May 12, 2016

Mr. Roman Tivyan and Ms. Nikki Sayavanh
8834 Capcano Road
San Diego, CA 92126

Subject: Biological Resources Letter Report for the Tivyan Residence Design Review Project (City PTS #: 412254), San Diego, California

Dear Mr. Tivyan and Ms. Sayavanh,

This letter report summarizes the results of the biological investigations for the proposed Tivyan Design Review Project (Project) based on an assessment by Tierra Data Inc. (TDI) in compliance with City of San Diego (City) requirements in satisfaction of their responsibilities as lead agency under the California Environmental Quality Act (CEQA).

SUMMARY

The proposed Project is the construction of a 2,879-square-foot, multi-level, single-family residence and an 841-square-foot, detached, two-car garage on a vacant, 2.80-acre parcel. The Project site is located at 11275 Beeler Canyon Road, San Diego, California (Assessor's Parcel Number 320-030-31-00) adjacent to the Rancho Encantada Precise Planning area, and supports Southern Mixed Chaparral vegetation and a drainage in the southwest corner. No sensitive plant or animal species were detected on site and only three sensitive animal species, the southern California rufous-crowned sparrow (*Aimophila canescens ruficeps*), Bell's sage sparrow (*Amphispiza bellii bellii*), and orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), have a moderate or high potential to occur on site. The site is within the quino checkerspot butterfly (*Euphydryas editha quino*) survey area but the site has an extremely low potential to support the species due to the lack of host plant and nectaring species. No state- or federal-listed species or City narrow endemic species are expected to occur on site. The site is within the City's Multiple Species Conservation Program (MSCP) Subarea Plan and, because it supports natural habitat, is subject to the City's Environmentally Sensitive Land (ESL) regulations. Multi-Habitat Planning Area (MHPA) occurs immediately to the south of the site.

The proposed Project would impact a total of 1.10 acres of Southern Mixed Chaparral on site and less than 0.01 acre of Developed Land off site. These impacts would occur as a result of grading/ construction/landscaping activities for the residence and driveway, a planned orchard, and application of Brush Management Zone (BMZ) 1. BMZ 2 outside of these areas would occur within an additional 0.39 acre of Southern Mixed Chaparral, but BMZ 2 is considered "impact neutral" and does not require mitigation as long as only thinning and pruning of native vegetation occurs. The proposed Project has the potential to violate the Migratory Bird Treaty Act (MBTA) and California Fish and Game (CFG) Code if clearing occurs during the bird breeding season, February 1 through September 15, and to violate MHPA Adjacency Guidelines, if not enforced.

Impacts from the proposed Project are to MSCP Tier IIIa habitat and would be mitigated at a ratio of greater than the required 1:1 ratio on site with recordation of a Covenant of Easement

(COE) over the proposed 1.70-acre Open Space with 1.30 acres being counted as mitigation and an additional 0.39 acre being within BMZ 2.

To comply with the MBTA and CFG Code, all vegetation clearing for construction and brush management should occur between September 16 and January 31 (i.e., outside of the bird breeding season). If clearing is not avoidable during the bird-breeding season, pre-clearance surveys for any active nests in the clearing area shall be conducted by a Qualified Biologist prior to the onset of activity. Work may proceed if no bird nests are observed. If an active bird nest is detected within the clearing area, clearing would need to be postponed or suspended until the young have fledged.

In addition, project design features and compliance with MHPA Adjacency Guidelines by the applicant will be required and shall be verified by City Development Services Department/Land Development Review (DSD/LDR) and/or MSCP staff on Project Construction Documents and shall be enforced and monitored by a Qualified Biologist during construction. The City will have limited right of entry to verify the private property owner has maintained the COE to protect the sensitive biological resources in perpetuity.

These mitigation measures constitute the Project's Mitigation Monitoring and Reporting Program (MMRP) and would mitigate direct impacts to sensitive habitat and indirect impacts to sensitive species, avoid potential impacts to the MHPA and migratory birds, and will ensure compliance with the CEQA, the MSCP Subarea Plan, MBTA, and CFG Code. With application of the MMRP, the proposed Project would not have a significant effect on biological resources and would be in compliance with all federal, state, and City regulations.

INTRODUCTION

The report describes the biological resources present on and near the proposed Project site and addresses potential impacts from the proposed Project to those biological resources as required by City Biology Guidelines (2012), the City's Guidelines for Conducting Biology Surveys (2012), as well as the Project's consistency with the City's MSCP Subarea Plan (1997).

LOCATION

The Project is located in the City of San Diego, California (Figure 1), west of Pomerado Road and south of Scripps Poway Parkway, and more specifically, immediately south of Beeler Canyon Road, between where the Stonecroft Terrace and Green Valley Court emergency access roads connect to Beeler Canyon Road. The street address is 11275 Beeler Canyon Road (Assessor's Parcel Number 320-030-31-00), in the RS-1-8 zone north of the Montecito Portion of the Rancho Encantada Precise Planning area. The Project site lies south of the Vulcan Materials Company sand and gravel quarry operation on Beeler Canyon Road, between vacant parcels to the east and west, and north of dedicated Open Space associated with the Stonebridge Estates developments to the south (Figure 1).

PROJECT DESCRIPTION

The Project is undergoing design review to determine if further analysis will be necessary to allow construction of a 2,879-square-foot, single-family home and an 841-square-foot, detached, two-car garage on a vacant, 2.80-acre lot.

The single-family residence building would take access off Beeler Canyon Road via a driveway in the northeast portion of the parcel and would be multi-level, extending approximately two-fifths of the way into the parcel from Beeler Canyon Road.

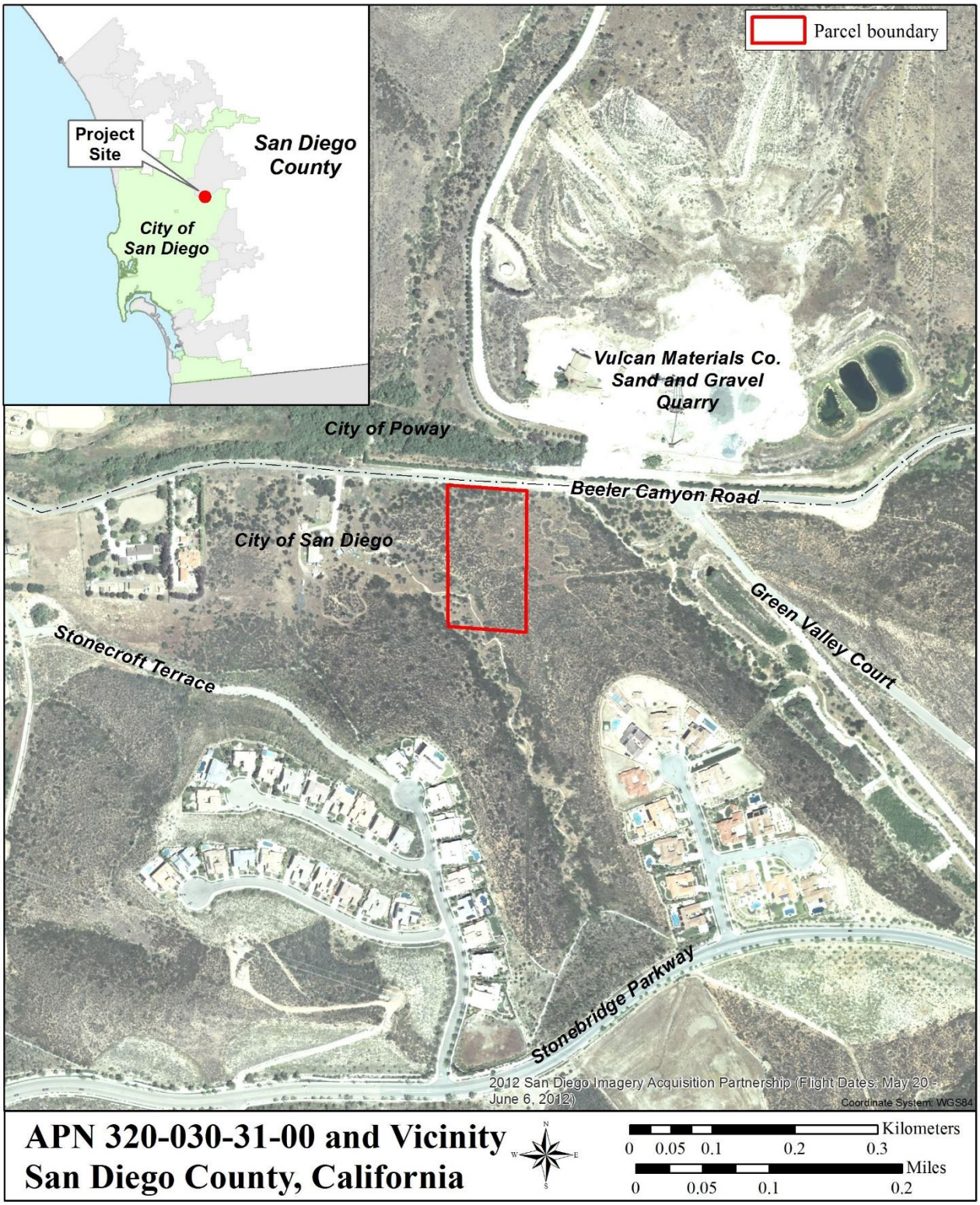


Figure 1. Regional Location and Vicinity

The driveway and house pad run northeast-southwest and would require grading with a cut slope to the southeast and a fill slope to the northwest. As a result, the house pad will be partially on cut and partially on fill. Approximately 1,446 cubic yards (cu yds) of cut will occur, versus 1,026 cu yds of fill, which before shrinkage and cobble removal totals 420 cu yds that will be spread on site and used for contour grading to maintain a natural appearance and avoids any export of soil from the site.

Water and sewer connections would be to City water and sewer lines in Beeler Canyon Road via the driveway.

Dry utilities (electricity, telephone and cable) will also come from Beeler Canyon Road to the proposed home.

The graded and landscaped portion of the site around the house are considered part of the Project development and are required to be covered by BMZ 1 regulations. An orchard is planned for the slopes between the house pad and Beeler Canyon Road.

To achieve the required brush management for the proposed residence, brush beyond the graded and landscaped portion of the site up to 100 feet from the structures would be required to comply with BMZ 2 thinning and pruning requirements. BMZs are of variable widths because fire resistive construction techniques will be applied to the western side of the residence and because of application of an increased BMZ 1 and reduced BMZ 2 pursuant to Section 142.0412(f) of the Municipal Code (City 2014).

BMZ requirements are summarized in the City's Brush Management Guide Bulletin #1 (City 2010) and requirements in Section 142.0412 of the Municipal Code (City 2014).

BMZ 1

- Generally must be permanently irrigated to maintain succulent growth.
- Shall consist primarily of low-growing plant material, less than 4 feet in height with the exception of trees. Plants shall be low-fuel and fire-resistive.
- All portions of trees, other than the trunk, which extend within ten feet of a structure or the outlet of any chimney shall be cut back.
- Trees adjacent to or overhanging any building must be free of dead wood.
- Roof and rain gutters of any structure must be free of leaves, needles, or other dead vegetative growth.
- Buildings or conditions legally in existence at the time of the adoption of the Brush Management Regulations as amended in 2005 (including habitable structures, accessory buildings, and other structures such as fences, gazebos, and decks) are allowed to have their use or occupancy continued. However, such use or occupancy must not constitute a distinct danger to life or property. New construction of non-habitable structures such as fences, gazebos, and decks must be non-combustible and/or have a minimum 1-hour fire resistance rating.
- Irrigation from Zone 1 must not run onto Zone 2 as it encourages growth of flammable vegetation.

BMZ 2 is the remaining land that extends beyond BMZ 1 and is usually comprised of native and/or naturalized vegetation:

- Can have NO permanent irrigation.
- Must be thinned and pruned on a seasonal basis consistent with Brush Management Regulations and Standards to reduce the fuel-load of vegetation greater than 24 inches in height without harming native plants, soil or habitats.

All impacts would occur on site except for the connection of the driveway to Beeler Canyon Road, and the connection, via trenching, of water and sewer pipe to the City water and sewer lines in Beeler Canyon Road. Construction equipment would either be parked on site or on Beeler Canyon Road during construction. The home would be built in one phase and would take approximately one year from approval.

METHODS

Prior to performing the field surveys, a California Natural Diversity Database (CNDDB) search was conducted to identify sensitive plant and wildlife species historically noted in the vicinity of the Project site (1-mile radius).

TDI Biologist Derek Langsford visited the property on October 10, 2014 and spent approximately two hours (7:45-9:40 AM) conducting wandering transects throughout the entire property, recording all plant and wildlife observations, creating a map of the existing vegetation communities, and taking photographs. The weather conditions were overcast and cool (60 degrees Fahrenheit [ºF]) with partial clearing of marine layer by 9:30 (at 63ºF).

The survey was performed late in the season/fall when mostly only perennial plants were identifiable, and only a few animals were using the site which limited the potential for observing spring annuals and migratory bird species. No focused surveys were performed during this site visit.

A follow-up visit was made by Derek Langsford on May 29, 2015 (7:30-8:45 AM) to detect additional species, especially annual plants, which may have been missed during the original survey. Conditions were overcast, calm, and 61ºF at the start of that survey.

RESULTS

PHYSICAL CHARACTERISTICS

The Project site resides on the lower portions of a descending ridgeline extending from the south to Beeler Canyon Road in a southeast-to-northwest direction. The Project site is mostly a northwest-facing, gentle slope supporting native chaparral vegetation adjacent to thickly vegetated parcels to the east, west, and south, and Beeler Canyon Road immediately to the north (see site photos in Appendix A). In the southwest of the Project site, on the western side of the ridge, an unnamed ephemeral drainage crosses the southwestern corner. This drainage continues off site heading northwest and eventually crosses underneath Beeler Canyon Road and joins Beeler Creek, which runs east-west on the north side of Beeler Canyon Road. On the road's verge a few ruderal species are present. The Project site is free of distinguishing topographic features, such as rocky outcrops and large boulders, although scattered rocks do occur on site.

The soil on the whole of the Project site is comprised of Redding cobbly loam (Conservation Biology Institute 2014). The soils generally occur on 15 to 50% slopes, with the exception of the south western portion of the site which is flat (0% slope) around the creek bed. This soil type is well-drained (California Resource Lab 2014).

Historically, the site has undergone profound changes over the last 50 or so years. Based on historic imagery (Historic Aerials 2014), in 1953, Beeler Canyon was largely undeveloped with native habitat on the slopes and Beeler Creek meandering through the valley. By 1964, Beeler Canyon Road had been graded though not surfaced, and the sand and gravel operation was beginning. By 1968, the site plus parcels to the west had been cleared. Some recovery had occurred by 1980 though homes started to appear in the valley, with almost full recovery occurring by 1989. All but the larger shrubs on site (along the road and scattered through the

site) were cleared between 1996 and 2002 (Google Earth 2014). Beeler Canyon burned in the Cedar Fire of October 2003. Stonebridge Estates (aka Sycamore Ranch) was developed to the south on the ridge tops soon after the Cedar Fire but the site and adjacent lands have remained undisturbed since then and have recovered, though the chaparral has not reached full stature or total vegetative cover. Minimal trash occurs on site, though lengths of black multi-core electrical wire can be found in two areas of the site.

ENVIRONMENTAL SETTING

The proposed Project site is near the bottom of Beeler Canyon bordered on three sides by undeveloped parcels supporting chaparral vegetation and to the north by Beeler Canyon Road. Most of the parcels on the south side of the road to the east of the site are in a mostly natural state. Beyond the adjacent parcel to the west are single family homes on large lots.

To the south are Open Space parcels associated with the Stonebridge Estates projects on the ridge tops.

To the north of Beeler Canyon Road is a tall oleander (*Nerium oleander*) hedge screening the sand and gravel quarry operations which takes access off Beeler Canyon Road approximately 470 feet to the east. Beeler Creek flows through the sand and quarry facility along the bottom of the valley.

From the site, one can see residential development on the hills to the west and south, industrial/commercial development on the ridge to the north in the City of Poway along Scripps Poway Parkway, and largely vacant land to the east.

REGIONAL AND REGULATORY CONTEXT

This section describes the regulatory requirements for the Project, and also the Project's regional resource planning status. The Project is subject to CEQA, and applicable state and federal regulations. The Project site is located within the City of San Diego, which is covered by the City's MSCP Subarea Plan.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

The City is the Lead Agency for the proposed Project. This report will provide information relative to biological issues for this portion of the Project.

FEDERAL AND STATE REGULATIONS

Regulations that apply or potentially apply to future development of the Project site include the federal and California Endangered Species Acts (ESA and CESA, respectively), MTBA, CFG Code, federal Clean Water Act (CWA), and CEQA. Impacts to the jurisdictional drainage feature would require a U.S. Army Corps of Engineers (USACE) CWA Section 404 Permit, a Regional Water Quality Control Board (RWQCB) CWA Section 401 Certification, and CFG Code Section 1602 Streambed Alteration.

The MBTA prohibits taking any migratory bird, part, nest, or eggs and is implemented using Section 10.12 of the U.S. Fish and Wildlife Service's (USFWS) MBTA regulations which defines "take" as to: pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities. A take does not include habitat destruction or alteration, as long as there is not a direct taking of birds, active nests, eggs, or parts thereof.

Pursuant to Section 3503, 3503.5, 3505, and 3513 of the CFG Code, it is unlawful to take, possess, or needlessly destroy the active nest or eggs of any bird. The CFG Code defines "take" as to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.

CITY OF SAN DIEGO MSCP GUIDELINES

In July 1997, the USFWS, California Department of Fish and Game (CDFG, now California Department of Fish and Wildlife [CDFW] as of January 1, 2013), and the City adopted the Implementing Agreement for the MSCP (City 1997). This program allows the incidental take of threatened and endangered species, as well as regionally sensitive species that are otherwise adequately conserved. The program designates regional preserves intended to be mostly void of development activities while allowing development of other areas subject to program requirements.

The City's MSCP Subarea Plan was prepared to meet the requirements of the California Natural Communities Conservation Planning Act of 1992 and to be consistent with the federal ESA and state CESA. This Subarea Plan describes how the City's portion of the MSCP Preserve (MHPA) will be implemented.

MHPA Preserve

The MSCP (City 1997) identifies an MHPA that is intended to link all core biological areas into a regional wildlife preserve. The nearest MHPA is on the southern boundary of the site and extends over the Open Space area for Stonebridge Estates to the south.

MHPA Adjacency Guidelines

The City's Subarea Plan includes recommendations so that development activities adjacent or in close proximity to the MHPA will be subject to special conditions so that minimal impacts to the preserve area can be assured. Potential impact issues requiring avoidance, minimization, or mitigation include drainage, lighting, noise, barriers, invasive species, and brush management. With MHPA adjacent to the site, these guidelines would apply to this proposed Project.

Specific Management Directives

No Specific Management Directives apply to this parcel per the City's MSCP Subarea Plan (1997).

Special Conditions for Covered Species

Special conditions apply to covered species that would be impacted by a project or have a moderate or high potential to occur on site. These conditions apply to plant species classified as "narrow endemic" and other sensitive animal and plant species specifically identified in the MSCP Subarea Plan's Appendix A. No narrow endemic species are expected to occur within the parcel.

City of San Diego Development Regulations

The City regulates development of sensitive biological resources through the Land Development Code. Mitigation requirements for sensitive resources discussed in this document follow requirements of the City's Biology Guidelines (City 2012) as outlined in the City's ESL regulations, which have the purpose to "protect, preserve and, where damaged restore, the environmentally sensitive lands of San Diego and the viability of the species supported by those lands." ESLs are defined to include sensitive biological resources, steep hillsides, coastal beaches, sensitive coastal bluffs, and 100-year floodplains. The parcel contains sensitive habitat and steep slopes covered by the City's ESL regulations.

BIOLOGICAL RESOURCES

The following sections describe the vegetation communities, plants and animals observed on site, discuss sensitive species with potential to occur on site, and assess the potential for any wildlife corridors to be present.

Plant and animal species are considered sensitive if they have been listed as such by federal or state resource agencies. The CDFW publishes comprehensive lists for sensitive plants and animals through the CNDDB and at their website (CDFW 2013). The CDFW also publishes the CNDDB RareFind, a computerized inventory of information on the location and condition of California's rare, threatened, endangered, and sensitive plants, animals, and natural communities.

VEGETATION COMMUNITIES

The property is dominated by native chaparral vegetation dominated by scrub oak (*Quercus berberdifolia*) adjacent to Beeler Canyon Road and chamise (*Adenostoma fasciculatum*) beyond (Table 1, Figure 2).

Southern Mixed Chaparral (37120)

Southern mixed chaparral is composed of tall (often between 10 and 20 feet), broad-leaved sclerophyllous shrubs that often form nearly impenetrable stands on mesic, rocky, north-facing slopes. It generally has a poorly developed understory, but instead may contain a large component of dead plant matter. It is common within San Diego County, and provides important habitat for wide-ranging species such as mule deer (*Odocoileus hemionus fuliginata*), mountain lion (*Felis concolor*), and golden eagle (*Aquila chrysaetos*).

Southern mixed chaparral occupies all of the project site, but is still recovering from the Cedar Fire which burned through Beeler Canyon in 2003. Charred stumps of shrubs that did not resprout are still visible on site. The vegetation has not reached 100 percent vegetative cover, most likely a result of decreased rainfall in most of the years since 2000 (San Diego County Water Authority 2014). Existing openings allows some forb species to exist. While scrub oak is predominant close to the road and chamise is predominant over the remainder of the site, other chaparral species co-occur including Ramona lilac (*Ceanothus tomentosus*), laurel sumac (*Malosma laurina*), San Diego mountain mahogany (*Cercocarpus minutiflorus*), toyon (*Heteromeles arbutifolia*), and Mojave yucca (*Yucca schidigera*). Few understory plants were present and even fewer identifiable but included rush rose (*Crocanthemum scoparium*), deerweed (*Acmispon glaber*), and scattered purple needle grass (*Stipa pulchra*). In the flat area along the creek, holly-leafed cherry (*Prunus ilicifola*) was prevalent as were non-native grasses including wild oats (*Avena* sp.). A few California sand aster (*Corethrogyne filaginifolia* ssp. *filaginifolia*) plants had just finished blooming near the drainage and in one small area in the middle of the site.

Developed (12000)

Developed land is where permanent structures and/or pavement has been placed, which prevents the growth of vegetation, or where landscaping is clearly tended and maintained. Developed land consists of Beeler Canyon Road immediately off site to the north.

Table 1 summarizes the acreages of habitat types within the Project site.

Table 1. Acreage of Habitat Type within the Project Site

Vegetation Community Type (Holland Code)	**Tier**	**On Site** (acres)
Southern Mixed Chaparral (37120)	IIIa	2.80
	TOTAL	**2.80**

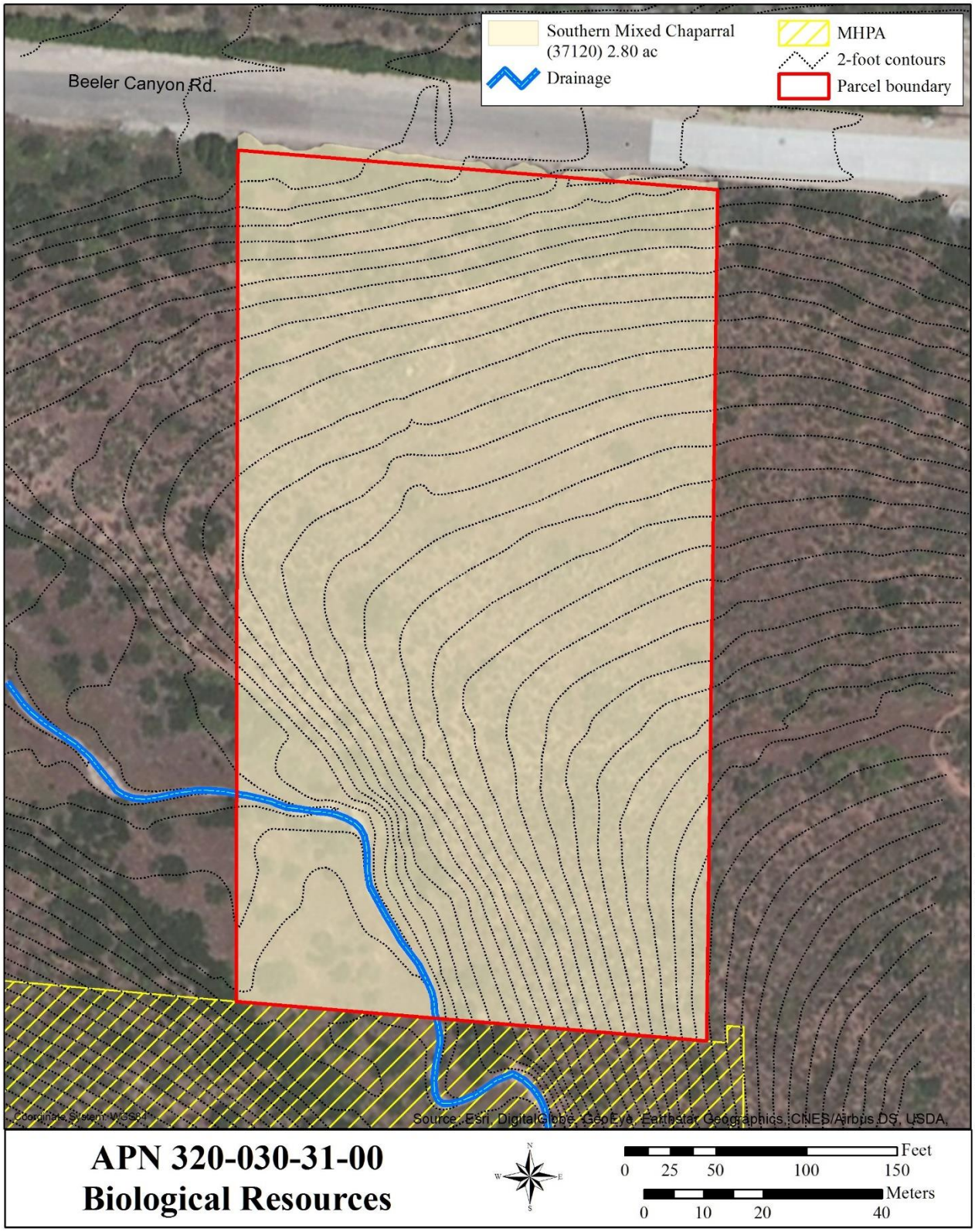


Figure 2. Vegetation and Sensitive Resources Observed on Site

PLANTS

A list of the plant species observed on site are presented in Appendix B.

