject property is not expected to represent a significant environmental concern.

According to building records reviewed, the subject property was developed from as early as 1964 with the current use as a golf course and tennis club.

4.1.7 Planning Department

Partner visited/contacted Newport Beach Planning Department (NBPD) on March 31, 2009 for information on the subject property in order to identify AULs associated with the subject property.

No AULs were found for the subject property at the NBPD.

4.1.8 Division of Oil, Gas and Geothermal Resources

Division of Oil, Gas and Geothermal Resources (DOGGR) maps contain information regarding oil and gas development. According to the DOGGR maps, no oil or gas wells are located on or adjacent to the subject property.

4.2 Mapped Database Records Search

Information from standard federal, state, county, and city environmental record sources was provided by Track Info Services Environmental FirstSearch. Data from governmental agency lists are updated and integrated into one database, which is updated as these data are released. The information contained in this report was compiled from publicly available sources and the locations of the sites are plotted utilizing a geographic information system, which geocodes the site addresses. The accuracy of the geocoded locations is approximately +/-300 feet. Please refer to the radius map for a complete listing (Appendix C).

The subject property was identified in the regulatory database report as a UST and LUST site (see respective sections below).

The adjacent properties were identified in the regulatory database report as a UST and LUST site (see respective sections below).

Federal NPL

The National Priorities List (NPL) is the Environmental Protection Agency (EPA) database of uncontrolled or abandoned hazardous waste sites identified for priority remedial actions under the Superfund Program.

No NPL sites are located within 1-mile of the subject property.

Federal CERCLIS List

The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list is a compilation of sites that the EPA has investigated or is currently investigating for a release or threatened release of hazardous substances.

No CERCLIS sites are listed within ½-mile of the subject property.

Federal CERCLIS-NFRAP Sites List

The CERCLIS No Further Remedial Action Planned (NFRAP) List is a compilation of sites that the EPA has investigated, and has determined that the facility does not pose a threat to human health or the environment, under the CERCLA framework.

No CERCLIS-NFRAP sites are listed within ½-mile of the subject property.

Federal RCRA CORRACTS Facilities List

The RCRA CORRACTS database is the EPA's list of TSD facilities subject to corrective action under RCRA.

No RCRA CORRACTS facilities are listed within 1-mile of the subject property.

Federal Resource Conservation and Recovery Act (RCRA) TSD Facilities List

The RCRA Treatment, Storage and Disposal (TSD) database is a compilation by the EPA of reporting facilities that treat, store or dispose of hazardous waste.

No RCRA TSD sites are listed within ½- mile of the subject property.

Federal RCRA Generator List

The EPA Resource Conservation and Recovery Act (RCRA) Program RCRA program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Generators database is a compilation by the EPA of reporting facilities that generate hazardous waste.

Two (2) RCRA Generator facilities are listed within $^1/_8$-mile of the subject property. These sites are not located adjacent to the subject property. Based on the relative distance, , these sites are not expected to represent a significant environmental concern.

Federal Institutional Controls/Engineering Controls (IC/EC)

The Federal IC/EC database is designed to assist the EPA in collecting, tracking, and updating information, as well as reporting on the major activities and accomplishments of the various Brownfield grant programs. The IC/EC sites are superfund sites that have either engineering or an institutional control in place. The data includes the control and the media contaminated.

No Federal IC/EC sites were found within ¼ mile of the subject property.

Federal Emergency Notification System (ERNS)

The Emergency Response Notification System (ERNS) is a national database used to collect information or reported release of oil or hazardous substances.

No ERNS sites were listed on or adjacent to the subject property.

Tribal Lands

The Tribal Lands database consists of areas with boundaries established by treaty, statute, and/or executive or court order, recognized by the Federal Government as territory in which American

Indian tribes have primary governmental authority. The Indian Lands of the United States map layer shows areas of 640 acres or more, administered by the Bureau of Indian Affairs. Included are Federally-administered lands within a reservation which may or may not be considered part of the reservation.

No Tribal Land sites were found within 1-mile of the subject property.

State/Tribal Sites

The State of California Environmental Protection Agency, Department Toxics Substance Control maintains a State Priority List (SPL) of sites considered to be actually or potentially contaminated and a State CERCLIS-equivalent list (SCL) of sites under investigation that could be actually or potentially contaminated and presenting a possible threat to human health and the environment.

No State/Tribal sites are listed within 1-mile of the subject property.

State Spills Sites (SPILLS)

The California Regional Water Quality Control Board maintains reports of sites that have records of spills, leaks, investigations and cleanups.

No SPILLS sites are listed within 1/8- mile of the subject property.

Solid Waste/Landfill Facilities (SWLF)

A database of SWLF is prepared by State of California Integrated Waste Management Board.

No SWLF facilities are listed within ½- mile of the subject property.

State/Tribal Leaking Underground Storage Tank List (LUST)

The California Regional Water Quality Control Board compiles lists of all leaks of hazardous substances from underground storage tanks.

Twenty-one (21) LUST sites are listed within ½- mile of the subject property. The subject property and eight sites are located within a ⅛-mile of the subject property and are further discussed below:

- The subject property (Newport Beach County Club; 1600 Coast Highway) was identified on the regulatory database as a LUST site. This listing is further discussed in Section 4.2.6 of this report.
- The Newport Beach Police Department at 870 Santa Barbara Drive was mismapped at the subject property, but is actually located adjacent to the northeast beyond Santa Barbara Drive (hydrologically cross-gradient) of the subject property. According to the regulatory database, this site experienced two unauthorized releases of gasoline during tank closure activities which reportedly impacted the soil only. The first release occurred

on August 31, 1988. The responsible party is identified as Mike Pisani. This case was granted closure on August 30, 1994 by the Orange County Local Oversight Program (LOP), presumably OCHA. The second release occurred on June 17, 2002. This case was granted closure by the OCHA on October 28, 2004. Based on the current regulatory status, identification of a responsible party and medium impacted, these releases are not expected to represent a significant environmental concern.

- Big Canyon Country Club at 1850 Jamboree Road was mismapped at the subject property, but is actually located 893 feet to the northeast (hydrologically cross-gradient) of the subject property. According to the regulatory database, this site experienced an unauthorized release of gasoline on March 18, 1986 during tank closure activities which impacted the soil only. The responsible party is listed as David Boorhes. This case was granted closure by the Orange County Local Oversight Program (LOP), presumably OCHA, on May 15, 2001. Based on the current regulatory status, identification of a responsible party and medium impacted, this site is not expected to represent a significant environmental concern.

- Shell Oil & Texaco Service Station at 1600 Jamboree Road is located approximately 316.8 feet to the northwest (hydrologically up-gradient) of the subject property. This site experienced two separate releases. The first release occurred on September 24, 1999 during tank closure of diesel and gasoline. The responsible party is listed as Bob Robles. This case was granted closure on June 17, 1997. According to the regulatory database, this site experienced an unauthorized release of gasoline on May 5, 2003. This site is currently undergoing open-site assessment. The responsible party is listed as Marvin Katz, regulatory oversight is provided by Orange County LOP. Based on the identification of a responsible party and current regulatory oversight, these listings are not expected to represent a significant environmental concern.

- Chevron 9-3042 at 1550 Jamboree Road is located approximately 422.4 feet to the northwest (hydrologically up-gradient) of the subject property. According to the regulatory database, this site experienced an unauthorized release of gasoline during tank testing on March 8, 1985. The responsible party is listed as Lisa Thompson. This case was granted closure by the Orange County LOP on April 5, 2005. Based on the current regulatory status and identification of a responsible party, this listing is not expected to represent a significant environmental concern.

- Land Rover at 1540 Jamboree Road is located approximately 475.2 to the northwest (hydrologically up-gradient) of the subject property. According to the regulatory database, this site experienced an unauthorized release of waste oil/motor/hydraulic/lubricating solvents on November 19, 1988 during tank closure activities. The responsible party is listed as Philip Vass. This case was granted closure by the Orange County LOP on June 18, 2005. Based on the current regulatory status and identification of a responsible party, this listing is not expected to represent a significant environmental concern.

The remaining sites are not located within a ⅛-mile of the subject property. Based on the relative distance, current regulatory status and/or inferred direction of groundwater flow, these sites are not expected to represent a significant environmental concern.

State/Tribal Underground Storage Tank/Aboveground Storage Tank List (UST/AST)

The California Regional Water Quality Control Board compiles a list of UST and AST locations.

The subject and property and adjacent properties were listed and are further discussed below:

- The subject property (Newport Beach County Club; 1600 Coast Highway) was identified twice as a UST site. This listing is further discussed in Section 4.2.6 of this report.
- The Newport Beach Police Department at 870 Santa Barbara Drive was mismapped at the subject property, but is actually located adjacent to the northeast beyond Santa Barbara Drive (hydrologically cross-gradient) of the subject property. This site was identified three times as a UST site. Please refer to the LUST section above for further discussion of this listing.
- Newport Beach Marriot Hotel at 900 Newport Center Drive is located adjacent to the northeast (hydrologically cross-gradient) of the subject property. This site was listed as a UST site. No further information is available. Based on the lack of documented releases, this site is not expected to represent a significant environmental concern.
- Big Canyon Country Club at 1850 Jamboree Road was mismapped at the subject property, but is actually located 893 feet to the northeast (hydrologically cross-gradient) of the subject property. This site was identified two times as a UST site. Please refer to the LUST section above for further discussion of this listing.

State/Tribal VCP sites

The California Department of Toxic Substances Control has developed an electronic database system with information about sites that are known to be contaminated with hazardous substances as well as information on uncharacterized properties where further studies may reveal problems. The Site Mitigation and Brownfield Reuse Program Database (SMBRPD), also known as CalSites, is used primarily by DTSC's staff as an informational tool to evaluate and track activities at properties that may have been affected by the release of hazardous substances.

No State/Tribal VCP sites were found within ½-mile of the subject property.

State/Tribal Brownfield sites

The California Department of Toxic Substances Control has developed an electronic database system with information about sites that are known to be contaminated with hazardous substances as well as information on uncharacterized properties where further studies may reveal problems. The Site Mitigation and Brownfield Reuse Program Database (SMBRPD), also known as CalSites, is used primarily by DTSC's staff as an informational tool to evaluate and track activities at properties that may have been affected by the release of hazardous substances.

No State/Tribal Brownfield sites were found within ½-mile of the subject property.

5.0 USER PROVIDED INFORMATION AND INTERVIEWS

Pursuant to ASTM E1527-05, Partner requested the following site information from Mr. Dave Wooten, the subject property owner's representative (User of this report).

5.1 Interviews

5.1.1 Interview with Owner

Mr. Dave Wooten, a representative of the subject property owner was not aware of any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on, or from the subject property; any pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products in, on, or from the subject property; or any notices from a governmental entity regarding any possible violation of environmental laws or possible liability relating to hazardous substances or petroleum products..

5.1.2 Interview with Report User

Pursuant to ASTM E1527-05, in order to qualify for one of the Landowner Liability Protections offered by the Small Business Liability Relief and Brownfield's Revitalization Act of 2001, the report User must provide the information (if available) presented in the ASTM User Questionnaire to the environmental professional. Failure to provide this information could result in a determination that "all appropriate inquiry" was not complete.

5.1.3 Interview with Key Site Manager

Mr. Bob Dogle & Mr. Perry Dickey, key site managers for Newport Beach County Club and Balboa Bay Club, were not aware of any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on, or from the subject property; any pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products in, on, or from the subject property; or any notices from a governmental entity regarding any possible violation of environmental laws or possible liability relating to hazardous substances or petroleum products.

5.1.4 Interviews with Past Owners, Operators and Occupants

Interviews with past owners, operators and occupants were not reasonably ascertainable and thus constitute a data gap. Based on information obtained from other historical sources (as discussed in Section 3.0), this data gap is not expected to alter the findings of this investigation.

5.1.5 Interview with Others

As the subject property is not an abandoned property as defined in ASTM 1527-05, interview with others were not performed.

5.2 User Provided Information

5.2.1 Title Records

Title Records were not reviewed as part of this investigation.

5.2.2 Environmental Liens or Activity and Use Limitation

The User did not provide information regarding environmental liens and activity and use limitations (AULs) for the subject property.

5.2.3 Specialized Knowledge

The User did not provide any specialized knowledge of environmental conditions associated with the subject property.

5.2.4 Commonly Known or Reasonably Ascertainable Information

The User did not provide any commonly known or *reasonably ascertainable* information within the local community about the subject property that is material to *recognized environmental conditions* in connection with the subject property.

5.2.5 Valuation Reduction for Environmental Issues

Partner inquired with the User regarding any knowledge of reductions in property value due to environmental issues. The User was not aware of any valuation reductions associated with the subject property.

5.2.6 Previous Reports and Other Provided Documentation

No previous reports or other pertinent documentation was provided to Partner for review during the course of this investigation.

6.0 SITE RECONNAISSANCE

The subject property was inspected by Ms. Sue Krobthong of Partner on March 31, 2009. The weather at the time of the site visit was sunny and clear. Mr. Bob Dogle and Mr. Perry Dickey, the key site managers provided site access.

Due to the size of the subject property, Partner was unable to physically inspect the entire facility. However, Partner was able to inspect a representative area of the subject property.

The subject property is currently occupied by the Newport Beach County Club, a golf club and The Tennis Club formerly known the Balboa Bay Racquet Club. On-site operations consist of recreational activities. On-site operations consist of recreational activities. Environmental concerns were identified during the onsite reconnaissance related to on-site operations, as further discussed in Section 6.1 and 6.2.

6.1 General Site Characteristics

6.1.1 Solid Waste Disposal

Solid waste generated at the subject property is disposed of in commercial dumpsters.

6.1.2 Sewage Discharge and Disposal

Sanitary discharges on the subject property are directed into the municipal sanitary sewer system. Presently, none of the operations on the property perform operations that would require a clarifier or other wastewater treatment system.

6.1.3 Surface Water Drainage

Surface water drainage at the subject property is via sheet flow to the curb and gutter systems located to the north and west of the subject property.

6.1.4 Source of Heating and Cooling

Heating and cooling systems are fueled by natural gas and electricity provided by The Gas Company and Southern California Edison (SCE), respectively.

6.1.5 Wells and Cisterns

The subject property is developed with a sprinkler system from municipal water. The sprinklers appear to be functioning at the time of the inspection. No violations were noted. No hazardous materials were noted near the vicinity of the sprinklers as they are located throughout the golf course. Based on the lack of documented releases and evidence of hazardous materials near the vicinity of the ponds, these structures on the subject property are not expected to represent a significant environmental concern.

6.1.6 Wastewater

Domestic wastewater generated at the subject property is disposed via the sanitary sewer. No industrial process is currently performed at the subject property.

6.1.7 Septic Systems

No septic systems were observed on the subject property.

6.1.8 Additional Site Observations

No additional relevant general site characteristics were observed.

6.2 Potential Environmental Hazards

6.2.1 Hazardous Materials and Petroleum Products Used or Stored at the Site

The subject property has been used as a golf course since 1964. The nature of use at the subject property involves the application, storage, and mixing of pesticides and herbicides at the subject property. A weed and feed storage shed was located adjacent to the maintenance building. The weed and feed storage shed was locked during Partner's site reconnaissance. The chemicals are reportedly utilized to service the golf greens/fairways located on the subject property. Based on the duration of use as a golf course and the tendency of these constituents to remain in near surface soil, the use and storage of pesticides and herbicides at the subject property may have impacted the subject property. However based on the planned continued use as a golf course, no further investigation is likely warranted at this time. Soil sampling would be recommended prior to any redevelopment of the subject property.

Partner observed two (2) 55-gallon drums of waste oil within the maintenance area of the golf course. These drums were used to store waste oil during golf cart repair activities and were stored over secondary containment. No spills, leaks or drains were observed near the vicinity of the drains. Based on the good housekeeping practices and lack of direct conduit to the subsurface of the subject property near the waste oil drums, these drums are not expected to represent a significant environmental concern.

6.2.2 Aboveground & Underground Hazardous Substance or Petroleum Product Storage Tanks (ASTs/USTs)

No evidence of ASTs or USTs was observed during the site reconnaissance.

6.2.3 Evidence of Releases

No spills, stains or other indications that a surficial release has occurred at the subject property were observed.

6.2.4 Polychlorinated Biphenyls (PCBs)

Older transformers and other electrical equipment could contain polychlorinated biphenyls (PCBs) at a level that subjects them to regulation by the U.S. EPA. PCBs in electrical equipment are controlled by United States Environmental Protection Agency regulations 40 CFR, Part 761. Under the regulations, there are three categories into which electrical equipment can be classified:

- Less than 50 parts per million (ppm) of PCBs – *"Non-PCB"*
- 50 ppm-500 ppm – *"PCB-Contaminated"*
- Greater than 500 ppm – *"PCB-Containing"*

The manufacture, process, or distribution in commerce or use of any PCB in any manner other than in a totally enclosed manner was prohibited after January 1, 1977.

The on-site reconnaissance addressed indoor and outdoor transformers that may contain PCBs. Three (3) -mounted transformers were observed on the subject property. The transformers are not labeled indicating PCB content. No staining or leakage was observed in the vicinity of the transformers. Based on the good condition of the equipment, the transformers are not expected to represent a significant environmental concern. These transformers appear to be owned by Southern California Edison (SCE) and its their responsibility to maintain these transformers. Additionally, no other potential PCB-containing equipment (interior transformers, oil-filled switches, hoists, lifts, dock levelers, hydraulic elevators, etc) was observed on the subject property during Partner's reconnaissance.

6.2.5 Strong, Pungent or Noxious Odors

No strong, pungent or noxious odors were evident during the site reconnaissance.

6.2.6 Pools of Liquid

No pools of liquid were observed on the subject property.

6.2.7 Drains, Sumps and Clarifiers

No drains, sumps or clarifiers were observed on the subject property.

6.2.8 Pits, Ponds and Lagoons

Two ponds were located within the boundaries of the golf course. No violations were noted. No hazardous materials were noted near the vicinity of the ponds as they are located throughout the golf course. Based on the lack of documented releases and evidence of hazardous materials near the vicinity of the ponds, these structures on the subject property are not expected to represent a significant environmental concern.

6.2.9 Stressed Vegetation

No stressed vegetation was observed on the subject property.

6.2.10 Additional Potential Environmental Hazards

No additional potential environmental hazards were observed.

6.3 Non-ASTM Services

6.3.1 Asbestos-Containing Materials (ACMs)

Asbestos is the name given to a number of naturally occurring, fibrous silicate minerals mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. Asbestos is commonly used as an acoustic insulator, thermal insulation, fire proofing and in other building materials. Exposure to airborne friable asbestos may result in a potential health risk because persons breathing the air may breathe in asbestos fibers. Continued exposure can increase the amount of fibers that remain in the lung. Fibers embedded in lung tissue over time may cause serious lung diseases including: asbestosis, lung cancer, or mesothelioma.

The Occupational Safety and Health Administration (OSHA) regulation 29 CFR 1926.1101, requires certain construction materials to be *presumed* to contain asbestos, for purposes of this regulation. All thermal system insulation (TSI), surfacing material, and asphalt/vinyl flooring that are present in a building constructed prior to 1980 and have not been appropriately tested are "presumed asbestos containing material" (PACM).

The subject property building was constructed in 1964. Partner has conducted a limited, visual evaluation of accessible areas for the presence of suspect asbestos containing materials (ACMs) at the subject property. The objective of this visual survey was to note the presence and condition of suspect ACM observed. Please refer to the table below for identified suspect ACMs:

Suspect Asbestos Containing Materials (ACMs)

Suspect ACM	Location	Physical Condition
Acoustic Ceiling Tiles	Within Subject Property Buildings	Good
Vinyl Floor Tiles	Within Subject Property Buildings	Good
Drywall Systems	Within Subject Property Buildings	Good

The visual survey consisted of noting observable materials (materials which were readily accessible and visible during the course of the site reconnaissance) that are commonly known to potentially contain asbestos. This activity was not designed to discover all sources of suspect ACM, PACM, or asbestos at the site; or to comply with any regulations and/or laws relative to planned disturbance of building materials such as renovation or demolition, or any other regulatory purpose. Rather, it is intended to give the lender an indication if significant (significant due to quantity, accessibility, or condition) potential sources of ACM or PACM are present at the subject property. Additional sampling, inspection, and evaluation will be warranted for any other use.

No building plans or specifications, which may be useful in determining areas likely to have used ACM, were made available for review.

According to the EPA, ACM and PACM that is intact and in good condition can, in general, be managed safely in-place under an Operations and Maintenance (O&M) program until removal is dictated by renovation, demolition, or deteriorating material condition. Prior to any disturbance of the construction materials within this facility, a comprehensive ACM survey is recommended.

6.3.2 Lead-Based Paint

Due to the commercial nature of use of the subject property, lead-based paint was not considered within the scope of this assessment.

6.3.3 Radon

Radon is a colorless, odorless, naturally occurring, radioactive, inert, gaseous element formed by radioactive decay of radium (Ra) atoms. The US EPA has prepared a map to assist National, State, and local organizations to target their resources and to implement radon-resistant building codes. The map divides the country into three Radon Zones, Zone 1 being those areas with the average predicted indoor radon concentration in residential dwellings exceeding the EPA Action limit of 4.0 picoCuries per Liter (pCi/L). It is important to note that the EPA has found homes with elevated levels of radon in all three zones, and the EPA recommends site specific testing in order to determine radon levels at a specific location. However, the map does give a valuable indication of the propensity of radon gas accumulation in structures.

Radon sampling ~~was not~~ conducted as part of this investigation. Review of the EPA Map of Radon Zones places the subject property in Zone 3, where average predicted radon levels are less than 2.0 pCi/L.

6.3.4 Lead in Drinking Water

The subject property is connected to the city water supply provided by the Newport Beach. According to 2007 Water Quality Report, the lead levels in the drinking water supplied to the subject property is within state and federal standards.

6.3.5 Mold

Molds are microscopic organisms found virtually everywhere, indoors and outdoors. Mold will grow and multiply under the right conditions, needing only sufficient moisture (e.g.in the form of very high humidity, condensation, or water from a leaking pipe, etc.) and organic material (e.g., ceiling tile, drywall, paper, or natural fiber carpet padding). Mold growths often appear as discoloration, staining, or fuzzy growth on building materials or furnishings and are varied colors of white, gray, brow, black, yellow, and green. In large quantities, molds can cause allergic symptoms when inhaled or through the toxins the molds emit.

Partner observed accessible, interior areas for the subject property building for significant evidence of mold growth; however, this ESA should not be used as a mold survey or inspection. Additionally, this inspection was not designed to assess all areas of potential mold growth.

No obvious indications of water damage or mold growth were observed during Partner's visual inspection.

6.4 Adjacent Property Reconnaissance

The adjacent property reconnaissance consisted of observing the adjacent properties from the subject property premises.

6.4.2 Aboveground & Underground Hazardous Substance or Petroleum Product Storage Tanks (ASTs/USTs)

The adjacent sites to the northeast (Newport Beach Fire Station) and east (Marriot Hotel) were identified on the regulatory database as UST sites. Please refer to Section 4.2 for further discussion of these sites.

7.0 FINDINGS AND CONCLUSIONS

Findings

A *recognized environmental condition (REC)* refers to the presence or likely presence of any hazardous substance or petroleum product on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term REC includes hazardous substances and petroleum products even under conditions that might be in compliance with laws. The term is not intended to include "de minimis" conditions that do not present a threat to human health and/or the environment and that would not be subject to an enforcement action if brought to the attention of appropriate governmental agencies. The following was identified during the course of this investigation:

- Partner did not identify any recognized environmental conditions during the course of this investigation.

A *historical recognized environmental condition (HREC)* refers to an environmental condition which would have been considered a REC in the past, but which may or may not be considered a REC currently. The following was identified during the course of this investigation:

- According to historical sources and regulatory database, the subject property (1600 East Coast Highway) was previously equipped with a 550-gasoline underground storage tank which was reportedly installed in 1965 and removed in 1987. On March 18, 1987, a <u>*Summary of Remedial Operations*</u> Report was prepared for the Newport Beach County Club for the former 550-gallon gasoline underground storage tank located on the southwestern portion of the subject property. According to building department records, this tank was installed in 1965. According to the report, a dime-sized hole was observed in the bottom of the tank. Subsequent sampling and laboratory analyses indicated elevated levels of hydrocarbon, including aromatic constituents' benzene, were present in the subsurface soil below the excavation pit. According to the report, the concentrations of hydrocarbons were highest in the samples collected from a depth of 15 feet below ground surface (bgs) and 18 feet bgs. On February 10, 1987, the soil surrounding the former tank location was excavated (approximately 600-700 cubic yards) and stockpiled. Verification soil sampling occurred. Four soil samples were collected at a depth of 10-12 feet bgs of the excavation pit and were analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, xylene and ethylbenzene. Analytical results indicated that the constituents analyzed were non-detect and closure was granted by the Orange County Health Authority. Based on the results of the previous investigation and regulatory closure, the former 550-gallon UST on the southwestern portion of the subject property is not expected to represent a significant environmental concern.

An *environmental issue* refers to environmental concerns identified by Partner, which do not qualify as RECs; however, require discussion. The following was identified during the course of this investigation:

- The subject property has been used as a golf course since 1964. The nature of use at the subject property involves the application, storage, and mixing of pesticides and herbicides at the subject property. A weed and feed storage shed was located adjacent to the maintenance building. The weed and feed storage shed was locked during Partner's site reconnaissance. The chemicals are reportedly utilized to service the golf greens/fairways located on the subject property. Based on the duration of use as a golf course and the tendency of these constituents to remain in near surface soil, the use and storage of pesticides and herbicides at the subject property may have impacted the subject property. However based on the planned continued use as a golf course, no further investigation is likely warranted at this time. Soil sampling would be recommended prior to any redevelopment of the subject property.

- Partner observed two (2) 55-gallon drums of waste oil within the maintenance area of the golf course. These drums were used to store waste oil during golf cart repair activities and were stored over secondary containment. No spills, leaks or drains were observed near the vicinity of the drains. Based on the good housekeeping practices and lack of direct conduit to the subsurface of the subject property near the waste oil drums, these drums are not expected to represent a significant environmental concern.

Conclusions, Opinions, and Recommendations

Partner has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E1527-05 of 1600 & 1602 East Coast Highway in the City of Newport Beach, Orange County, California (the "subject property"). Any exceptions to or deletions from this practice are described in Section 1.4 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the subject property. Based on the conclusions of this assessment, Partner recommends no further investigation of the subject property at this time.

8.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

Partner has performed a Phase I Environmental Site Assessment on the property at 1600 & 1602 East Coast Highway in the City of Newport Beach, Orange County, California in general conformance with the scope and limitations of the protocol and the limitations stated earlier in this report. Exceptions to or deletions from this protocol are discussed earlier in this report.

By signing below, Partner declares that, to the best of our professional knowledge and belief, the undersigned meet the definition of an *Environmental Professional* as defined in §312.10 of 40 CFR 312 and have the specific qualifications based on education, training, and experience to assess a *property* of the nature, history, and setting of the subject *property*.

Prepared By:

Sue Krobthong
Environmental Scientist

Reviewed By:

Summer D. Gell
Senior Author

Figures

1- Site Location Map

2- Site Plan

3- Aerial Photographs

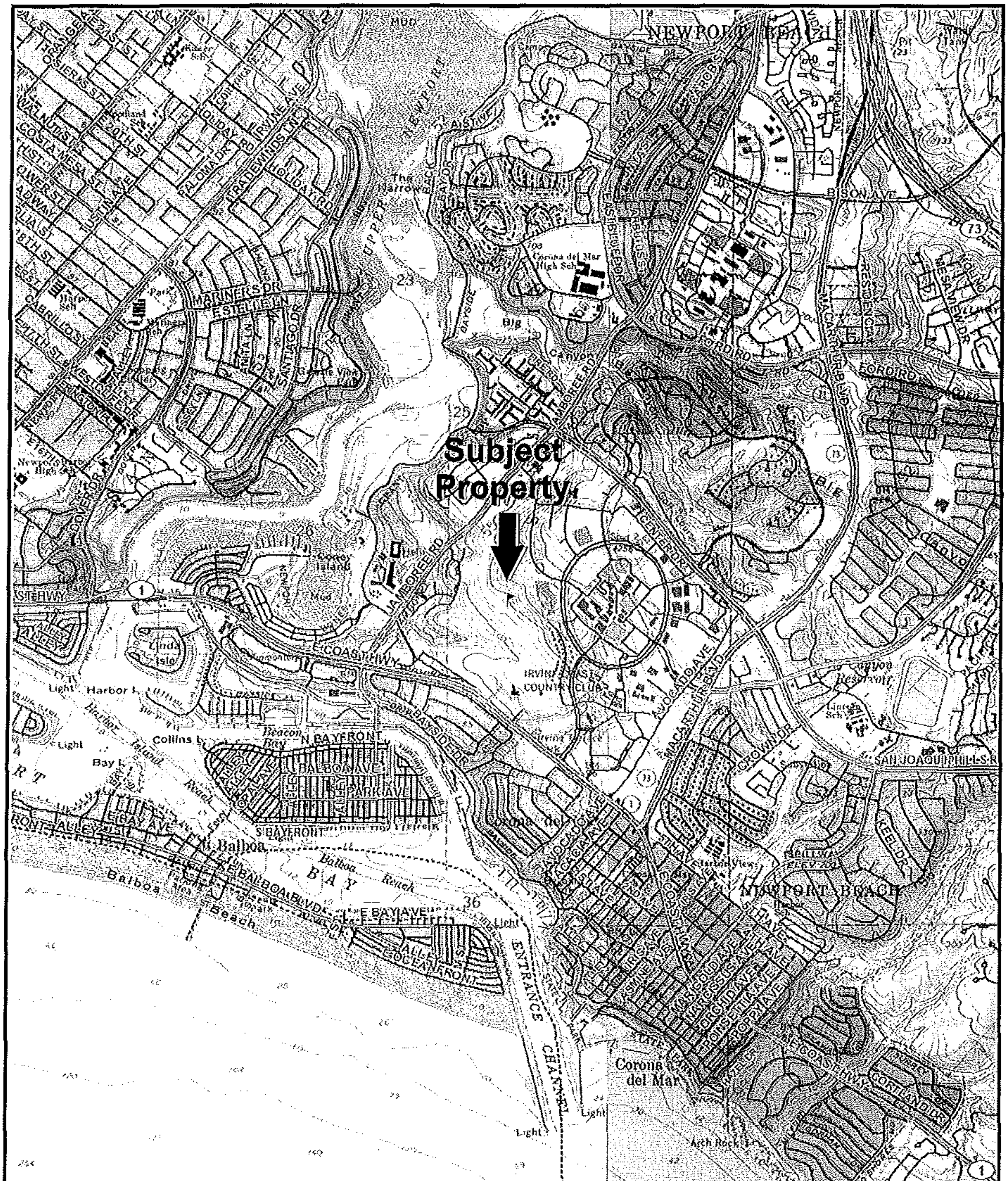


FIGURE 1: SITE LOCATION MAP

Site Address:

1600 & 1602 East Coast Highway
Newport Beach, California 92660

N

USGS Newport Beach OES, CA Quadrangle
Created: 1978;
Revised: 1981

PARTNER
Engineering and Science, Inc.
2101 Rosecrans Avenue, Suite 4270
El Segundo, California 90245

Job Number: 81338

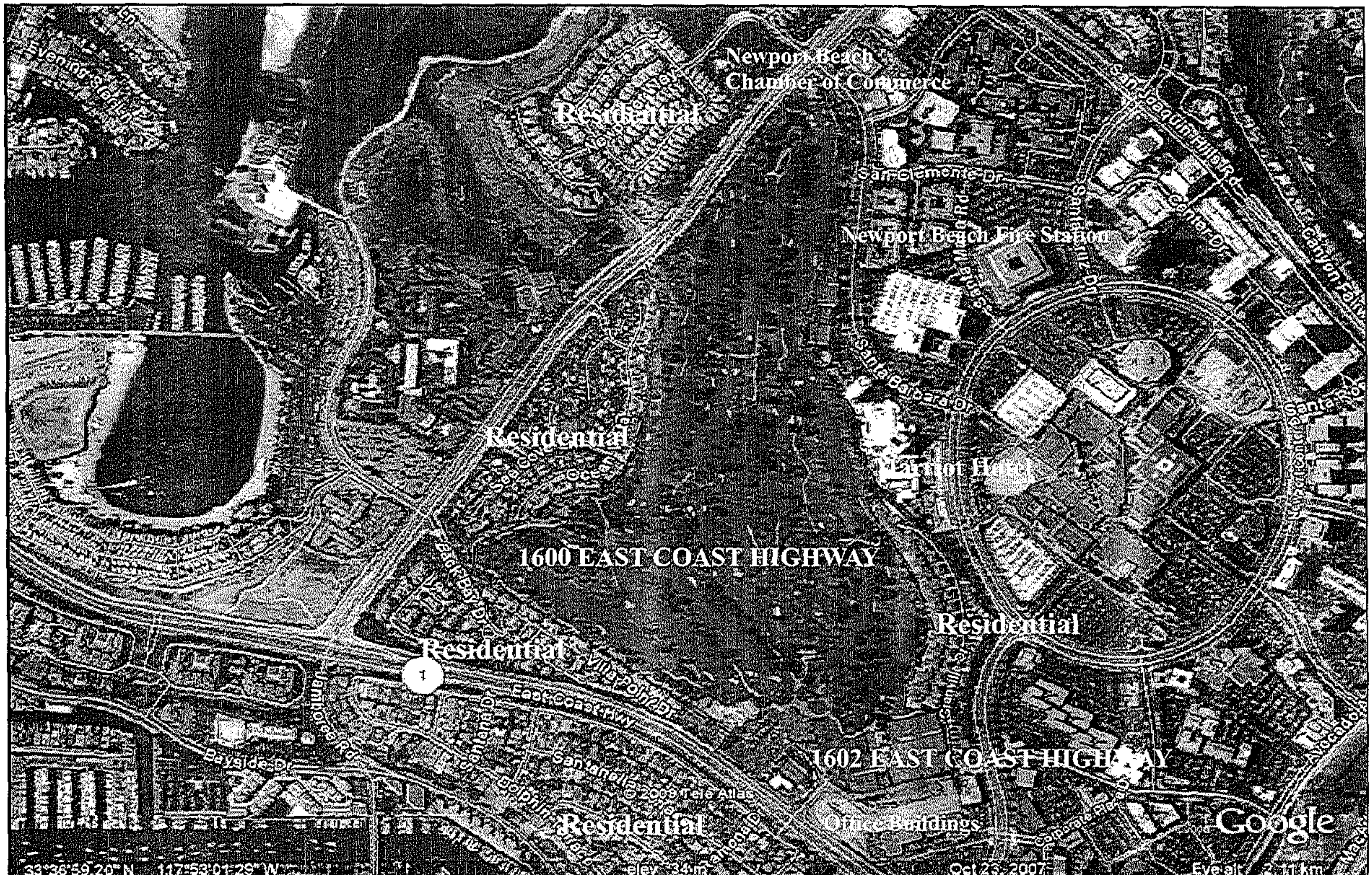


FIGURE 2: SITE PLAN

Site Address:

1600 & 1602 East Coast Highway
Newport Beach, California 92660

KEY:
Subject Site

N

GROUNDWATER FLOW

PARTNER
Engineering and Science, Inc.
2101 Rosecrans Avenue, Suite 4270
El Segundo, California 90245

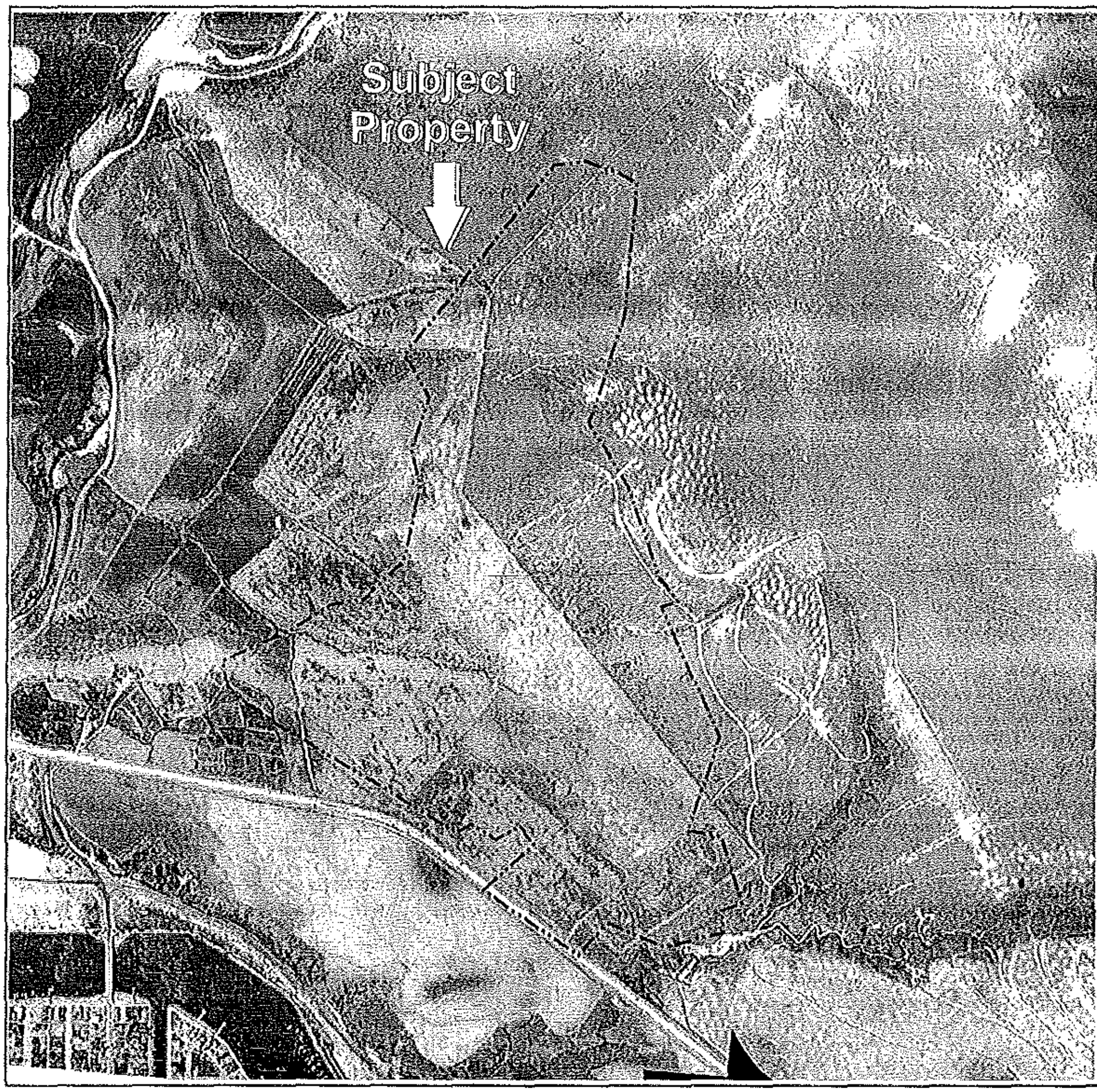
Job Number: 81338

Track Info Services, LLC

Historical Aerial Photo

Site: 1600 East Coast Hwy, Newport Beach, CA 92660

Photo Year: 1938



Job Number: 81338

Original Scale of Photo: 1:20,000

Approximate Scale of This Image: 1 in equals 750 ft

Coverage Area Approximately 1/2 Mile Radius from Subject Site

≈ 750 ft

FIGURE 3: AERIALS	N	Date: 1938	PARTNER Engineering and Science, Inc.
Site Address:			2101 Rosecrans Avenue, Suite 4270
1600 & 1602 East Coast Highway Newport Beach, California 92660			El Segundo, California 90245 Job Number: 81338

GMU
GEOTECHNICAL, INC.

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Report of Geotechnical Studies and Review of Vesting Tentative Tract Map No. 15347, Newport Beach Country Club, City of Newport Beach, Orange County, California

Prepared For
GOLF REALTY FUND

May 2, 2008

GMU Project No. 07-140-00

Parcel 2, Map 94-102
APN: 442-011-35, 62, 63

GMU
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TRANSMITTAL

GOLF REALTY FUND
1 Upper Newport Plaza
Newport Beach, CA 92660

DATE: May 2, 2008

GMU PROJECT: 07-140-00

ATTENTION: Mr. Robert O'Hill

SUBJECT: Geotechnical Report for Newport Beach Country Club

WE ARE SENDING THE FOLLOWING:

One (1) copy of our "Report of Geotechnical Studies and Review of Vesting Tentative Tract Map No 15347, Newport Beach Country Club, City of Newport Beach, Orange County, California," dated May 2, 2008

COPIES OF REPORT DISTRIBUTED TO:

Stearns Architecture
Attn: Mr Leland Stearns (3 wet signature copies)

Adams-Streeter Civil Engineers, Inc.
Attn: Mr Randy Streeter (3 wet signature copies)

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INTRODUCTION

We have reviewed the geotechnical aspects of the reference (1) plan and have completed our geotechnical studies for the Newport Beach Country Club in the City of Newport Beach, Orange County, California (see Vicinity Map on Plate 1). The subject property is Parcel 2 on Parcel Map 94-102, with an Assessor's Parcel Numbers of 442-011-35, 62, and 63. Our geotechnical services were provided at the request of Mr. Robert O'Hill of Golf Realty Fund. This report provides a summary of our geotechnical investigation, data, conclusions, and recommendations pertaining to grading and the construction of proposed improvements at the site.

EXISTING SITE CONDITIONS

The subject property is currently the Balboa Bay Club Racquet Club with improvements as shown on the base map on Plate 1. The existing improvements include 24 tennis courts, approximately four building structures, a parking lot, and appurtenant hardscape and landscape features. The reference (1) plan indicates that the planned improvements will require demolition of 18 tennis courts, the existing buildings, and a majority of the parking lot and landscape areas.

Topography at the site (Plate 1) is relatively flat-lying, with up to 13 feet of relief across the entire site. The southwest portion of the property is near elevation 100 feet above MSL, whereas the northeast corner of the property is near elevation 113 feet above MSL.

DESIGN GRADING AND PLANNED IMPROVEMENTS

The design grading consists of making various cuts and fills as indicated by the reference (1) plan Designed cuts and fills are limited to about 3 feet, with no significant cut or fill slopes. Various retaining walls will also be constructed throughout the property. The planned grading and construction will serve to create the following improvements:

- Tennis Clubhouse with new stadium tennis court
- The Villas (5 single family lots; Lots 1 through 5)
- Golf Bungalows (13 guest rental units; Lot 6)
- Tennis Bungalows (14 guest rental units; Lot 7)
- driveways and parking areas
- hardscape and landscape areas
- pools and spas

SUBSURFACE EXPLORATION

Our exploration for the proposed project consisted of excavating eight (8) hollow stem auger borings up to 29 feet deep. The drill holes locations are shown on Plate 1 – Geotechnical Map, and the boring logs are included within Appendix A – Log of Drill Holes. The purposes of our exploration were to: a) visually observe the subsurface geologic conditions, b) visually observe the depth and suitability of existing engineered fill, and c) collect bulk and undisturbed samples for laboratory testing. All borings were excavated at least 7 feet into the underlying bedrock.

It should be noted that our subsurface investigation was limited to the margins of the project due to the presence of existing improvements at the site Three borings were located at the planned Tennis Clubhouse, two borings were adjacent to the planned Villas, and three borings were adjacent to the planned Bungalows Subsequent to future demolition activities, GMU recommends one additional day of drilling (i.e., about 3 to 4 borings) to confirm subsurface geotechnical conditions within the central portion of the property.

LABORATORY TESTING

Laboratory testing for the subject investigation was performed to characterize moisture and density, particle size distribution, atterberg limits, maximum density, expansion index (EI), corrosion, consolidation, R-Value, and shear strengths. The results of our laboratory testing are summarized on Table B-1 and included within Appendix B – Laboratory Testing. Laboratory test results on samples collected at the site indicate that very low to low expansion soils are present. Particle size distribution testing indicates that the shallow on-site soils (i.e., existing artificial fill) consist of various mixtures of sand, silt, and clay. Engineered fill produced from the planned design and remedial grading will also consist of clayey and silty sand to sandy and silty clay. Given the exploration and laboratory data, it is our opinion that the proposed improvements should be designed assuming a medium expansion potential.

The results of chemical testing indicate that the on-site soils at the site will be corrosive to ferrous metals The results of sulfate tests indicate that the site will have a negligible exposure to concrete as defined by the CBC.