Sensitive Plants

Sensitive species that have been detected within one mile of the Project include Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), San Diego barrel cactus (*Ferocactus viridescens*), and San Diego goldenstar (*Bloomeria clevelandii*). The CNDDB identifies a swath of San Diego goldenstar along the floor of Beeler Canyon (CNDDB 2014); however, the precise location of the observation was not originally specified. The species is found mostly in grasslands and at shrubland edges, and much less likely in chaparral. The species would have been detected in 2015 if present.

The site is mostly natural with minimal recent disturbance or trash present. Few non-native plants were observed. Del Mar manzanita and San Diego barrel cactus would have been observed if present. No sensitive plants were detected during either the fall 2014 surveys or spring 2015 surveys.

Sensitive plants with potential to occur are assessed in Appendix C. A table of City MSCP Narrow Endemics with their potential to occur on site is provided in Appendix D.

ANIMALS

A small number of wildlife species were observed during the site visits conducted on October 10, 2014 and May 29, 2015. Minimal activity was detected either because of the time of year, the relative cool temperatures at the time of visits, the habitat present, and the drought-stressed condition of the vegetation. Eight avian species, a few insects, and sign of six mammal species were detected. A list of animals observed or detected on site is provided in Appendix E.

Birds detected included Anna's hummingbird (*Calypte anna*), hermit thrush (*Catharus guttatus*), California and spotted towhee (*Pipilo crissalis* and *P. maculatus*), and western scrub jay (*Aphelocoma californica*). American crows (*Corvus brachyrhychos*) flew over the site and an unidentified warbler flew off site and out of sight from the drainage area in the southwest corner. All avian species observed appeared to be passing over or through the site as it was not nesting season and minimal flowering and fruiting were occurring because of the lack of rainfall the previous spring. Bird activity was much greater in the riparian habitat along Beeler Creek off site to the north. There was evidence of small mammal use (active burrows) in multiple places with Lepidorid (rabbit and hare family) scat over much of the site. Mule deer scat was also detected on site. No mammals were observed during the site visits. Coyotes (*Canis latrans*) could be heard in the distance along Beeler Creek.

Sensitive Animals

While no CNDDB records exists for sensitive animals on site, others have been detected within 1 mile including coastal California gnatcatcher (*Polioptila californica*) and coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*), and southern California rufous-crowned sparrow was detected on site in 2005 per city records; however, none of these species were observed on site in either fall 2014 or spring 2015 surveys. Of these three species only the southern California rufous-crowned sparrow has any potential to occur on site. No raptors are expected to roost or nest on site but may forage over the site and along the more open drainage area. One other sensitive bird species, Bell's sage sparrow has a moderate or high potential to occur on site but it is not an MSCP-covered species. The southern California rufous-crowned sparrow and orange-throated whiptail are the only MSCP-covered species that have a moderate or high potential to occur on site. A list of animal species with potential to occur is provided in Appendix F.

Quino Checkerspot Butterfly

The site is within the Recommended Quino Survey Area for the federally-listed as endangered quino checkerspot butterfly per the 2014 USFWS protocol (USFWS 2014) and has some habitat characteristics that are associated with known quino checkerspot butterfly occurrences such as openings in scrub and chaparral. But as described above, the site has undergone profound changes over the last 50 or so years that have devalued the site for the species. By 1968, the site plus parcels to the west, had been cleared (Historic Aerials 2014). After almost full recovery by 1989, all but the larger shrubs on site were cleared again between 1996 and 2002 (Google Earth 2014). Beeler Canyon then burned in the Cedar Fire of October 2003. Stonebridge Estates (i.e., Sycamore Estates and Rancho Encantada) was developed soon after the Cedar Fire on the ridges to the south. Quino checkerspot surveys in 2001 of that area were negative, even though conditions were considered ideal for the species: open ridges, dot-seed plantain patches, and nectaring resources after a winter of moderate rainfall (8.57 inches). At that time, the result suggested this part of the county did not support the species. The Project site is far from any Designated Critical Habitat (DCH) for the species occurring in southern San Diego and southern Riverside counties. So, while the site currently meets the criteria for surveys in terms of vegetation, its location at the bottom of a slope near a valley floor, adjacency to a paved road, with development on ridge tops both directly to the north and south, past clearing, and the nearest potentially usable ridge tops being two miles to the east, the probability of the species occurring on site is low.

The closest sightings within the last 20 years have been on an undeveloped ridge to the east of Sycamore Estates (2.1 miles away during surveys for the Sunrise Powerlink), on Fanita Ranch north of Santee (almost 4 miles away), in Mission Trails Regional Park (6 miles away), and north and south of San Vicente Reservoir (over 6 miles away) (http://quinocheckerspotbutterfly.blogspot.com 2013). Detections documented to the west in the 1920s and 1960s, prior to the species' listing, are in areas that are developed and from which the butterfly is most likely extirpated. Although plant taxa indicative of Quino checkerspot butterfly habitat have not been identified, the butterfly has been associated with vegetation communities that support its two most frequently used host plants, dot-seed plantain (*Plantago erecta*), and owl's clover (*Castelleja exserta*; Longcore *et al*. 2003). Commonly occurring with these plant species are peppergrass (*Lepidium nitidum*), tidy tips (*Layia platyglossa*), goldfields (*Lasthenia californica*), blue dicks (*Dichlostemma capitatum*), fringed linanthus (*Linanthus dianthoflorus*), as well as *Allium*, *Bloomeria*, *Cryptantha*, *Plagiobothrys*, and *Amsinckia* species, several of which are used as nectar sources. These species, if present, would have been detectable during the spring 2015 survey, but were not observed. Without host plant or nectaring resources, it is extremely unlikely the quino checkerspot butterfly uses the site.

JURISDICTIONAL AREAS

An ephemeral drainage with a cobble streambed that is approximately 4 feet wide occurs in the southwestern portion of the site (Figure 2). It is likely jurisdictional to the USACE, CDFW, RWQCB, and City, but with no development proposed in that portion of the site and all drainage from the proposed Project directed to the north, no impacts to USACE, CDFW, RWQCB, or City jurisdictional areas are expected. As a result, the drainage was not formally delineated for this Project.

WILDLIFE CORRIDORS AND LINKAGES

Wildlife movement corridors are areas that connect suitable wildlife habitat areas in a region otherwise fragmented by rugged terrain, changes in vegetation, or human disturbance. Natural features such as canyon drainages, ridgelines, or areas with vegetative cover provide corridors for wildlife movement. Wildlife movement corridors are important because they provide access to mates, food, and water; allow the dispersal of individuals away from high population density areas; and facilitate the exchange of genetic traits between populations.

The site is located in a rural area within a patch of native habitat that is part of a larger area of habitat in Beeler Canyon connected to lands to the east, west, and south, and is recognized in the MSCP as a southern extension of the Central Poway/San Vicente Reservoir/North Poway Biological Core Area (City 1998). It connects lands that make up the majority of the Biological Core Area to the east with Peñasquitos Canyon to the west.

Beeler Creek acts as a thoroughfare in the canyon and ultimately west to Peñasquitos Canyon for birds and animals that require cover from predators. Beeler Canyon peters out in the east into undeveloped land in the County of San Diego's Gooden Ranch Sycamore Canyon Preserve and the majority of the Core Area. To the north, the industrial and commercial development along Scripps Poway Parkway in the City of Poway acts as a barrier to wildlife movement north. While the Stonebridge Estates projects act as a barrier to the south, gaps in the development allow for animal movement with only Stonebridge Parkway as a barrier. Only the creekbed in the southwest corner of the site is a likely local movement area for wildlife, although the creek passes through a residential lot to the east before crossing under Beeler Canyon Road and joining Beeler Creek. The majority of the site does not have features that lend itself to acting as a wildlife corridor. It does provide habitat for resident wildlife and local movement for wildlife species but would not be considered to be within a major wildlife movement corridor when a large swath of vacant land exists in east Miramar and East Elliot connecting the Biological Core Area in the east with the canyons of the urban San Diego area to the west and south.

IMPACTS

Impacts are either direct or indirect. An impact is direct when the primary effect is removal of existing habitat, often replacing it with development and landscaping. An indirect impact consists of secondary effects of a project (such as noise) that leads to habitat degradation. The magnitude of an indirect impact may be the same as a direct impact; however, the effect usually takes a longer time to become apparent.

The significance of impacts to biological resources present or to those with potential to occur was determined based upon the sensitivity of the resource and the extent of the anticipated impacts.

DIRECT IMPACTS

The proposed Project consists of clearing, grading with excavation and recompacting to create a pad, construction of the home, landscaping, an orchard, and sewer, water, and dry utility connection to street utilities in Beeler Canyon Road. The proposed Project will also be required to apply BMZs to the land between the home and natural resources to the east, west, and south. Grading and landscaping are considered part of the Project development and are required to be covered by BMZ 1 regulations if between the residence and natural resources. Land between areas covered by BMZ 1 and natural resources require thinning and pruning as part of BMZ 2 which provides additional protection to the proposed structures.

VEGETATION

Per City Biology Guidelines (City 2012):

> "… lands containing Tier I, II, IIIa and IIIb [(see Table 3 of City's Biology Guidelines] and all wetlands [see Tables 2a and/or 2b of City's Biology Guidelines] are considered sensitive and declining habitats. As such, impacts to these resources may be considered significant. Lands designated as Tier IV are not considered to have significant habitat value and impacts would not be considered significant."

The proposed site improvements, as well as implementation of BMZ 1 and 2 requirements, will occur within the native Tier IIIa habitat that covers the property. Impacts to 1.10 acres of Southern Mixed Chaparral (Table 2; Figure 3) from grading of the pad and slopes, development of the house, garage, and driveway, orchard, and application of BMZ 1 are significant, and require mitigation pursuant to the City's Land Development Code, MSCP, and CEQA. BMZ 2 activities restricted to thinning and pruning pursuant to City BMZ regulations (0.39 acre) are considered impact neutral and do not require mitigation pursuant to the City Biology Guidelines (City 2012).

SENSITIVE PLANTS AND ANIMALS

Per City Biology Guidelines (City 2012), "Impacts to individual sensitive species, outside of any impacts to habitat, may also be considered significant based upon the rarity and extent of impacts. Impacts to state or federally listed species and all narrow endemics [see the City's Biology Guidelines] should be considered significant. Certain species covered by the MSCP [see Section I of the Biology Guidelines] and other species not covered by the MSCP, may be considered significant on a case-by-case basis taking into consideration all pertinent information regarding distribution, rarity, and the level of habitat conservation afforded by the MSCP."

Sensitive Plants

As no sensitive plants were detected (Appendix B), and none have a moderate or high potential to occur on site (Appendix C), no direct impacts to sensitive plant species are expected.

Narrow Endemics

No City Narrow Endemics were detected and none are expected to occur on site (Appendix D). No impacts to Narrow Endemic species are expected to occur.

Sensitive Animals

No special status animal species were detected on site (Appendix E) and few are expected to occur on site (Appendix F). Scat of mule deer, an MSCP-Covered Species, was detected on site but the species has no sensitivity status, impacts are mitigated through habitat preservation, and there are no associated MSCP Conditions of Coverage. Bell's sage sparrow, southern California rufous-crowned sparrow, and the orange-throated whiptail are the only sensitive species that are likely to be affected by the Project because they are considered to have a moderate or high potential to occur on site (Appendix F). Bell's sage sparrow is not an MSCP-covered species and potential effects are mitigated by habitat preservation. MSCP Conditions of Coverage for the orange-throated whiptail and southern California rufous-crowned sparrow are as follows (City 1997, 1998):

Orange-throated whiptail - Area Specific Management Directives must address edge effects.

Southern California rufous-crowned sparrow – Area Specific Management Directives must include maintenance of dynamic processes, such as fire, to perpetuate open spaces of coastal sage scrub with herbaceous components.

The Project is downslope of the proposed mitigating Open Space and existing MHPA to the south. BMZ 2, where only thinning and pruning per City Municipal Code and Standards is allowed, will be dedicated as part of the COE and will provide a buffer between the residence and the protected habitat to the south for orange-throated whiptail. Dynamic processes will be perpetuated because BMZ 2 will be kept thinned, providing opening for annuals for Southern California rufous-crowned sparrows, and the BMZs will protect the residence thus allowing dynamic processes to occur (e.g., fires) in the Open Space without threat to property. Combined with preservation of Southern Mixed Chaparral habitat per prescribed mitigation ratios, impacts

would not be significant to these species and the Project would be in compliance with the species' MSCP Conditions of Coverage.

Nesting Birds

All actively nesting birds and their nests, with a few exceptions, are protected under the MBTA and CFG Code. Direct impacts may occur to birds nesting in the vegetation on site if clearing occurs during the bird breeding season (February 1 through September 15). No raptors have potential to nest on site because of the lack of suitable nesting locations.

JURISDICTIONAL AREAS

No development is being proposed in the portion of the site with the jurisdictional drainage being wholly contained in open space and all drainage from the proposed Project being directed to the north away from the drainage. As a result, no impacts to USACE, CDFW, RWQCB, or City jurisdictional areas are expected and no mitigation or approvals from USACE, CDFW, and RWQCB are required.

INDIRECT IMPACTS

Indirect impacts can affect vegetation communities or their potential use by sensitive species including raptors and nesting birds. Potential indirect impacts from construction of the Project include decreased water quality, construction noise, night lighting, colonization of non-native plant species, and human and pet intrusion. These potential indirect impacts are discussed below.

The clearing, grading, and development area of the proposed Project is buffered from the proposed mitigating Open Space by BMZ 2 that precludes development and despite thinning and pruning per City Municipal Code and Standards, provides screening for wildlife in the mitigation area. Project features described for compliance with the MHPA Adjacency Guidelines are also applicable to the Open Space and offset indirect impacts.

MHPA ADJACENCY GUIDELINES

The MHPA occurs at the very southern boundary of the Project site, approximately 250 feet south of the nearest structure, and 150 feet from the nearest area of BMZ 2, but the City's MHPA Adjacency Guidelines still need to be addressed because of the proximity of the Project Site to the MHPA to ensure compliance.

Per Section 1.4.3 of the City's MSCP Subarea Plan, drainage, toxic substances, lighting, noise, barriers, invasive species, brush management, and grading are topics of concern addressed by the City's MHPA Adjacency Guidelines (2013a). While the proposed Project is not within the MHPA, the following describes how Project compliance with the MHPA Adjacency Guidelines would avoid impacts to the MHPA. These project features and compliance measures will be applied per the mitigation measures described below (Mitigation Section) via monitoring and enforcement as part of the MMRP.

Drainage

Guideline:

> *All new and proposed parking lots and developed areas in and adjacent to the preserve must not drain directly into the MHPA. All developed and paved areas must prevent the release of toxins, chemicals, petroleum products, exotic plant materials and other elements that might degrade or harm the natural environment or ecosystem processes within the MHPA. This can be accomplished using a variety of methods including natural detention basins, grass swales or mechanical trapping devices. These systems should be maintained approximately once per year, or as often as needed, to*

Table 2. Project Impacts and Mitigation

Vegetation Community Type (Holland Code)	**Tier**	***On Site*** *(acres)*	**Impacts** *(acres)*			**Open Space** *(acres)*		
			On Site	***Off Site***				
			Grading for House, Garage, and Driveway, Drainage Improvements, BMZ 1 and Orchard	***Driveway Connection, Water and Sewer Lines***	***Total***	***BMZ 2***	***Mitigation***	***Total[1]***
Southern Mixed Chaparral (37120)	IIIA	2.80	1.10	<0.01	1.10	0.39	1.30	1.70
Developed (12000)	IV	-	-	<0.01	<0.01	-	-	-
TOTAL[1]		**2.80**	**1.10**	**<0.01**	**1.10**	**0.39**	**1.30**	**1.70**

[1] Column and row totals may not add due to rounding error.

ensure proper functioning. Maintenance should include dredging out of sediments if needed, removing exotic plant materials, and adding chemical-neutralizing compounds (e.g., clay compounds) when necessary and appropriate.

Compliance:

All drainage from the proposed development areas of the site has been designed to pass through storm water treatment features (Figure 3), and is either stored on site or flows towards Beeler Canyon Road away from the MHPA and Open Space. The Project by design will comply with this provision.

Toxic Substances

Guideline:

Land uses, such as recreation and agriculture, that use chemicals or generate by- products such as manure, that are potentially toxic or impactive to wildlife, sensitive species, habitat, or water quality need to incorporate measures to reduce impacts caused by the application and/or drainage of such materials into the MHPA. Such measures should include drainage/detention basins, swales, or holding areas with non-invasive grasses or wetland-type native vegetation to filter out the toxic materials. Regular maintenance should be provided. Where applicable, this requirement should be incorporated into leases on publicly owned property as leases come up for renewal.

Compliance:

The proposed Project site and its storm drainage system drains water and any potential toxic substances into on-site storm treatment areas and stores storm water on site in an underground area adjacent to Beeler Canyon Road (Figure 3) and away from the MHPA and Open Space. During construction, all maintenance of any construction equipment (e.g., refueling, oil changing, hydraulic maintenance) will be conducted within designated BMP-fortified areas in the grading area or off site in a manner that will not allow the release of toxins, chemicals, petroleum into the Open Space or MHPA. The CDs shall contain a note stating: *All construction related activity that may have potential for leakage or intrusion shall be monitored by the Qualified Biologist/Owner's Representative or Resident Engineer to ensure there is no impact to the MHPA.*

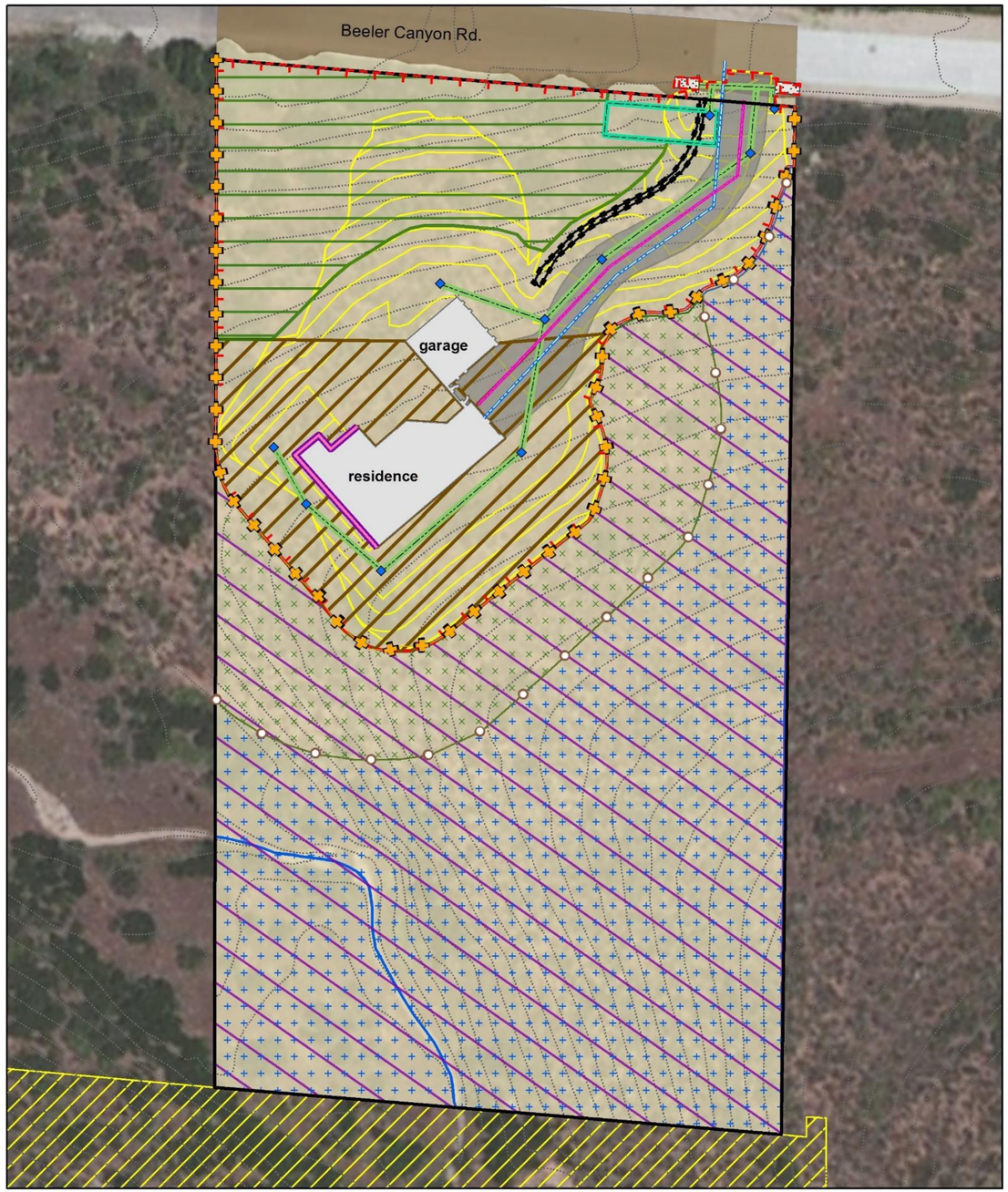
Lighting

Guideline:

Lighting of all developed areas adjacent to the MHPA should be directed away from the MHPA. Where necessary, development should provide adequate shielding with non-invasive plant materials (preferably native), berming, and/or other methods to protect the MHPA and sensitive species from night lighting.

Compliance:

The MHPA will be partially shielded from the proposed development area of the site because of the cut slope. Any lighting will be for the area immediately around the home, in the landscaping, and not directed towards the Open Space or MHPA. With the home approximately 250 feet from the MHPA and not directed at the Open Space or MHPA, lighting will not impact the MHPA. Lighting will comply with City Outdoor Lighting regulations per Municipal Code Section 142.0740 (City 2014).



APN 320-030-31-00
Impacts

Parcel boundary
Structures
Driveway
Grading plan
Three-wire fence
Sewer line
Water line
Stormwater drains
Stormwater lines
Stormwater dissipators
Stormwater swale
Stormwater underground storage
Orchard
Impact area (1.10 ac)

Brush Management Zones
Brush Management Zone 1 (0.38 ac)
Brush Management Zone 2 (0.39 ac)
Alternative compliance for brush management

Open Space
Mitigating Open Space (1.30 ac)
Open Space signage/marker
Covenant of Easement (1.70 ac)

Biological Resources
Southern Mixed Chaparral (37120) (2.80 ac on site)
Developed (12000)
MHPA
Drainage
2-foot contours

N
W E
S

Feet
50 25 0 50
Meters
10 5 0 10 20 30
1 inch = 55 feet

Figure 3. Impacts to Vegetation Communities and Sensitive Resources

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Noise

Guideline:

Uses in or adjacent to the MHPA should be designed to minimize noise impacts. Berms or walls should be constructed adjacent to commercial areas, recreational areas, and any other use that may introduce noises that could impact or interfere with wildlife utilization of the MHPA. Excessively noisy uses or activities adjacent to breeding areas must incorporate noise reduction measures and be curtailed during the breeding season of sensitive species. Adequate noise reduction measures should also be incorporated for the remainder of the year.

Compliance:

No listed species were detected or have any potential to occur. No other sensitive species were detected and only three have moderate or high potential to use the Open Space or adjacent MHPA. The proposed Project would not generate noise that would interfere with wildlife usage in the MHPA. Grading of a single house pad and construction of the home will involve machinery but such work on this limited area would be temporary and would not meet thresholds for noise for species in the MHPA. The nearest grading is approximately 200 feet from the MHPA which provides buffering for any construction noise.

Barriers

Guideline:

New development adjacent to the MHPA may be required to provide barriers (e.g., non-invasive vegetation, rocks/boulders, fences, walls, and/or signage) along the MHPA boundaries to direct public access to appropriate locations and reduce domestic animal predation.

Compliance:

The Project is development of a private home. No public access will be granted to the Open Space or MHPA through the property. A three wire fence and Open Space signage/markers will be installed to identify the boundary of BMZ 1 and BMZ 2 and mitigating Open Space area respectively so that brush management does not incur in the protected habitat (Figure 3). The area is rural and domestic pets, especially cats, are susceptible to predation by coyotes rather than domestic pets being a threat to wildlife in the MHPA which would be 250 feet from the residence.

Invasive Species

Guideline:

No invasive non-native plant species shall be introduced into areas adjacent to the MHPA.

Compliance:

The proposed Project will avoid usage of invasive plant species in landscaping (see City Landscaping Standards Table 1 and www.cnpssd.org/invasives.html for restricted plants) and as a result, will not introduce invasive species into the Open Space or MHPA.