GEOLOGIC FINDINGS

SOIL AND ROCK MATERIALS

The property consists entirely of artificial fill at the existing ground surface and immediately below the existing improvements Artificial fill is underlain by Terrace Deposits, Colluvium, and/or bedrock of the Monterey Formation These soil and rock materials, as encountered during our investigation, are discussed below

Artificial Fill (Qaf). Previous grading and construction of the existing property improvements have resulted in the placement of artificial fill at the site The artificial fill is typically less than 10 feet thick, but increases up to about 22 feet thick near the southern portion of the site (i.e., near DH-4) Fill materials are typically composed of clayey sand and sandy clay, with other varying mixtures of sand, silt, and clay Based on field observations and laboratory testing (i.e., moisture, density, and consolidation tests), artificial fill within the uppermost 5 feet below ground surface is generally characterized by moderate compressibility and below optimum moisture content. Below about 5 feet, density increases, moisture content is near optimum, and consolidation potential decreases The existing artificial fill below about 5 feet will suitable for the support of planned fills and improvements following the corrective grading recommended herein.

Colluvium (Qcol). Colluvium is potentially present in a limited area near DH-2 at a depth of about 7 to 12 feet below ground surface. This material consists of damp to moist, firm silty clay. A consolidation test performed on this material indicates limited compressibility at the anticipated loads. The colluvium is therefore considered suitable for support of the planned fills and improvements.

Terrace Deposits (Qt). Terrace deposits which are presumably marine in origin were encountered in DH-6 and DH-7 and are also present near the southeastern and eastern margins of the property. The terrace deposits dominantly consist of medium dense silty sand to clayey sand, with some sandy clay near the surface. These materials are considered suitable for support of the planned fills and improvements.

Monterey Formation (Tm). Bedrock of the Monterey Formation exists below the surficial materials on-site. The bedrock consists of fractured and thinly bedded siltstone and claystone that is weathered near the contact with overlying materials. The siltstone and claystone were observed to be slightly diatomaceous or bentonitic in some samples. The Monterey Formation will not be directly encountered during the proposed grading.

GROUNDWATER

Groundwater was not encountered during our subsurface investigation at the site. However, groundwater was encountered in the geotechnical investigations performed by NMG Geotechnical, Inc. (references (2) and (3)) for the adjacent properties southwest and east of the subject property. For the adjacent property to the southwest, groundwater was found to be at an elevation of about 79 feet above MSL (reference 2). For the adjacent property to the east, groundwater was found to be at an elevation of about 96 feet above MSL (reference 3).

Depending on irrigation practices and seasonal variations in precipitation, perched groundwater may also occur near geologic contacts, such as at the base of engineered fill, and/or above the bedrock contact.

SEISMICITY

Most of southern California is subject to some level of ground shaking (ground motion) as a result of movement along active and potentially active fault zones in the region. Several sizeable, historic earthquakes have occurred in southern California (Plate 2). Given the proximity of the site to several active and potentially active faults (see discussion below), the site will likely be subject to earthquake ground motions in the future. The level of ground motion at a given site resulting from an earthquake is a function of several factors including earthquake magnitude, type of faulting, rupture propagation path, distance from the epicenter, earthquake depth, duration of shaking, site topography, and site geology

Fault Rupture. No known active or potentially active faults are shown on current available geologic maps as crossing the site. The site is not within a designated Alquist-Priolo Earthquake Fault Zone (Jennings, 1994; Hart and Bryant, 1999). However, the site is located within close proximity of several surface faults that are presently zoned as active or potentially active by the California Geological Survey (CGS) pursuant to the guidelines of the Alquist-Priolo Earthquake Fault Zoning Act (Jennings, 1994; Hart and Bryant, 1999). The site is located approximately 3.7 kilometers east of the Newport-Inglewood fault zone.

The site may also be located within 1 km of the San Joaquin Hills Blind Thrust (SJHBT), an inferred, low-angle fault system (e.g., blind thrust) suggested by Grant et al. (1999). Blind thrust faults normally do not break the ground surface during sizeable earthquakes. The existence of the SJHBT is postulated from comparison of an early 20th Century topographic survey with recent geodetic measurements in the Newport Back Bay and from presumably uplifted marine terraces within the San Joaquin Hills (Grant et al., 1999). Not all earth scientists, including some with the Southern California Earthquake Center (SCEC) agree with this interpretation or would promote such an hypothesis based on the limited evidence (Bender, 2000).

In order to characterize statewide ground shaking, the CGS in cooperation with the United States Geological Survey performed a statewide probabilistic seismic hazard analysis (PSHA). The first maps generated from the statewide PSHA were released in 1996. In June of 2003, the CGS released an update of their seismic source catalog for California. That update included various revisions to the seismic source catalog. The revised seismic source catalog included the SJHBT. However, the CGS weighted the SJHBT at 50-percent for PSHA calculations. By comparison, the CGS weighted the Newport-Inglewood fault 100-percent for PSHA calculations. In other words, the State acknowledges the uncertainty in the geometry, slip rate, and existence of the SJHBT and other blind thrust faults by weighting these faults less than 100-percent in their PSHA calculations.

Ground Shaking. A probabilistic seismic hazard analysis (PSHA) of horizontal ground shaking was performed to evaluate the likelihood of future earthquake ground motions occurring at the site. A PSHA is a mathematical process based on probability and statistics that is used to estimate the mean number of events per year (Annual Frequency of Exceedance) in which the level of some ground motion parameter exceeds a specified risk level. The mathematical computations of probability and statistics are based on work by Cornell (1968). The commercial computer program *EZ-FRISK* ver. 7.22 was used to make the mathematical computations for this analysis. The software program *EZ-FRISK* is based on earlier work of McGuire (1976) but has been updated and modified to analyze earthquake sources as 3-D planes using modern attenuation relationships.

The seismic source model used for the PSHA computations was the CGS Statewide Database of faults and gridded seismicity (CDMG OFR 96-08; Petersen et al., 1996; Cao et al., 2003). A search radius of 80 kilometers was selected as this is the maximum site-to-source distance applicable to the attenuation relationship used in the PSHA computations (Boore et al., 1997). Review of the CDMG database indicates that 23 seismogenic faults are located within a radius of 80 kilometers of the site coordinates (Latitude 33.6105°N, Longitude 117.8804°W). The "Maximum Moment Magnitude" presented in Appendix A of CGS OFR 96-08 (revised 2003) and the CGS California Fault Parameters web page are taken to represent the maximum earthquake each of the 23 faults presented in Table 1 are capable of generating under the current tectonic regime

Table 1 - Seismic Source Model[1]

Fault Name	Distance (km)	Seismology Parameters		
		Maximum M_W	Fault Type	Slip Rate (mm/yr)
San Joaquin Hill Blind Thrust	<1.0	6.6	bt	0.5
Newport-Inglewood (Offshore)	3.7	7.1	rl-ss	1.5
Newport-Inglewood (L.A. Basin)	4.1	7.1	rl-ss	1.0
Palos Verdes	22.9	7.3	rl-ss	3.0
Chino-Central Avenue	30.7	6.7	rl-r-o	1.0
Whittier	33.7	6.8	rl-ss	2.5
Elsinore - Glen Ivy	35.2	6.8	rl-ss	5.0
Puente Hill Thrust	35.2	7.1	bt	0.4
Coronado Bank	38.3	7.6	rl-ss	3.0
San Jose	47.7	6.4	ll-r-o	0.5
Elsinore - Temecula	49.4	6.8	rl-ss	5.0
Elysian Park Thrust (upper)	54.8	6.4	r	1.3
Sierra Madre	58.2	7.2	r	2.0
Cucamonga	58.9	6.9	r	5.0
Raymond	60.6	6.5	ll-r-o	1.5
Verdugo	63.2	6.9	r	0.5
Clamshell-Sawpit	64.0	6.5	r	0.5
Hollywood	65.2	6.4	ll-r-o	1.0
Rose Canyon	68.8	7.2	rl-ss	1.5
Santa Monica	70.7	6.6	ll-r-o	1.0
San Jacinto - San Bernardino	74.1	6.7	rl-ss	12.0
San Jacinto - San Jacinto Valley	75.0	6.9	rl-ss	12.0
Malibu Coast	76.4	6.7	ll-r-o	0.3

[1] - CDMG Statewide Fault Database (CDMG OFR 96-08, revised 2003)

[2] - rl = right-lateral; ll = left-lateral; ss = strike-slip; r = reverse; o = oblique; bt = blind thrust

The PSHA computations were performed for peak horizontal ground acceleration (PHGA) using equally-weighted attenuation relationships of Abrahamsom and Silva (1997), Boore et al. (1997), Campbell and Bozorgnia (2003), and Sadigh et al. (1997). These attenuation relationships require that the site be categorized according to material type in the upper 30 meters of the site. Based on the site geology and the projected subsurface conditions following grading, the upper 30 meters of the site will be predominantly underlain by engineered fill and bedrock of the Monterey Formation. These materials can be characterized as stiff soils over soft rock. Given this, our seismic hazard analysis utilized a conservative shear wave velocity of about 380 meters/second, which corresponds to the lower limit of the S_C Soil Profile Type (Boore et al., 1997). In accordance with the 2007 CBC, the specified risk level for this analysis was a ~475 year ARP hazard level (i.e., 10 percent probability of exceedance in 50 years). The site coordinates used in the PSHA were 33.6105° North Latitude and 117.8804° West Longitude. The PSHA included contributions of earthquake events with magnitude of 5.0 or greater. The PHGA at the specified risk level of ~475 ARP is 0.40g.

GEOTECHNICAL ENGINEERING FINDINGS AND DESIGN

SLOPES

No significant slopes are planned within the property and none exist at the perimeter of the property. Issues related to slope stability are therefore not anticipated to have an adverse impact on the project.

SETTLEMENT

General. The depth of planned engineered fill is anticipated to be 5 to 10 feet following both design and corrective grading. Total fill depths (i.e., new and existing fill) are anticipated to range from 5 to about 25 feet. All fill will be placed as engineered fill on top of existing suitable artificial fill, terrace deposits, or bedrock. Post-grading settlement of these shallow-depth fills is anticipated to be minor as most of the grading related settlement (i.e., due to fill self weight) should be complete at the completion of grading. Secondary compression is not anticipated due to: (1) the low plasticity of anticipated fill soils, (2) the low fill thickness, and (3) the over-consolidated nature of the underlying terrace deposits and bedrock. Hydro-compression of the fill soils should be minor due to the fact that the fills will be placed above optimum moisture content

Significant post-grading settlement of the underlying bedrock due to loading from the proposed fills is not anticipated. Similarly, hydro-collapse of the bedrock materials will be negligible due to the existing high-density and over-consolidated nature of these materials.

For the reasons discussed above, post-grading settlements related to grading are not anticipated to have a significant effect on structures and improvements. Conservatively, total and differential settlements are not anticipated to exceed 1.5" and 0.75", respectively.

Settlement Monitoring. Due to the relatively shallow to moderate total fill depths, settlement monitoring is not considered necessary

EXPANSIVE SOILS

Expansion index testing on two samples of anticipated fill material indicates EIs of 19 and 44. This testing suggests a very low to low expansion potential. However, based on the testing being at the upper limit of the "low" expansion classification, and our review of the boring logs, we recommend that a medium expansion potential be assumed for design of the on-site improvements. Additional expansion index testing is recommended below proposed improvements upon completion of grading and prior to construction.

CORROSIVE SOILS

To evaluate the corrosion potential of the on-site soils to both ferrous metals and concrete, representative samples were tested for pH, minimum resistivity, soluble chlorides, and soluble sulfates. The results are contained in Appendix B and indicate that the on-site soils possess a negligible sulfate exposure to concrete, and should be considered corrosive to ferrous metals. Further corrosivity testing is recommended below proposed improvements upon completion of grading and prior to construction to confirm the results provided here.

LIQUEFACTION

The subject property is not located within a mapped liquefaction hazard zone on the Seismic Hazard Zone Map for the Newport Beach Quadrangle (CGS, 1997). Furthermore, the presence of shallow bedrock and the absence of saturated alluvial soils indicate that liquefaction potential is negligible.

EXCAVATION CHARACTERISTICS

Rippability and Oversize Rock. The surficial geologic materials present at the site (i.e., artificial fill, colluvium, and terrace deposits) can be excavated with scrapers, dozers, excavators, and backhoes. These materials may require light to medium ripping with a Caterpillar D9, or equivalent equipment. Although bedrock of the Monterey Formation is not likely to be encountered during grading, this rock can also typically be excavated with scrapers and dozers after light to medium ripping with a Caterpillar D9, or equivalent equipment.

Rock clasts in excess of 6 inches in diameter were not encountered during our investigation. If encountered during grading, oversized (i.e., >6 inches) rock, concrete, or asphalt materials would require export or placement within approved areas.

Volume Change. Corrective grading removals that are recommended to support the designed grading will typically involve removal and recompaction of low-density, compressible materials such as weathered artificial fill, and possibly minor amounts of colluvium and terrace deposits. The corrective grading removals or over-excavations are therefore anticipated to shrink in volume approximately 5%. Demolition and removal of existing site improvements should also be considered in determining the overall earthwork balance.

Trenching. Trenching is anticipated to be feasible with standard trenching equipment, such as backhoes or excavators. Trench support requirements are expected to consist of those required by safety laws and/or government regulations.

FILL SUPPORT

The near-level areas within the project that are underlain by competent artificial fill, terrace deposits, or in-place bedrock materials will be suitable for the support of the planned fills and improvement after the removal of all topsoil and low-density or potentially compressible soils such as the uppermost about 5 feet of artificial fill. Specific corrective grading recommendations are provided in a subsequent section of this report.

SOIL MOISTURE CONDITIONS

Observation of the on-site soils, in addition to the moisture and density data included in Appendix B, suggests that the soils to be handled during grading (i.e., the uppermost ~5 feet) have variable moistures that tend to be slightly below the optimum moisture content. Note that the moisture content may vary depending on irrigation practices and seasonal variations in precipitation. The majority of the materials to be handled during grading will therefore require some blending or addition of water to meet acceptable moisture ranges for sufficient compaction (i.e., minimum 2% above optimum).

CONCLUSIONS

We have reviewed the current plan (reference 1) and conclude that the grading and improvements are feasible and practical from a geotechnical standpoint if accomplished in accordance with requirements of the City of Newport Beach and the recommendations presented in subsequent sections of this report. A summary of conclusions is as follows:

1. The project area is underlain predominantly by artificial fill, which is underlain by Monterey Formation and minor amounts of colluvium and terrace deposits. The artificial fill will require minor corrective grading (i.e., ~5 feet) to support the proposed grading and future improvements.
2. No known active surficial faults cross the project area. The closest active fault is the Newport-Inglewood fault zone, which is located approximately 3.7 kilometers from the site. The site is also located within 1 km of the San Joaquin Hills Blind Thrust. A probabilistic seismic hazard analysis for the site suggests a PGA of 0.40g.
3. Liquefaction potential at the site is negligible
4. The soils anticipated to be involved in the proposed grading are anticipated to possess a negligible sulfate exposure to concrete, to be corrosive to ferrous metals, and have a very low to medium expansion potential.
5. Groundwater is not likely to be encountered during the planned grading.

RECOMMENDATIONS

GENERAL

The subject site should be utilized in accordance with requirements of the City of Newport Beach (and all other applicable codes and ordinances) and the recommendations as outlined in the following sections of this report. Future grading plans, improvement plans, foundation plans, etc. should be reviewed by GMU Geotechnical prior to grading and construction. Particular care should be taken to confirm that all project plans conform with the recommendations provided in this report. All grading and construction should also be monitored by GMU Geotechnical to verify general compliance with the recommendations outlined in this report.

SITE PREPARATION AND GRADING

General. All site preparation and grading should be performed in accordance with requirements of the City of Newport Beach (and all other applicable codes and ordinances) and the recommendations presented in this report.

Demolition and Clearing. All significant organic materials such as weeds, brush, tree branches, roots, construction debris, or other decomposable materials should be removed from areas to be graded. Special care should be taken during and after demolition to ensure that all debris is removed from the site. Soil or rock materials disturbed by demolition activities should also be removed and recompacted prior to additional fill placement.

Corrective Grading. Corrective grading will involve removal of existing soil materials from areas to receive fill or where exposed at design grade in cut areas. It should be noted that the recommendations provided herein are approximations based on our subsurface exploration and knowledge of the on-site soils. Actual removals may vary based on observations of geologic materials encountered during grading. The bottom of all corrective grading removals shall be observed by a GMU representative to verify the suitability of in-place soils prior to fill placement. Corrective grading should be anticipated as follows:

(a) <u>Removal of Unsuitable Material</u>. Low-density artificial fill that is present where fill is to be placed should be removed. Based on the laboratory testing and drilling observations, we anticipate that the corrective grading will be approximately 5 feet deep. Corrective grading removals in the uppermost 5 feet may also involve terrace deposits or colluvium. Deeper removals may be necessary if unsuitable soils are observed to be locally thicker during grading. Furthermore, areas where designed cut is less than about 5 feet below the existing ground surface will require corrective grading such that the uppermost 5 feet of material (below existing ground surface) has been removed and recompacted.

(b) <u>Over-Excavation</u>. Proposed building pads should be over-excavated, if necessary, to provide a uniform fill blanket at least 5 feet thick below the bottom of proposed footings.

Temporary Construction Excavations. During the grading of the site, the contractor should conform to all applicable occupational and health standards, rules, regulations, and orders established by the State of California and the Federal Government, including shoring bracing, sloping, or other provisions as necessary. The contractor should also install sheet piling, shoring, cribbing, or whatever means are necessary to support existing structures and roadways within or adjacent to the grading limits.

FILL MATERIAL AND PLACEMENT

Suitability. All on-site soil material, including that removed by corrective grading, is suitable for use as compacted fill from a geotechnical perspective if care is taken to remove all significant organic and other decomposable debris, and separate and stockpile rock materials larger than 6 inches in maximum diameter.

Compaction Standard and Methodology. All soil material used as compacted fill, or material processed in-place or used to backfill trenches, should be moistened, dried, or blended as necessary and densified to at least 90% relative compaction as determined by ASTM Test Method D 1557. It is recommended that fills be placed a minimum of 2% above optimum moisture content.

Use of Rock or Broken Concrete. Significant rock materials greater than 6 inches in diameter are not anticipated during the subject grading. However, if encountered, rock or broken concrete material between 6 and 12 inches in diameter may be placed in limited quantities within non-structural fill areas if placed in accordance with methods approved by GMU. Oversize rock or broken concrete material greater than 12 inches in diameter will require crushing or export.

STRUCTURE SEISMIC DESIGN

No active or potentially active faults are known to cross the site, therefore, the potential for primary ground rupture due to faulting on-site is very low to negligible. However, the site will likely be subject to seismic shaking at some time in the future. Site-specific seismic design parameters were determined using the USGS computer program titled "Seismic Hazard Curves and Uniform Hazard Response Spectra, Version 5.0.8." The site coordinates used in the analysis were 33.6105° North Latitude and 117.8804° West Longitude. On-site structures should be designed in accordance with the following 2007 CBC criteria:

Parameter	**Factor**	**Value**
0.2s Period Spectral Response	S_S	1.80g
1.0s Period Spectral Response	S_1	0.67g
Soil Profile Type	Site Class	C
Site Coefficient	F_a	1.00
Site Coefficient	F_v	1.30
Adjusted Spectral Response	S_{MS}	1.80g
	S_{M1}	0.87g
Design Spectral Response	S_{DS}	1.20g
	S_{D1}	0.58g

It should be recognized that much of southern California is subject to some level of damaging ground shaking as a result of movement along the major active (and potentially active) fault zones that characterize this region. Design utilizing the 2007 CBC is not meant to completely protect against damage or loss of function. Therefore, the preceding parameters should be considered as minimum design criteria.

FOUNDATION DESIGN CRITERIA

General. The following foundation design recommendations are based on the results of our exploration and testing and may be applied to the Tennis Clubhouse, The Villas, and/or The Bungalows that are planned on the property. As discussed previously in this report, we recommend that the on-site improvements, including foundation systems, be designed using a medium expansion potential as defined by the CBC. The foundation system will also need to be designed for potential long-term differential settlement as described in a previous section of this report.

Foundation Type(s). It is our understanding that the structural engineer for the Tennis Clubhouse (Scott Wallace Structural Engineers) has recommended a mat slab for the Tennis Clubhouse. We have also been informed that the structural engineer for The Villas (ESI/FME, Inc Structural Engineers) is currently recommending post-tension slabs, with the possibility of using conventional non pre-stressed ribbed slabs as an alternative. Consequently, this report presents recommendations for each of the three types of foundations.

- *Conventional Non Pre-Stressed Ribbed Slab* Design in general accordance with the most recent version of WRI/CRSI – Design of Slab-on-Ground Foundations.

- *Post-Tension Slab (post tensioned mat or ribbed slab)* PTI Methodology.

- *Non Pre-Stressed Mat Slab.* Based on PTI equations for moment, shear, and required stiffness, or other alternate rational method specified by the structural engineer.

Bearing Materials. All foundations should bear into engineered fill approved by a representative from GMU.

Bearing Value. An allowable bearing pressure of 2000 pounds per square foot (psf) may be used for foundations at least 12 inches wide and embedded a minimum of 18 inches below the top of slab or lowest adjacent grade. The allowable bearing pressure may be increased to 2800 pounds per square foot for foundations with a minimum embedment of 24 inches.

Lateral Load Design. Lateral loads may be resisted by friction at the base of the foundations and by passive resistance within the adjacent earth materials A coefficient of friction of 0.35 may be used between the foundations and the recommended bearing material. Passive resistance equal to 300 pounds per square foot per foot of embedment may be assumed When combining passive resistance and friction for resistance of lateral loads, the passive component should be reduced by one-third. In addition, the upper 6 inches of embedment for the at-grade foundations should be disregarded when calculating passive pressures. The values for passive pressure and bearing pressure may be increased by one-third when designing for short-duration wind and seismic forces

Subgrade Soil Moisture Content. Foundation subgrades should be moisture conditioned/pre-saturated as necessary to at least 3% over the optimum moisture content to a minimum depth of 18 inches. The moisture content of the subgrade soils should be verified by GMU prior to initiating foundation construction.

Concrete. It is anticipated that the typical soil materials at the site will have a negligible sulfate exposure per the CBC. Although not required by code, we recommend the use of Type V cement along with a maximum water/cement ratio of 0.50 to be used for all foundations including buildings, walls, and miscellaneous foundations (i.e., pilasters, shade structures, barbeques, etc.). This recommendation will serve to minimize the potential of water and/or vapor transmission through the concrete and minimize the potential for physical attack to concrete from non-sulfate based salts. In addition, wet curing of the concrete as described in ACI Publication 308 should be considered.