Brush Management

Guideline:

> *New development located adjacent to and topographically above the MHPA (e.g., along canyon edges) must be set back from slope edges to incorporate Zone 1 brush management areas on the pad and outside of the MHPA. Zone 2 may be located in the MHPA upon granting of an easement to the City (or other acceptable agency) except where narrow wildlife corridors require it to be located outside of the MHPA. Brush management zones will not be greater in size than is currently required by the City's regulations. Initial thinning of woody vegetation shall not exceed 50 percent coverage of the existing vegetation prior to implementation of Brush Management activities. Additional thinning and pruning shall be done consistent with City standards to obtain minimum vertical and horizontal clearances and shall avoid/minimize impacts to covered species to the maximum extent possible. For all new development, regardless of the ownership, brush management in the Zone 2 area will be the responsibility of a homeowners association or other private party. For existing and approved projects, the brush management zones, standards and locations, and clearing techniques will not change from those required under existing regulations.*

Compliance:

> BMZs are required for the Project. The proponents will comply the City's Brush Management Guidelines (2014). The City's prescribed BMZs are a BMZ 1 of 35 feet and a BMZ 2 of 65 feet or as allowed under Section 142.0412 of the Municipal Code (City 2014). The Project is lower in elevation than the MHPA and BMZ 1 is mostly contained within the grading area. BMZ 2 does not encroach into the MHPA because of the mitigating Open Space that will be dedicated on site between the edge of BMZ 2 and the MHPA. Further, regular brush management activity in BMZ 2 shall not exceed that required by the City Municipal Code and Standards and shall be restricted to only occur outside of the bird-breeding season of February 1 through September 15 to avoid impacts to all nesting birds. Avoidance of brush management during the bird-breeding season also provides compliance with the MBTA and CFG Code. A three wire fence will delineate the boundary of BMZ 1 and BMZ 2 so that clearing does not occur in BMZ 2. Open Space signage/markers will identify the boundary of BMZ 2 and the mitigating Open Space so that thinning and pruning in BMZ 2 does not occur in the protected habitat (Figure 3). As a result, no impacts to the mitigating Open Space or MHPA will occur from brush management.

Grading/Land Development

Guideline:

> *Manufactured slopes associated with site development shall be included within the development footprint for projects within or adjacent to the MHPA.*

Compliance:

> No grading will occur outside of that need for home construction and associated landscaping and will occur within BMZ 1 that is 200 feet from the MHPA. MHPA boundaries on site shall be delineated on the CDs. DSD Planning and/or MSCP staff shall ensure that all grading and manufactured slopes are included within the development footprint.

As demonstrated above, the proposed Project is in compliance with the MHPA Adjacency Guidelines and indirect impacts to the open space and the MHPA are not expected to occur.

CUMULATIVE IMPACTS

Although impacts to sensitive biological resources may not be significant when considered independently, when multiple impacts such as from several development projects within an area are combined, they may be cumulatively significant. Implementation of the proposed Project would contribute to the incremental loss of native habitats occurring within the City; however, cumulative impacts to biological resources would not be significant because the impacts of the Project occur outside the MHPA, will be fully mitigated per City Biology Guidelines (2012), are in compliance with MHPA Adjacency Guidelines, and are compliance with the City's MSCP Subarea Plan (1997) that was designed to mitigate cumulative impacts from development outside of the MHPA.

MITIGATION

Pursuant to City requirements in its Biology Guidelines (City 2012) and the MSCP Subarea Plan (City 1997) the following Mitigation Program is proposed to reduce significant impacts to below a level of significance and constitutes the Mitigation, Monitoring, and Reporting Program (MMRP) for the Project.

Mitigation Element

As wetlands are avoided, no vernal pools occur on site, and no MHPA occurs on site, mitigation for direct impacts to habitat will be for grading, storm water features, orchard, and BMZ 1 impacts to Southern Mixed Chaparral habitat. Impacts to most sensitive species are considered fully mitigated by securing habitat at the required ratio (City 2012) and the analysis above demonstrates that the Project complies with the MSCP Conditions of Coverage for the two MSCP-covered species that have a moderate or high potential to occur on site as well as the MHPA Adjacency Guidelines. As a result, impacts to southern California rufous-crowned sparrow and orange-throated whiptail were not significant and require no additional mitigation.

Impact 1:

> *Direct impacts to 1.10 acre of Southern Mixed Chaparral from grading of the pad and slopes, development of the house, garage, and driveway, planned orchard, and application of BMZ 1 are significant. Per the City's Biology Guidelines (2012), impacts to Tier IIIa Southern Mixed Chaparral outside of the MHPA requires mitigation at a 1:1 ratio when mitigated outside the MHPA and 0.5:1 when mitigation is inside the MHPA.*

Mitigation Measure 1:

> The Project proponents will preserve as Open Space a 1.70-acre area of Southern Mixed Chaparral (Figure 3) of which 1.30 acres outside the BMZ 2 is mitigation, through recordation of a COE to meet and exceed the required 1:1 mitigation ratio. The mitigation area is adjacent to extant habitat to the east and west, and to extant habitat preserved within the MHPA to the south, such that it will be part of a large block of habitat that has long-term viability (Figures 1, 2, and 3). Edge effects will be minimized by dedication of BMZ 2 as part of the COE which will act as a buffer from the developed area of the parcel, because all drainage will remain on site or go to Beeler Canyon Road, because the COE is upslope of the proposed development, and the Project will comply with the MHPA Adjacent Guidelines as described above.

Impact 2:

Direct impacts to birds nesting in shrubs on site are not expected to occur if clearing occurs outside the bird breeding season (February 1- September 15); otherwise, the Proposed Project could be in violation of the MBTA and CFG Code.

Mitigation Measure 2:

Impacts to nesting birds would be avoided. All shrub trimming, thinning, or removal will be performed prior to or after the bird breeding season, February 1 through September 15 (i.e., only between September 16 and January 31). During Project construction, a Qualified Biologist shall monitor all shrub trimming, thinning or removal, and construction to ensure compliance. If clearing is planned to occur during the breeding season, pre-construction nest surveys shall be conducted prior to any clearing. Work may proceed if no bird nests are observed. Regular brush management activities shall also occur outside of the bird breeding season.

Protection and Noise Element

The Mitigation Program must provide assurances that areas offered for mitigation but indirectly impacted by the proposed development will be adequately protected from future development (City 2012).

In addition to minimizing indirect impacts through project features and compliance with the MHPA Adjacency Guidelines, a COE shall be recorded against the title of the property over the identified mitigating Open Space and the BMZ 2 area, which allows only thinning and pruning per City Municipal Code and Standards, south of the developed area (Figure 3). This will legally bind the property owner with respect to future use of the land, identify permissible passive activities, and other conditions, and will run with the land. The COE will grant the City with limited right of entry to the area covered by the COE to verify the private property owner's compliance with brush management requirements, MHPA Adjacency Guidelines, and maintenance of the biological resources in perpetuity (City 2012).

Management Element

The Mitigation Program must provide assurances that areas offered for mitigation will be adequately managed and monitored in a manner consistent with Section 1.5 Preserve Management of the City's MSCP Subarea Plan (1997). The Mitigation Program should identify how the objectives of the MSCP Preserve Management recommendations result will be met for the area, as well as provide any additional management recommendation resulting from site-specific information (area specific management directives; City 2012).

The mitigating Open Space area and BMZ 2 will have a COE granted in favor of the City, the USFWS, and CDFW recorded against the title of the property. As a result, the City, will have limited right of entry to verify the private property owner's has maintained the COE to protect sensitive resources in perpetuity in accordance with the MSCP Framework Management Plan as modified by the area specific management directives per Section III.B.3a of the City's Land Development Code Biology Guidelines (City 2012). Per the assessment of potential impacts to sensitive species described above, area specific management directives must address edge effects for the orange-throated whiptail and for the southern California rufous-crowned sparrow must include maintenance of dynamic processes, such as fire, to perpetuate open spaces of coastal sage scrub with herbaceous components. The COE will allow the City to verify the private property owner has maintained the biological resources within the COE and is in compliance with the MHPA Adjacency Guidelines.

The property owner shall be responsible for ensuring the maintenance of brush management areas and compliance with the MHPA Adjacency Guidelines as identified above but would not be responsible for future monitoring reports or maintenance activities (City 2012). The City will have limited right of entry to monitor compliance and maintenance of the biological resources within the COE in perpetuity.

CONCLUSION

Direct impacts to 1.10 acre of Southern Mixed chaparral would be mitigated at a ratio greater than 1:1 by dedication of 1.30 acres of Southern Mixed chaparral on site as permanently protected, mitigating Open Space within a 1.70-acre COE. Through implementation of the Mitigation Program: recordation of the COE, clearing and brush management restricted to outside the bird breeding season (i.e., September 16 through January 31), biological monitoring of construction, compliance with MHPA Adjacency requirements, and maintenance of the biological resources within COE in perpetuity by the private property owner, the proposed Project would be in compliance with CEQA, the MSCP Subarea Plan, and the MSCP MHPA Adjacency Guidelines. The applicant would also ensure project compliance with the MBTA and CFG Code. After application of the Mitigation Program, no significant direct or indirect impacts to vegetation communities, sensitive species, jurisdictional drainages, or MHPA are anticipated by the proposed grading of the pad, construction of a new residence with associated utilities, and implementation of brush management. Dedication of the 1.70-acre COE over the BMZ 2 and remaining ESL including the Southern Mixed Chaparral and drainage will preserve the remaining sensitive resources found on site in perpetuity. As a result of the project design and mitigation, the proposed Project would have a less than significant effect on biological resources.

If you have any questions please contact Derek Langsford at derek.langsford@tierradata.com or by phone at (760) 749-2247.

Derek H. Langsford, PhD, CSE
Biology Practice Manager

Appendices:

Appendix A	Site Photos
Appendix B	Plant Species Observed on Site
Appendix C	Sensitive Plant Species with Potential to Occur
Appendix D	Potential for Narrow Endemics to Occur
Appendix E	Animal Species Observed on Site
Appendix F	Sensitive Animal Species with Potential to Occur
Appendix G	Resume

List of Figures

List of Tables

QUALIFICATIONS AND CERTIFICATION

The following individuals contributed to the fieldwork and/or preparation of this report. See Appendix E for their resumes.

Derek H. Langsford Ph.D., Ecology, UC Davis/San Diego State University, 1996
B.Sc., (Hons.), Ecological Science, University of Edinburgh, 1985
ESA Certified Senior Ecologist, San Diego County Approved Biologist

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APPENDICES

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APPENDIX A

Site Photos

Photo 1. Looking into the site from Beeler Canyon Road at the northeast corner in a SSW direction.

Photo 2. Looking into the site from Beeler Canyon Road further west than Photo 1 in a SW direction with homes of Stonebridge Estates visible on the ridge tops. Interior scrub oaks visible with a broom baccharis in bloom at the center.

Photo 3. Looking SE through broom baccharis shrubs and weedy grasses into the interior of the site Project site, looking SE from the NW of the site

Photo 4. Looking WSW from the approximate location of the proposed residence. Chamise shrubs are narrow and stunted from probable lack of rainfall.

Photo 5. Looking SE from the central west of the site through thicker chaparral. The upper levels of the sand and gravel operation are visible in the upper right.

Photo 6. Looking SW across the valley with the drainage with Stonebridge Estates homes on the ridge tops. The opposite hillside is within the MHPA.

Photo 7. The ephemeral drainage in the SW of the site with cobble bed.

Photo 8. Looking N along drainage in area of open southern mixed chaparral.

Photo 9. Looking N downslope from near SE corner of property.

Photo 10. Looking N downslope from near SE corner of property with openings in the chaparral.

Photo 11. Grouping of California sand asters in the south central portion of the site.

Photo 12. Mule deer scat seen on south central portion of site.

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APPENDIX B

PLANT SPECIES OBSERVED ON SITE

FAMILY/	SCIENTIFIC NAME	COMMON NAME	HABITAT(S)‡
FERNS AND MOSSES			
Selaginellaceae	*Selaginella cinerascens*	ashy spikemoss	SMC
Polypodiaceae	*Pentagramma triangularis*	goldenback fern	SMC
ANGIOSPERMS – MONOCOTS			
Agavaceae	*Yucca schidigera*	Spanish dagger	SMC
Poaceae	*Avena* sp.*.	wild oat	SMC
	Bromus diandrus *	ripgut grass	SMC,
	*Bromus 1ismontane**	soft brome	SMC
	Bromus madritensis	foxtail chess	SMC
	*Festuca mysosurus**	rattail grass	SMC
	Stipa sp.	needle grass	SMC
	*Vulpia myuros**	foxtail fescue	SMC
ANGIOSPERMS – DICOTS			
Anacardiaceae	*Malosma laurina*	laurel sumac	SMC
	Toxicodendron diversilobum	western poison oak	SMC
Apiaceae	*Daucus pusillus*	wild carrot	SMC
	Foesniculum vulgare	fennel	SMC
Asteraceae	*Ambrosia psilostachya*	western ragweed	DEV
	Baccharis sarathroides	broom baccharis	SMC, DEV
	*Centaurea melitensis**	star thistle	SMC
	Crocanthemum scoparium	rush rose	SMC
	Deinandra fasciculata	fascicled tarweed	SMC
	*Dittrichia graveolens**	stinkwort	DEV
	*Helminthotheca echioides**	bristly ox-tongue	SMC
	Corethrogyne filaginifolia ssp. *filaginifolia*	California sand aster	SMC
	Logfia filaginoides	filago	SMC
	*Logfia gallica**	narrowleaf cottonrose	SMC
	Stephanomeria sp.	Wreath plant	SMC
	Uropappus lindleyi	silver puffs	SMC
Boraginaceae	*Phacelia* sp.	phacelia	SMC
Brassicaceae	*Brassica nigra**	black mustard	SMC
	Lepidium densiflorus	common pepperweed	SMC
	*Sisymbrium orientale**	Indian hedge mustard	SMC
Caprifoliaceae	*Lonicera subspicata* var. *denudata*	honeysuckle	SMC
Chenopodiaceae	*Salsola tragus**	Russian thistle	DEV
Convolvulaceae	*Calystegia macrostegia*	morning glory	SMC

Appendix B (cont.)

PLANT SPECIES OBSERVED ON SITE

FAMILY	SCIENTIFIC NAME	COMMON NAME	HABITAT(S)‡
ANGIOSPERMS – DICOTS (cont.)			
Ericaceae	*Xylococcus bicolor*	mission manzanita	SMC
Euphorbiaceae	*Croton setigerus*	dove weed	SMC
Fabaceae	*Acmispon glaber*	deerweed	SMC
Fagaceae	*Quercus berberidifolia*	scrub oak	SMC
Geraniaceae	*Erodium* sp.*	filaree	SMC
Lamiaceae	*Salvia mellifera*	black sage	SMC
Malvaceae	*Malacothamnus fasciculatus* var. *fasciculatus*	bush mallow	SMC
Myrsinaceae	*Anagalis arvensis**	scarlet pimpernel	SMC
Orobanchaceae	*Cordylanthus rigidus*	rigid bird's beak	SMC
Plumbaginaceae	*Plumbago auriculata*	Cape leadwort	SMC (drainage)
Polygonaceae	*Eriogonum fasciculatum*	California buckwheat	SMC
	*Rumex crispus**	curly dock	SMC (drainage)
Ranunclulaceae	*Clematis pauciflora*	virgin's bower	SMC (drainage)
Resedaceae	*Reseda luteola**	Dyer's rocket	SMC (drainage)
Rhamnaceae	*Ceanothus tomentosus*	Ramona lilac	SMC
	Rhamnus crocea	redberry	SMC (drainage)
Rosaceae	*Adenostoma fasciculatum*	chamise	SMC
	Cercocarpus minutiflorus	San Diego mountain mahogany	SMC
	Heteromeles arbutifolia	toyon	SMC
	Prunus illicifolia ssp. *illicifolia*	holly-leafed cherry	SMC
Rubiaceae	*Galium angustifolium.*	Narrow-leaved bedstraw	SMC
Rutaceae	*Cneridium dumosum*	bushrue	SMC
Scrophulariaceae	*Mimulus aurantiacus*	monkey-flower	SMC

‡Habitat acronyms: DEV=Developed, SMC=Southern Mixed Chaparral, (drainage) = found along drainage
*non-native species

APPENDIX C

LISTED OR SENSITIVE PLANT SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
California adolphia (*Adolphia californica*)	--/-- CRPR List 2.1	None. Occurs in wetter areas of coastal sage scrub or chaparral. Project site likely outside of species' range. Would have been observed if present.
Del Mar manzanita (*Arctostaphylos glandulosa ssp. crassifolia*)	FE/-- CRPR List 1B.1 MSCP	Low. Occurs in moderately tall mixed chaparral. Reported approximately 2 miles to the north in Poway. Majority of observations are more coastal and would have been detected on site if present.
San Diego sagewort (*Artemisia palmeri*)	--/-- CNPS List 4.2	Low. Generally occurs in riparian habitats but may occur in wetter chaparral areas. Although potentially suitable habitat occurs on site, species should have been detected on site if present in spring 2015.
San Diego goldenstar (*Bloomeria clevelandii*)	--/-- CRPR List 1B.1 MSCP	Low. Found in grasslands, openings in coastal sage scrub and chaparral. CNDDB shows previously detected in Beeler Canyon in valley bottom but lower portion of site supports a dense chaparral. Openings further upslope more suitable but species not detected in spring 2015.
Thread-leaved brodiaea (*Brodiaea filifolia*)	FT/SE CRPR List 1B.1	Very low. Generally found in association with vernal pools or grasslands, which are not found on site. Site too far east.
Orcutt's brodiaea (*Brodiaea orcuttii*)	--/-- CRPR List 1B.1	Very low. Found in vernally moist grasslands and along vernal pool periphery. No vernal pools or grasslands occur on site.
Orcutt's pincushion (*Chaenactis glabruiscula* var. *orcuttiana*)	--/-- CRPR List 1B.1	None. Grows in coastal sage scrub, more commonly coastal bluff scrub. Most sites near coast, though one identified in Fallbrook. No suitable habitat on site.
Peninsular spineflower (*Chorizanthe leptotheca*)	--/-- CRPR List 4.2	None. Occurs in chaparral openings in eastern San Diego County. Although suitable chaparral occurs on site, the nearest reported populations are east of Highway 67 on Iron Mountain.
Delicate clarkia (*Clarkia delicata*)	--/-- CRPR List 1B.2	Low. Herbaceous annual found in shaded areas of chaparral and oak woodland in inland San Diego County. Most reported sightings are well east of project area.

Appendix C (Cont.)

LISTED OR SENSITIVE PLANT SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
Summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*)	--/-- CRPR List 1B.2	None. Usually occurs in chaparral on north-facing slopes in foothill and coastal areas. A conspicuous shrub that would have been observed if present.
Many-stemmed dudleya (*Dudleya multicaulis*)	--/-- CRPR List 1B.2	Very low. Found in openings in coastal sage scrub and grasslands, particularly those with gravelly or cobbly soils. Restricted to coastal areas. Nearest reported location is on Camp Pendleton.
Sticky dudleya (*Dudleya viscida*)	--/-- CRPR List 1B.2 MSCP	Low. An obvious species found in rock crevices on exposed, north-facing slopes in coastal areas. Site too far inland. Would likely have been detected if present.
Palmer's grappling hook (*Harpagonella palmeri*)	--/-- CRPR List 4.2	Low. . Occurs in open coastal sage scrub or chaparral, as well as on grassy hillsides up to 1500 feet. Tends to be found in association with clay soils, which are not present on site. Has been found on East Miramar to the south. Would have been detected in spring 2015 if present.
San Diego barrel cactus (*Ferocactus viridescens*),	--/-- CRPR List 2.1 MSCP	None. Typically found in coastal sage scrub habitat in western San Diego County. Would have been detected if present.
Mesa horkelia (*Horkelia cuneata* var. *puberla*)	--/-- CRPR List 1B.1	None. Found in sandy or gravelly soils in coastal sage scrub, or chaparral. Range is from northern San Diego County through San Luis Obispo County.
Ramona horkelia (*Horkelia truncata*)	--/-- CRPR List 1B.3	Low. Generally found in dense chamise or mixed chaparral in mountain foothills. Nearest locations are east of Hwy 67.
Southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*)	--/-- CRPR List 4.2	None. Found in marsh habitats, and occasionally along drainages in association with willow riparian communities. Drainage on site is ephemeral. This conspicuous plant would have been detected if present on site.
Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*)	--/-- CRPR List 1B.2	Low. Found in exposed openings in coastal sage scrub and chaparral. Widely distributed outside of deserts in San Diego County. Not detected in spring 2015
Chaparral nolina (*Nolina cismontana*)	--/-- CRPR List 1B.2	None. Grows in coastal sage scrub and chaparral in mountain foothills. Nearest reported location is Pamo Valley near Ramona. Conspicuous species that would have been detected if present.

Appendix C (Cont.)

LISTED OR SENSITIVE PLANT SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
California adder's-tongue (*Ophioglossum californicum*)	--/-- CRPR List 4.2	Very low. Generally occurs on clay soils along the periphery of vernal pools or seeps within chaparral or sage scrub communities. No vernal pools or obvious seeps on site.
Chaparral rein-orchid (*Piperia cooperi*)	--/-- CRPR List 4.2	Very low. Generally found in moist, shaded areas within coastal sage scrub or chaparral with shallow clay soils or in streambeds up to approximately 6,000 feet. Site is mostly dry and does not have clay soils.
Narrow-petaled rein-orchid (*Piperia leptopetala*)	--/-- CRPR List 4.3	Low. Generally found in mixed and chamise chaparral as well as oak woodlands, particularly in clay or sandy soils in montane areas. Not reported in project vicinity. Site is too far west.
Parry's tetracoccus (*Tetracoccus dioicus*)	--/-- CRPR List 1B.2 MSCP	None. Shrub found in low, dry chaparral, sometimes in coastal sage scrub. Nearest reported sightings are east of San Vicente Reservoir. Would have been detected if present.

Status:

City:

MSCP = Covered species in the Multiple Species Conservation Plan

Federal:

FE = Federal Endangered

FT = Federal Threatened

FC = Federal Candidate

BCC = Bird of Conservation Concern

State:

SE = State Endangered

ST = State Threatened

FP = Fully Protected

SR = State Rare

SSC = Species of Special Concern

California Rare Plant Rank (CRPR)

List 1A = Plants Presumed Extinct in California

List 1B = Plants Rare, Threatened or Endangered in California and Elsewhere

List 2 = Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

List 3 = Plants About Which We Need More Information, A Review List

List 4 = Plants of Limited Distribution, A Watch List

State Rank and CRPR is followed by threat code (e.g., State Rank S2.2 or CRPR 1B.2)

.1 = Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)

.2 = Fairly endangered in California (20-80% occurrences threatened)

.3 = Not very endangered in California (<20% of occurrences threatened)

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APPENDIX D

POTENTIAL FOR NARROW ENDEMICS TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
San Diego thorn-mint (*Acanthomintha ilicifolia*)	FT/SE CRPR List 1B.1 MSCP	None. While site has grassy openings in chaparral, species found on friable or broken clay soils, which are not present on site.
Shaw's agave (*Agave shawii*)	--/-- CRPR List 2.1 MSCP	None. This succulent shrub is found in coastal sage scrub and maritime succulent scrub, often on volcanic soils. Blooming period is September to May. Would have been observed if present.
San Diego ambrosia (*Ambrosia pumila*)	FE/-- CRPR List 1B.1 MSCP	Low. Creek beds, seasonally dry drainages, and floodplains are preferred habitat but has also been found in disturbed habitat. Should have been detectable along the creek area if present
Aphanisma (*Aphanisma blitoides*)	--/-- CRPR List 1B.2 MSCP	None. Found in sandy, alkaline areas in coastal shrubland and bluffs. Blooming period is April to May. No records of this species in the Project vicinity. Would have been observed if present.
Coastal dunes milk vetch (*Astragalus tener* var. *titi*)	FE/SE CRPR List 1B.1 CA Endemic MSCP	None. Habitat for this annual is coastal dunes and sandy places along the coast. Blooming period is March to May. No suitable habitat present on site.
Encinitas baccharis (*Baccharis vanessae*)	FT/SE CRPR List 1B.1 CA Endemic MSCP	None. Occurs in southern maritime and southern mixed chaparral in northern San Diego county. Site visited during blooming period. Would have been detected if on site.
Otay tarplant (*Deinandra conjugens*)	FT/SE CRPR List 1B.1 MSCP	None. Occurs from Sweetwater Reservoir area south to the Mexican border. Blooming period is May to June; outside of known range and little suitable habitat on site.
Short-leaved dudleya (*Dudleya blochmaniae* ssp. *brevifolia*)	--/SE CRPR List 1B.1 CA Endemic MSCP	Low. Open areas and sandstone bluffs of chamise chaparral or Torrey pine forest. Some potentially suitable habitat present.
Variegated dudleya (*Dudleya variegata*)	--/-- CRPR List 1B.2 MSCP	Low. Found in openings in sage scrub and chaparral, isolated rocky substrates in open grasslands, and a proximity to vernal pools and mima mound topography.

Appendix D (Cont.)

POTENTIAL FOR NARROW ENDEMICS TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
San Diego button-celery (*Eryngium aristulatum* ssp. *parishii*)	FE/SE CRPR List 1B.1 MSCP	None. Occurs in vernal pools and marshes. No suitable habitat on site.
Prostrate navarretia (*Navarretia fossalis*)	FT/-- CRPR List 1B.1 MSCP	None. Occurs in vernal pools and marshes. No suitable habitat on site.
Snake cholla (*Opuntia californica* var. *californica*)	--/-- CRPR List 1B.1 MSCP	None. Occurs in chaparral and coastal sage scrub from Point Loma south to Chula Vista and Baja. Site too far north and would have been detected if present.
California orcutt grass (*Orcuttia californica*)	FE/SE CRPR List 1B.1 MSCP	None. Occurs in vernal pools and marshes. No suitable habitat on site.
San Diego mesa mint (*Pogogyne abramsii*)	FE/SE CRPR List 1B.1 CA Endemic MSCP	None. Occurs in vernal pools and marshes. No suitable habitat on site.
Otay Mesa mint (*Pogogyne nudiuscula*)	FE/SE CRPR List 1B.1 MSCP	None. Occurs in vernal pools on Otay Mesa; outside of known range and no suitable habitat on site.