The aforementioned recommendations in regards to concrete are made from a soils perspective only. Final concrete mix design as well as any concrete testing is outside our purview. All applicable codes, ordinances, regulations, and guidelines should be followed in regard to designing a durable concrete with respect to the potential for detrimental exposure from the on-site soils and/or changes in the environment.

Post Construction Movements. Settlement due to foundation loads is anticipated to be minor (i.e., ½" total and ¼" differential). For design, the proposed structures should be designed for 1.0 inch differential settlement over a horizontal distance of 40 feet.

CONVENTIONAL NON PRE-STRESSED RIBBED SLAB

Slab Design. Ribbed slabs should be designed in accordance with Section 1805.8 of the 2007 CBC utilizing an Effective Plasticity Index of 30. The ribbed slab should also have a minimum thickness of 5 inches and be minimally reinforced with No. 4 bars at 18 inches on center.

Minimum Footing Depth. The minimum footing depth is 18 inches below top of slab (for interior footings/stiffner beams) and lowest adjacent outside grade (for perimeter footings). Reinforcement should be determined by the structural engineer.

Maximum Beam Spacing. The maximum beam spacing should be 15 feet.

POST-TENSIONED SLAB (MAT OR RIBBED SLAB)

Slab Design. The post-tensioned slab foundation systems should be designed assuming a medium expansive condition exists. The slab foundation systems will also need to be designed for potential long-term differential settlement. These parameters should be utilized in accordance with the most recent PTI design method to calculate values of bending moment, shear, and differential deflection expected to occur. The calculated values of moment, shear, and deflection may then be used in the design of post-tensioned slab foundations.

Geotechnical Design Parameters for Post-Tension Footings.

Minimum Footing Depth. For ribbed slabs, the minimum footing depth is 18 inches below top of slab (for interior footings) and lowest adjacent outside grade (for perimeter footings). For mat slabs, the perimeter edge should be 12 inches below lowest adjacent outside grade. Reinforcement should be determined by the structural engineer.

Slab Subgrade Friction. The structural engineer should determine an appropriate friction coefficient value expected to be effective during tendon stressing.

Modulus of Subgrade Reaction. A modulus of subgrade reaction of 150 pounds per square inch per inch may be utilized in the design of post-tension foundation systems.

Design and Construction Methods. The methods used in the design and construction of the post-tension foundation systems should conform to all applicable and current codes, ordinances, and standards. The allowable limits selected for foundation deflection due to any differential soil expansion should be coordinated with the architect and structural engineer responsible for the design of the structure framing and roof systems. They should confirm that such deflection will not cause excessive distress to those systems or to interior and exterior walls and ceilings of the planned structures.

Slab Thickness. Slab thickness should be determined by the structural engineer responsible for design of post-tension foundation systems.

PTI Slab Type. Post-tension foundation systems for the site should be designed for both potential expansion and settlement. The following parameters are presented assuming that the PTI method of design is utilized.

Expansion. The following design parameters assume a medium expansive soil condition and account for "factors not related to climate" per Section 4.2 (B)(4) of the Post-Tensioning Institute publication entitled "Design and Construction of Post-Tensioned Slab On Ground," Second Edition.

Edge Moisture Variation Distance, e_m	
Edge Lift	3.5 feet
Center Lift	5.0 feet
Differential Swell, y_m	
Edge Lift	1.00 inches
Center Lift	2.50 inches

The above recommendation for differential swell in the edge lift condition requires a minimum edge beam embedment of 18 inches for a ribbed slab. The perimeter edge of post-tensioned mat slabs should have a minimum embedment of 12 inches.

Our foundation design recommendations assume that the moisture content of the subgrade soils will be maintained above the optimum moisture content (i.e., at least 3% over optimum) prior to and during foundation construction, that the site will be developed in a timely manner following construction of post-tension foundation systems, and that the site will be maintained in such a manner that extreme changes in soil moisture content do not occur.

Post-tension End Caps. The on-site soils are corrosive to metals. Consequently, adequate protection of the post-tension cable end caps should be provided by the structural designer.

NON PRE-STRESSED MAT SLAB

Slab Design. Non pre-stressed mat slabs should be designed based on PTI equations for moment, shear, and required stiffness. The post-tension soil parameters presented above should be used for PTI-based design. As an alternate for design, other rational design methods specified by the structural engineer may be used, subject to review by GMU.

Minimum Depth for Moisture Cut-Off. For mat slabs, the perimeter edge should be 12 inches below lowest adjacent outside grade.

MOISTURE VAPOR RETARDER

Moisture Vapor Retarder. A moisture vapor retarder should be constructed below all slab areas of the foundation system, including non-living and basement areas. The moisture vapor retarders, at a minimum, should have: 1) a minimum thickness of 15 mils, 2) a U.S. perm rate of 0.02 or less, and 3) a tensile strength of 70 lbf/inch or greater (i.e., Stego 15 mil or equivalent).

Moisture vapor retarders should be installed in accordance with the manufacturer's recommendations as well as with all applicable recognized installation procedures such as ASTM E 1643-98. Joints between sheets and the openings for utility piping should be lapped and taped. If the barrier is not continuously placed across footings/ribs, the barrier should, as a minimum, be lapped into the sides of the footing/rib trenches down to the bottom of the trench. Punctures in the vapor barrier should be repaired prior to concrete placement. Proper placement of the retarder is the responsibility of the contractor.

Prior to placing the retarder, a minimum of 2 inches of sand, having a minimum sand equivalent of 30, should be placed in a dry condition over the subgrade.

The need for sand and/or the amount of sand above the moisture vapor retarder should be specified by the structural engineer. The selection of sand above the retarder is not a geotechnical engineering issue and is hence outside our purview. However, if sand is to be placed above the barrier for this project, the sand should be placed in a dry condition.

WATER VAPOR TRANSMISSION

General. As discussed in a previous section of this report, placement of a moisture vapor retarder below all slab areas is recommended. This moisture vapor retarder recommendation is intended only to reduce moisture vapor transmissions from the soil beneath the concrete and is consistent with the current standard of the industry for residential construction in Southern California. It is not intended to provide a "waterproof" or "vapor proof" barrier or reduce vapor transmission from sources above the retarder. Sources above the retarder include any sand placed on top of the retarder (i.e., to be determined by the project structural designer) and from the concrete itself (i.e., vapor emitted during the curing process). The evaluation of water vapor from any source and its effect on any aspect of the proposed living space above the slab (i.e., floor covering applicability, mold growth, etc.) is outside our purview and the scope of this report

FLOOR COVERINGS

Prior to the placement of flooring, the floor slabs should be properly cured and tested to verify that the water vapor transmission rate (WVTR) is compatible with the flooring requirements

RETAINING WALL DESIGN AND CONSTRUCTION CRITERIA

Foundation Design Parameters.

Minimum Foundation Width	12 inches
Minimum Depth	18" below lowest outside adjacent grade
Bearing Materials	Engineered fill
Allowable Bearing Capacity	2000 psf; can be increased to maximum 2800 psf for foundations with minimum embedment of 24 inches
Coefficient of Friction	0.35
Unit Weight of Backfill	125 pcf
Passive Earth Pressure	300 psf/foot of depth (reduce by one-third when combining friction and passive pressure)

Wall Design Parameters.

Lateral Earth Pressure. The following equivalent fluid pressures in pounds per cubic foot are presented with their applicable conditions:

Restrained Wall: (At-rest)	65 pcf for level backfill 85 pcf for sloping backfill
Unrestrained Wall:	45 pcf for level backfill 65 pcf for sloping backfill

The unrestrained values are applicable only when the walls are designed and constructed as cantilevered walls allowing sufficient wall movement to mobilize active pressure conditions. This wall movement should not be less than 0.01 H (H = height of wall) for the unrestrained values to be applicable.

Given the height of the potential on-site walls, our understanding of the proposed structures, the historic performance of retaining walls during earthquakes, and the life-safety design criteria normally assumed for seismic design, the incorporation of seismic earth pressures does not, in our opinion, appear to be warranted. However, should the structural engineer and/or owner desire additional protection during an earthquake event, a seismic earth pressure of 15H psf (applied as a rectangular pressure) may be added to the static lateral earth pressure.

Wall Backfill. In general, all retaining wall backfill to within 1 to 2 feet of final grade should consist of granular material possessing a very low (i.e., EI < 20) expansion potential. However, the final determination of the material to be used for backfill shall be made by the geotechnical consultant prior to use. Gravel backfill should possess a gradation that will not allow significant fines migration. Gravels such as open, poorly graded rock (i.e., ¾-inch rock) will require filter fabric (Mirafi 140N or equivalent) to minimize the potential for migration of fines into the gravel. The width of this backfill zone should be equal to at least one-half the height of the wall.

Fine-grained native soils should be used to cap the upper 2 feet of the select backfill zone where walls are greater than 3 feet in height. Where walls are less than 3 feet in height but greater than 2 feet, the fine-grained cap should not be greater than 1.5 feet, and where walls are less than 2 feet in height, the fine-grained cap should be limited to 1 foot.

All native wall backfill should be moisture conditioned as necessary to a minimum 2% over the optimum moisture content and compacted to at least 90% relative compaction as determined by ASTM Test Method D 1557. The unit weight of select wall backfill can be assumed to be 125 pcf.

Drainage. The retaining walls should be constructed to provide for subdrainage at the back of the walls. A backdrain consisting of 4-inch-diameter perforated plastic pipe surrounded by at least 1 cubic foot of an approved filter material per lineal foot of pipe is recommended.

Backdrain systems should outlet into area drain facilities. The wall design should attempt to provide backdrain outlets spaced no greater than about every 200 feet. The backdrain gradient should not be less than 1% where possible.

Waterproofing. The back side of all retaining walls should be waterproofed down to the bottom of the foundation prior to placing subdrains or backfill. The design and selection of the waterproofing system is outside the scope of this report and is outside our purview.

Control/Construction Joints. Control/construction joints should be designed by the structural engineer. At a minimum, vertical joints should be provided at angle points and at regular intervals.

MISCELLANEOUS FOUNDATIONS

General. Concrete for all miscellaneous foundations should be Type V and have a maximum water/cement ratio of 0.50. The bottom of all footings should be moisture conditioned as needed to a minimum of 2% over optimum moisture content. It should be noted that depending on the moisture conditioning efforts applied during grading, additional moisture conditioning may not be necessary. In this regard, it is recommended that the geotechnical consultant determine the moisture content of subgrade soils prior to the initiation of moisture conditioning efforts.

Shade Structures, Fountains, Barbeques, etc. Foundations for shade structures, fountains, barbeques, etc. should be a minimum of 18 inches deep. Minimum reinforcement should consist of two #5 bars placed in the top and bottom of the footing (four bars total).

Fence Post Foundations. Foundations for fence posts should be a minimum of 12 inches in diameter and 18 inches deep.

Wall Foundations and Pilasters. The following parameters may be utilized for the design of non-retaining wall foundations and pilasters.

Minimum Footing Depth All footings must be a minimum depth of 18 inches below the lowest adjacent grade.

Bearing and Foundation Resistance. An allowable bearing pressure of 2000 pounds per square foot may be used for foundations at least 12 inches wide and embedded a minimum of 18 inches below the lowest adjacent grade. The bearing value may be increased 20% for each additional foot up to a maximum 2800 psf.

Lateral loads may be resisted by friction at the base of the foundations and by passive resistance within the adjacent earth materials A coefficient of friction of 0.35 may be used between the foundations and the bearing material. Passive resistance equal to 300 pounds per square foot per foot of embedment may be assumed. The above values may be increased by one-third when designing for short-duration wind or seismic forces. When combining passive resistance of lateral loads, the passive component should be disregarded in the upper 6 inches to account for future ground disturbance.

CORROSION PROTECTION OF METAL STRUCTURES

The results of the laboratory chemical tests performed on soil samples collected within and adjacent to the subject area indicate that the on-site soils have a corrosion potential to ferrous metals. Consequently, metal structures which will be in direct contact with the soil (i.e., underground metal conduits, pipelines, metal sign posts, metal door frames, etc.) and/or in close proximity to the soil (wrought iron fencing, etc.) may be subject to corrosion. The use of special coatings or cathodic protection around buried metal structures has been shown to be beneficial in reducing corrosion potential. The potential for corrosion of ferrous metal reinforcing elements embedded in structural concrete will be reduced by the use of the recommended maximum water/cement ratio for concrete.

The laboratory testing program performed for this project does not address the potential for corrosion to copper piping. In this regard, a corrosion engineer should be consulted to perform more detailed testing and develop appropriate mitigation measures (if necessary). Otherwise, the on-site soils should be considered corrosive to copper.

The above discussion is provided for general guidance in regards to the corrosiveness of the on-site soils to typical metal structures used for construction. Detailed corrosion testing and recommendations for protecting buried ferrous metal and/or copper elements is beyond our purview.

PAVEMENT DESIGN

Asphalt Pavement Design. R-value testing was performed on a representative soil sample to evaluate the required thicknesses of asphalt pavement for parking stalls, drive aisles, and the main drive (Lot D). The sample is considered worst-case for the site, and yielded an R-value of 13. Based on the low R-value of 13, the following pavement thicknesses should be anticipated:

Location	R-Value	Traffic Index	Asphalt Concrete (in.)	Aggregate Base* (in.)
Parking Stalls	13	4.0	3.0	6.0
Drive Aisles	13	5.5	4.0	9.0
Main Drive (Lot D)	13	6.5	4.0	13.0

* Assumes R-value of 78

Final design sections will be based on additional testing performed at the completion of future precise grading of the specific locations, and confirmation of the traffic indices by the project civil engineer.

Concrete Pavement Design. Driveways and appurtenant concrete paving, such as trash receptacle bays or concrete parking areas, will require Portland cement concrete (PCC) pavement. Assuming a T.I. of 6 to 7, a design section of 8 inches of PCC over 6 inches AB should be adequate. The AB should be Class 2 compacted to a minimum of 95% relative compaction as per ASTM D 1557.

SWIMMING POOL DESIGN CRITERIA

The reference (1) plan illustrates several swimming pools, spas, and adjacent decking. These improvements should be designed in minimum accordance with Plate C-1 -- Swimming Pool and Spa Design Criteria Detail for Low to Medium Expansion Sites. Corrosive conditions should also be accommodated. The swimming pool and spa excavations will expose engineered fill; however, if the pool or spa excavations encounter a fill-bedrock transition, the bottom should be over-excavated an additional 3 feet minimum. All pool excavations should be inspected by GMU during construction in order to confirm the design criteria presented herein.

The flatwork for the proposed swimming pools and spas should be designed in minimum accordance with Plate C-2 -- Pool Deck Detail Design Criteria for Low to Medium Expansion Soils Sites. Plates C-1 and C-2 are contained in Appendix C -- Swimming Pool and Spa Details.

CONCRETE FLATWORK

Flatwork Recommendations. Flatwork should be designed in minimum accordance with the recommendations contained in Appendix D - Table 1. It should be noted that the recommendations contained in this table are largely to improve "post-cure" performance relative to expansive soils. All other aspects of concrete design (i.e., concrete mix design, curing, type, and location of joints, etc.), as well as concrete inspection of any kind, are outside our purview. It is recommended that the final flatwork design be reviewed by our office prior to bidding.

It should further be noted that even with extensive crack control and expansive soil mitigation, all concrete flatwork will crack and move (i.e., lift) to some degree due to a variety of mechanisms. Consequently, concrete cracking and movement and hence concrete repair/ replacement should be anticipated.

Pool and Spa Decking Recommendations. Flatwork adjacent to pools and spas should be designed in accordance with Plate C-2 included in Appendix C -- Swimming Pool and Spa Details.

UTILITY TRENCH BACKFILL CONSIDERATIONS

Backfill compaction of utility trenches in and immediately adjacent to building pad areas and in any driveway, parking, or other improvement or concrete flatwork areas should be such that no significant settlement will occur. Backfill for all of these trenches should be compacted to at least 90% relative compaction subject to sufficient observation and testing. In the event that granular material having a sand equivalent of 30 or greater is used for backfill and this material is thoroughly flooded into place, extensive testing is not required. If native material with a sand equivalent less than 30 is used for backfill, it should be placed at near-optimum moisture content and mechanically compacted. Jetting or flooding will not densify native soil materials with a sand equivalent less than 30 due to its silty to clayey nature. Also, jetting or flooding of granular material should not be used to consolidate backfill in trenches adjacent to any foundation elements.

Where trenches closely parallel a footing and the trench bottom is located within a 1 horizontal to 1 vertical plane projected downward and outward from any structure footing, concrete slurry backfill should be utilized to backfill the portion of the trench below this plane The use of concrete slurry is not required for backfill where a narrow trench crosses a footing at about right angles.

We suggest that these recommendations be included as a specification in all subcontracts for underground improvements.

LANDSCAPING AND MAINTENANCE

We recommend that a qualified landscape architect be retained to provide detailed recommendations for planting and maintenance. In order to avoid future distress related to moisture build-up and groundwater, extra precaution should be taken with respect to irrigation, drainage, and maintenance. Specifically, the irrigation systems should be designed to provide low rates of precipitation and operated to avoid saturation of ground surfaces.

SURFACE DRAINAGE

Surface drainage should be carefully controlled to prevent ponding of water on flat pad areas. Positive drainage away from structures is essential to reduce the potential for moisture migration through the floor slabs. Maintaining positive drainage of all landscaping areas along with avoiding over-irrigation will help minimize the possibility of "perched" groundwater accumulating slightly below the graded surfaces. All drainage at the site should be in minimum conformance with the applicable codes and standards of the City of Newport Beach

FUTURE PLAN REVIEW

The precise grading plans, final foundation plans, wall plans, and landscaping plans should be reviewed by our office Structural calculations for walls should also be reviewed.

FUTURE IMPROVEMENTS

Any additional or future improvements that are not specifically addressed in this report or shown on the reference (1) plans should be subject to additional geotechnical evaluation. Additional recommendations for future improvements can be provided upon request.

LIMITATIONS

All parties reviewing or utilizing this report should recognize that the findings, conclusions, and recommendations presented represent the results of our professional geological and geotechnical engineering efforts and judgements We believe we have exercised a degree of care comparable to the standard of practice presently maintained by other professionals in the fields of geotechnical engineering and engineering geology, and believe that our findings present a reasonably representative description of geotechnical conditions and their probable influence on the use of the property.

SUPPORTING DATA

The Plates and Appendices which complete this report are listed in the Table of Contents.

Respectfully submitted,

GMU GEOTECHNICAL, INC.

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Gary K. Urban, GE 2237
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/07-140-00R (5-2-08)

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SITE-SPECIFIC REFERENCES

(1) "Vesting Tentative Tract Map No. 15347 in the City of Newport Beach, County of Orange, State of California" dated October 30, 2007, prepared by Adams-Streeter Civil Engineers, Inc.

(2) "Geotechnical Investigation of Corporate Plaza West Phase 2 Building Located within Corporate Plaza West Near Intersection of Pacific Coast Highway and Clubhouse Drive, City of Newport Beach, County of Orange," dated August 23, 2005, prepared by NMG Geotechnical, Inc. (NMG Project 97070-03).

(3) "Preliminary Geotechnical Investigation for Proposed Office Building at Newport Center Drive and Granville Drive, 1150 Granville Drive, Lot 10, Tract 14839, City of Newport Beach, County of Orange," dated January 19, 2004, prepared by NMG Geotechnical, Inc. (NMG Project 03099-01).

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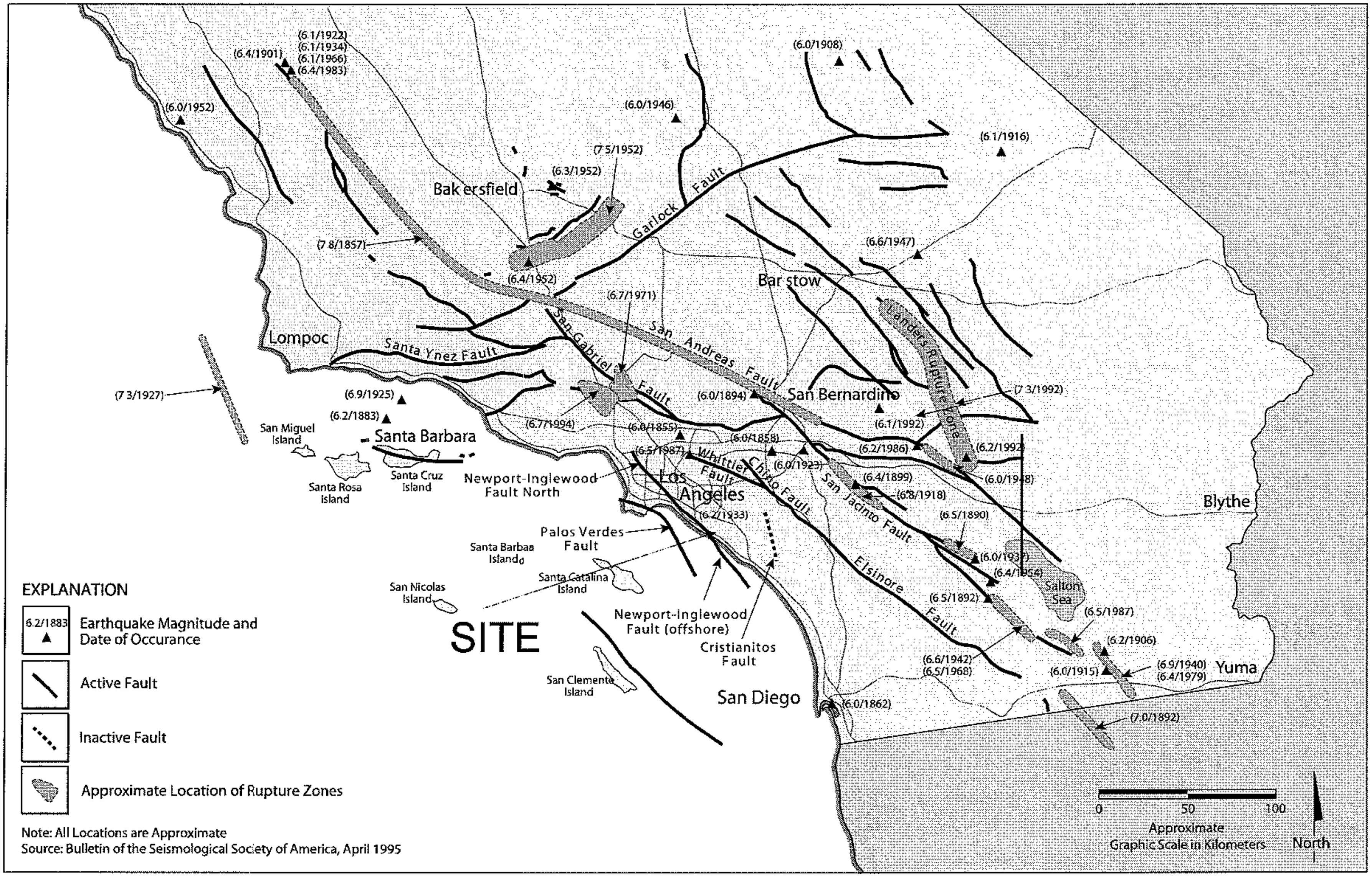

GMU GEOTECHNICAL, INC

REGIONAL SEISMICITY:
Location of Major Active Surface Faults, Significant Inactive Faults, and Major Earthquake Epicenters (M>6.0)

Plate 2

P4-1/1/2002

APPENDIX A

GMU
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APPENDIX A

GMU GEOTECHNICAL EXPLORATION PROCEDURES AND BORING LOGS

Our exploration at the subject site consisted of eight (8) hollow stem auger borings. The estimated locations of the borings are shown on Plate 1 – Geotechnical Map. Our borings were logged by an engineering geologist, and bulk and undisturbed samples of the excavated soils were collected. The logs of each boring are contained in this Appendix A, and the Legend to Logs is presented as Plate A-1.