*Refer to Appendix C for a listing and explanation of status and sensitivity codes

APPENDIX E

ANIMAL SPECIES OBSERVED ON SITE

SCIENTIFIC NAME	COMMON NAME	HABITAT(S)‡
INVERTEBRATES		
Pogonomyrmex sp.	black harvester ant	SMC
Schistocerca nitens	gray bird grasshopper	SMC
Vanessa cardui	painted lady	SMC
VERTEBRATES		
Birds		
Aphelocoma californica	western scrub jay	SMC
Calypte anna	Anna's hummingbird	SMC
Catharus guttatus	hermit thrush	SMC
Corvus brachyrhycos	American crow	SMC
Dendroica sp.	unidentified warbler	SMC
Mimus polyglottos	northern mockingbird	SMC
Pipilo crissalis	California towhee	SMC
Pipilo maculatus	spotted towhee	SMC
Mammals		
Canis latrans	coyote	SMC
Neotoma sp.	wood rat	SMC
Odocoileus hemionus fuliginata	mule deer	SMC (scat)
Spermophilus beecheyi	California ground squirrel	SMC
Sylvilagus sp.	rabbit	SMC
Thomomys bottae	Botta's pocket gopher	SMC

Habitat acronyms: SMC=southern mixed chaparral

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APPENDIX F

LISTED OR SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
INVERTEBRATES		
Insects		
Quino checkerspot butterfly (*Euphydryas editha quino*)	FE/--	Low. Found on ridges and mesa tops in grasslands or openings in shrublands (e.g., fire breaks, near dirt roads) supporting dot-seed plantain host plant. While chaparral is open in portions of the site, site lies towards the bottom of Beeler Canyon with development on ridge tops to the south and riparian to the north. Nearest observation is 2 miles east.
Hermes copper butterfly (*Lycaena hermes*)	--/--	Very low. Species found in lower foothills of central and south San Diego County. Requires complexes of host plant redberry (*Rhamnus crocea*) and buckwheat. Only a few redberry detected on site.
VERTEBRATES		
Amphibians		
Arroyo toad (*Anaxyrus californicus*)	FE/SSC MSCP	None. Breeds in open-canopy riparian areas with shallow, slowly moving streams, but burrows in adjacent uplands during dry months. Drainage on site ephemeral. Species not known from Beeler Creek
Large-blotched salamander (*Ensatina eschscholzii klauberi*)	--/SSC	None. Found in moist locations under logs and bark in conifer forest or riparian woodlands. Suitable habitat does not occur on site.
California red-legged frog (*Rana draytonii*)	FT/SSC MSCP	None. Appropriate habitat is characterized by dense, shrubby riparian vegetation with deep, slow-moving water. Readily displaced by introduced aquatic predators, including bullfrogs (*Rana catesbiana*) or crayfish (*Procambarus* sp.). Believed extirpated from San Diego County (Jennings, pers. comm. 2003).
Reptiles		
Silvery legless lizard (*Anniella pulchra pulchra*)	--/SSC	Low. Occurs in areas with loose soil, particularly in sand dunes and or otherwise sandy soil. Generally found in leaf litter, under rocks, logs, or driftwood in oak woodland, chaparral, and desert scrub. Little suitable habitat on site.

Appendix F (Cont.)

LISTED OR SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
VERTEBRATES (cont.)		
Reptiles (cont.)		
Orange-throated whiptail (*Aspidoscelis hyperythra beldingi*)	--/SSC MSCP	High. Occurs in semi-arid brushy areas typically with loose soil and rocks, including washes, stream sides, rocky hillsides, and coastal chaparral. Habitat on site is suitable.
Southwestern pond turtle (*Clemmys marmorata pallida*)	--/SSC MSCP	None. Found largely in permanent water, particularly deep ponds with muddy substrates and abundant logs, rocks, or submerged vegetation for cover. Generally require native upland habitat nearby for overwintering. No ponding on site or in vicinity.
San Diego banded gecko (*Coleonyx variegatus abbotti*)	--/--	Very Low. Found in open scrub habitats and woodlands, often in association with rock outcrops from sea-level to 4,000 feet. No rock outcrops present on site.
Red-diamond rattlesnake (*Crotalus exsul*)	--/SSC	Low. Occurs in coastal sage scrub and chaparral with abundant rocky outcrops. No noticeable rock outcrops on site.
San Diego ringneck snake (*Diadophis punctatus similis*)	--/--	Low. Occurs in moist habitats such as oak woodlands and canyon bottoms, but also sometimes encountered in grassland, chaparral, and coastal sage scrub. Little suitable habitat occurs on site.
Coronado Island skink (*Eumeces skiltonianus interparietalis*)	--/SSC	Low to Moderate. Occurs in grassland, scrublands, and cismontane woodlands with abundant leaf litter. Chaparral near Beeler Canyon Road has leaf litter.
Coastal rosy boa (*Lichanura trivirgata roseofusca*)	--/--	Very Low. Found in coastal sage scrub and chaparral with abundant rock outcrops for basking and shelter. No rock outcrops are found on site, limiting potential.
Coast horned lizard (*Phrynosoma coronatum blainvillei*)	--/SSC	None. Inhabits open sage scrub where it preys upon carpenter ants. No coastal sage scrub occurs on site.
Coast patch-nosed snake (*Salvadora hexalepis virgultea*)	--/SSC	Low. Found in coastal sage scrub, chaparral, riparian, grasslands, and agricultural fields. Prefers open habitat with friable or sandy soils, burrowing rodents for food, and enough cover to escape being preyed upon. Some suitable habitat found on site, but soil not friable and limited cover in terms of rock outcroppings, litter etc.

Appendix F (Cont.)

LISTED OR SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
VERTEBRATES (cont.)		
Reptiles (cont.)		
Two-striped garter snake (*Thamnophis hammondii*)	--/SSC	Very Low. Found along permanent creeks and streams but also around vernal pools and along intermittent streams. Rarely found in upland scrub habitats relatively far from permanent water. Nearest reported sightings are from MCAS Miramar. Drainage on site is ephemeral and site mostly supports upland scrub.
South Coast garter snake (*Thamnophis sirtalis novum*)	--/SSC	None. Found in north County watersheds. Prefers riparian areas with willows and mule fat. No suitable habitat occurs on site. This is a dubious taxonomic group based upon color patterns that are not correlated with phylogeny.
Birds		
Sharp-shinned hawk (*Accipiter striatus*)	--/SSC	Very Low. Breeds in coniferous forests of northern California and the Sierra Nevada. Limited foraging on site.
Southern California rufous-crowned sparrow (*Aimophila canescens ruficeps*)	--/CSC MSCP	Moderate. Inhabits coastal sage scrub and open chaparral, particularly where nearby to grassland.
Bell's sage sparrow (*Amphispiza bellii bellii*)	--/SSC	Moderate to High. Occurs in sunny, dry stands of coastal sage scrub or chaparral. Suitable habitat present on site.
Golden eagle (*Aquila chrysaetos*)	BCC/FP MSCP	Very Low. Forages over grassy, open, shrubby habitats, generally nesting on cliffs and occasionally in trees. Tends to require habitat at a distance from humans. Area too developed for this species.
Great blue heron (*Ardea herodias*)	--/--	None. Forages along marshes, swamps, lakes, and ponds. Nests in trees adjacent to foraging habitat. No suitable habitat. Does not occur on site.
Burrowing owl (*Athene cunicularia*)	--/SSC MSCP	None. Restricted to flattish, open habitat with suitable burrows or rocky areas for nesting. Burrows most often acquired from ground squirrels. No ground squirrels or burrows detected on site.

Appendix F (Cont.)

LISTED OR SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
VERTEBRATES (cont.)		
Birds (cont.)		
Coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*)	--/SSC MSCP	None. Occurs in coastal sage scrub with large cacti for nesting. No cactus detected on site.
Southwestern willow flycatcher (*Empidonax traillii extimus*)	FE/SE MSCP	None. Breeds within thickets of willows or other riparian understory usually along streams, ponds, lakes, or canyons. Migrants may be found among other shrubs in wetter areas. Significant known populations within the County only occur on Santa Margarita River and the San Luis Rey River. No suitable habitat on site.
Least bittern (*Ixobrychus exilis*)	--/SSC	None. Occurs in marshes in association with ponds and reservoirs which do not occur on site.
Mammals		
Pallid bat (*Antrozous pallidus*)	--/SSC	Low. Roosts colonially in caves, mines, crevices, and abandoned buildings that do not occur on site but could forage in area.
Ringtail (*Bassariscus astutus*)	--/--	Very Low. Found in various riparian habitats and in brush stands of moist forest and shrub habitats at low to middle elevations.
Townsend's big-eared bat (*Corynorhinus townsendii*)	--/SSC	Very Low. Roosts in caves and buildings, but strongly tied to water. Widespread but uncommon through California. Presence negatively correlated with human presence.
Dulzura pocket mouse (*Chaetodipus californicus femoralis*)	--/SSC	Low to moderate. Occurs in coastal sage scrub, chaparral, grasslands, and woodland habitats up to 7,900 feet. Suitable habitat and rodent burrows are present on site.
Stephens' kangaroo rat (*Dipodomuys stephensi*)	FE/ST	None. Prefers areas of disturbed or patchy grasslands and open coastal sage scrub. Project site is outside species' known range in San Diego County. No suitable habitat. Nearest known location is in Ramona.
Western mastiff bat (*Eumops perotis californicus*)	--/SSC	Very Low. Roost in crevices in cliff faces, which are not found on site. Strongly tied to presence of large (100 feet long or more) ponds for drinking.

Appendix F (Cont.)

LISTED OR SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
VERTEBRATES (cont.)		
Mammals (cont.)		
Mountain lion (*Felis concolor*)	--/-- MSCP	Low to moderate. Occurs in a variety of habitats, particularly where mule deer are common. Wide ranging; requires extensive riparian and scrub habitat. May pass though site, but habitat in the project vicinity is likely becoming too fragmented to support mountain lions.
Western red bat (*Lasiurus blossevillii*)	--/SSC	Low. Prefer riparian areas where they roost in tree foliage. May be migratory, with US observations generally occurring in summer.
San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)	--/CSC	Low. Found in areas of open vegetation, grasslands, and agriculture fields. While the site has openings, they are in a matrix of denser chaparral that make it unlikely for the species to be present. Would likely have been detected if present.
Western small-footed myotis (*Myotis ciliolabrum*)	--/--	Low. Generally occurs in deserts and other arid locales. Roost in caves, rock crevices, buildings, and in holes or cracks in trees. Only marginally suitable habitat found on site.
Yuma myotis (*Myotis yumanensis*)	--/--	Very Low. Presence tied to water sources, which are not available on site. Roosts in caves and buildings, which are not present on site.
San Diego desert woodrat (*Neotoma lepida intermedia*)	--/SSC	Low. Found in sage scrub or chaparral primarily associated with rock outcroppings, boulders, cacti, or areas of dense undergrowth. A few woodrat nests were observed on site at the base of shrubs and are more likely to be the nests of the common desert woodrat because of the lack of rock outcroppings, boulders on cacti on site.
Pocketed free-tailed bat (*Nyctinimops femorosaccus*)	--/SSC	None. Prefers desert habitats with high cliffs or rock outcrops. Out of species range. Suitable high rocks not found on site.
Big free-tailed bat (*Nyctinimops macrotis*)	--/SSC	None. Occurs in low, rugged canyons, which are not found on site. Forages over open water.

Appendix F (Cont.)

LISTED OR SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	**STATUS***	**POTENTIAL TO OCCUR**
VERTEBRATES (cont.)		
Mammals (cont.)		
Mule deer (*Odocoileus hemionus fuliginata*)	--/-- MSCP	Present. Require a mixture of habitats, including shrublands, grasslands, and woodlands, providing ample cover. Scat found on site. Species possibly pass through or forage on site.
Southern grasshopper mouse (*Onychomys torridus ramona*)	--/SSC	Low. Generally found in desert habitats with loose, friable soils. Less common in coastal scrub and chaparral. Habitat on site is only moderately suitable. No records in project vicinity.
American badger (*Taxidea taxus*)	--/SSC MSCP	Low. Occurs in a variety of scrub habitats, particularly in open areas with friable soils. Require fossorial rodents upon which they prey. Habitat on site is suitable, but burrow would have been detected on site if present.

*Refer to Appendix C for a listing and explanation of status and sensitivity codes

APPENDIX G

Resume

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Derek Langsford PhD, CSE, Biology Practice Manager

Tierra Data Inc. **derek.langsford@tierradata.com** **(760) 749-2247**

Experience Summary

Dr. Langsford has over 26 years of experience as an ecologist and over 14 years in consulting as a biologist, project manager, and group manager in Southern California. He has managed projects on behalf of federal, state, county and municipal governments; water, school, college and hospital districts, as well as private clients. Dr. Langsford participates in all biological aspects of project entitlement including field surveys, data analysis, preparation of technical reports, permitting applications, and mitigation, monitoring, and management plans. His management responsibilities include client liaison, budgeting, research, fieldwork support, supervision of field biologists, regulatory permitting assistance, agency liaison, and quality control. He is a County of San Diego Approved Biologist and has been a member of their Biological Advisory Technical Committee. Specific capabilities includes vegetation mapping; general botanical and zoological surveys, entitlement processing, mitigation planning, and agency negotiations.

Education

University of California, Davis/SDSU — Ph.D. in Ecology, 1996

University of Edinburgh, Scotland — BSc. In Ecological Science, 1985

Permits & Certifications

- Certified Senior Ecologist, Ecological Society of America, 2012- Present
- Approved Biological Consultant, County of San Diego, 1999 – Present
- Certificate in GIS, Cuyamaca College 2013
- Endangered Species Act Section 10(a)(A) permit for surveys of quino checkerspot butterfly, USFWS, 2000-2010

Relevant Experience

(Partial List)

Sunset Cliffs Natural Park Trail Improvements
Point Loma, San Diego, California **Biology Project Manager, 2011-2013**

Proposed project was to establish a planned trail system with fencing to protect sensitive habitat and overlooks, improve drainage through the park and reduce erosion, remove an abandoned ball field and dwellings within the 68-acre park boundary, and to revegetate unauthorized trails, disturbed areas, and demolition areas. Required conformance to the Park's adopted Master Plan and MEIR, and the MSCP. Required updated biological studies including vegetation mapping and rare plant surveys, and preparation of a biological technical report and revegetation plan.

BrightSource Rio Mesa Solar Electric Generating Facility;
Blythe, California **Biology Project Manager, 2011-2013**

Biological Task Manager for fieldwork including vegetation mapping, jurisdictional delineation, rare plant, desert tortoise, burrowing owl, and Mojave fringed-toed lizard surveys, on an approximately 11,300-acre site near Blythe, CA. Managed preparation and performed QA/QC review of biological section of AFC and Biological Technical Report. Work performed for BrightSource Energy, Inc.

Benton Burn Remedial Action
Escondido, California **Project Manager, 2011- 2013:**

Remediation of a trash burn site from the late 1940s/early 1950s in a canyon that included an ephemeral drainage, coastal sage scrub, and nearby residences. Project required clearing of sage scrub, capping with two feet of clean soil, biological and archeological monitoring Clean Water Act 404 permits, 401 certification and CFG Code 1602 Streambed Alteration Agreement.

Street Properties CUP Renewal
Otay Mesa, San Diego, California **Project Manager, 2011-2013**

Project Manager for CUP renewal of an auto-dismantling facility on 130 acres in Otay Mesa, San Diego. Existing project required to comply with current regulatory requirements; included new drainage facilities, brush management zones, MHPA correction and compliance with current City of San Diego ESL and MSCP regulations. Budget approximately $30K.

Joint Water Agencies NCCP/HCP
Helix, Otay, and Padre Dam municipal water districts, and Sweetwater Authority **Task Manager, 2009-2010**

Updated of Subregional Plan and Conservation Analysis for this multi-agency NCCP/HCP in southwest and central San Diego County that proposed to cover 77 species within an 8,088-acre Study Area of which over 3,000 acres would be conserved. Update includes changes to study area, predictive distribution models, and coverage assessment. Budget $240K.

County Open Space Preserve Baseline Surveys and 5-Year Monitoring
County of San Diego, California **Senior Biologist, 2009-2010**

Performed biological resource surveys and resource management planning on several County of San Diego Parks and Recreation on-call projects, including Lawrence and Barbara Daley Ranch Preserve near Jamul, Tijuana River Valley Regional Park at the U.S/Mexico Border and Barnett Ranch Preserve near Ramona. Budget approximately $100K per location.

Friars Road/SR 163 Interchange Improvements
San Diego, California **Biology Project Manager, 2004-2008**

Managed Biological Studies for the interchange improvement project that would widen the SR 163 bridge across the San Diego River and improve the interchange of SR 163 with Friars Road. Performed vegetation mapping and managed focused biological surveys (gnatcatcher, least Bell's vireo, flycatcher, rare plants, and wetland delineation) for a 315-acre study area. Managed preparation of the NES and coordination on biological issues with City and Caltrans. Work performed for City of San Diego.

Lilac Ranch
Valley Center, California **Biology Project Manager, 2004-2008**

Performed or managed vegetation mapping, jurisdictional delineation, rare plants, gnatcatcher, vireo, flycatcher, and Hermes copper butterfly, and arroyo toad surveys, prepared biology report for County of San Diego and negotiated hardline preserve areas with wildlife agencies for this 954 acre 354–unit project in Valley Center. Issues included Keys Creek riparian corridor, Native American sites, County RPO drainages. Work performed for Empire Land, LLC and Sage Community Group, Inc.

Eternal Hills Memorial Park
Oceanside, California **Project Manager, 2004-2007**

Managed the biological work for this proposed expansion of gravesites. Area was outside of designated MHCP Preserve into area supporting a concentration of coastal California gnatcatchers and coastal sage scrub habitat. Oversaw surveys and preparation of biological technical report to meet City of Oceanside requirements including its draft MHCP Subarea Plan. Work performed for Services Corporation International.

Preliminary Geotechnical Investigation

Proposed 3-Lot Development
2.8 Acre Parcel
Beeler Canyon Road
County of San Diego

(A.P.N. 320-030-31)

June 27, 2005

Prepared For:
MR. JOHN R. WARD
2837 La Colina Drive
Escondido, California 92027

Prepared By:
VINJE & MIDDLETON ENGINEERING, INC.
2450 Vineyard Avenue, Suite 102
Escondido, California 92029

Job #05-276-P

VINJE & MIDDLETON ENGINEERING, INC.

3450 Vincent Avenue
Escondido, California 92029-1229

Phone 760 745-1214
Fax 760 739-0344

Job #05-276-P

June 27, 2005

Mr. John R. Ward
2837 La Colina Drive
Escondido, California 92027

PRELIMINARY GEOTECHNICAL INVESTIGATION, PROPOSED 3-LOT DEVELOPMENT, BEELER CANYON ROAD, POWAY (A.P.N. 320-030-31)

Pursuant to your request, Vinje and Middleton Engineering, Inc., has completed the enclosed Preliminary Geotechnical Investigation Report for the subject site.

The following report summarizes the results of our field investigation, including laboratory analyses and conclusions, and provides recommendations for the proposed development as understood. From a geotechnical engineering standpoint, it is our opinion that the site is suitable for the planned 3-lot residential development with the associated pavement and underground utility improvements provided the recommendations presented in this report are incorporated into the design and construction of the project.

The conclusions and recommendations provided in this study are consistent with the site geotechnical conditions and are intended to aid in preparation of final development plans and allow more accurate estimates of development costs.

If you have any questions or need clarification, please do not hesitate to contact this office. Reference to our Job #05-276-P will help to expedite our response to your inquiries.

We appreciate this opportunity to be of service to you.

VINJE & MIDDLETON ENGINEERING, INC.

Dennis Middleton
CEG #980

DM/jt

REGISTERED GEOLOGIST
DENNIS MIDDLETON
CEG 980
CERTIFIED ENGINEERING
Exp. 8/31/05
STATE OF CALIFORNIA

TABLE OF CONTENTS

TABLE OF CONTENTS

PLATE NO.

PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED 3-LOT DEVELOPMENT
2.8 ACRE PARCEL - BEELER CANYON ROAD
COUNT OF SAN DIEGO
(A.P.N. 320-030-31)

I. INTRODUCTION

The property investigated in this work includes 2.8 acres of gentle hillside terrain located along the south flank of Beeler Canyon located near the southern reaches of the City of Poway in the County of San Diego. The project location is depicted on a Regional Index Map enclosed with this report as Plate 1. We understand that the site is planned for subdivision into 3 individual lots which will support single-family dwellings and an entrance roadway. Consequently, the purpose of this work was to determine geologic and soils conditions beneath the property and their impacts on the proposed development. Test hole digging, soil sampling and testing were among the activities conducted in this work which resulted in construction recommendations provided herein.

II. SITE DESCRIPTION

The project site is a rectangular-shaped parcel characterized by gentle north-facing terrain along the south flank of Beeler Canyon. Site topographic conditions are shown on a Geotechnical Map enclosed with this report as Plate 2. Gentle surface areas ascend southward from Beeler Canyon Road at gradients that approach 8:1 (horizontal to vertical). Steeper terrain characterize off-site areas to the south. Flowline topography marks the southwest corner with a canyon that flows northward, tributary to Beeler Canyon.

Surface areas are mantled by a modest cover of native brush. Site drainage sheetflows northward. Excessive erosion resulting from concentrated run-off is not in evidence.

III. SITE INVESTIGATION

Geotechnical conditions beneath the project site were chiefly determined from the excavation of 6 test trenches dug with a tractor-mounted backhoe. All of the trenches were logged by our project geologist who also retained representative soil samples at selected locations, and frequent intervals for subsequent laboratory testing. Trench locations are shown on Plate 2. Logs of the test trenches are included with this report as Plates 3-5. Laboratory test results are summarized in a following section herein.

IV. PROPOSED DEVELOPMENT

Preliminary development plans for the project site are also depicted on Plate 2. As shown, 3 individual building sites will be created at the property by cut-fill grading. Entrance driveways will provide access from Beeler Canyon Road. Graded cut-fill slopes are programed at 2:1 gradients and reach a maximum vertical height of 15 feet.

Detailed foundation and building plans are not yet available. However, the use of conventional wood-frame with exterior stucco buildings supported on shallow stiff continuous strip and spread pad concrete footings and slab-on-grade floor foundation is anticipated.

V. FINDINGS

The project site is gentle hillside terrain underlain by sedimentary formational rocks at shallow depths. Slope instability is not indicated at the site or in nearby areas. The following geotechnical conditions are unique to the property:

A. Earth Materials

Natural formational rocks at the project site consist chiefly of conglomerate units including up to 70% pebbles to cobbles in a sandy matrix. Near-surface exposures are typically well cemented grading to friable in deeper exposures. Exposed formational rocks appear massive and lack notable structure. However, nearby quarry excavations north of Beeler Canyon suggest near-horizontal bedding along sandstone contacts elsewhere in the section.

Formational rocks at the site are mantled by a thin cover of unconsolidated sandy to rocky and locally clayey topsoil.

Details of earth materials underlying the project site are given on the enclosed Test Trench Logs, Plates 3-5, and further defined in a following section herein. A Geologic Cross-Section which depicts subsurface conditions and proposed grading levels is enclosed with this report as Plate 6.

B. Groundwater

Subsurface water was not encountered in project test trenches nor is it expected to impact site construction. However, like all graded hillside lots, the proper control of site drainage is an important factor in the continued stability of the property. Surface drainage should preclude ponding and overwatering of site vegetation should be avoided.

C. Slope Stability

The property is characterized by gentle topography underlain by flat-lying sandy conglomerate units. Slope instability is not indicated nor expected under these circumstances. Planned cut excavations are also expected to perform well to the proposed embankment heights.

D. Faults / Seismicity

Faults or significant shear zones are not indicated on or near proximity to the project site.

As with most areas of California, the San Diego region lies within a seismically active zone; however, coastal areas of the county are characterized by low levels of seismic activity relative to inland areas to the east. During a 40-year period (1934-1974), 37 earthquakes were recorded in San Diego coastal areas by the California Institute of Technology. None of the recorded events exceeded a Richter magnitude of 3.7, nor did any of the earthquakes generate more than modest ground shaking or significant damages. Most of the recorded events occurred along various offshore faults which characteristically generate modest earthquakes.

Historically, the most significant earthquake events which affect local areas originate along well known, distant fault zones to the east and the Coronado Bank Fault to the west. Based upon available seismic data, compiled from California Earthquake Catalogs, the most significant historical event in the area of the study site occurred in 1800 at an estimated distance of 16 miles from the project area. This event, which is thought to have occurred along an off-shore fault, reached an estimated magnitude of 6.5 with estimated bedrock acceleration values of 0.14g at the project site. The following list represents the most significant faults which commonly impact the region. Estimated ground acceleration data compiled from Digitized California Faults (Computer Program EQFAULT VERSION 3.00 updated) typically associated with the fault is also tabulated.

TABLE 1

Fault Zone	Distance from Site	Maximum Probable Acceleration (R.H.)
Elsinore - Julian	25.8 miles	0.135g
Newport - Inglewood	47.8 miles	0.072g
Rose Canyon	26.0 miles	0.158g
Coronado Bank	12.5 miles	0.209g

The location of significant faults and earthquake events relative to the study site are depicted on a Fault - Epicenter Map enclosed with this report as Plate 7.

More recently, the number of seismic events which affect the region appears to have heightened somewhat. Nearly 40 earthquakes of magnitude 3.5 or higher have been recorded in coastal regions between January 1984 and August 1986. Most of the earthquakes are thought to have been generated along offshore faults. For the most part, the recorded events remain moderate shocks which typically resulted in low levels of ground shaking to local areas. A notable exception to this pattern was recorded on July 13, 1986. An earthquake of magnitude 5.3 shook County coastal areas with moderate to locally heavy ground shaking resulting in $700,000 in damages, one death, and injuries to 30 people. The quake occurred along an offshore fault located nearly 30 miles southwest of Oceanside.

A series of notable events shook County areas with a (maximum) magnitude 7.4 shock in the early morning of June 28, 1992. These quakes originated along related segments of the San Andreas Fault approximately 90 miles to the north. Locally high levels of ground shaking over an extended period of time resulted; however, significant damages to local structures were not reported. The increase in earthquake frequency in the region remains a subject of speculation among geologists however, based upon empirical information and the recorded seismic history of County areas, the 1986 and 1992 events are thought to represent the highest levels of ground shaking which can be expected at the study site as a result of seismic activity.

In recent years, the Rose Canyon Fault has received added attention from geologists. The fault is a significant structural feature in metropolitan San Diego which includes a series of parallel breaks trending southward from La Jolla Cove through San Diego Bay toward the Mexican border. Test trenching along the fault in Rose Canyon indicated that at that location the fault was last active 6,000 to 9,000 years ago. More recent work suggests that segments of the fault are younger having been last active 1000 - 2000 years ago. Consequently, the fault has been classified as active and included within an Alquist-Priolo Special Studies Zone established by the State of California.

Fault zones tabulated in the preceding table are considered most likely to impact the region of the study site during the lifetime of the project. The faults are periodically active and capable of generating moderate to locally high levels of ground shaking at the site. Ground separation as a result of seismic activity is not expected at the property.

For design purposes, site specific seismic parameters were determined as part of this investigation in accordance with the California Building Code. The following parameters are consistent with the indicated project seismic environment and may be utilized for project design work:

TABLE 2

Site Soil Profile Type	Seismic Zone	Seismic Zone Factor	Seismic Source Type	Seismic Response Coefficients					
				Na	Nv	Ca	Cv	Ts	To
Sc	4	0.4	B	1.0	1.0	0.44	0.64	0.582	0.116
According to Chapter 16A, Divisions IV & V of the 2001 California Building Code									

E. Geologic Hazards

Geologic hazards are not presently indicated at the project site. Exposed slopes do not indicate gross geologic instability. The most significant geologic hazards at the property will be those associated with ground shaking in the event of a major seismic event. Liquefaction or related ground rupture failures are not anticipated.

F. Laboratory Testing / Results

Earth deposits encountered in our exploratory test excavations were closely examined and sampled for laboratory testing. Based upon our test trench and field exposures site soils have been grouped into the following soil types:

TABLE 3

Soil Type	Description
1	Cobbles in a silty to clayey sand matrix - Topsoil/Formational Rock
2	Sandy clay - Topsoil

The following tests were conducted in support of this investigation:

1. Grain Size Analysis: Grain size analysis was performed on a representative sample of Soil Type 1. The test result is presented in Table 4.

TABLE 4

Sieve Size		1½"	1"	¾"	½"	#4	#10	#20	#40	#200
Location	Soil Type	Percent Passing								
T-3 @ 2'	1	65	49	39	24	10	8	6	5	3

2. **Maximum Dry Density and Optimum Moisture Content:** The maximum dry density and optimum moisture content of Soil Type 1 was determined in accordance with ASTM D-1557. The test result is presented in Table 5.

TABLE 5

Location	Soil Type	Maximum Dry Density (Y_m-pcf)	Optimum Moisture Content (ω_{opt}-%)
T-3 @ 2'	1	117.2	13.1

3. **Moisture-Density Tests (Undisturbed Chunk Samples):** In-place dry density and moisture content of representative soil deposits beneath the site were determined from relatively undisturbed chunk samples using the water displacement test method. The test results are presented in Table 6 and tabulated on the enclosed Test Trench Logs (Plates 3-5).

TABLE 6

Sample Location	Soil Type	Field Moisture Content (ω-%)	Field Dry Density (Y_d-pcf)	Max. Dry Density (Y_m-pcf)	Ratio Of In-Place Dry Density To Max. Dry Density* ($Y_d/Y_m \times 100$)
T-5 @ 1½'	1	8.0	112.8	117.2	96.3
T-6 @ 4½'	2	17.2	100.9	-	-
* Designated as relative compaction for structural fills. Required relative compaction for structural fill is 90% or greater unless otherwise specified.					

4. **Expansion Index Test:** Two expansion index tests were performed on representative samples of Soil Types 1 and 2 in accordance with the Uniform Building Code Standard 18-2. The test results are presented in Table 7.

TABLE 7

Sample Location	Soil Type	Remolded ω (%)	Saturation (%)	Saturated ω (%)	Expansion Index (EI)	Expansion Potential
T-3 @ 2'	1	12.4	50.9	19.4	2	very low
T-6 @	2	16.3	49.9	34.7	81	medium
(ω) = moisture content in percent.						

5. Direct Shear Test: One direct shear test was performed on a representative sample of Soil Type 1. The prepared specimen was soaked overnight, loaded with normal loads of 1, 2, and 4 kips per square foot respectively, and sheared to failure in an undrained condition. The test result is presented in Table 8.

TABLE 8

Sample Location	Soil Type	Sample Condition	Wet Density (Yw-pcf)	Angle of Int. Fric. (Φ-Deg.)	Apparent Cohesion (c-psf)
T-3 @ 2'	1	remolded to 90% of Ym @ % ωopt	119.7	33	277

6. Ph and Resistivity Test: Ph and resistivity of a representative sample of Soil Type 1 collected at selected locations were determined using "Method for Estimating the Service Life of Steel Culverts," in accordance with the California Test 643. The test result is presented in Table 9.

TABLE 9

Sample Location	Soil Type	Minimum Resistivity (OHM-CM)	Ph
T-1 @ 2'	1	2912	6.3

7. Sulfate Test: One sulfate test was performed on a representative sample of Soil Type 1 in accordance with the California Test 417. The test result is presented in Table 10.

TABLE 10

Sample Location	Soil Type	Amount of Water Soluble Sulfate (so4) In Soil (% by Weight)
T-1 @ 2'	1	0.001

VI. CONCLUSIONS

Based on the foregoing study, development of the study site for a 3-Lot residential construction, is feasible from a geotechnical viewpoint. The project site is underlain at shallow to locally modest depths with competent formational rocks. Geotechnical factors presented below are unique to the project property and will most influence its development and associated construction costs:

- On-site natural hillside terrain are geologically stable. Landslides or other forms of geologic instability which could preclude site development are not indicated. Site formational rocks are competent, stable and dense deposits that will provide adequate support for the future structures, improvements and compacted fills.

- The project site is mantled by a thin cover of topsoil, which is not suitable for the support of the planed site structures, improvements or compacted fills in their present conditions. These soils should be regraded as recommended in the following sections. Added removals of upper cut areas and reconstruction to design grades with compacted fills are recommended in case of cut-fill transition pads in order to facilitate trenching and construct uniform bearing and subgrade soil conditions under the planned structures and improvements.

- Site formational units are highly cemented cobble conglomerate units which may create some excavations and handling difficulties. Cut excavations are expected be achieved using larger bulldozers (Caterpillar D-8 or greater). The need for blasting or special excavation techniques are currently not expected.

- The overall stability of graded building surfaces developed over sloping terrain is most dependent upon adequate keying and benching of fill into the undisturbed rock units during the grading operations. At the project site, added care should be given to proper construction of keyways and benching during the grading operations.

- Earth materials at the site consist predominantly of very low expansive pebbles and cobbles in a sandy matrix. Locally, some expansive clayey topsoils also occur at the site which are expected in minor quantities. Clayey soils, where encountered, should be selectively buried in deeper fills or thoroughly mixed with an abundant of very low expansive soils available from site excavations in order to manufacture a very low expansive mixture.

- Soil generated from the site excavations and removals are generally considered suitable for reuse as properly compacted fill provided larger rock sizes are excluded from the mixture as recommended below. Added processing and moisture conditioning efforts should also be expected for manufacturing the generated deposits into a uniform fill mixture.

- Based upon grading and pad construction recommendations provided herein, final bearing and subgrade soils are anticipated to consist of gravelly silty sands to silty sandy gravels (GW/SW) with very low expansion potential (expansion index less

than 21) according to the California Building Code classification (Table 18A-I-B). Actual classification and expansion characteristics of the finish grade soil mix can only be provided in the final as-graded compaction report based on proper testing of foundation bearing and subgrade soils when rough finish grades are achieved.

- In general, natural groundwater is not expected to impact project grading or the long term stability of the developed lot. Slope toe drains may be useful in protecting moisture sensitive improvements constructed near ascending cut embankments.

- Liquefaction and seismically induced settlements will not be factors in the development of the project site.

- Post construction total and differential settlements will not be a factor in the construction of the planned structures and improvements provided our remedial grading and foundation recommendations are followed.

- Soil collapse will not be a factor in the project construction provided our remedial grading recommendations are followed.

VII. RECOMMENDATIONS

The following recommendations are consistent with the indicated geotechnical conditions at the project property and should be reflected in the final plans and implemented during the construction phase. Added or modified recommendations may also be appropriate and can be provided at the final plan review phase:

A. Grading / Earthworks

Cut-fill and remedial grading techniques may be used in order to achieve final design grades and construct stable building surfaces. All grading and earthworks should be completed in accordance with Appendix Chapter 33 of the California Building Code, County of San Diego Grading Ordinances, the Standard Specifications for Public Works Construction and the requirements of the following sections wherever applicable:

1. **Cleaning and Grubbing:** Surface vegetation, debris and other deleterious/unsuitable materials should be removed from within the project grading and construction areas planned for new fills, structures and improvements plus 10 feet outside the perimeter, unless otherwise approved in the field. Ground preparations should be inspected and approved by the project geotechnical engineer or his designated field representative prior to grading.

Abandoned underground structures, pipes and utility lines should be properly removed or plugged as appropriate and approved in the field. Voids created by the removals of the abandoned underground tanks, pipes and structures should be properly backfilled with compacted fills in accordance with the requirements of this report.

2. **Removals and Over-excavations:** The most effective method to mitigate upper loose compressible topsoils will utilize removal and recompaction remedial grading techniques. Site existing topsoils should be removed to the underlying competent formational rocks as approved in the field in all areas to receive new fills, structures and improvements plus a minimum of 10 feet outside the perimeter, unless otherwise approved, and recompacted.

   Typical removal depths in the vicinity of individual exploratory test sites are shown in Table 11. The tabulated values are subject to changes by the project geotechnical consultant in the field at the time of remedial grading. Locally deeper removals may be necessary based on the actual field exposures and should be anticipated.

TABLE 11

Test Trench Location	Total Depth (ft)	Estimated Depth to Groundwater (ft)	Estimated Removal Depths (ft)	Comments
T-1	5'	not encountered	2½'	Parcel 3 driveway. Depth of driveway cut / undercut will govern.
T-2	2½	not encountered	1'	Parcel 3 cut areas. Depth of cut / undercut will govern. Backhoe refusal at 2½'.
T-3	2½'	not encountered	1'	Parcel 3 driveway/fill areas. Backhoe refusal at 2½'.
T-4	2½'	not encountered	1'	Parcel 1 cut areas. Depth of cut / undercut will govern. Backhoe refusal at 2½'.
T-5	10'	not encountered	1½'	Parcel 2 cut areas. Depth of cut / undercut will govern.
T-6	8'	not encountered	7'	Parcel 2 fill slope areas. Remove and recompact entire section of topsoil. Depth of fill slope keyway will govern.

Notes:

1. All removal depths recommended for remedial grading are measured from the existing ground levels.
2. Actual depths may vary at the time of construction based on actual subsurface exposures.

3 Bottom of all removals should be additionally prepared and recompacted to a minimum depth of 6 inches as directed in the field.
4 Exploratory Test Trenches excavated in connection with our study at the indicated locations were backfilled with loose and uncompacted deposits. The loose/uncompacted backfill soils within these trenches shall also be re-excavated and placed back as properly compacted fills as a part of the project remedial grading operations.
5 All grounds steeper than 5:1 receiving fills/backfills should be properly benched and keyed as directed in the field.

3. **Excavation Characteristics:** Formational rock units at the site occur in well-cemented and massive conditions, however, planned cuts are modest and deep excavations are not expected. Project formational rock units will likely excavate to design grades as well as undercut depths with larger size bulldozers (Caterpillar D-8 or greater). Utilizing larger excavation equipments will also increase production levels and improve the quality of the generated fills.

4. **Non-uniform Bearing Soils Transitioning:** Ground transition from excavated cut to compacted fill should not be permitted underneath the proposed structures and improvements. Building foundations and floor slabs should be supported entirely on compacted fills or founded entirely on competent formational rock units. Transition pads will require special treatment. The cut portion of the cut-fill pads plus 10 feet outside the perimeter should be undercut to a sufficient depth to provide for a minimum of 3 feet of compacted fill mat below rough finish grades, or at least 12 inches of compacted fill beneath the deepest footing whichever is more. In the roadways, driveway, parking and on-grade slabs/improvement transition areas there should be a minimum of 12 inches of compacted soils below rough finish subgrade.

   Undercutting the cut portion of the building pads will also accommodate excavation of the foundation and underground utility trenches in an otherwise harder and cemented formational units. In the case of deeper utility trenches, undercutting to a minimum of 6 inches below the proposed inverts may be considered.

5. **Fill Materials, Select Grading and Compaction:** Soils generated from site removals and excavations are considered suitable for reuse as new compacted site fills provided all trash, debris, larger rocks and unsuitable materials are selectively removed and properly disposed of to the satisfaction of the project geotechnical engineer.

   The removals of on-site topsoils, however, will locally generate some clayey deposits. Clayey site soils, where encountered, should be selectively buried in deeper fills a minimum of 3 feet below rough finish grades, or may be

thoroughly mixed with an abundant of very low expansive sandy to gravelly soils available from site excavations in order to manufacture a very low expansive mixture as directed in the field. Clayey soils and larger cobble sizes should not occur within the upper pad grades or used in wall backfills. Added processing, mixing and moisture conditioning efforts should also be expected for manufacturing a uniform fill and backfill mixture.

Project fills shall be clean deposits consisting of minus 6-inch particles and include at least 40% finer than #4 sieve materials by weight. Rocks larger than 6 inches should be excluded from the site fills. Wall backfills shall consist of minus 3 inches particles. Import soils, if required to improve the quality of generated rocky fills or complete grading, should be very low expansive granular sandy deposits (100% passing ¾-inch sieve, more than 90% passing sieve #4 sieve and less than 20% passing sieve #200 with expansion index less than 21) inspected and approved by the project geotechnical consultant prior to delivery to the site.

Uniform bearing soil conditions should be constructed at the site by the grading operations. Site soils should be adequately processed, thoroughly mixed, moisture conditioned to slightly (2%-3%) above the optimum moisture levels as directed in the field, manufactured into a uniform mixture, placed in thin uniform horizontal lifts and mechanically compacted to a minimum 90% of the corresponding laboratory maximum dry density per ASTM D-1557, unless otherwise specified.

A minimum 90% compaction levels will be required for all structural fills and wall/trench backfills. In the improvement areas, fills should also be compacted to a minimum 90% with the exception of the upper 12 inches under the asphalt paving surfaces where a minimum 95% compaction levels will be required.

6. **Permanent Graded Slopes**: Planned new cut-fill slopes should be constructed at 2:1 gradients maximum. Graded slopes constructed as recommended herein will be grossly stable with respect to deep seated and surficial failures for the indicated maximum vertical heights.

   All fill slopes shall be provided with a lower keyway. The keyway should maintain a minimum depth of 2 feet into the competent formational rock with a minimum width of 12 feet. The keyway should expose firm materials throughout with the bottom heeled back a minimum of 2% into the natural hillside and inspected and approved by the project geotechnical engineer. Additional level benches should be constructed into the firm natural hillside as the fill slope construction progresses. Fill slopes should also be compacted to

90% (minimum) of the laboratory standard out to the slope face. Over-building and cutting back to the compacted core, or backrolling a minimum of 4-foot vertical increments and "track-walking" at the completion of grading is recommended for site fill slope construction. Geotechnical engineering inspections and testing will be necessary to confirm adequate compaction levels within the fill slope face.

Cut slopes should be inspected and approved by the project geotechnical consultant during the grading to confirm stability. Additional recommendations will be provided at that time in the event adverse geologic conditions such as unfavorable geologic features are noted.

7. **Cut Slope Toe Drainage:** Graded cut slopes at the project may discharge up-slope run-off along the toe. Sensitive pad improvements located near the slope can best be protected by a toe drain constructed along the base of the cut slope. Slope toe drains, if appropriate, should consist a minimum 4-inch diameter, Schedule 40 (SDR 35) perforated pipe surrounded in a minimum of 2.25 cubic feet, per foot, of ¾-inch crushed rocks (1½ feet by 1½ feet trench), wrapped in filter fabric (Mirafi 140-N), or Caltrans Class 2 permeable aggregate. Filter fabric can be eliminated if Caltrans Class 2 permeable material is used. The subdrain shall be installed at suitable elevation to ensure positive drainage into an approved drainage facility. The need for slope toe drains can best be evaluated after rough grading and based on final improvement plans.

8. **Surface Drainage and Erosion Control:** A critical element to the continued stability of the building pads and slopes is an adequate surface drainage system and protection of the slope face. This can most effectively be achieved by appropriate vegetation cover and the installation of the following systems:

   * Drainage swales should be provided at the top and toe of slopes per the project civil engineer design.

   * Building pad surface run-off should be collected and directed away from the planned buildings and improvements to a selected location in a controlled manner. Area drains should be installed.

   * The finished slopes should be planted soon after completion of grading. Unprotected slope faces will be subject to severe erosion and should not be allowed. Over-watering of the slope faces should also not be allowed. Only the amount of water to sustain vegetation should be provided.

* Temporary erosion control facilities and silt fences should be installed during the construction phase periods and until landscaping is established as indicated and specified on the approved project grading/erosion control plans.

9. **Engineering Inspections**: All grading operations including removals, suitability of earth deposits used as compacted fill, and compaction procedures should be continuously inspected and tested by the project geotechnical consultant and presented in the final as-graded compaction report. The nature of finished subgrade soils should also be confirmed in the final compaction report at the completion of grading.

   Geotechnical engineering inspections shall include but not limited to the following:

   * Initial Inspection - After the grading/brushing limits have been staked but before grading/brushing starts.

   * Keyway/bottom of over-excavation inspection - After formational rock is exposed and prepared to receive fill but before fill is placed.

   * Cut slope/excavation inspection - After the excavation is started but before the vertical depth of excavation is more than 5 feet. Local and Cal-OSHA safety requirements for open excavations apply.

   * Fill/backfill inspection - After the fill/backfill placement is started but before the vertical height of fill/backfill exceeds 2 feet. A minimum of one test shall be required for each 100 lineal feet maximum in every 2 feet vertical gain with the exception of wall backfills where a minimum of one test shall be required for each 25 lineal feet maximum. Wall backfills should consist of minus 3-inch materials, and also mechanically compacted to a minimum 90% compaction levels unless otherwise specified. Finish rough and final pad grade tests shall be required regardless of fill thickness.

   * Foundation trench inspection - After the foundation trench excavations but before steel placement.

   * Foundation bearing/slab subgrade soils inspection - Prior to the placement of concrete for proper moisture and specified compaction levels.

* Geotechnical foundation/slab steel inspection - After the steel placement is completed but before the scheduled concrete pour.

* Subdrain/wall back drain inspection - After the trench excavations but during the actual placement. All material shall conform to the project material specifications and approved by the project geotechnical engineer.

* Underground utility/plumbing trench inspection - After the trench excavations but before placement of pipe bedding or installation of the underground facilities. Local and Cal-OSHA safety requirements for open excavations apply. Inspection of the pipe bedding may also be required by the project geotechnical engineer.

* Underground utility/plumbing trench backfill inspection - After the backfill placement is started above the pipe zone but before the vertical height of backfill exceeds 2 feet. Testing of the backfill within the pipe zone may also be required by the governing agencies. Pipe bedding and backfill materials shall conform to the governing agencies' requirements and project soils report if applicable. All trench backfills shall be mechanically compacted to a minimum 90% compaction levels unless otherwise specified. Plumbing trenches over 12 inches deep maximum under the interior floor slabs should be mechanically compacted and tested for a minimum 90% compaction levels. Flooding or jetting techniques as a means of compaction method shall not be allowed.

* Pavement/improvements subgrade and basegrade inspections - Prior to the placement of concrete or asphalt for proper moisture and specified compaction levels.

B. Foundations and Slab-on-Grade Floors

The following recommendations are consistent with very low expansive (expansion index less than 21) gravelly silty sands to silty sandy gravels (GW/SW), foundation bearing soil and site specific geotechnical conditions. Additional recommendations may also be required and should be given at the plan review phase. All design recommendations should also be further confirmed and/or revised at the completion of rough grading based on the expansion characteristics of the foundation bearing soils and as-graded site geotechnical conditions, and presented in the final as-graded compaction report:

1. The proposed buildings and structures may be supported on shallow stiff concrete foundations. The shallow foundations should be uniformly supported on certified very low expansive compacted fills or founded entirely on undisturbed competent formational rocks. Acceptable building foundations may include a system of spread pad and strip footings with slab-on-grade floors.

2. Continuous strip concrete foundations should be sized at least 12 inches wide and a minimum of 12 inches deep for single-story buildings and at least 15 inches wide and a minimum of 18 inches deep for two-story buildings. Isolated pad footings should be at least 24 inches square and 12 inches deep. Footing depths are measured from the lowest adjacent ground surface, not including the sand/gravel beneath floor slabs. Exterior continuous footings should enclose the entire building perimeter.

3. Continuous interior and exterior foundations should be reinforced by at least two #4 reinforcing bars. Place a minimum of 1-#4 bar 3 inches above the bottom of the footing and a minimum of 1-#4 bar 3 inches below the top of the footing. Reinforcement details for spread pad footings should be provided by the project architect/structural engineer.

4. Interior floor slabs should be a minimum of 4 inches in thickness, reinforced with #3 reinforcing bars spaced 18 inches on center each way placed mid-height in the slab. Slabs should be underlain by 4 inches of clean sand (SE 30 or greater) which is provided with a well performing moisture barrier/vapor retardant (minimum 10-mil plastic) placed mid-height in the sand.

5. Provide "softcut" contraction/control joints consisting of sawcuts spaced 10 feet on centers each way for all interior slabs. Cut as soon as the slab will support the weight of the saw and operate without disturbing the final finish which is normally within 2 hours after final finish at each control joint location or 150 psi to 800 psi. The sawcuts should be a minimum of 1-inch in depth but should not exceed 1¼-inches deep maximum. Anti-ravel skid plates should be used and replaced with each blade to avoid spalling and raveling. Avoid wheeled equipments across cuts for at least 24 hours.

6. Provide re-entrant corner reinforcement for all interior slabs. Re-entrant corners will depend on slab geometry and/or interior column locations. The enclosed Plate 8 may be used as a general guideline.

7. Foundation trenches and slab subgrade soils should be inspected and tested for proper moisture and specified compaction levels and approved by the project geotechnical consultant prior to the placement of concrete.

C. Exterior Concrete Slabs / Flatworks

1. All exterior slabs (walkways, and patios) should be a minimum of 4 inches in thickness reinforced with 6x6/10x10 welded wire mesh carefully placed mid-height in the slab.

2. Provide "tool joint" or "softcut" contraction/control joints spaced 10 feet on center (not to exceed 12 feet maximum) each way. Tool or cut as soon as the slab will support weight and can be operated without disturbing the final finish which is normally within 2 hours after final finish at each control joint location or 150 psi to 800 psi. Tool or softcuts should be a minimum of 1-inch but should not exceed 1¼-inches deep maximum. In case of softcut joints, anti-ravel skid plates should be used and replaced with each blade to avoid spalling and raveling. Avoid wheeled equipments across cuts for at least 24 hours.

3. All exterior slab designs should be confirmed in the final as-graded compaction report.

4. Subgrade soils should be tested for proper moisture and specified compaction levels and approved by the project geotechnical consultant prior to the placement of concrete.

D. Soil Design Parameters

The following soil design parameters are based on laboratory testing of representative samples obtained from the subsurface exploratory excavations. All parameters should be re-evaluated when the characteristics of the final as-graded soils have been specifically determined.

* Design wet density of soil = 120 pcf.
* Design angle of internal friction of soil = 33 degrees.
* Design active soil pressure for retaining structures = 35 pcf (EFP), level backfill, cantilever, unrestrained walls.
* Design at-rest soil pressure for retaining structures = 55 pcf (EFP), non-yielding, restrained walls.
* Design passive soil resistance for retaining structures = 406 pcf (EFP), level surface at the toe.
* Net allowable foundation pressure for certified compacted fills (minimum 12 inches wide by 12 inches deep footings) = 1750 psf.
* Net allowable foundation pressure for competent undisturbed formational rock units (minimum 12 inches wide by 12 inches deep footings) = 2500 psf.
* Allowable lateral bearing pressure (all structures except retaining walls) for compacted fill = 150 psf/ft.

Notes:

* Use a minimum safety factor of 1.5 for wall over-turning and sliding stability. However, because large movements must take place before maximum passive resistance can be developed, a safety factor of 2 may be considered for sliding stability where sensitive structures and improvements are planned near or on top of retaining walls.