The geologic and engineering field descriptions and classifications that appear on these logs are prepared according to Corps of Engineers and Bureau of Reclamation standards. Major soil classifications are prepared according to the Unified Soil Classification System as modified by ASTM Standard No 2487. Since the description and classification that appear on the Log of Drill Hole are intended to be that which most accurately describe a given interval of a drill hole (frequently an interval of several feet), discrepancies do occur in the Unified Soil Classification System nomenclature between that interval and a particular sample in that interval. For example, an 8-foot-thick interval in the Log of Drill Hole may be identified as silty sand (SM) while one sample taken within the interval may have individually been identified as sandy silt (ML). This discrepancy is frequently allowed to remain to emphasize the occurrence of local textural variations in the interval.

The descriptive terminology of the logs is modified from current ASTM Standards to suit the purposes of this study and is summarized as follows:

a.	Soil Type	- per Legend to Logs
b.	Color	- at field moisture
c.	Moisture	- (as estimated during exploration)
	"dry"	
	"damp"	- some moisture but less than optimum for compaction.
	"moist"	- near optimum.
	"wet"	- above optimum.
	"saturated"	- containing free moisture.
d.	Grain size	- "fine," "medium" and "coarse"
e.	Density (granular soils) – "loose," "medium dense" and "dense"	
f.	Consistency (cohesive soils)	
	"very soft"	Thumb will penetrate soil more than 1 inch (25 mm).
	"soft"	Thumb will penetrate soil about 1 inch (25 mm).
	"firm"	Thumb will indent soil about ¼ inch (5 mm).
	"hard"	Thumb will not indent soil but readily indented with thumbnail.
	"very hard"	Thumbnail will not indent soil.

MAJOR DIVISIONS			Group Letter	Symbol	TYPICAL NAMES
COARSE-GRAINED SOILS More Than 50% Retained On No.200 Sieve. Based on The Material Passing The 3-Inch (75mm) Sieve. Reference: ASTM Standard D2487	**GRAVELS** 50% or More of Coarse Fraction Retained on No.4 Sieve	Clean Gravels	GW		Well Graded Gravels and Gravel-Sand Mixtures, Little or No Fines.
			GP		Poorly Graded Gravels and Gravel-Sand Mixtures Little or No Fines.
		Gravels With Fines	GM		Silty Gravels, Gravel-Sand-Silt Mixtures
			GC		Clayey Gravels, Gravel-Sand-Clay Mixtures
	SANDS More Than 50% of Coarse Fraction Passes No.4 Sieve	Clean Sands	SW		Well Graded Sands and Gravelly Sands Little or No Fines
			SP		Poorly Graded Sands and Gravelly Sands Little or No Fines
		Sands With Fines	SM		Silty Sands Sand-Silt Mixtures
			SC		Clayey Sands Sand-Clay Mixtures
FINE-GRAINED SOILS 50% or More Passe The No.200 Sieve. Based on The Material Passing The 3-Inch (75mm) Sieve. Reference: ASTM Standard D2487	**SILTS AND CLAYS** Liquid Limit Less Than 50%		ML		Inorganic Silts, 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 50% or Greater		MH		Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silts.
			CH		Inorganic Clays of High Plasticity Fat Clays
			OH		Organic Clays of Medium To High Plasticity Organic Silts
HIGHLY ORGANIC SOILS			PT		Peat and Other Highly Organic Soils

ADDITIONAL TESTS

DS = Direct Shear
HY = Hydrometer Test
TC = Triaxial Compression Test
UC = Unconfined Compression
CN = Consolidation Test
(T) = Time Rate
EX = Expansion Test
CP = Compaction Test
PS = Particle Size Distribution
EI = Expansion Index
SE = Sand Equivalent Test
AL = Atterberg Limits
FC = Chemical Tests
RV = Resistance Value
SG = Specific Gravity
SU = Sulfates
CH = Chlorides
MR = Minimum Resistivity
pH
(N) = Natural Undisturbed Sample
(R) = Remolded Sample

SAMPLE SYMBOLS

Undisturbed Sample (California Sample)
Undisturbed Sample (Shelby Tube)
Bulk Sample
Unsuccessful Sampling Attempt
SPT Sample

10: 10 Blows for 12-Inches Penetration
6/4: 6 Blows Per 4 Inches Penetration
P: Push
(13): Uncorrected Blow Counts ('N' Values) for 12-Inches Penetration- Standard Penetration Test (SPT)

GEOLOGIC NOMENCLATURE

B = Bedding S = Shear
C = Contact F = Fracture
J = Joint Flt = Fault
RS = Rupture Surface

= Groundwater

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LEGEND TO LOGS
ASTM Designation: D 2487
(Based on Unified Soil Classification System)

Plate A-1

P8-1/1/2002

Project: NBCC Land/Newport Beach Country Club **Project Location: 1602 Newport Center Drive** **Project Number: 07-140-00**	**Log of Drill Hole DH-1** Sheet 1 of 2

Date(s) Drilled	**26/3/08**	Logged By	**LBS**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling, Inc.**	Total Depth of Drill Hole	**26.0 feet**
Drill Rig Type	**CME 75 Track**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**106.5**
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Open drive sampler with 6-inch sleeve/SPT**	Drill Hole Backfill	**Native**
Remarks	**Seepage at 21.5 feet; No Caving**			Driving Method and Drop	**140lb Auto Hammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
105			**ARTIFICIAL FILL (Qaf)** 6 inches asphaltic concrete no aggregate base Upper 5 feet consists of variable soil types, including sand, silt, and clay in 6-inch to 2-foot thick lifts						18		PS HY AL, CP DS (R) EI FC
	5				SILTY SAND (SM); yellowish brown, damp to moist medium dense (top of sample)		15	140	11	114	CN
100					SILTY CLAY (CL); very dark brown damp to moist, firm						
95	10		**MONTEREY FORMATION (Tm)** Siltstone and claystone, weathered, fractured, orange and yellow staining		SILTY CLAY (CL); olive to yellowish gray damp to moist, firm		(12)	140			
90	15				CLAYEY SILT (ML); brownish gray, moist, firm to very firm		26	140	47	71	

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ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Slightly diatomaceous		Becomes yellowish brown and light gray		(27)	140			
85			Standing water from seepage at completion of drilling								
	25		Siliceous siltstone		SILT (ML); brown, wet, very firm to hard (no sample recovered)		85	140			

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Project: NBCC Land/Newport Beach Country Club
Project Location: 1602 Newport Center Drive
Project Number: 07-140-00

Log of Drill Hole DH-2

Date(s) Drilled	26/3/08	Logged By	LBS	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc.	Total Depth of Drill Hole	28.5 feet
Drill Rig Type	CME 75 Track	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	103.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks	Very Minor Seepage at 28 feet; No Caving			Driving Method and Drop	140lb Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf)		SILTY SAND (SM) with CLAY; yellowish brown, damp to moist medium dense						
100							(10)	140			
	5										
			COLLUVIUM/ARTIFICIAL FILL (Qcol/Qaf)		SILTY CLAY (CL); very dark brown damp to moist, firm						
95							16	140	24	99	CN
	10										
			MONTEREY FORMATION (Tm)		SILTY CLAY (CL); light brown to light gray, damp to moist, firm						
90			slightly diatomaceous				(12)	140			
	15										
					SANDY SILT (ML) with CLAY; reddish brown to gray, damp to moist, firm						
85			Moderately to steeply dipping bedding at 17 5 feet				20	140	38	80	

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Project: NBCC Land/Newport Beach Country Club
Project Location: 1602 Newport Center Drive
Project Number: 07-140-00

Log of Drill Hole DH-2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
80					SANDY SILT (ML) with CLAY; reddish brown to gray damp to moist, firm		(21)	140			
	25										
75			Clay is bentonitic Very minor seepage at 28 feet		Same as above		37	140	41	74	

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Project: NBCC Land/Newport Beach Country Club Project Location: 1602 Newport Center Drive Project Number: 07-140-00	**Log of Drill Hole DH-3** Sheet 1 of 2

Date(s) Drilled	26/3/08	Logged By	LBS	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc.	Total Depth of Drill Hole	26.5 feet
Drill Rig Type	CME 75 Track	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	103.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140lb Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
	0		**ARTIFICIAL FILL (Qaf)**		SILTY CLAY (CL) with SAND; brown and gray, damp, firm fine-grained sand				18		PS HY AL, CP DS (R) EI, RV FC
100											
	5				SILTY SAND (SM); light brown, damp medium dense fine grained		(9)	140			
95											
	10				CLAYEY SAND (SC); dark gray, damp to moist, medium dense fine-grained sand, scattered subrounded to subangular pebbles		15	140	16	112	CN
90											
	15		**MONTEREY FORMATION (Tm)** Claystone and siltstone, weathered, abundant caliche, fractured locally thinly bedded steeply dipping		SILTY CLAY (CL); yellowish brown to gray, damp to moist firm		(14)	140			
85											

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Drill Hole DH-3

Project: NBCC Land/Newport Beach Country Club	Log of Drill Hole DH-3
Project Location: 1602 Newport Center Drive	
Project Number: 07-140-00	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Thinly bedded and vertical at 20 feet		CLAYEY SILT (ML-CL); yellowish brown and gray damp to moist stiff		28	140	23	92	
80											
	25				SANDY SILT (ML); light grayish brown damp to moist stiff fine-grained sand		(35)	140			

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Project: NBCC Land/Newport Beach Country Club **Project Location:** 1602 Newport Center Drive **Project Number:** 07-140-00	# Log of Drill Hole DH-4

Date(s) Drilled	26/3/08	Logged By	LBS	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc.	Total Depth of Drill Hole	29.0 feet
Drill Rig Type	CME 75 Track	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	105.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks	Very Minor Seepage at 29 feet; No Caving			Driving Method and Drop	140lb Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			<u>ARTIFICIAL FILL (Qaf)</u>								
					SILTY SAND (SM); brown, dry to damp, medium dense, fine grained abundant rock fragments		82	140	12	99	
100	5										
					Becomes yellowish brown to brown with some rock fragments		(11)	140			
95	10										
					SILTY CLAY (CL); brown with black, brown, and yellow mottling, dry to damp, firm		15	140	39	68	CN
90	15										
					SILTY SAND (SM) with CLAY; brown, damp to moist medium dense		(30)	140			

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			MONTEREY FORMATION (Tm)		CLAYEY SILT (ML); yellowish brown to gray, damp to moist, stiff, some fine-grained sand		40	140	43	67	
80	25										
			Very minor seepage at 29 feet		Becomes yellowish brown brown and gray moist and stiff		(53)	140			

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Project: NBCC Land/Newport Beach Country Club	# Log of Drill Hole DH-5
Project Location: 1602 Newport Center Drive	Sheet 1 of 2
Project Number: 07-140-00	

Date(s) Drilled	27/3/08	Logged By	LBS	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc.	Total Depth of Drill Hole	23.5 feet
Drill Rig Type	CME 75 Track	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	112.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140lb Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) Derived from bedrock and terrace deposits		SILTY CLAY (CL); brownish gray with black mottling moist firm minor sand						
110											
									0		
	5		**MONTEREY FORMATION (Tm)** Siltstone and claystone, locally thinly bedded, possibly steeply dipping, locally siliceous or diatomaceous, very weathered								
105											
			Slightly siliceous		SILTY CLAY (CL); brown and gray with black mottling, damp to moist, firm		(15)	140			
	10										
100											
			Becomes less weathered		Same as above, with some fine-grained sand, firm to very firm, micaceous		26	140	0		
	15										
95											
			Appears massive		SILTY CLAY (CL); gray, moist, firm, trace fine-grained sand		(10)	140			

Project: NBCC Land/Newport Beach Country Club
Project Location: 1602 Newport Center Drive
Project Number: 07-140-00

Log of Drill Hole DH-5

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
90			Siliceous siltstone		CLAYEY SILT (ML); light yellowish brown damp to moist, very firm some fine-grained sand		33	140	0		

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Project: NBCC Land/Newport Beach Country Club	Log of Drill Hole DH-6
Project Location: 1602 Newport Center Drive	Sheet 1 of 2
Project Number: 07-140-00	

Date(s) Drilled	27/3/08	Logged By	LBS	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc.	Total Depth of Drill Hole	21.0 feet
Drill Rig Type	CME 75 Track	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	110.5
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140lb Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
110			ARTIFICIAL FILL (Qaf)		SAND (SP); brown, moist to wet medium dense				23		PS HY AL
			TERRACE DEPOSIT (Qt)		SANDY CLAY (CL); brown, moist to wet, firm, scattered small rock fragments						
105	5				SILTY SAND (SM); brown to reddish brown, damp to moist, medium dense, abundant clasts of siliceous siltstone		(20)	140			
100	10						33	140	0		
			MONTEREY FORMATION (Tm) Siltstone and claystone, massive to thinly bedded, fractured, some fractures lined with jarasite, weathered from 10 to 15 feet bgs		SILTY CLAY (CL); brownish gray moist firm to very firm						
95	15				SILT (ML); light gray, damp, very stiff to hard, cemented		(76/10")	140			

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Drill Hole DH-6

Project: NBCC Land/Newport Beach Country Club Project Location: 1602 Newport Center Drive Project Number: 07-140-00	**Log of Drill Hole DH-6** Sheet 2 of 2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
90					CLAYEY SILT (ML); brownish gray with yellow staining, moist firm to very firm		22	140	0		

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Drill Hole DH-6

Project: NBCC Land/Newport Beach Country Club **Project Location: 1602 Newport Center Drive** **Project Number: 07-140-00**	# Log of Drill Hole DH-7

Date(s) Drilled	**27/3/08**	Logged By	**LBS**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**2R Drilling, Inc.**	Total Depth of Drill Hole	**24.0 feet**
Drill Rig Type	**CME 75 Track**	Diameter(s) of Hole, inches	**8**	Approx. Surface Elevation, ft MSL	**106.0**
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Open drive sampler with 6-inch sleeve/SPT**	Drill Hole Backfill	**Native**
Remarks	**Very Minor Seepage at 7 feet; No Caving**			Driving Method and Drop	**140lb Auto Hammer**

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			<u>ARTIFICIAL FILL (Qaf)</u>		SANDY CLAY (CL); very dark brown, moist to wet, firm, fine-grained sand, scattered roots and rock fragments						
105											
			<u>TERRACE DEPOSIT (Qt)</u>		CLAYEY SAND (SC); brown to reddish brown, moist, medium dense, fine to medium grained						
	5						16	140	0		
100			Very minor seepage at 7 feet bgs								
			<u>MONTEREY FORMATION (Tm)</u> Claystone and siltstone, massive to well bedded, fractured weathered from 7 to 12 feet bgs		SILTY CLAY (CL); pale gray moist, firm to very firm		24	140	0		
	10										
95											
					Becomes very firm to stiff with minor fine-grained sand		(26)	140			
	15										
90											
					CLAYEY SILT (ML); gray and brown moist very firm, minor sand		28	140	0		

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Project: NBCC Land/Newport Beach Country Club Project Location: 1602 Newport Center Drive Project Number: 07-140-00	Log of Drill Hole DH-7 Sheet 2 of 2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
85											
					SANDY SILT (ML); reddish brown, moist stiff fine-grained sand minor clay		(34)	140			

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Project: NBCC Land/Newport Beach Country Club Project Location: 1602 Newport Center Drive Project Number: 07-140-00	**Log of Drill Hole DH-8** Sheet 1 of 2

Date(s) Drilled	27/3/08	Logged By	LBS	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling, Inc.	Total Depth of Drill Hole	21.5 feet
Drill Rig Type	CME 75 Track	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	103.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve/SPT	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140lb Auto Hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) Possible Colluvium (Qcol) Abundant caliche below 1 foot		SANDY CLAY (CL); very dark brown moist to wet, firm						
100											
	5						36	140	0		
			MONTEREY FORMATION (Tm) Siltstone and claystone, massive to thinly bedded, moderately dipping, fractured, weathered to 10 feet bgs		SILTY CLAY (CL); brownish gray moist firm to very firm						
95											
	10				Becomes very firm to stiff with minor fine-grained sand		(26)	140			
90											
	15		Well bedded		Same as above		53	140	0		
85											

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GMU GEOTECHNICAL INC

Drill Hole DH-8

Project: NBCC Land/Newport Beach Country Club **Project Location: 1602 Newport Center Drive** **Project Number: 07-140-00**	**Log of Drill Hole DH-8** Sheet 2 of 2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					CLAYEY SILT (ML) with SAND; brownish gray moist, firm, fine-grained sand		(15)	140			
80											

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Drill Hole DH-8

APPENDIX B

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GEOTECHNICAL, INC

APPENDIX B

GEOTECHNICAL LABORATORY PROCEDURES AND TEST RESULTS

Moisture and Density. Field moisture content and in-place density were determined for each 6-inch sample sleeve of undisturbed soil material obtained from the drill holes. The field moisture content was determined in general accordance with ASTM Test Method D 2216 by obtaining one-half the moisture sample from each end of the 6-inch sleeve. The in-place dry density of the sample was determined by using the wet weight of the entire sample.

At the same time the field moisture content and in-place density were determined, the soil material at each end of the sleeve was classified according to the Unified Soil Classification System. The results of the field moisture content and in-place density determinations are summarized on Table B-1. The results of the visual classifications were used for general reference.

Particle Size Distribution. As part of the engineering classification of the materials underlying the site, representative samples were tested to determine the distribution of the particle sizes. The distribution was determined in general accordance with ASTM Test Method D 422 using U.S. Standard Sieve Openings 3", 1.5", ¾", ⅜", and U.S. Standard Sieve Nos. 4, 10, 20, 40, 60, 100, and 200. In addition, standard hydrometer tests were performed to determine the distribution of particle sizes passing the No. 200 sieve (i.e., silt and clay-size particles). The results of the tests are contained in Appendix B. Key distribution categories (% gravel; % sand, etc.) are contained on Table B-1.

Atterberg Limits. As part of the engineering classification of the soil underlying the site, representative samples of the on-site soil materials were tested to determine relative plasticity. This relative plasticity is based on the Atterberg limits determined in general accordance with ASTM Test Method D 4318. The results of these tests are contained in Appendix B and also Table B-1.

Expansion Tests. To provide a standard definition of one-dimensional expansion, expansion index testing was performed on representative samples in general accordance with ASTM Test Method D 4829. The results from this test procedure are reported as an "expansion index." The results of this test are contained in Appendix B and also Table B-1.

Chemical Tests. The corrosion potential of typical on-site materials under long-term contact with both metal and concrete was determined by chemical and electrical resistance tests. The soluble sulfate test for potential concrete corrosion was performed in general accordance with California Test Method 417, the minimum resistivity tests for potential metal corrosion were performed in general accordance with California Test Method 643, and the concentration of soluble chlorides was determined in general accordance with California Test Method 422. The results of these tests are contained in Appendix B and also Table B-1.

Compaction Tests. Bulk samples representative of the underlying on-site materials were tested to determine the maximum dry density and optimum moisture content of the soil. These compactive characteristics were determined in general accordance with ASTM Test Method D 1557. The results are summarized in Appendix B -- Compaction Test Data.

Consolidation Tests. The one-dimensional consolidation properties of "undisturbed" samples were evaluated in general accordance with ASTM Test Method D 2435. Sample diameter was 2.625 inches and sample height was 1.00 inch. Water was added during the test at various normal loads to evaluate the potential for hydro-collapse and to produce saturation during the remainder of the testing. Consolidation readings were taken regularly during each load increment until the change in sample height was less than approximately 0.0001 inch over a two-hour period. The graphic presentation of consolidation data is a representation of volume change in change in axial load. As a result, both expansion and consolidation are illustrated. The results of the consolidation load tests are contained in Appendix B -- Consolidation Test Data.

Direct Shear Strength Tests. Direct shear tests were performed on samples intended to represent engineered fill. The general philosophy and procedure of the tests were in accord with ASTM Test Method D 3080 - "Direct Shear Tests for Soils Under Consolidated Drained Conditions".

The tests are single shear tests and are performed using a sample diameter of 2.625 inches and a height of 1.00 inch. The normal load is applied by a vertical dead load system. A constant rate of strain is applied to the upper one-half of the sample until failure occurs. Shear stress is monitored by a strain gauge-type precision load cell and deflection is measured with a digital dial indicator.

This data is transferred electronically to data acquisition software which plots shear strength vs. deflection. The shear strength plots are then interpreted to determine either peak or ultimate shear strengths. Residual strengths were obtained through multiple shear box reversals. A strain rate compatible with the grain size distribution of the soils was utilized. The interpreted results of these tests are shown in Appendix B.

R-value Tests. The resistance value (R-value) of typical on-site soil materials was determined for use on pavement section design. The results are contained in Appendix B – R-Value Test Results.

TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Satur-ation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2µ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min Resistivity (ohm/cm)
DH-1	0	106.5	Qaf	CL-ML	18.3		79	0	49	50	24	22	18	4	114.0	14.0	19		8.4	32	750	1220
DH-1	5	101.5	Qaf	SM/CL	11.1	114	65															
DH-1	15	91.5	Tm	CL-ML	47 2	71	95															
DH-2	7.5	95.5	Qcol/Qaf	CL	23.6	99	94															
DH-2	17.5	85.5	Tm	ML	37 6	80	94															
DH-2	27.5	75.5	Tm	ML	41.3	74	88															
DH-3	1	102.0	Qaf	SC	17.9		82	14	52	34	15	30	20	10	114.0	13.5	44	13	7.7	7	380	1900
DH-3	10	93.0	Qaf	SC	16.1	112	89															
DH-3	20	83.0	Tm	ML-CL	22.8	92	76															
DH-4	2.5	102.5	Qaf	SM	12.3	99	48															
DH-4	22.5	82.5	Tm	ML-CL	43.2	67	78															
DH-5	2.5	109.5	Qaf	CL	31.6	86	92															
DH-5	12.5	99.5	Tm	CL	44.7	75	98															
DH-5	22.5	89.5	Tm	ML	6 1																	
DH-6	0	110.5	Qaf/Qt	CL	22.9			8	36	57	31	33	18	15								
DH-6	10	100.5	Tm	CL	45.4	76	103															
DH-6	20	90.5	Tm	ML	54.6	68	101															
DH-7	5	101.0	Qt	SC	20 1	96	73															
DH-7	7	99.0	Tm	CL	52.2	64	87															
DH-7	17.5	88.5	Tm	ML	55.9	61	86															
DH-8	5	98.0	Tm	CL	16.1	81	40															
DH-8	15	88.0	Tm	CL	54.4	66	96															

GMU_TABLE_SOIL_LAB_DATA 07-140-00.GPJ FNC AB GWGN01.GDT 05/01/08

Project: NBCC Land/Newport Beach Country Club
Project No 07-140-00

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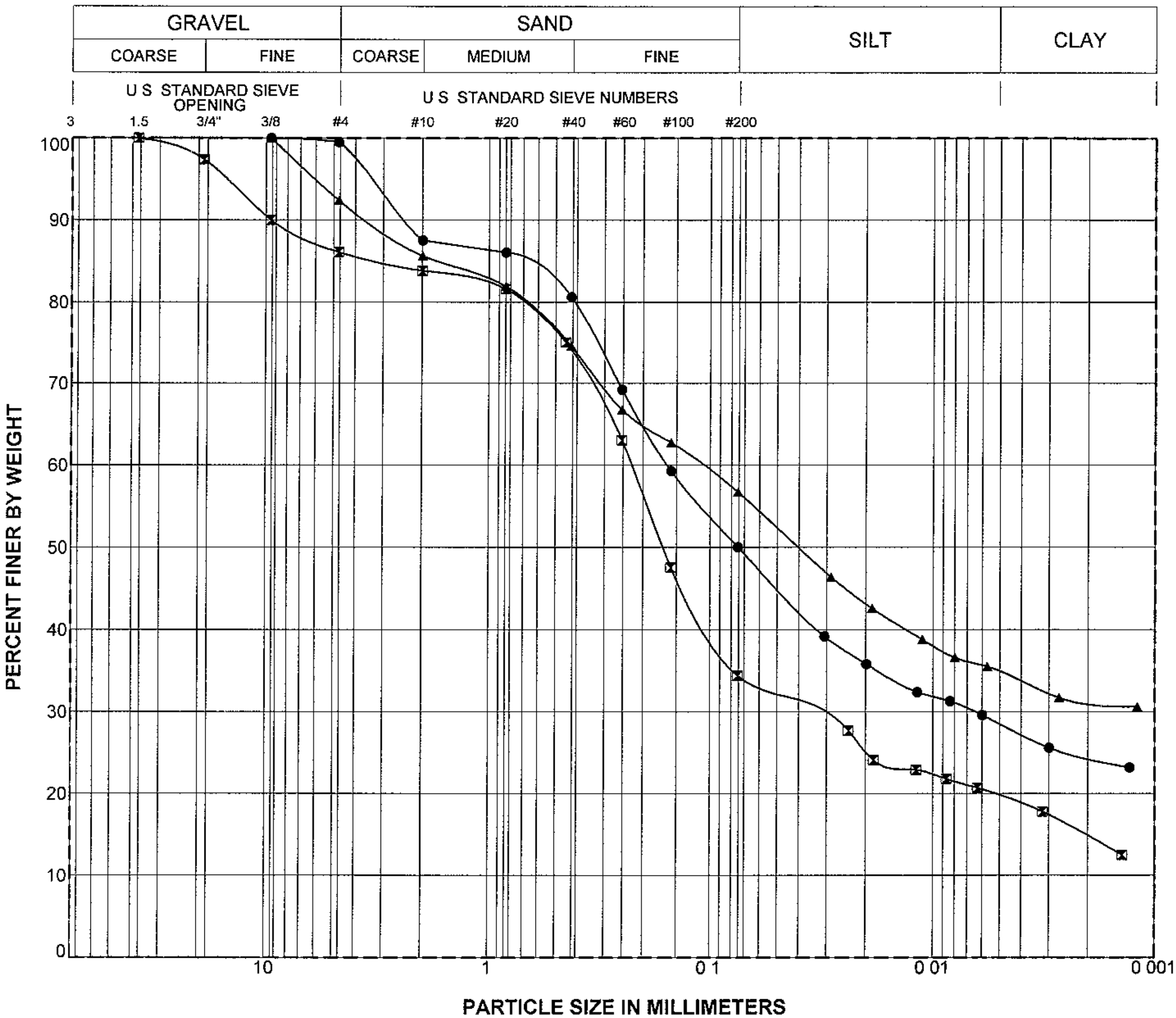

Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH-1	0 0	Qaf	●	22	4	Sandy Silty Clay (CL-ML)
DH-3	1 0	Qaf	⌧	30	10	Clayey Sand (SC)
DH-6	0 0	Qaf/Qt	▲	33	15	Sandy Lean Clay (CL)

GMU_GRAIN_SIZE 07-140-00.GPJ 05/01/08

PARTICLE SIZE DISTRIBUTION

Project: NBCC Land/Newport Beach Country Club

Project No 07-140-00

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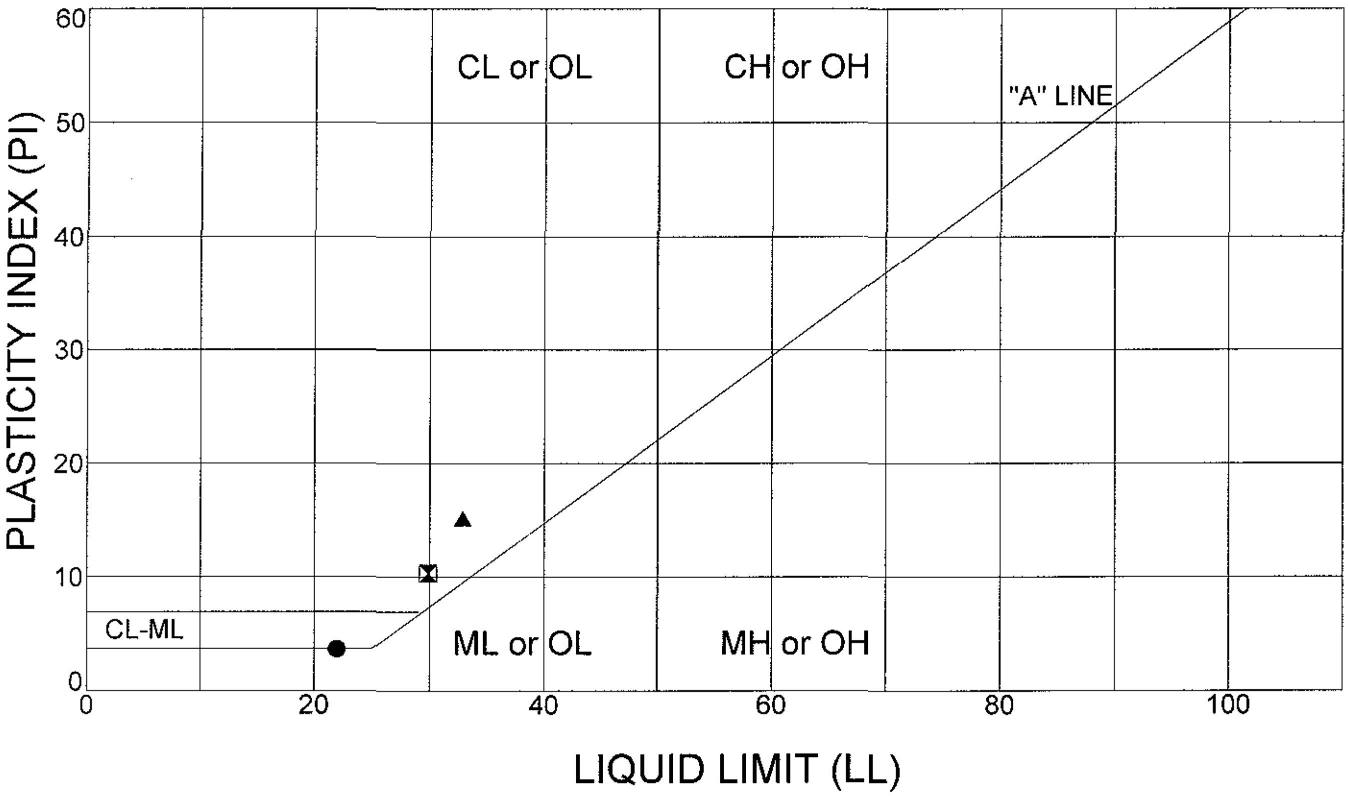
PLATE



Boring Number	Depth (feet)	Geologic Unit	Test Symbol	Insitu Water Content (%)	LL	PL	PI	Classification
DH-1	0.0	Qaf	●	18	22	18	4	Sandy Silty Clay (CL-ML)
DH-3	1.0	Qaf	⊠	18	30	20	10	Clayey Sand (SC)
DH-6	0.0	Qaf/Qt	▲	23	33	18	15	Sandy Lean Clay (CL)

LIMITS 07-140-00.GPJ 05/01/08

ATTERBERG LIMITS

Project: NBCC Land/Newport Beach Country Club

Project No. 07-140-00

GMU GEOTECHNICAL INC

PLATE

EXPANSION INDEX AND CHEMICAL TEST RESULTS

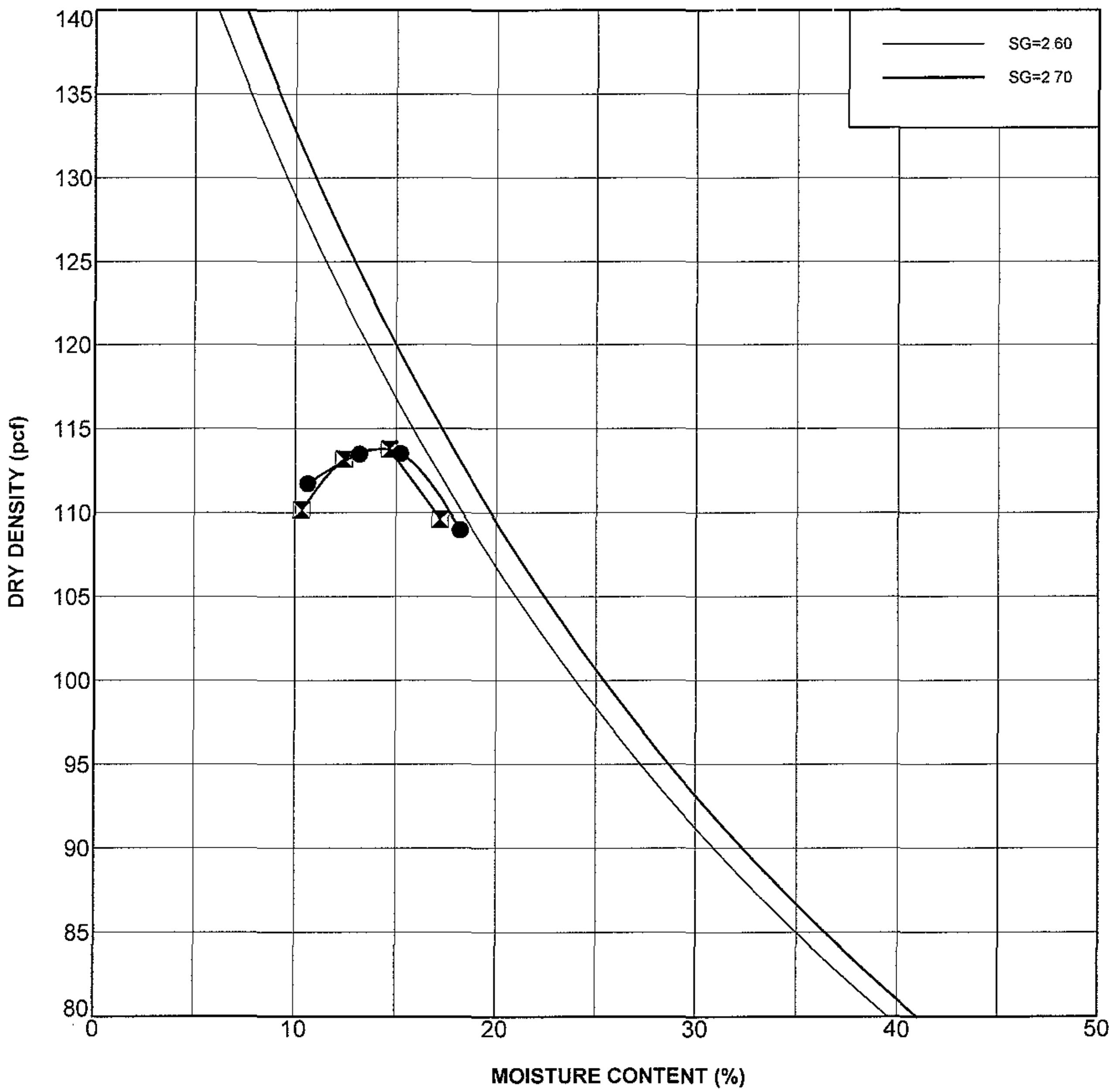
Drill Hole	DEPTH	pH	SOLUBLE SULFATES (ppm)	SOLUBLE CHLORIDES (ppm)	MINIMUM RESISTIVITY ohm-cm	EXPANSION INDEX	EXPANSION POTENTIAL
DH-1	0-5'	8.4	32	750	1,220	19	VERY LOW
DH-3	1'-3'	7.7	7	380	1,900	44	LOW

PERFORMED IN GENERAL ACCORDANCE WITH CT 417/422/643 AND ASTM D4829

GMU GEOTECHNICAL, INC.

O'Hill Partners

07-140-00



Boring Number	Depth (feet)	Geologic Unit	Symbol	Maximum Dry Density, pcf	Optimum Moisture Content, %	Classification
DH-1	0 0	Qaf	●	114	14	Sandy Silty Clay (CL-ML)
DH-3	1 0	Qaf	⧗	114	13 5	Clayey Sand (SC)

DVTCOMP 07-140-00.GPJ 05/01/03

COMPACTION TEST DATA

Project: NBCC Land/Newport Beach Country Club
Project No 07-140-00

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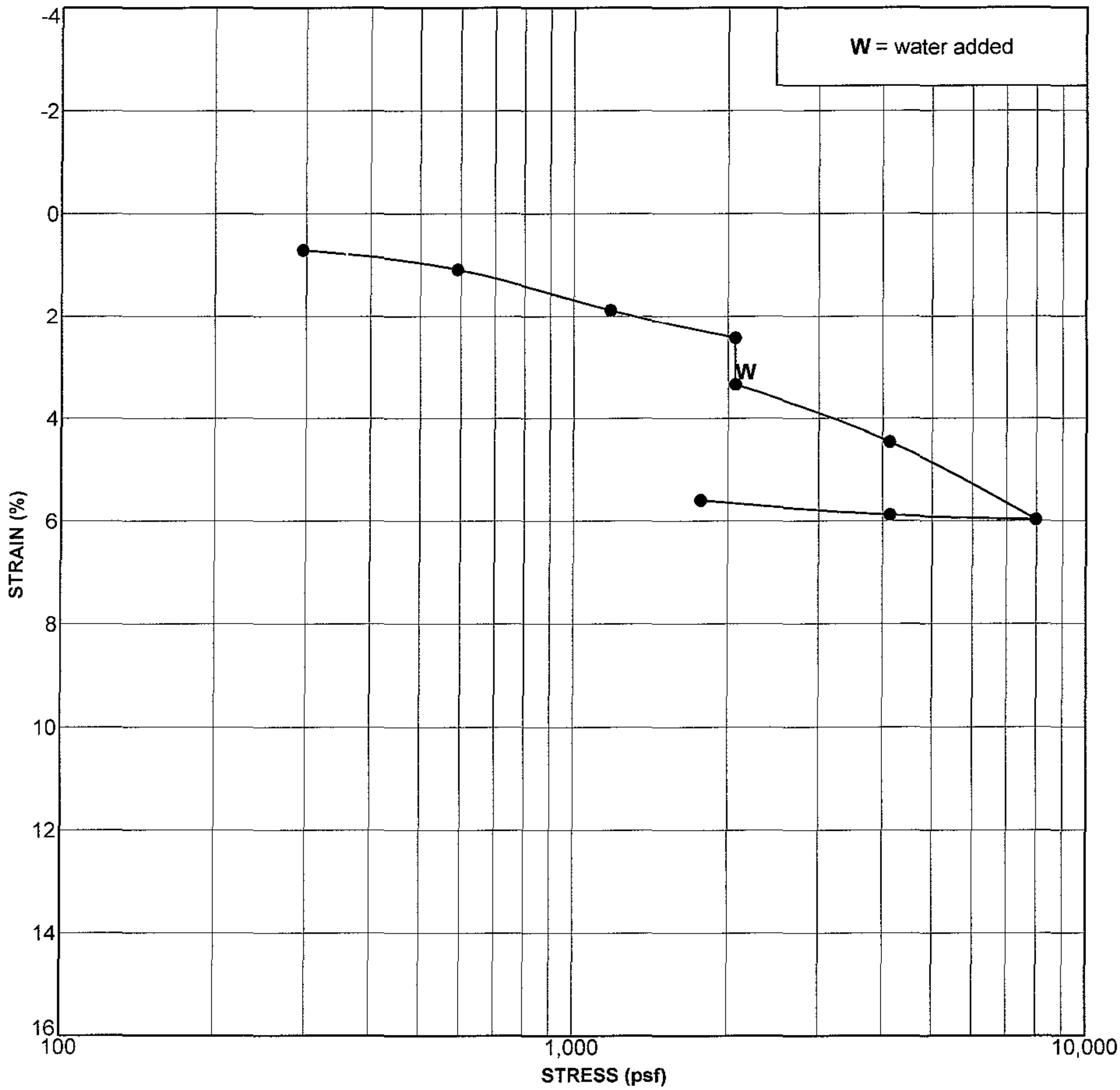
PLATE



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-1	5 0	Qaf	●	In Situ	0 91	Silty Clay/Silty Sand (SM/CL)

GMU_CONSOL 07-140-00.GPJ GM&U.GDT 05/01/08

CONSOLIDATION TEST DATA

Project: NBCC Land/Newport Beach Country Club

Project No 07-140-00

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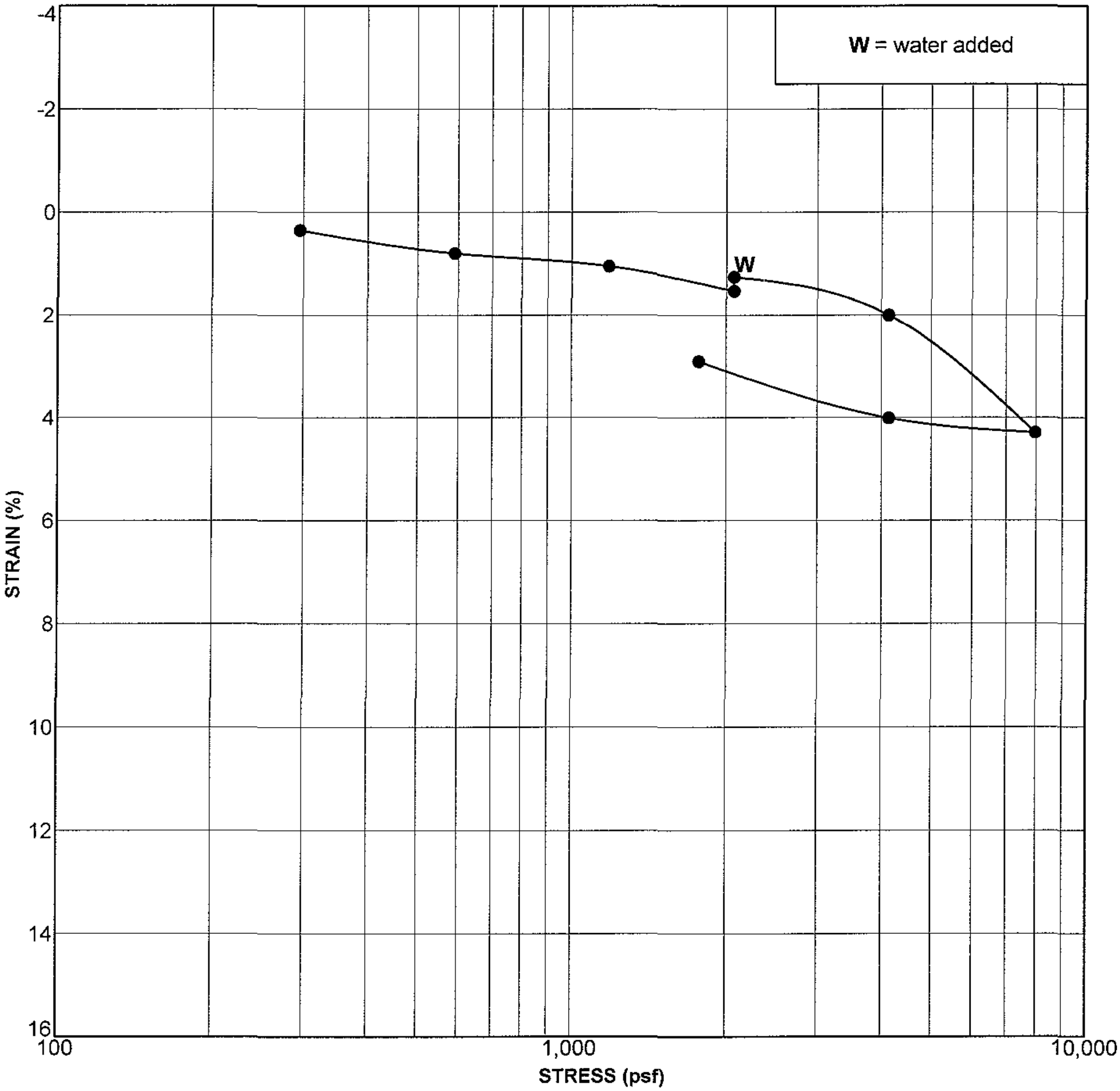
PLATE