* When combining passive pressure and frictional resistance the passive component should be reduced by one-third.

* The net allowable foundation pressure provided herein was determined for footings having the indicated minimum width and depth. The indicated value may be increased by 20% for each additional foot of depth and 20% for each additional foot of width to a maximum of 4500 psf, if needed. The allowable foundation pressure provided herein also applies to dead plus live loads and may be increased by one-third for wind and seismic loading.

* The allowable lateral bearing earth pressures may be increased by the amount of the designated value for each additional foot of depth to a maximum of 1500 pounds per square foot.

E. Asphalt and PCC Pavement Design

Specific pavement designs can best be provided at the completion of rough grading based on R-value tests of the actual finish subgrade soils. However, the following structural sections may be considered for initial planning phase cost estimating purposes only (not for construction):

1. A minimum section of 3 inches asphalt on 6 inches Caltrans Class 2 aggregate base or the minimum structural section required by the County of San Diego, whichever is more, may be considered for on-site asphalt paving surfaces outside public and private right-of-way. Actual designs will depend on the final R-value, design TI and approval of the County of San Diego.

   Base materials should be compacted to a minimum 95% of the corresponding maximum dry density (ASTM D-1557). Subgrade soils beneath the asphalt paving surfaces should also be compacted to a minimum 95% of the corresponding maximum dry density within the upper 12 inches.

2. Residential PCC driveways and parking supported on very low expansive (expansion index less than 21) granular subgrade soils should be a minimum of 5 inches in thickness, reinforced with #3 reinforcing bars at 18 inches on centers each way, placed mid-height in the slab. Subgrade soils beneath the PCC driveways and parking should be compacted to a minimum 90% of the corresponding maximum dry density within the upper 6 inches.

   Provide "tool joint" or "softcut" contraction/control joints spaced 10 feet on center (not to exceed 15 feet maximum) each way. Tool or cut as soon as the slab will support weight and can be operated without disturbing the final finish which is normally within 2 hours after final finish at each control joint location or 150 psi to 800 psi. Tool or softcuts should be a minimum of 1-inch but should not exceed 1¼ inches deep maximum. In case of softcut joints, anti-ravel skid plates should be used and replaced with each blade to avoid spalling and raveling. Avoid wheeled equipments across cuts for at least 24 hours.

3. Subgrade and basegrade soils should be tested for proper moisture and specified compaction levels and approved by the project geotechnical consultant prior to placement of the base or asphalt/PCC finish surface.

4. Base section and subgrade preparations per structural section design, will be required for all surfaces subject to traffic including roadways, travelways, drive lanes, driveway approaches and ribbon (cross) gutters. Driveway approaches within the public right-of-way should have 12 inches subgrade compacted to a minimum 95% compaction levels and provided with a 95% compacted Class 2 base section per the structural section design. Base layer under curb and gutters should be compacted to a minimum 95%, while subgrade soils under curb and gutters, and base and subgrade under sidewalks should be compacted to a minimum 90% compaction levels. Base section may not be required under curb and gutters, and sidewalks in the case of very low expansive subgrade soils (expansion index less than 21 and SE greater than 30). Site specific recommendations should be given in the final as-graded compaction report.

F. General Recommendations

1. The minimum foundation design and steel reinforcement provided herein are based on soil characteristics and are not intended to be in lieu of reinforcement necessary for structural considerations.

2. Adequate staking and grading control is a critical factor in properly completing the recommended remedial and site grading operations. Grading control and staking should be provided by the project grading contractor or surveyor/civil engineer and is beyond the geotechnical engineering services. Inadequate staking and/or lack of grading control may result in unnecessary additional grading which will increase construction costs.

3. Footings located on or adjacent to the top of slopes should be extended to a sufficient depth to provide a minimum horizontal distance of 7 feet or one-third of the slope height, whichever is greater (need not exceed 40 feet maximum) between the bottom edge of the footing and face of slope. This requirement applies to all improvements and structures including fences, posts, pools, spas, etc. Concrete and AC improvements should be provided with a thickened edge to satisfy this requirement.

4. Expansive clayey soils should not be used for backfilling of any retaining structure. All retaining walls should be provided with a 1:1 wedge of granular, compacted backfill measured from the base of the wall footing to the finished surface. Retaining walls should be provided with a back drainage in general accordance with the enclosed Plate 9.

5. All underground utility and plumbing trenches should be mechanically compacted to a minimum 90% of the maximum dry density of the soil unless otherwise specified. Care should be taken not to crush the utilities or pipes during the compaction of the soil. Non-expansive, granular backfill soils should be used.

6. Site drainage over the finished pad surfaces should flow away from structures onto the street in a positive manner. Care should be taken during the construction, improvements and fine grading phases not to disrupt the designed drainage patterns. Roof lines of the buildings should be provided with roof gutters. Roof water should be collected and directed away from the buildings and structures to a suitable location. Consideration should be given to adequately damp-proof/waterproof the basement walls/foundations and provide the planter areas adjacent to the foundations with an impermeable liner and a subdrainage system.

7. Based on the result of the tested soil sample, the amount of water soluble sulfate (SO4) was found to be 0.001 percent by weight which is considered negligible according to the California Building Code Table No. 19-A-4. Portland cement Type II may be used.

8. Table 12 is appropriate based on the Ph-Resistivity test result:

TABLE 12

Design Soil Type	Gage	18	16	14	12	10	8
1	Years to Perforation of Steel Culverts	16	20	25	35	44	54

9. Final plans should reflect preliminary recommendations given in this report. Final foundations and grading plans may also be reviewed by the project geotechnical consultant for conformance with the requirements of the geotechnical investigation report outlined herein. More specific recommendations may be necessary and should be given when final grading and architectural/structural drawings are available.

10. All foundation trenches should be inspected to ensure adequate footing embedment and confirm competent bearing soils.

11. The amount of shrinkage and related cracks that occurs in the concrete slab-on-grades, flatworks and driveways depend on many factors, the most important of which is the amount of water in the concrete mix. The purpose of the slab reinforcement is to keep normal concrete shrinkage cracks closed tightly. The amount of concrete shrinkage can be minimized by reducing the amount of water in the mix. To keep shrinkage to a minimum the following should be considered:

    * Use the stiffest mix that can be handled and consolidated satisfactorily.

    * Use the largest maximum size of aggregate that is practical. For example, concrete made with ¾-inch maximum size aggregate usually requires about 40-lbs. more (nearly 5-gal.) water per cubic yard than concrete with 1-inch aggregate.

    * Cure the concrete as long as practical.

    The amount of slab reinforcement provided for conventional slab-on-grade construction considers that good quality concrete materials, proportioning, craftsmanship, and control tests where appropriate and applicable are provided.

12. A preconstruction meeting between representatives of this office, the property owner or planner, city inspector and the grading contractor/builder is recommended in order to discuss grading/construction details associated with site development.

VIII. LIMITATIONS

The conclusions and recommendations provided herein have been based on available data obtained from pertinent reports and plans, subsurface exploratory excavations as well as our experience with the soils and formational materials located in the general area. The materials encountered on the project site and utilized in our laboratory testing are believed representative of the total area; however, earth materials may vary in characteristics between excavations.

Of necessity we must assume a certain degree of continuity between exploratory excavations and/or natural exposures. It is necessary, therefore, that all observations, conclusions, and recommendations be verified during the grading operation. In the event discrepancies are noted, we should be contacted immediately so that an inspection can be made and additional recommendations issued if required.

The recommendations made in this report are applicable to the site at the time this report was prepared. It is the responsibility of the owner/developer to ensure that these recommendations are carried out in the field.

It is almost impossible to predict with certainty the future performance of a property. The future behavior of the site is also dependent on numerous unpredictable variables, such as earthquakes, rainfall, and on-site drainage patterns.

The firm of VINJE & MIDDLETON ENGINEERING, INC., shall not be held responsible for changes to the physical conditions of the property such as addition of fill soils, added cut slopes, or changing drainage patterns which occur without our inspection or control. The property owner(s) should be aware that the development of cracks in all concrete surfaces such as floor slabs and exterior stucco are associated with normal concrete shrinkage during the curing process. These features depend chiefly upon the condition of concrete and weather conditions at the time of construction and do not reflect detrimental ground movement. Hairline stucco cracks will often develop at window/door corners, and floor surface cracks up to ⅛-inch wide in 20 feet may develop as a result of normal concrete shrinkage (according to the American Concrete Institute).

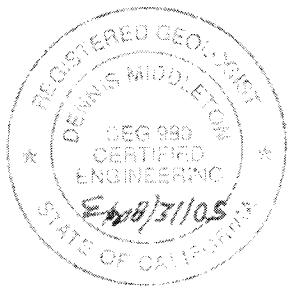
This report should be considered valid for a period of one year and is subject to review by our firm following that time. If significant modifications are made to your tentative development plan, especially with respect to the height and location of cut and fill slopes, this report must be presented to us for review and possible revision.

Vinje & Middleton Engineering, Inc., warrants that this report has been prepared within the limits prescribed by our client with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

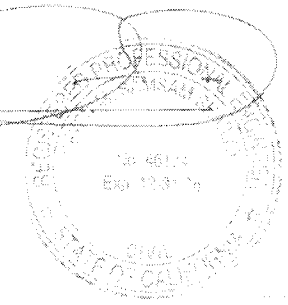
Once again, should any questions arise concerning this report, please do not hesitate to contact this office. Reference to our Job #05-276-P will help to expedite our response to your inquiries.

We appreciate this opportunity to be of service to you.

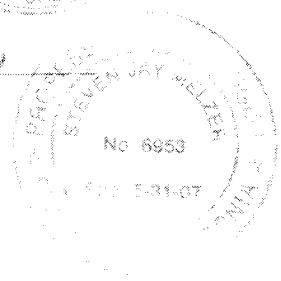
VINJE & MIDDLETON ENGINEERING, INC.



Dennis Middleton
CEG #980



S. Mehdi S. Shariat
RCE #46174



Steven J. Melzer
RG #6953

DM/SMSS/SJM/jt

Distribution: Addressee (5)

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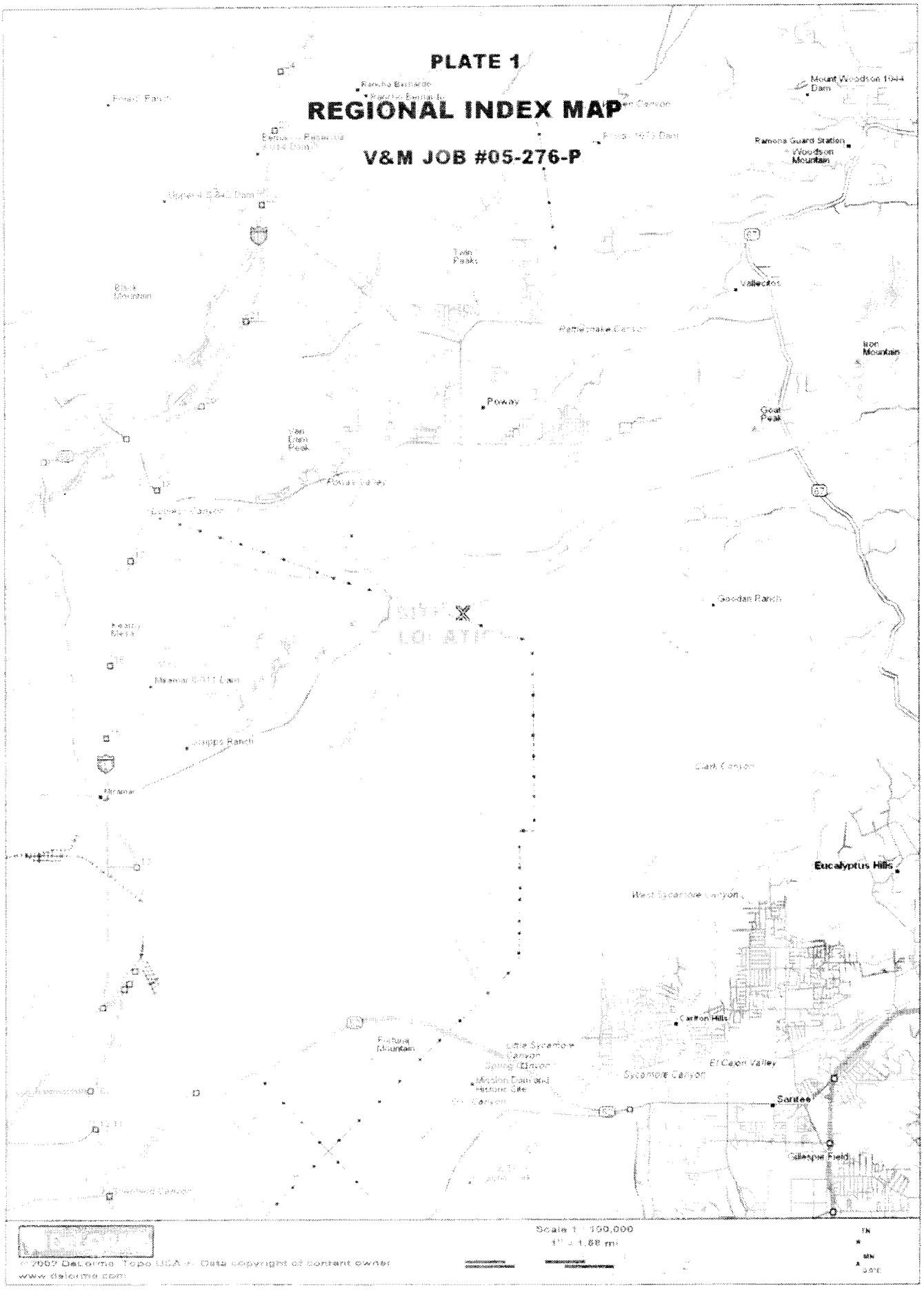
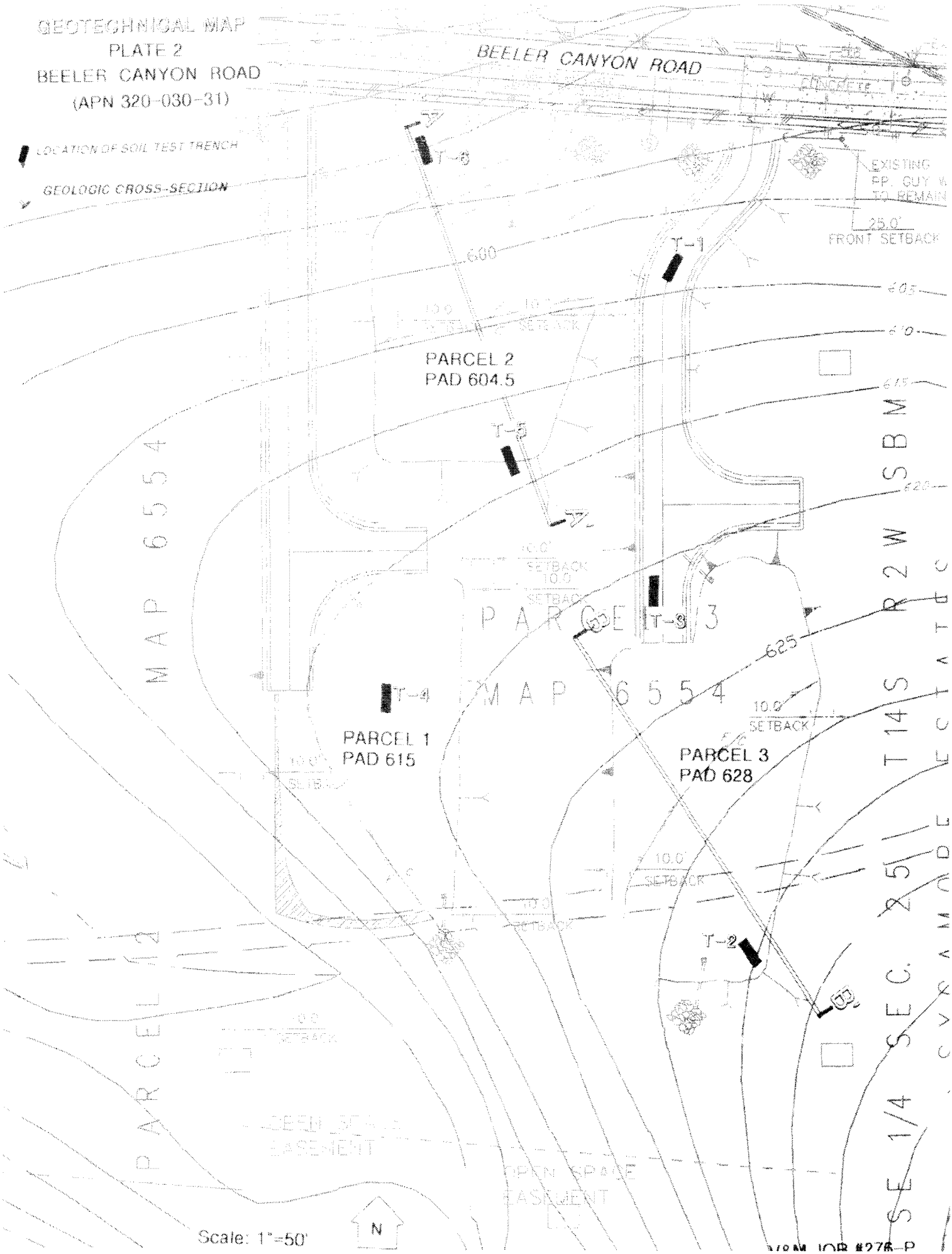
PLATE 1

REGIONAL INDEX MAP

V&M JOB #05-276-P



Scale 1" = 100,000
1" = 1.58 mi


GEOTECHNICAL MAP
PLATE 2
BEELER CANYON ROAD
(APN 320-030-31)
LOCATION OF SOIL TEST TRENCH
GEOLOGIC CROSS-SECTION
BEELER CANYON ROAD
T-6
T-1
T-5
T-3
T-4
T-2
EXISTING
FP, GUY W
TO REMAIN
25.0'
FRONT SETBACK
PARCEL 2
PAD 604.5
PARCEL 1
PAD 615
PARCEL 3
PAD 628
10.0'
SETBACK
600
605
610
615
620
625
MAP 6554
MAP 6554
SE 1/4 SEC. 25 T 1 4 S R 2 W SBM
OPEN SPACE
EASEMENT
Scale: 1"=50'
N

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS: MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS: MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GRAVEL WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	SANDS: MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
FINE GRAINED SOILS: MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS: LIQUID LIMIT IS LESS THAN 50%		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS: LIQUID LIMIT IS GREATER THAN 50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

GRAIN SIZES U.S. STANDARD SERIES SIEVE — CLEAR SQUARE SIEVE OPENINGS

200	40	10	4	3/4"	3"	12"

SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

RELATIVE DENSITY

SANDS, GRAVELS AND NON-PLASTIC SILTS	BLOWS FOOT
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

CONSISTENCY

CLAYS AND PLASTIC SILTS	STRENGTH	BLOWS/FOOT
VERY SOFT	0 - ¼	0 - 2
SOFT	¼ - ½	2 - 4
FIRM	½ - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32

1. Blow count, 140 pound hammer falling 30 inches on 2 inch O.D. split spoon sampler (ASTM D-1586)
2. Unconfined compressive strength per SOILTEST pocket penetrometer CL-700

▼ Sand Cone Test ■ Bulk Sample | $^{2}4_{6}$ = Standard Penetration Test (SPT) (ASTM D-1586) with blow counts per 6 inches

□ Chunk Sample ○ Driven Rings ‖ $^{2}4_{6}$ = California Sampler with blow counts per 6 inches

VINJE & MIDDLETON ENGINEERING, INC.
2450 Vineyard Ave., #102
Escondido, CA 92029-1229

KEY TO EXPLORATORY BORING LOGS
Unified Soil Classification System (ASTM D-2487)

PROJECT NO	DATE	KEY

Date: 5-12-05 **Logged by: SJM**

DEPTH (ft)	SAMPLE	T-1 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
1		TOPSOIL: Cobbles (70%) in silty fine sand. Brown color. Dry. Loose. ST-1	GP/GM			
2	■					
3		FORMATIONAL ROCK: Cobble conglomerate. 60% +cobbles in a fine to medium grained sandy matrix with a trace of clay. Yellow - tan color. Moderately cemented. Difficult to excavate ST-1	GW/GM			
4						
5						
6		End Test Trench at 5' No caving. No groundwater.				
7						
8						

Date: 5-12-05 **Logged by: SJM**

DEPTH (ft)	SAMPLE	T-2 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
1		TOPSOIL: Cobbles (60%) in silty fine sand. Brown color. Dry. Loose. ST-1	SM/GM			
2						
3		FORMATIONAL ROCK: Cobble conglomerate. 70% cobbles in a fine to medium grained sandy matrix with a trace of clay. Yellow-tan to brown color. Well cemented. Hard. Refusal at 2½'. ST-1	GW/GM			
4						
5						
6		End Test Trench at 2½' - Refusal. No caving. No groundwater				
7						
8						

VINJE & MIDDLETON ENGINEERING, INC
2450 Vineyard Avenue, Suite 102
Escondido, California 92029-1229
Office 760-743-1214 Fax 760-739-0343

TEST TRENCH LOGS

BEELER CANYON ROAD
COUNTY OF SAN DIEGO

PROJECT NO. 05-276-P PLATE 3

▼ Sand Cone Test ■ Bulk Sample ❏ Chunk Sample ○ Driven Rings

Date: 5-12-05 **Logged by: SJM**

DEPTH (ft)	SAMPLE	T-3 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
1		TOPSOIL: Cobbles (30%) in silty fine sand. Brown color. Dry. Loose ST-1	GP/GM			
2	■					
3		FORMATIONAL ROCK: Cobble conglomerate. 70% cobbles in a fine to sandy matrix with trace of clay. Yellow - tan color. Well cemented. Hard ST-1	GW/GM			
4						
5						
6		End Test Trench at 2½'. No caving. No groundwater.				
7						
8						

Date: 5-12-05 **Logged by: SJM**

DEPTH (ft)	SAMPLE	T-4 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
1		TOPSOIL: Cobbles (40%) in silty fine sand. Brown color. Dry. Loose ST-1	SM/GM			
2						
3		FORMATIONAL ROCK: Cobble conglomerate. 75% cobbles in a fine sandy matrix with trace of clay. Yellow-tan to red-brown color. Well cemented. Hard. Refusal at 2½' ST-1	GW/GM			
4						
5						
6						
7		End Test Trench at 2½' - Refusal. No caving. No groundwater.				
8						

VINJE & MIDDLETON ENGINEERING, INC
2450 Vineyard Avenue, Suite 102
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Office 760-743-1214 Fax 760-739-0343

TEST TRENCH LOGS

BEELER CANYON ROAD
COUNTY OF SAN DIEGO

PROJECT NO. 05-276-P PLATE 4

▼ Sand Cone Test ■ Bulk Sample ❑ Chunk Sample ○ Driven Rings

Date: 5-12-05 **Logged by: SJM**

DEPTH (ft)	SAMPLE	T-5 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
0	■	TOPSOIL: Cobbles (20%) in silty fine sand. Brown color. Dry. Loose ST-1	SM/GM	8.0	112.8	96.3
5	■	FORMATIONAL ROCK: Cobble conglomerate. 40% cobbles in a fine to medium grained sandy matrix with trace of clay. Yellow-tan to red-brown color. Moderately cemented. Irregular shaped, discontinuous grey siltstone lens at 4'-5'. ST-1	GM/GC			
10		End Test Trench at 10'. No caving. No groundwater.				
15						

Date: 5-12-05 **Logged by: SJM**

DEPTH (ft)	SAMPLE	T-6 DESCRIPTION	USCS SYMBOL	FIELD MOISTURE (%)	FIELD DRY DENSITY (pcf)	RELATIVE COMPACTION (%)
1		TOPSOIL: Cobbles (15%) in silty fine sand. Dark brown to tan color. Slightly moist. Loose ST-1	SM/GM			
2						
3		Sandy clay. Grey color. Some rust-colored staining. 5% cobbles. Moist. Stiff. Plastic. ST-2				
4						
5	❑	FORMATIONAL ROCK: Cobble conglomerate. 70% cobbles in a fine to medium grained sandy matrix with clay. Yellow-tan to red-brown color. Cemented hard. ST-1	GW/GM	17.2	100.9	-
6						
7		End Test Trench at 8'. No caving. No groundwater.				
8						

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2450 Vineyard Avenue, Suite 102
Escondido, California 92029-1229
Office 760-743-1214 Fax 760-739-0343

TEST TRENCH LOGS

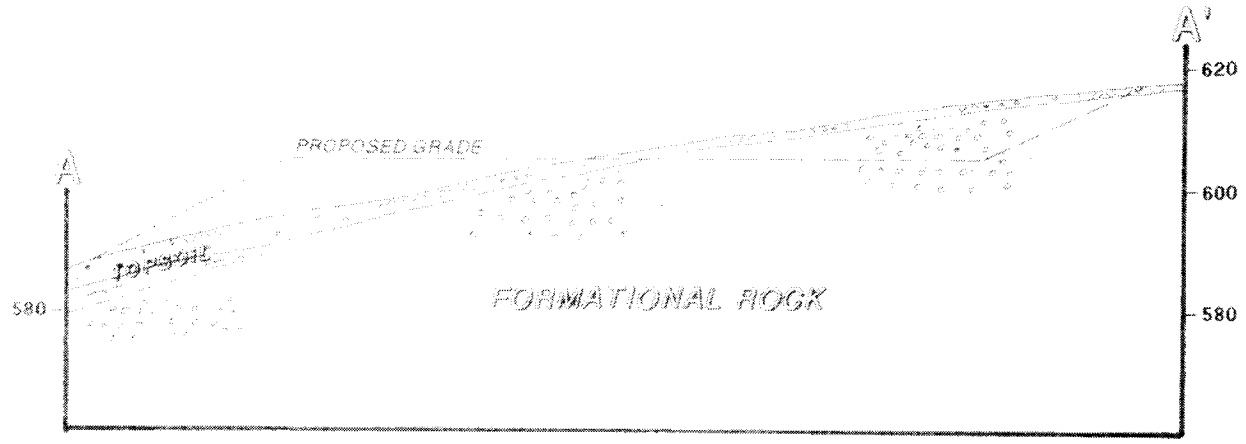
BEELER CANYON ROAD
COUNTY OF SAN DIEGO

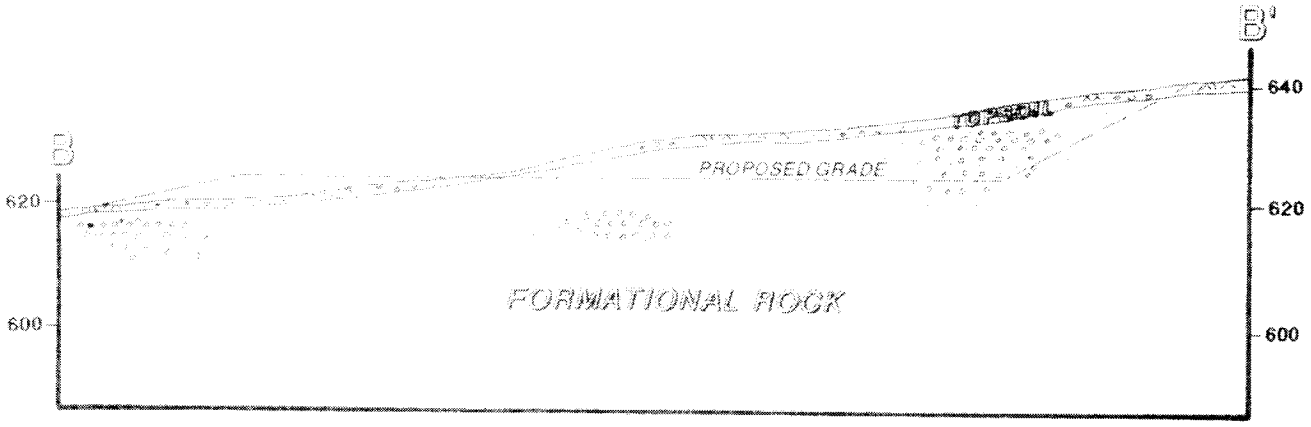
PROJECT NO. 05-276-P PLATE 5

▼ Sand Cone Test ■ Bulk Sample ❑ Chunk Sample ○ Driven Rings

GEOLOGIC CROSS-SECTIONS

PLATE 6





SCALE: 1"=30'

V&M JOB #05-276-P

FAULT - EPICENTER MAP

SAN DIEGO COUNTY REGION

INDICATED EARTHQUAKE EVENTS THROUGH 75 YEAR PERIOD (1900-1974)

Map data is compiled from various sources including California Division of Mines and Geology, California Institute of Technology and the National Oceanic and Atmospheric Administration. Map is reproduced from California Division of Mines and Geology, "Earthquake Epicenter Map of California; Map Sheet 39."

Earthquake Magnitude

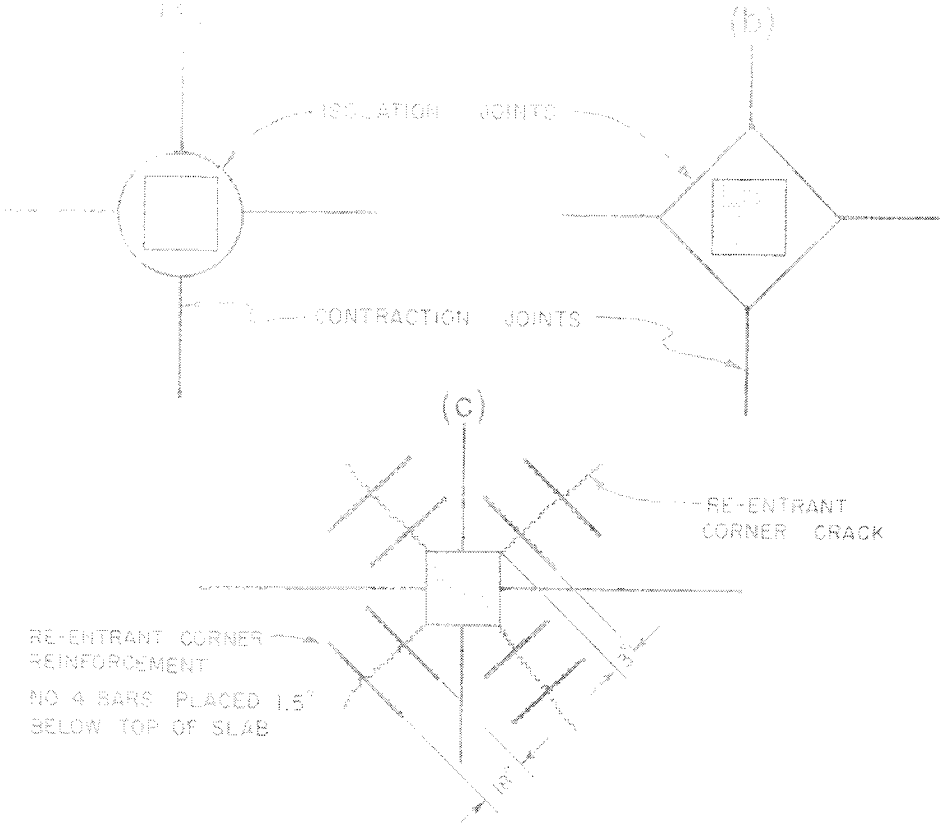
- 4.0 TO 4.9
- 5.0 TO 5.9
- 6.0 TO 6.9
- 7.0 TO 7.9

Fault

PROJECT: Job #05-276-P

BEELER CANYON ROAD, COUNTY OF SAN DIEGO

PLATE: 7



NOTES:

1. Isolation joints around the columns should be either circular as shown in (a) or diamond shaped as shown in (b). If no isolation joints are used around columns, or if the corners of the isolation joints do not meet the contraction joints, radial cracking as shown in (c)may occur (reference ACI).

2. In order to control cracking at the re-entrant corners (±270° corners), provide reinforcement as shown in (c).

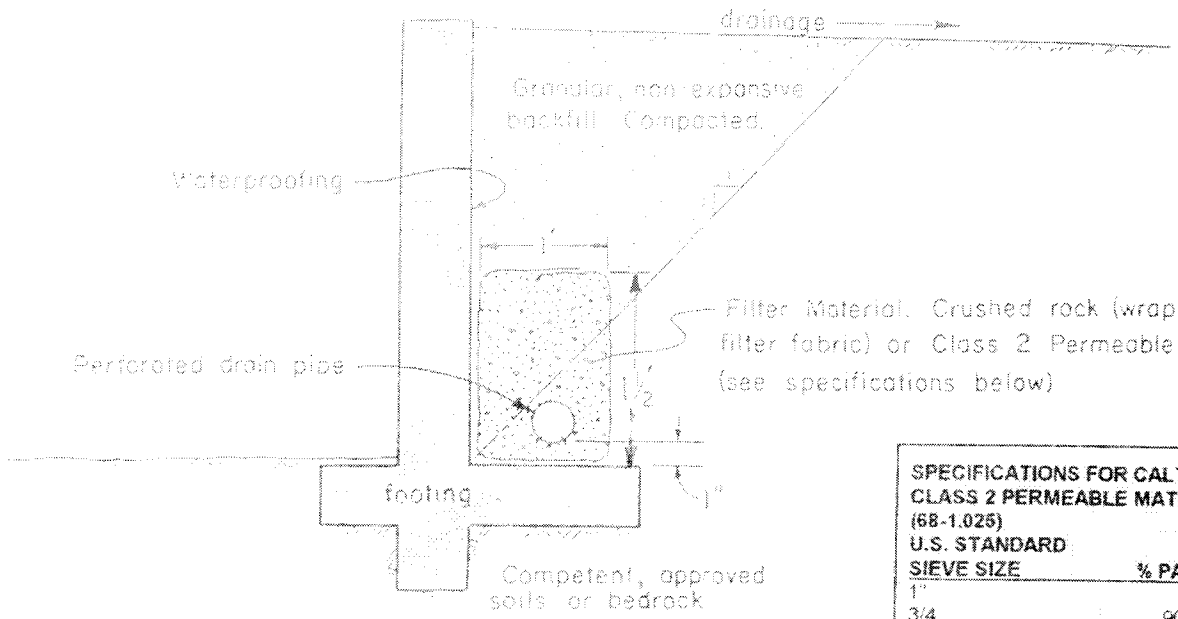
3. Re-entrant corner reinforcement shown herein is provided as a general guideline only and is subject to verification and changes by the project architect and/or structural engineer based upon slab geometry, location, and other engineering and construction factors.

VINJE & MIDDLETON ENGINEERING, INC.

PLATE 8

RETAINING WALL DRAIN DETAIL

Typical - no scale



SPECIFICATIONS FOR CALTRANS CLASS 2 PERMEABLE MATERIAL (68-1.025)
U.S. STANDARD

SIEVE SIZE	% PASSING
1"	100
3/4	90-100
3/8	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0 -7
No. 200	0 -3

Sand Equivalent > 75

CONSTRUCTION SPECIFICATIONS:

1. Provide granular, non-expansive backfill soil in 1:1 gradient wedge behind wall. Compact backfill to minimum 90% of laboratory standard.

2. Provide back drainage for wall to prevent build-up of hydrostatic pressures. Use drainage openings along base of wall or back drain system as outlined below.

3. Backdrain should consist of 4" diameter PVC pipe (Schedule 40 or equivalent) with perforations down. Drain to suitable outlet at minimum 1%. Provide ¾" - 1½" crushed gravel filter wrapped in filter fabric (Mirafi 140N or equivalent). Delete filter fabric wrap if Caltrans Class 2 permeable material is used. Compact Class 2 material to minimum 90% of laboratory standard.

4. Seal back of wall with waterproofing in accordance with architect's specifications.

5. Provide positive drainage to disallow ponding of water above wall. Lined drainage ditch to minimum 2% flow away from wall is recommended.

* Use 1½ cubic foot per foot with granular backfill soil and 4 cubic foot per foot if expansive backfill soil is used.

VINJE & MIDDLETON ENGINEERING, INC.

ALLIED EARTH TECHNOLOGY

7915 SILVERTON AVENUE, SUITE 317
SAN DIEGO, CALIFORNIA 92126
TEL : (858) 586-1665 (619) 447-4747
E-MAIL : ROBERTAET@AOL.COM

==========

ROBERT CHAN, P.E.

November 24, 2015

Mr. Roman Tivyan
8834 Capcano Road
San Diego, Ca.92126

Subject : Project No. 14-1210E2
Response to City Comments
Update of "Preliminary Geotechnical Investigation for Proposed 3-Lot Development, 2.8 Acre Parcel, Beeler Canyon Road, County of San Diego"
Proposed Residential Building Site
11275 Beeler Canyon Road
San Diego, California

Dear Mr. Tivyan :

The follow are response to City of San Diego comments :

4. *The geotechnical consultant must indicate that they agree with the data and conclusions contained in the referenced geotechnical report dated June 27, 2005.*

We agree with the data and conclusions contained in the referenced geotechnical report dated June 27, 2005.

5. *Provide a geologic map and geologic cross section*

See attached.

6. *Determine if the site is safe from geologic hazards*

The site is safe from geologic hazards.

7. *Indicate if unfavorable geologic structure exists at the site.*

No unfavorable geologic structure exists at the site.

8. *The project's geotechnical consultant must indicate if storm water infiltration or percolation from the proposed Storm Water Treatment Swale LID would result in adverse impacts on the proposed improvements or adjacent properties. Revise the plans accordingly or provide details that show the proposed Storm Water Treatment Swale LID is designed with an impermeable liner.*

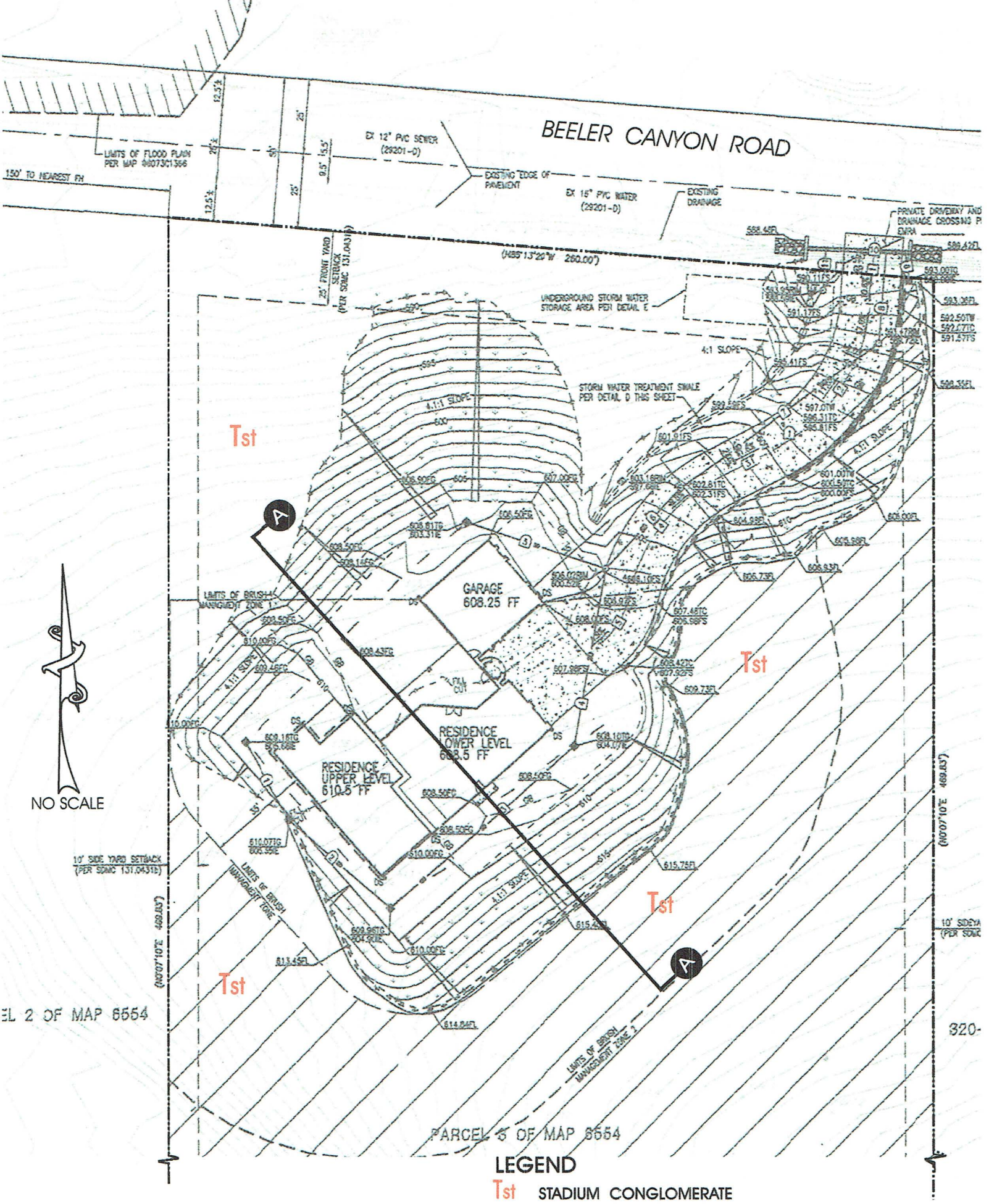
See revised grading plan where the Storm Water Treatment Swale LID is designed with an impermeable liner.

9. *Geotechnical reports must be prepared in accordance with the City's Guidelines for Geotechnical Reports.*

Noted

Respectfully submitted,
ALLIED EARTH TECHNOLOGY

ROBERT CHAN, P.E.

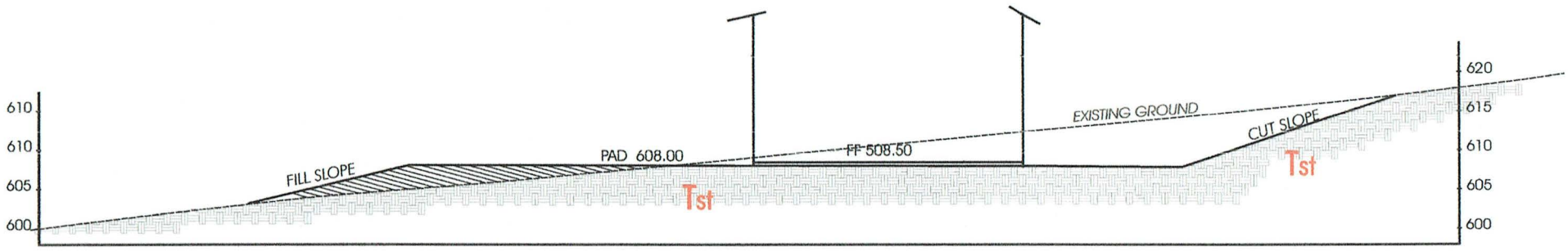


LEGEND

Tst STADIUM CONGLOMERATE

PROJECT NO. 14-1210 E2

FIGURE NO.1



SECTION "AA"

SCALE 1"=20'

LEGEND

Tst STADIUM CONGLOMERATE

PROJECT NO. 14-1210 E2

FIGURE NO.2

DRAINAGE STUDY
for

TIVYAN RESIDENCE
SAN DIEGO, CA 92123

Project Nbr. #412254

APN: 320-030-31

Prepared By:

9449 Balboa Avenue, Suite 270
San Diego, CA 92123
B&W Job #: 11900u

Date: July, 2015
Rev. Date: November, 2015

TABLE OF CONTENTS

Attachments

1. Purpose

The purpose of this drainage study is to analyze the existing and proposed conditions drainage patterns, and peak flow rates for the Tivyan Residence. This study will also provide recommendations to mitigate stormwater runoff in order for the project to match or decrease the pre-development peak flow rates in the proposed condition.

To determine the impacts of the proposed development on the existing drainage patterns, the pre- and post-peak flow rates are analyzed and compared for the 100-year storm event using the Rational Method. This report has been prepared in accordance with the requirements of the City of San Diego Drainage Design Manual (1984).

2. Background

The 2.8 acres project site is located in the City of San Diego, California. The site is located on the south side of the Beeler Canyon Road and approximately 500 feet west of the intersection between Beeler Canyon Road and Green Valley Court. The site is physically located at: 32.927^0 N & 117.040^0 W.

(See Attachment A for Vicinity & Imagery Maps)

The Federal Emergency Management Agency (FEMA) categorizes the site as Zone X, where Zone X is area determined to be outside of 500-year floodplain (FIRM Panel 1366 of 2375). Attachment E illustrates the FEMA floodplain mapping within the vicinity of the project site. The proposed development is located outside of the existing 100 year flood plain limits. Therefore, the redevelopment will not cause any adverse impact to the existing flood plain limits. The site is located adjacent to the Water Quality Sensitive Areas.

3. Existing Condition

The existing site is currently undeveloped and covered with vegetation. The site topography is relatively steep and slopes from the south to the north direction. The majority runoff from the site discharges towards north into a swale located adjacent to Beeler Canyon Road. The existing swale situated along northerly property line ultimately discharges to the Beeler Creek located northerly side of the Beeler Canyon Road. The remaining portion of the site (southerly area) drains to existing natural channel located along the westerly side of the site. The storm runoff originating from the site ultimately confluence at the westerly side of the site before being discharged to Beeler Creek. The Beeler Creek is a tributary to the Penasquitos Creek which ultimately discharges to the Pacific Ocean.

The runoff originating from upstream (offsite) drainage areas is discharged to Penasquitos Creek via two existing culverts located approximately 135’ east to the project site. It is assumed that these culverts are sized adequately to convey the anticipated peak flow runoff from the offsite drainage area. Therefore, the hydraulic analysis of these culverts is not required.

The hydrology of the site area within the project boundary can be generally analyzed at 1 discharge point which is shown graphically in the existing conditions hydrology map.

(See Attachment B for Existing Conditions Hydrology Map)

4. Proposed Improvements

The proposed development works include but are not limited to construction of a new residential building, access driveway, and new landscaping. The associated improvement work will also include drainage construction, and dry & wet utilities construction.

The drainage improvement work also includes construction of an 18" RCP culvert within the southerly ROW of Beeler Canyon Road where new driveway is proposed. This culvert is designed to convey the peak runoff from 100-yr storm event.

The on-site drainage patterns will be altered slightly but discharge locations will be maintained. The hydrology of the site can be generally analyzed at 1 discharge point which is shown graphically in the proposed condition hydrology map.

The proposed culvert within Beeler Canyon Road is designed to convey the offsite runoff

(See Attachment C for Proposed Conditions Hydrology Map)

5. Soil Characteristics

A conservative assumption that the project site consists of Soil Type "D" is made for the hydrologic analysis as described in the City of San Diego Drainage Design Manual (1984).

6. Methodology

Rational Method:
A rational method is utilized to perform hydrologic calculations in this study;

Rational Equation: $Q = C * I * A$

Where;
Q = Peak discharge, cfs
C = Rational method runoff coefficient
I = Rainfall intensity, inch/hour
A = Drainage area, acre

A computer model CivilD is used to automate the hydrology analysis process. This computer version of the rational method analysis allows user to develop a node-link model of the watershed. CivilD computer program has the capability of performing calculations utilizing mathematical functions. These functions are assigned code numbers, which appear in the printed results. The code numbers and their corresponding functions are described below;

Sub area Hydrologic Processes;

Code 1 - INITIAL subarea input, top of stream
Code 2 - STREET flow through subarea, includes subarea runoff
Code 3 - ADDITION of runoff from subarea to stream
Code 4 - STREET INLET + parallel street & pipe flow + area
Code 5 - PIPEFLOW travel time (program estimated pipe size)**
Code 6 - PIPEFLOW travel time (user specified pipe size)
Code 7 - IMPROVED channel travel time (open or box)**
Code 8 - IRREGULAR channel travel time**
Code 9 - USER specified entry of data at a point
Code 10 - CONFLUENCE at downstream point in current stream
Code 11 - CONFLUENCE of mainstreams
**NOTE: These options do not include subarea runoff
**NOTE: (#) - Required pipe size determined by the hydrology program

7. Calculations

7.a. Impervious and Pervious Areas

The impervious and pervious areas are calculated for both the existing and proposed site conditions. The site is designed to increase the impervious area by 8,710 square feet (=7.1% of total site area) as shown in Table 7-1. See Attachment B for pervious and impervious areas exhibit.

Table 7-1 Summary of Areas

	Area (Acres)			Percent Impervious Area	Percent Pervious Area
	Total	**Impervious (Ai)**	**Pervious (Ap)**		
Existing	2.80	0.00	2.80	0.0%	100.0%
Proposed	2.80	0.20	2.60	7.1%	92.9%
Percentage Change	**0.0%**		**-7.1%**		

7.b. Runoff Coefficient

The runoff coefficient for the site is obtained from Table 2 of the City of San Diego Drainage Design Manual for residential type land use. The C values are estimated as 0.45 & 0.55 for the existing and proposed conditions respectively. (See Appendices B, and C for runoff coefficient calculations for existing and proposed conditions respectively). The lowest C value from table 2 is assigned for the existing condition whereas, the C value of 0.55 is used for residential development.

7.c. Peak Flow Rates

The rational method is used to perform the hydrologic analysis.

The peak flow rates for the 100 year storm events are calculated and summarized in Table 7-4 for comparison purpose. Tables 7-2, & 3 summarize the peak flow runoff rates at each hydrology nodes for the existing and proposed conditions respectively. Table 7-4 summarizes the peak flow rates for the hydrology nodes for the hydrology analysis for the proposed 18 inch culvert. The detailed calculations/results for existing and proposed conditions analysis are located in Appendices B and C respectively.

Table 7-2 Nodal Flow Rates for Existing Condition

Node #	Peak 100-yr Flow Rate (cfs)
100	0
101	0.72
102	2.40

Table 7-3 Nodal Flow Rates for Proposed Condition

Node #	Peak 100-yr Flow Rate (cfs)
100	0
101	0.37
102	0.90
103	0.90
104	1.20
105	2.12
106	2.96

Table 7-4 Existing and Proposed Conditions Peak Flow Rates Summary

	Drainage Area (acres)		100 Yr Flow (cfs)			% Mitigated from Existing Condition
	Existing Condition	Proposed Condition	Existing Condition	Proposed Condition (Unmitigated)	Proposed Condition (Mitigated)	
Analysis Point 1	1.71	1.71	2.40	2.96	2.26	**-5.83**
Total	**1.7**	**1.7**	**2.40**	**2.96**	**2.26**	**-5.83**

Note: The peak flow rates from the offsite drainage area analyzed for the culvert analysis is not included in the comparison purpose.

Due to the proposed development of the site the runoff generated from the 100 year storm event can be expected to increase by 0.56 cfs. The increase in peak flow rate is mainly due to the increased impervious area in the proposed condition. The peak flow rate is mitigated by routing the flow through self-retaining areas and detention basin. The overall peak flow reduction due to the routing is 0.7 cfs. Therefore, the peak flow rate in the mitigated condition is 2.26 cfs which is smaller than the existing condition peak flow rate of 2.40 cfs.