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-2	7 5	Qcol/Qaf	●	In Situ	-0 27	Sandy Clay (CL)

GMU_CONSOL 07-140-00.GPJ GM&U.GDT 05/01/08

CONSOLIDATION TEST DATA

Project: NBCC Land/Newport Beach Country Club

Project No. 07-140-00

PLATE

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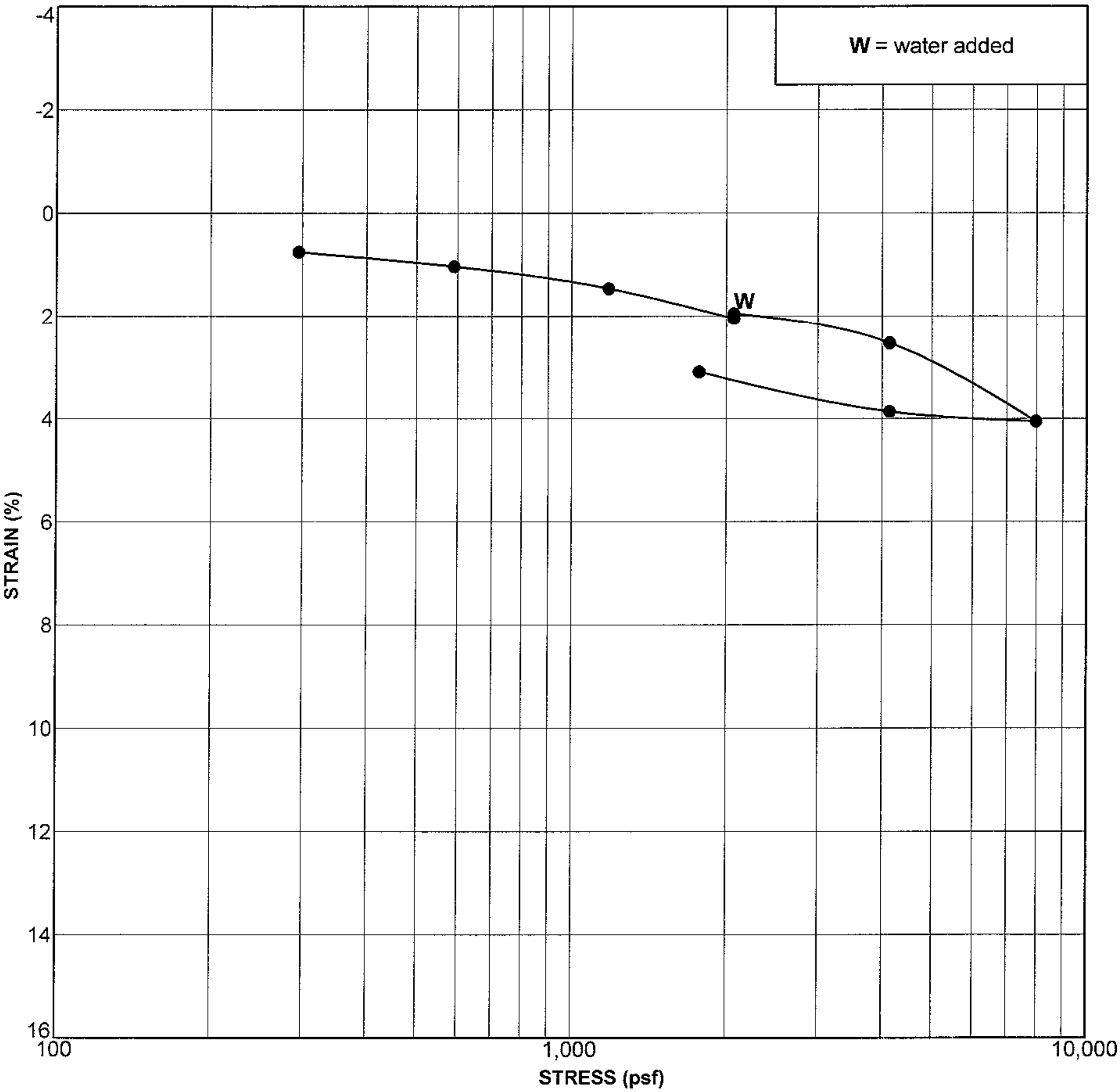


Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-3	10 0	Qaf	●	In Situ	-0 1	Clayey Sand (SC)

GMU_CONSOL 07-140-00.GPJ GM&U.GDT 05/01/08

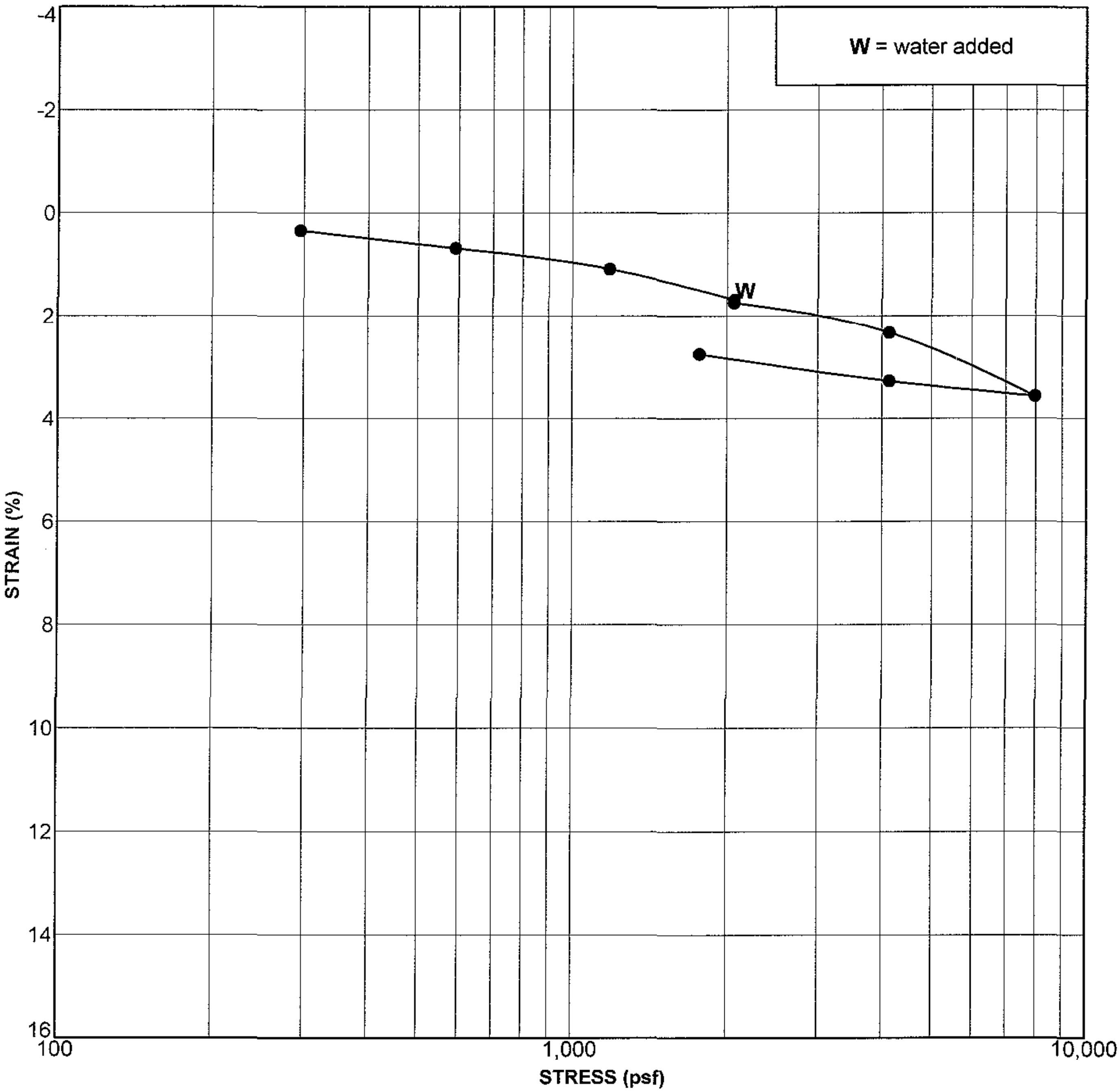
CONSOLIDATION TEST DATA

Project: NBCC Land/Newport Beach Country Club

Project No. 07-140-00

GMU GEOTECHNICAL INC

PLATE



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-4	12 5	Qaf	●	In Situ	0 06	Silty Clay (CL-ML)

GMU_CONSOL 07-140-00.GPJ GM&U.GDT 05/01/08

CONSOLIDATION TEST DATA

Project: NBCC Land/Newport Beach Country Club

Project No 07-140-00

PLATE

GMU GEOTECHNICAL INC

R-VALUE TEST RESULTS

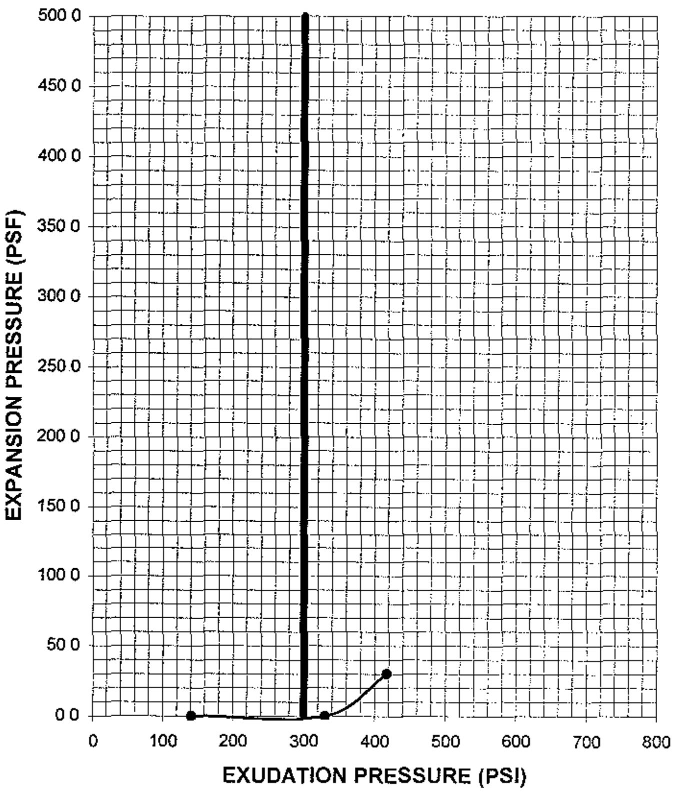
GEOTECHNICAL, INC

PROJECT NAME: Newport Beach Country Club
SAMPLE LOCATIOI 1'-3'
SAMPLE DESCRIP 0

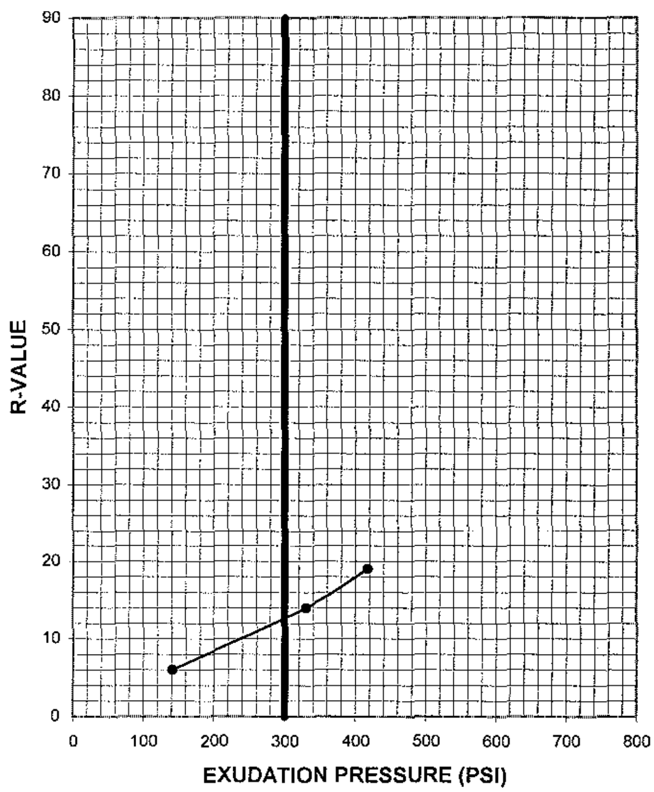
PROJECT NUMBER: 07-140-00
SAMPLE NUMBER: DH-3
TECHNICIAN: JV
DATE TESTED

TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	19.1	18.0	16.3
WEIGHT OF SAMPLE, grams	1023	1034	1055
HEIGHT OF SAMPLE, Inches	2.51	2.49	2.47
DRY DENSITY, pcf	103.7	106.6	111.2
COMPACTOR AIR PRESSURE, psf	70	90	230
EXUDATION PRESSURE, psf	141	330	417
EXPANSION, Inches x 10exp-4	0	0	7
STABILITY Ph 2,000 lbs (160 psi)	142	128	120
TURNS DISPLACEMENT	4.63	3.85	3.45
R-VALUE UNCORRECTED	6	14	19
R-VALUE CORRECTED	6	14	19

EXPANSION PRESSURE VS. EXUDATION PRESSURE

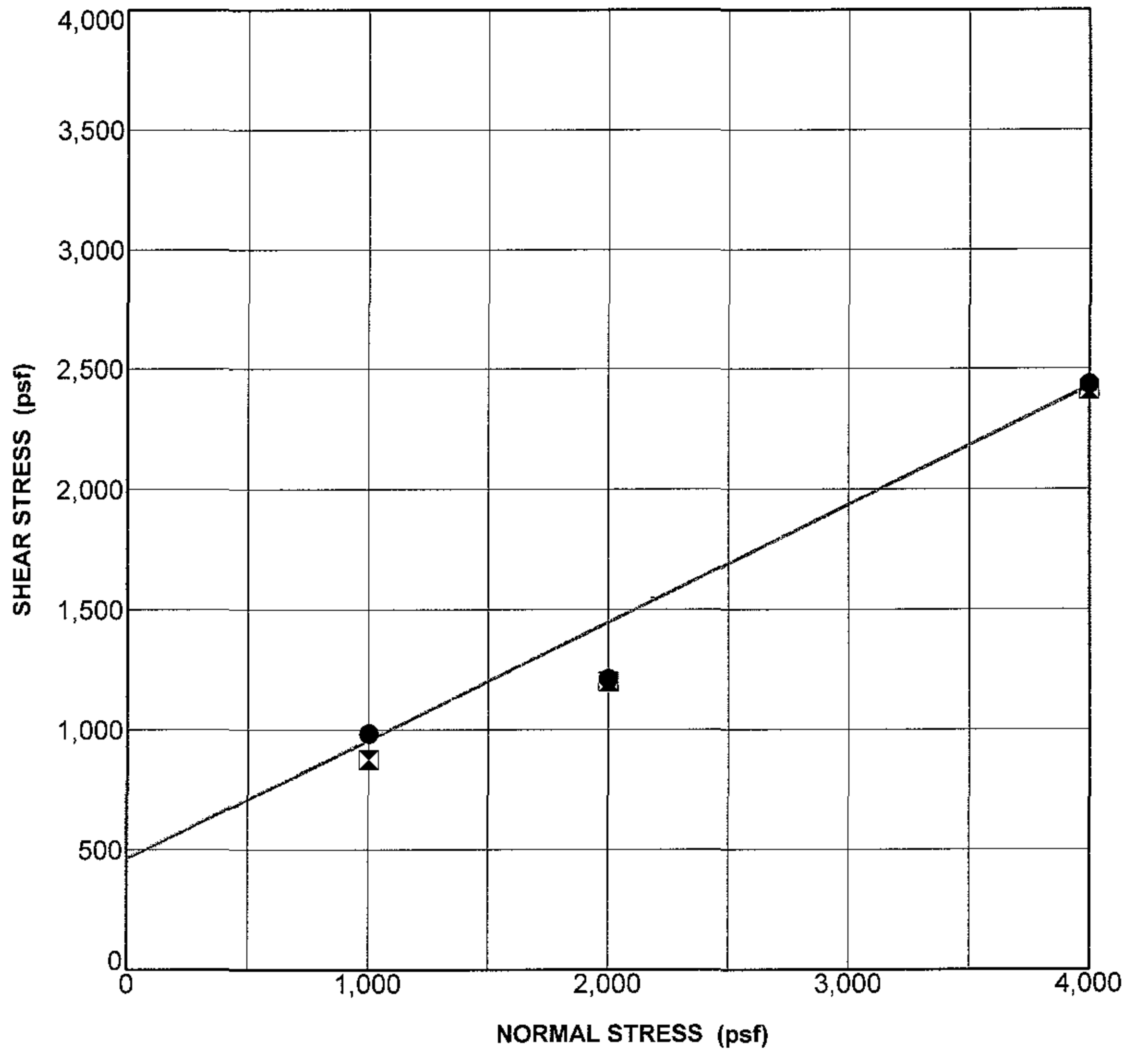


R-VALUE VS. EXUDATION PRESSURE



R-VALUE AT 300 PSI EXUDATION PRESSURE :	13
EXP. PRESSURE AT 300 PSI EXUDATION PRESSURE (PSF) :	0

PLATE B-5.1



SAMPLE AND TEST DESCRIPTION		
Sample Location: DH-1 @ 0.0 ft	**Geologic Unit:** Qaf	**Classification:** Sandy Silty Clay (CL-ML)
Strain Rate (in/min): 0.001	**Sample Preparation:** Remolded	
Notes:		

STRENGTH PARAMETERS		
STRENGTH TYPE	COHESION (psf)	FRICTION ANGLE (degrees)
● Peak Strength	475	26 0
⊠ Ultimate Strength	475	26 0

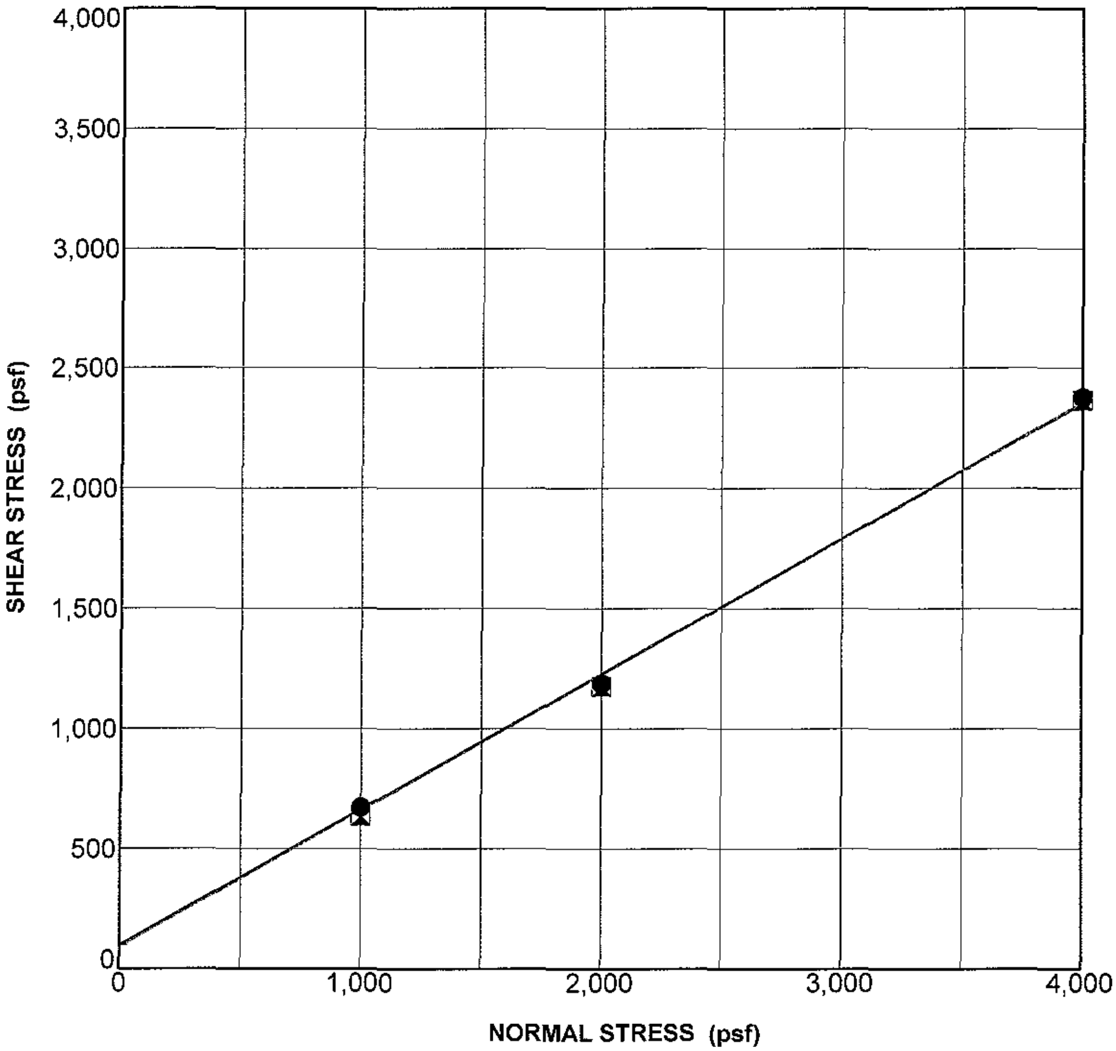
SHEAR TEST DATA

Project: NBCC Land/Newport Beach Country Club

Project No. 07-140-00

PLATE

GMU
GEOTECHNICAL INC



SAMPLE AND TEST DESCRIPTION		
Sample Location: DH-3 @ 1 0 ft	**Geologic Unit:** Qaf	**Classification:** Clayey Sand (SC)
Strain Rate (in/min): 0 001	**Sample Preparation:** Remolded	
Notes:		

STRENGTH PARAMETERS		
STRENGTH TYPE	**COHESION (psf)**	**FRICTION ANGLE (degrees)**
● Peak Strength	100	29 0
⊠ Ultimate Strength	100	29 0

SHEAR TEST DATA

Project: NBCC Land/Newport Beach Country Club
Project No. 07-140-00

PLATE

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GMU_DIRECT_SHEAR 07-140-00.GPJ GM&U.GDT 05/01/08

APPENDIX C

GMU
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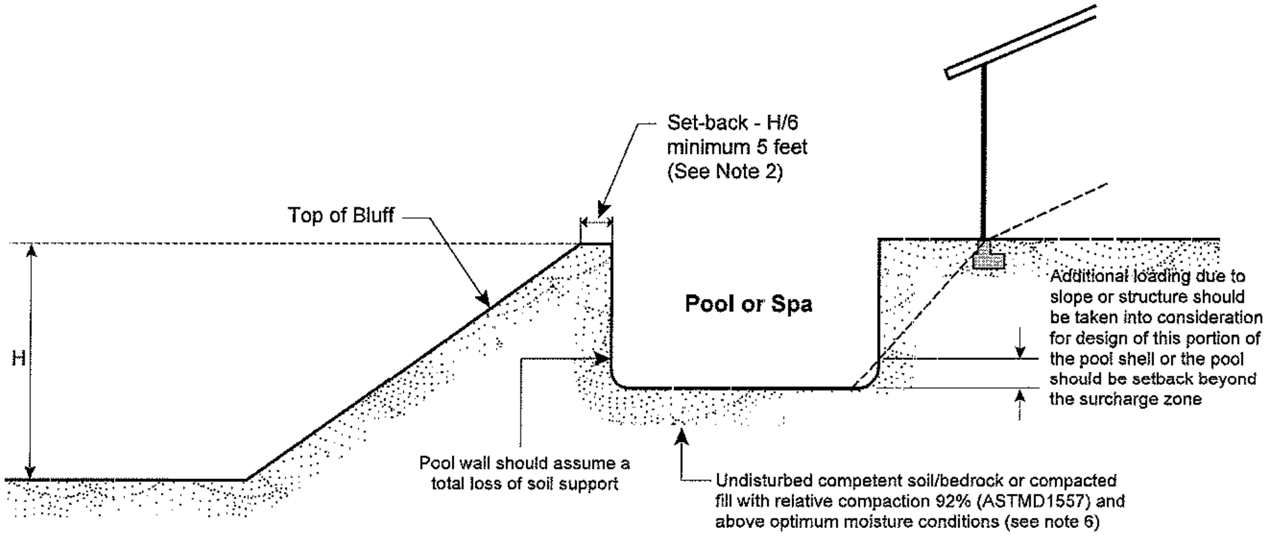
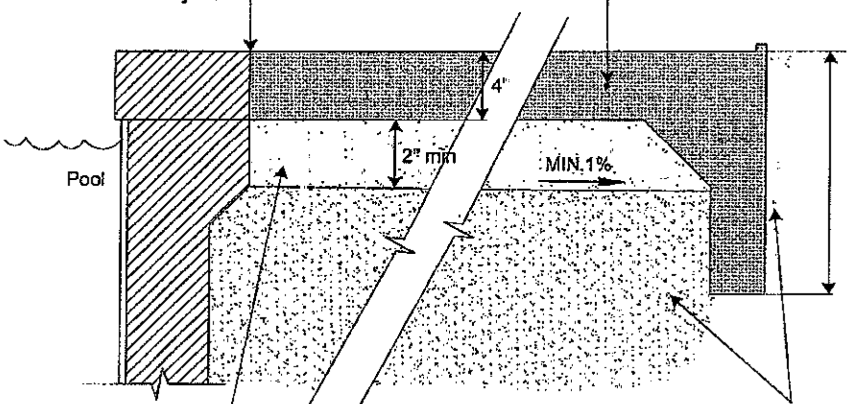


1) For construction in soils possessing a "low" to "medium" expansion potential, the pool walls should be designed for an equivalent lateral fluid pressure of 65 lbs./cu ft. The actual expansiveness of soils exposed in pool excavation should be evaluated upon completion of the excavation as pool subgrade soils are exposed.
2) As a minimum, pools and spas should be setback from the top of the slope a distance equivalent to H/6 (minimum 5') If a pool or spa is located within this set-back zone, special design recommendations will be required.
   The portion of the pool wall adjacent to the top of slope shall be capable of supporting the water in the pool without soil support
   Where pools are planned near toes-of-slope and/or structures, appropriate surcharge loads should be incorporated into the design and construction.
3) Pool/Spa excavations exposing bedrock should be evaluated by GMU to determine the need for special design to account for bedding plane surcharges If encountered, the pool walls should be designed to support any daylighted bedding The bedding plane surcharge pressure will vary depending upon bedding angle, rock type, and strength.
4) In order to provide uniform conditions, the bottom of the pool excavation may need to be over-excavated and replaced to pool subgrade with compacted fill As an alternative, the reinforcing steel in the area of a transition area may be increased to account for the differences in engineering properties and the potential differential behavior
5) Whereas pool excavation may be free of water at a time of construction, future irrigation could result in the development of perched water zones which could affect subsurface improvements. Heavy-duty pipes and flexible couplings should be used for the pool plumbing system to minimize leaking which may produce additional pressures on the pool shell. In addition, installation of a pressure valve in the pool bottom should be used to mitigate potential build-up of pressure
6) In general, all below grade improvements must be constructed by qualified professionals utilizing appropriate designs which account for the on-site (lot) geotechnical and geologic conditions Observation/testing should be performed by GMU during pool/spa excavation to verify exposed soil conditions are consistent with the assumed design conditions
7) For highly/severely corrosive soils, cement shall be Type V and concrete shall have a minimum water to cement ratio of 0.45. For moderately corrosive soils, a minimum water to cement ratio of 0.50 should be used and Type V cement should be considered Final concrete mix design is outside our purview
8) It should be noted that implementation of the above recommendations only serve to reduce the potential for post construction soil movements. The recommendations are not intended to eliminate these types of movements Consequently, some distortion should be anticipated

GMU GEOTECHNICAL, INC	**SWIMMING POOL AND SPA DESIGN CRITERIA DETAIL FOR LOW TO MEDIUM EXPANSION SITES**	Plate C-1

P19_Low_Exp



1) To reduce the potential for excessive craking due to expansive soil forces, pool deck concrete slabs should be a minimum of 4 inches thick and provided with construction or weakened plane joints at frequent intervals (e.g., every 6 feet or less). Slabs should be underlain by a layer of crushed rock or gravel, having a minimum thickness 2 inches Presoaking the subgrade to a minimum of 2 % over optimum and to a depth of 12 inches is recommended Presoaking should be observed, tested, and accepted by GMU prior to placing concrete

2) All concrete has a tendency to crack and cracks in concrete can be caused by many different factors When constructing concrete decks, patios, sidewalks, etc., it is important that the ground supporting these improvements be properly prepared, including moisture conditioning. Slab thickness, location of joints, reinforcement, and concrete mixture must also be appropriate for the intended use Proper placement, finishing, and curing of concrete are also very important factors in minimizing cracking

3) For highly/severly corrosive soils, cement should be Type V Concrete mix design should account for sulfate resistance and shrinkage control and is outside of our purview

GMU GEOTECHNICAL, INC	**POOL DECK DETAIL FOR LOW TO MEDIUM EXPANSION SOILS SITES (RESIDENTIAL SITES)**	Plate C-2

P15

APPENDIX D

GMU
GEOTECHNICAL, INC.

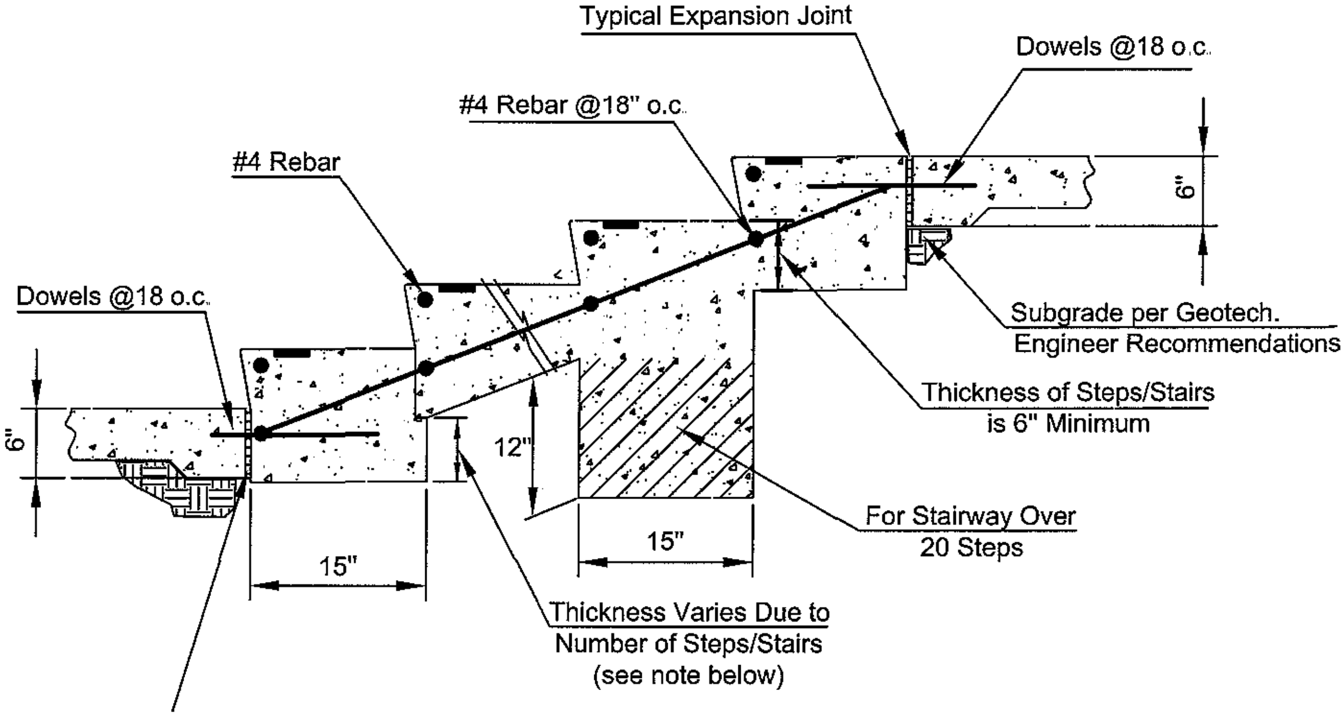
TABLE 1

FLATWORK RECOMMENDATIONS
Newport Beach Country Club

Description	Subgrade Preparation	Minimum Concrete Thickness (Full)	Cut-off Barrier or Edge Thickness	Reinforcement[2]	Joint Spacing (Maximum)	Cement Type	Sulfate Resistance
Sidewalks and Walkways [5]	1) 2% over optimum to 18"[1]	4"	Not Required	Where adjacent to curbs or structures (at entry points) use dowels: #3 bars @ 18" o.c.	5 feet	V	(3)
Patios and Porches [5]	1) 2% over optimum to 18"[1]	4"	Not Required	1) Slab - #3 bars @ 18" o.c. bent into cut-off	10 feet	V	(3)
Driveways [5]	1) 2% over optimum to 18"[1], 2) Minimum 2 full inches of well graded rock (i.e., Class II base or equiv.) above moisture conditioned subgrade.	5"	12" from adjacent finish grade on 3 sides of driveway (except adjacent garage). Min. 12" width	1) Slab - #3 bars @ 18" o.c. bent into cut-off; 2) Cut-off - one #3 bar placed in long direction 3) Dowel into garage grade beam - #3 bars @ 18"[6]	10 feet	V	(3)

(1) The moisture content of the subgrade must be verified by the geotechnical consultant prior to sand/rock placement.
(2) Reinforcement to be placed at or above the mid-point of the slab (i.e., a minimum of 2.0 to 2.5 inches above the prepared subgrade).
(3) The site has negligible levels of sulfates as defined by UBC Table 19-A-4. Concrete mix design shall be selected by the concrete designer such that sulfate attack mitigation is balanced with shrinkage crack control. Concrete mix design is outside the geotechnical engineer's purview.
(4) Stairs or steps within a walkway should meet the requirements contained on Plates D-1 and D-2.
(5) Where flatwork is adjacent a stucco surface, a ¼" to ½" foam separation/expansion joint should be used.
(6) If dowels are placed in cored holes, the core holes shall be placed at alternating in-plane angles (i.e., not cored straight into slab).

General Note: Minor deviations to the above recommendations may be required at the discretion of the soils engineer or his representative.



Not to scale

Note:
* 6 Or Less Steps Thickness = 6"
* 7 Or More Steps Thickness = 12"
* Stairways Over 20 Steps Should Have at Least a 12 Inch Deep Key at No Greater Then 10 Foot Spacing. The Length and Width of the Key Should Be Equal to the Step Dimensions.

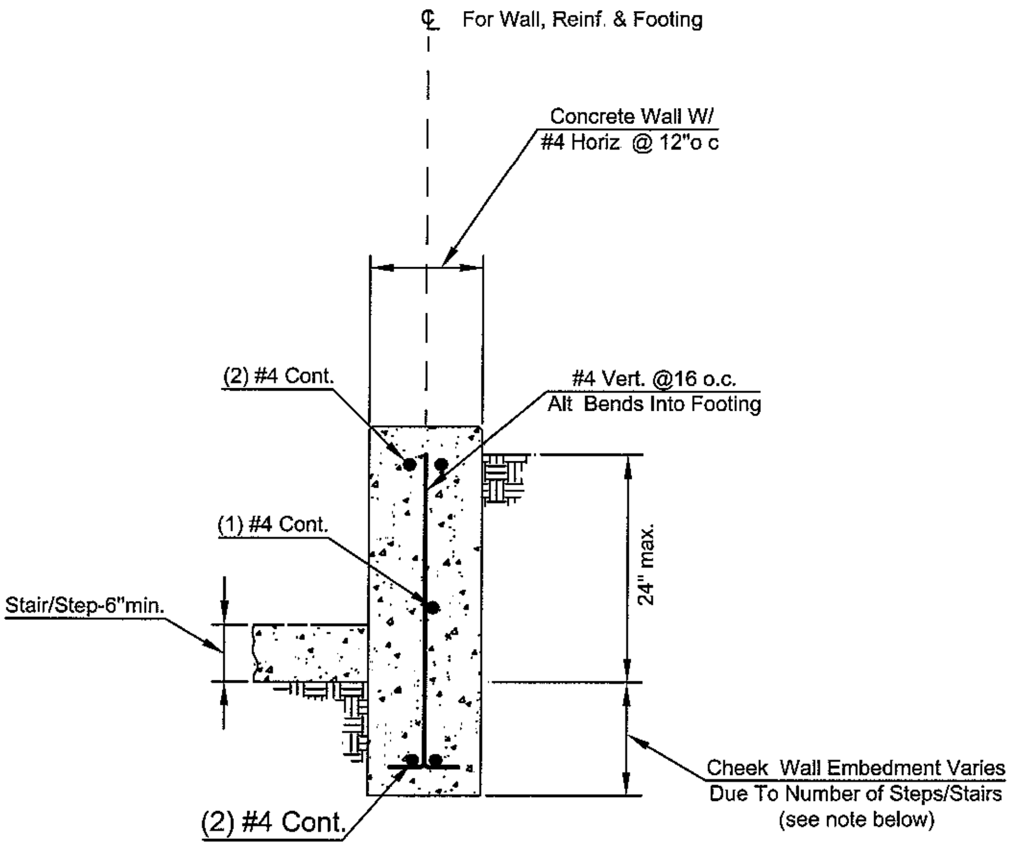
Note:
The Above Minimum Recommendations Are Presented From a Geotechnical Perspective Only To Improve Post Construction Performance Recommendations From a Structural Engineer May Exceed These Recommendations

GMU GEOTECHNICAL, INC.

MINIMUM FLATWORK RECOMMENDATIONS FOR STAIRS

Plate

D-1



Not to scale

Note:

* Cheek Wall Embedment is 12" Minimum For 6 or Less Steps
* Cheek Wall Embedment is 18" Minimum For 7 to 20 Steps

Note:
The Above Minimum Recommendations Are Presented From a Geotechnical Perspective Only To Improve Post Construction Performance. Recommendations From a Structural Engineer May Exceed These Recommendations.

GMU GEOTECHNICAL, INC

MINIMUM FLATWORK RECOMMENDATIONS FOR STAIRWAY CONCRETE CHEEK WALL

Plate D-2

GMU
GEOTECHNICAL, INC.

Memorandum

To: Robert O'Hill, Golf Realty Fund
Leland Stearns, Stearns Architecture

From: Gary K. Urban, GE

Date: April 25, 2008

Subject: Revised Preliminary Geotechnical Design Parameters for the NBCC Planned Community, Newport Beach Country Club, Newport Beach, California

GMU No.: 07-140-00

GMU has recently completed subsurface exploration and laboratory testing for the subject project. Geotechnical design parameters are presented in this memo based on our preliminary assessment of the geotechnical data. We anticipate that the building structures will be founded on shallow amounts of engineered fill overtop terrace deposits or bedrock of the Monterey Formation. The engineered fill will be placed as part of future design and remedial grading. Remedial grading is anticipated to extend approximately 5 to 8 feet below existing ground depending on local geotechnical conditions, final precise grades, and building loads. We recommend the following geotechnical design parameters be utilized in the design of the subject structures.

Seismic Values (2007 CBC)

Parameter	Factor	Value
0.2s Period Spectral Response	S_S	1.80g
1.0s Period Spectral Response	S_1	0.67g
Soil Profile Type	Site Class	C
Site Coefficient	F_a	1.00
Site Coefficient	F_v	1.30
Adjusted Spectral Response	S_{MS}	1.80g
	S_{M1}	0.87g
Design Spectral Response	S_{DS}	1.20g
	S_{D1}	0.58g

Foundation Types

It is our understanding that the structural engineer for the Tennis Clubhouse (Scott Wallace Structural Engineers) has recommended a Mat Slab for the tennis clubhouse. We have also been informed that the structural engineer for the Villas (ESI/FME, Inc. Structural Engineers) is currently recommending post-tension slabs, with the possibility of using conventional non pre-stressed ribbed slabs as an alternative. Recommendations for the three foundation types are presented below.

Conventional Non Pre-Stressed Ribbed Slab: Design in general accordance with the most recent version of WRI/CRSI – Design of Slab-on-Ground Foundations

Post-Tension Slab (post tensioned mat or ribbed slab): PTI Methodology

Non Pre-Stressed Mat Slab: Based on PTI equations for moment, shear, and required stiffness, or other alternate rational method specified by the structural engineer.

Bearing Materials

Engineered Fill

Expansion Potential

Results of expansion index testing are presented on Plate 1. Although the maximum expansion index result was found to be 44, we recommend that the site be designed for a "medium" expansion potential.

Soil Bearing Pressure and Passive Resistance (All Foundations)

Bearing Pressure:	2000 psf – minimum depth is 18 inches below top-of-slab or lowest adjacent grade. The allowable bearing pressure may be increased to a maximum of 2800 psf for foundations with a minimum of 24 inches of embedment.
Passive Pressure:	300 psf/ft
Coefficient of Friction:	0.35

* *The above values for passive pressure and bearing pressure may be increased by 1/3 when designing for short-duration wind and seismic forces.*

Minimum Depths for Footing, Stiffner Beam, or Moisture Cut-Off

Conventional and PTI-Ribbed:
Perimeter Footings/Stiffner Beams: 18" below lowest adjacent outside grade

Mat (PT and Non PT):
Perimeter Edge: 12" below lowest adjacent outside grade

Slab Design

Conventional:

Minimum Thickness:	5 inches
Effective PI:	30
Min. Reinforcement:	#4 Bars at 18 inches o.c.
Maximum Beam Spacing:	15 feet

Post Tension (may be post tensioned mat or ribbed slab) :

Center Lift:	$e_m = 5.0'$ $y_m = 2.5"$
Edge Lift:	$e_m = 3.5'$ $y_m = 1.0"$
Modulus of Subgrade Reaction:	150 pci

Non Pre-Stressed Mat Slab:
Use post tension soil parameters shown above.

Slab Sub-Section

Moisture retarder to consist of Stego 15 mil or equivalent, placed continuously, or as a minimum, placed to the bottom of the footing/beams.

The need for sand and/or the amount of sand above the moisture vapor retarder should be specified by the structural engineer. If sand is to be placed above the barrier for this project, the sand should be placed in a dry condition.

Subgrade should be pre-saturated as necessary to at least 3% over the optimum moisture content to a minimum depth of 18 inches.

Wall Design

Lateral Earth Pressures

Restrained Wall: (At-rest)	65 pcf for level backfill 85 pcf for sloping backfill
Unrestrained Wall:	45 pcf for level backfill 65 pcf for sloping backfill

Wall Backfill

- Granular material possessing a very low (i.e., EI < 20) expansion potential.
- Fine-grained native soils should be used to cap the upper 2 feet of the select backfill zone where walls are greater than 3 feet in height.

Wall Drainage

- A backdrain consisting of 4-inch-diameter perforated plastic pipe surrounded by at least 1.0 cubic foot of an approved filter material per lineal foot of pipe is recommended.
- Backdrain systems should outlet into area drain facilities. The wall design should attempt to provide backdrain outlets spaced no greater than about every 200 feet. The backdrain gradient should not be less than 1% where possible.

Waterproofing

- The back side of all retaining walls should be waterproofed prior to placing subdrains or backfill.
- The waterproofing should extend continuously from the back of the wall to the top of the footing and down the back of the footing.

Concrete

- Negligible sulfate exposure (see test results on Plate 1)
- Maximum W/C ratio = 0.50
- Cement = Type V

Metals Corrosion

Results of corrosivity testing are presented on Plate 1. The site should be considered corrosive to ferrous metals and copper. In addition, all metal utility pipes should be protected from corrosion.

EXPANSION INDEX AND CHEMICAL TEST RESULTS

Drill Hole	DEPTH	pH	SOLUBLE SULFATES (ppm)	SOLUBLE CHLORIDES (ppm)	MINIMUM RESISTIVITY ohm-cm	EXPANSION INDEX	EXPANSION POTENTIAL
DH-1	0-5'	8.4	32	750	1,220	19	VERY LOW
DH-3	1'-3'	7.7	7	380	1,900	44	LOW

PERFORMED IN GENERAL ACCORDANCE WITH CT 417/422/643 AND ASTM D4829

GMU GEOTECHNICAL, INC.

NBCC, Golf Realty Fund

07-140-00

PLATE 1

GMU ELCHEM