Culvert Analysis: The hydrology of the tributary drainage area for the proposed culvert is also analyzed for 100-yr storm event. Majority of the drainage area tributary to this culvert lies easterly side of the subject property as shown in the proposed condition hydrology map. A portion of the Beeler Canyon road in between the cul-de-sac and the proposed culvert is also draining to the proposed culvert. The peak flow rate for the 100-yr storm event is determined to be 5.3 cfs for the approximate drainage area of 2.63 acres including the subject property. The 18" culvert with the slope of 2.7% can adequately convey the design peak 100-yr flow rate of 5.3 cfs. An energy dissipater with no. 2 backing is also proposed for the inlet and outlet protection.

Table 7-5 Nodal flow rates for Offsite Hydrology for 18 Inch Culvert

200	0.00
201	0.12
202	1.86
203	4.10

8. Downstream Drainage Impact Analysis

The onsite drainage patterns will change minimally due to the proposed redevelopment. The runoff will continue to flow in the same general directions, but new storm drain system is added to effectively manage the runoff in the proposed condition.

The runoff from majority site area discharges to an existing swale situated at the northerly side. The 100 year runoff at an analysis point 1 is mitigated in the proposed condition. Since the net increase in peak flow rate from the site is negative, downstream drainage impact is not anticipated due to this development.

9. Conclusions

Storm water runoff from the site is collected and conveyed by a system of downspouts, inlets, storm drain pipes, and swales. The proposed development mitigates the water quantity impacts to the maximum extent practicable through the use of best management practices.

The existing drainage patterns change slightly to accommodate the proposed development. In the proposed condition, the site is expected to reduce the 100 year peak flow rates from 2.40 to 2.26 cfs. The peak flow attenuation is achieved by routing the flow through proposed detention basin and two self-retaining areas. A detention basin with a total volume of 900 cf is provided for this purpose. There are two self-retaining areas designed to capture 1" of rainfall. These areas are also analyzed for the peak flow mitigation. Approximately 0.40 cfs is mitigated through these detention basins. As a result the proposed condition peak flow rate leaving the site is reduced from the existing condition. Therefore, the negative downstream drainage impacts are not anticipated due to this development.

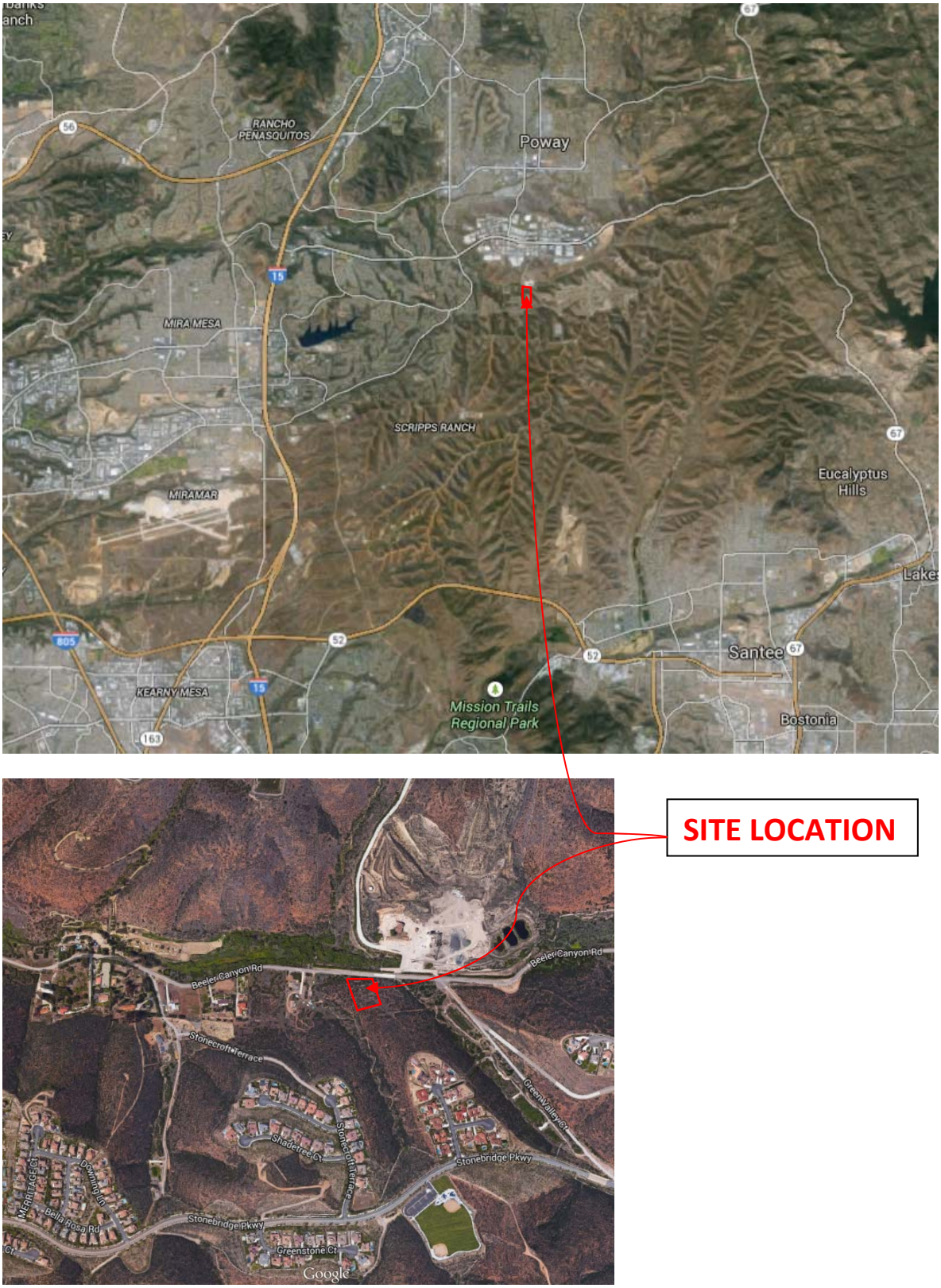
The proposed 18" culvert is designed to convey the peak 100-yr flow rate of 5.3 cfs.

10. References

- City of San Diego, Drainage Design Manual (April, 1984).

ATTACHMENT A:

Site Vicinity Map
Site Imagery Map



VICINITY MAP

IMAGERY MAP

ATTACHMENT B:

Existing Conditions Runoff Coefficient Calculations
Existing Condition Hydrology Calculations
Existing Conditions Pervious/Impervious Areas Map
Existing Conditions Hydrology Map

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 07/01/15

EXISTING CONDITION HYDROLOGY
ANALYSIS POINT 1
TIVYAN RESIDENCE

********* Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.450 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance = 239.000(Ft.)
Highest elevation = 636.000(Ft.)
Lowest elevation = 610.000(Ft.)
Elevation difference = 26.000(Ft.)
TC=[(11.9*0.0453^3)/(26.00)]^.385= 1.24 + 10 min. = 11.24 min.
Rainfall intensity (I) = 3.234(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.450
Subarea runoff = 0.713(CFS)
Total initial stream area = 0.490(Ac.)

++
Process from Point/Station 101.000 to Point/Station 102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 1.601(CFS)
Depth of flow = 0.114(Ft.), Average velocity = 2.450(Ft/s)
******* Irregular Channel Data **********

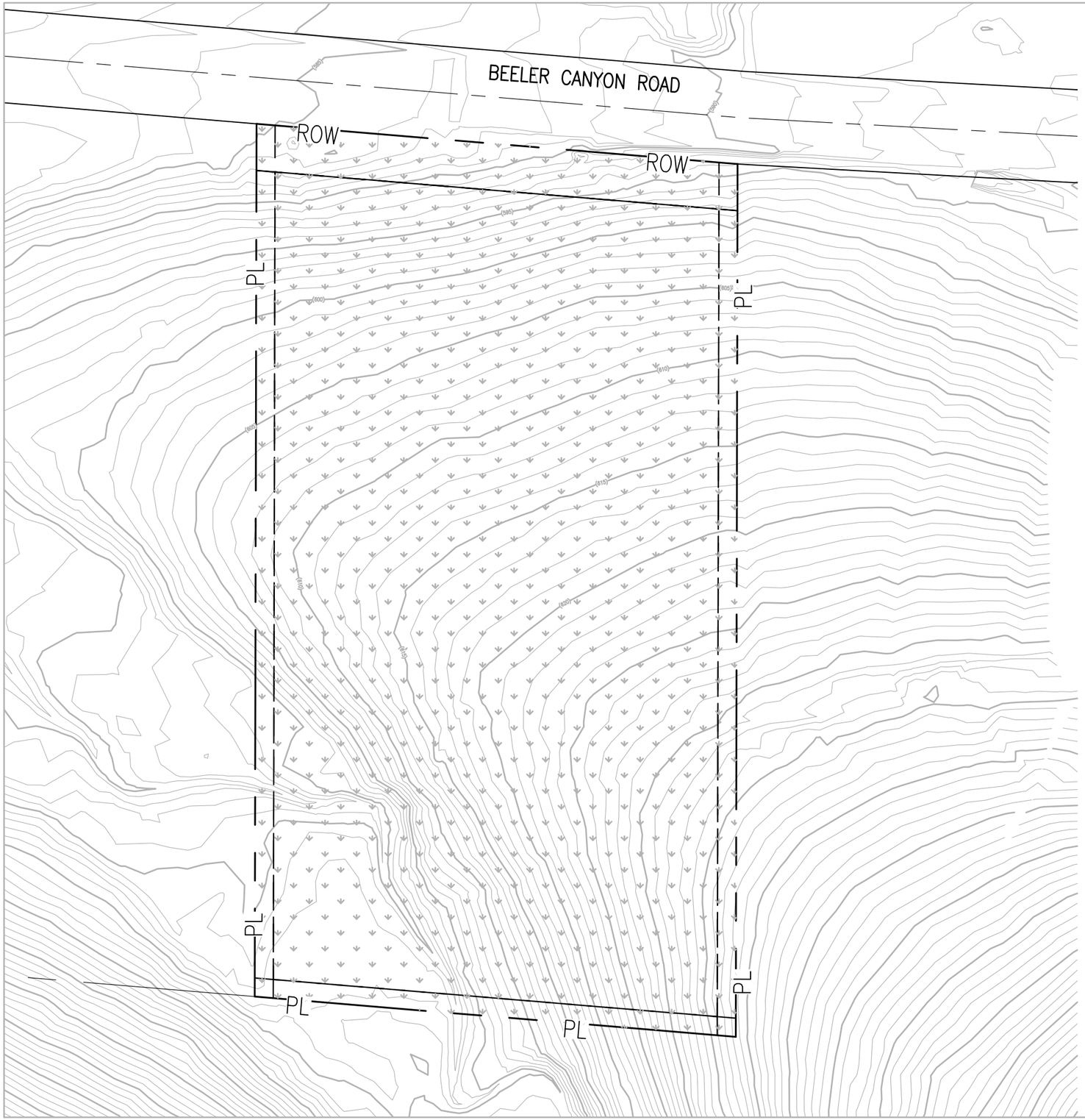
Information entered for subchannel number 1 :

```
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.20
        2             10.00              0.00
        3             20.00              0.20
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =      1.601(CFS)
  '     '        flow top width =     11.432(Ft.)
  '     '    velocity=    2.450(Ft/s)
  '     '        area =      0.653(Sq.Ft)
  '     '        Froude number =     1.806

Upstream point elevation =   610.000(Ft.)
Downstream point elevation =   585.000(Ft.)
Flow length =   225.000(Ft.)
Travel time  =    1.53 min.
Time of concentration =   12.77 min.
Depth of flow =   0.114(Ft.)
Average velocity =   2.450(Ft/s)
Total irregular channel flow =     1.601(CFS)
Irregular channel normal depth above invert elev. =   0.114(Ft.)
Average velocity of channel(s) =   2.450(Ft/s)

Sub-Channel No. 1 Critical depth =      0.145(Ft.)
  '     '       '     Critical flow top width =     14.453(Ft.)
  '     '       '     Critical flow velocity=    1.533(Ft/s)
  '     '       '     Critical flow area =      1.044(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.450 given for subarea
Rainfall intensity =      3.086(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.450
Subarea runoff =      1.694(CFS) for    1.220(Ac.)
Total runoff =      2.407(CFS)  Total area =        1.71(Ac.)
End of computations, total study area =           1.710 (Ac.)
```



LEGEND

PROPERTY/RIGHT OF WAY

EXISTING LANDSCAPE AREA 2.8AC

EXISTING CONTOUR (xxx)

N

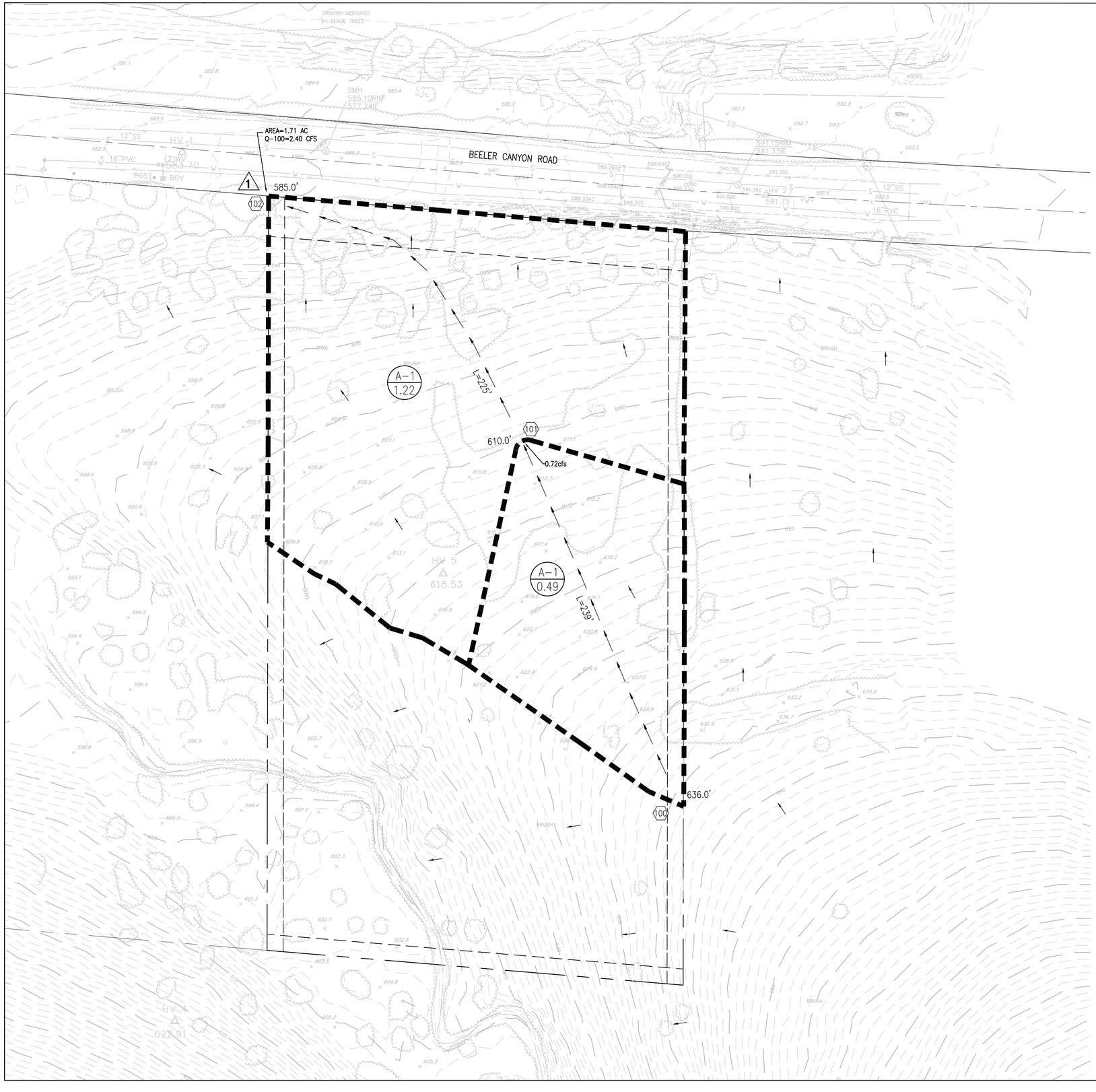
30 0 60 120

SCALE IN FEET
1 inch = 60 ft.

EXISTING CONDITIONS MAP
TIVYAN RESIDENCE

DATE: JULY 2015

PLOT: M:\PROJECTS\11500\11900U1.00-BEELER CANYON ROAD - TIVYAN\DOCUMENTS\REPORTS\WQTR\PERV-IMPV MAP EX.DWG Min GC 7/1/2015 11:42 AM



LEGEND

- HYDROLOGY NODE — XXX
- SUB BASIN BOUNDARY
- EXISTING CONTOUR — XXX
- FLOW DIRECTION
- SPOT ELEVATION — x 245.0
- NODE/CONTOUR ELEVATION — XXX.XX
- ANALYSIS POINT — 1
- SUB-BASIN MARKER & AREA (AC) — X-X / X.XX

15 0 30 60

SCALE IN FEET
1 inch = 30 ft.

EXISTING CONDITIONS HYDROLOGY MAP
TIVYAN RESIDENCE

DATE: NOVEMBER 2015

PLOT: M:\PROJECTS\115001\119000\1.00-BEELER CANYON ROAD - TIVYAN\DOCUMENTS\REPORTS\HYDROLOGY\NEW-HYDRO\EXHIBITS\EXIST_HYDRO 2015-11.DWG Mon CC 11/6/2015 2:47 PM

Composite 'C' Value Calculations

Project: Tivyan Residence

C-perv = 0.45 (for rural lots > 1/2 acre per City of SD drainage design manual)

C-imp= 1 (for paved areas)

C-composite= **[(Cperv*Ap + Cimp*Ai)/At]** …… (1)

Total Area At= **Ap + Ai** (sum of pervious & impervious areas)

Existing Conditions

Basin	Area (Acres)			[(Cperv*Ap + Cimp*Ai)]	C-composite
	Total Area (At)	Imp. Area (Ai)	Perv. Area (Ap)		
A/1	2.80	0.00	2.80	1.26	0.45
Overall	**2.80**	**0.00**		**1.26**	**0.45**

ATTACHMENT C:

Proposed Conditions Runoff Coefficient Calculations
Proposed Condition Hydrology/Hydraulic Calculations
Proposed Conditions Pervious/Impervious Areas Map
Proposed Conditions Hydrology Map

Composite 'C' Value Calculations

Project: Tivyan Residence

C-perv = 0.45 (for rural lots > 1/2 acre per City of SD drainage design manual)

C-imp= 1 (for paved areas)

C-composite= **[(Cperv*Ap + Cimp*Ai)/At]** …… (1)

Total Area At= **Ap + Ai** (sum of pervious & impervious areas)

Basin /Exit Point	Area (Acres)			[(Cperv*Ap + Cimp*Ai)]	C-composite
	Total Area (At)	Imp. Area (Ai)	Perv. Area (Ap)		
A/1	2.80	0.20	2.60	1.37	0.49
Overall	**2.80**	**0.20**		**1.37**	**0.49**

Note: Coefficient of runoff in the proposed conditions is less than 0.55. Therefore, minimum C value of 0.55 (for Single Family Land Use) will be used in the analysis.

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 11/06/15

PROPOSED CONDITION ANALYSIS
ANALYSIS POINT 1
TIVYAN RESIDENCE

********* Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

++

Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.550 given for subarea
Time of concentration computed by the
natural watersheds nomograph (App X-A)
TC = [11.9*length(Mi)^3)/(elevation change(Ft.))]^.385 *60(min/hr) + 10 min.
Initial subarea flow distance = 187.000(Ft.)
Highest elevation = 636.000(Ft.)
Lowest elevation = 616.500(Ft.)
Elevation difference = 19.500(Ft.)
TC=[(11.9*0.0354^3)/(19.50)]^.385= 1.05 + 10 min. = 11.05 min.
Rainfall intensity (I) = 3.255(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.550
Subarea runoff = 0.376(CFS)
Total initial stream area = 0.210(Ac.)

++

Process from Point/Station 101.000 to Point/Station 102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.644(CFS)
Depth of flow = 0.227(Ft.), Average velocity = 6.280(Ft/s)
******* Irregular Channel Data **********

Information entered for subchannel number 1 :

```
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.50
        2              1.00              0.00
        3              2.00              0.50
Manning's 'N' friction factor =   0.013
-----------------------------------------------------------------
Sub-Channel flow  =      0.644(CFS)
  '     '        flow top width =      0.906(Ft.)
  '     '    velocity=    6.280(Ft/s)
  '     '        area =      0.103(Sq.Ft)
  '     '        Froude number =     3.288

Upstream point elevation =   616.000(Ft.)
Downstream point elevation =   607.500(Ft.)
Flow length =   133.000(Ft.)
Travel time  =    0.35 min.
Time of concentration =   11.40 min.
Depth of flow =   0.227(Ft.)
Average velocity =   6.280(Ft/s)
Total irregular channel flow =     0.644(CFS)
Irregular channel normal depth above invert elev. =   0.227(Ft.)
Average velocity of channel(s) =   6.280(Ft/s)

Sub-Channel No. 1 Critical depth =      0.363(Ft.)
  '     '       '     Critical flow top width =      1.453(Ft.)
  '     '       '     Critical flow velocity=    2.442(Ft/s)
  '     '       '     Critical flow area =      0.264(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.550 given for subarea
Rainfall intensity =      3.218(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.550
Subarea runoff =      0.531(CFS) for    0.300(Ac.)
Total runoff =      0.907(CFS)  Total area =        0.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.907(CFS)
Depth of flow =   0.197(Ft.), Average velocity =  11.654(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
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        2              1.00              0.00
        3              2.00              0.50
Manning's 'N' friction factor =   0.013
-----------------------------------------------------------------
Sub-Channel flow  =      0.907(CFS)
  '     '        flow top width =      0.789(Ft.)
  '     '    velocity=   11.654(Ft/s)
  '     '        area =      0.078(Sq.Ft)
  '     '        Froude number =     6.540

Upstream point elevation =   607.500(Ft.)
Downstream point elevation =   603.000(Ft.)
Flow length =    17.000(Ft.)
Travel time  =    0.02 min.
Time of concentration =   11.42 min.
Depth of flow =   0.197(Ft.)
```

```
Average velocity =  11.654(Ft/s)
Total irregular channel flow =     0.907(CFS)
Irregular channel normal depth above invert elev. =   0.197(Ft.)
Average velocity of channel(s) =  11.654(Ft/s)

Sub-Channel No. 1 Critical depth =      0.418(Ft.)
  '     '       '     Critical flow top width =      1.672(Ft.)
  '     '       '     Critical flow velocity=    2.596(Ft/s)
  '     '       '     Critical flow area =      0.349(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.550 given for subarea
Rainfall intensity =      3.215(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.550
Subarea runoff =      0.000(CFS) for    0.000(Ac.)
Total runoff =      0.907(CFS)  Total area =        0.51(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.058(CFS)
Depth of flow =   0.245(Ft.), Average velocity =   8.808(Ft/s)
       ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              0.50
       2              1.00              0.00
       3              2.00              0.50
Manning's 'N' friction factor =   0.013
------------------------------------------------------------------
Sub-Channel flow  =      1.058(CFS)
  '     '        flow top width =      0.980(Ft.)
  '     '    velocity=    8.808(Ft/s)
  '     '        area =      0.120(Sq.Ft)
  '     '        Froude number =     4.434

Upstream point elevation =   603.000(Ft.)
Downstream point elevation =   591.000(Ft.)
Flow length =   106.000(Ft.)
Travel time  =    0.20 min.
Time of concentration =   11.62 min.
Depth of flow =   0.245(Ft.)
Average velocity =   8.808(Ft/s)
Total irregular channel flow =     1.058(CFS)
Irregular channel normal depth above invert elev. =   0.245(Ft.)
Average velocity of channel(s) =   8.808(Ft/s)

Sub-Channel No. 1 Critical depth =      0.445(Ft.)
  '     '       '     Critical flow top width =      1.781(Ft.)
  '     '       '     Critical flow velocity=    2.668(Ft/s)
  '     '       '     Critical flow area =      0.397(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.550 given for subarea
Rainfall intensity =      3.195(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.550
Subarea runoff =      0.299(CFS) for    0.170(Ac.)
Total runoff =      1.206(CFS)  Total area =        0.68(Ac.)
```

++
Process from Point/Station 104.000 to Point/Station 105.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 588.500(Ft.)
Downstream point/station elevation = 588.000(Ft.)
Pipe length = 42.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.206(CFS)
Nearest computed pipe diameter = 9.00(In.)
Calculated individual pipe flow = 1.206(CFS)
Normal flow depth in pipe = 5.38(In.)
Flow top width inside pipe = 8.83(In.)
Critical Depth = 6.07(In.)
Pipe flow velocity = 4.38(Ft/s)
Travel time through pipe = 0.16 min.
Time of concentration (TC) = 11.78 min.

++
Process from Point/Station 105.000 to Point/Station 105.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.550 given for subarea
Time of concentration = 11.78 min.
Rainfall intensity = 3.179(In/Hr) for a 100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.550
Subarea runoff = 0.629(CFS) for 0.360(Ac.)
Total runoff = 1.835(CFS) Total area = 1.04(Ac.)

++
Process from Point/Station 105.000 to Point/Station 105.000
**** SUBAREA FLOW ADDITION ****

User specified 'C' value of 0.550 given for subarea
Time of concentration = 11.78 min.
Rainfall intensity = 3.179(In/Hr) for a 100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.550
Subarea runoff = 0.280(CFS) for 0.160(Ac.)
Total runoff = 2.115(CFS) Total area = 1.20(Ac.)

++
Process from Point/Station 105.000 to Point/Station 106.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 2.564(CFS)
Depth of flow = 0.441(Ft.), Average velocity = 2.195(Ft/s)
******* Irregular Channel Data ***********

Information entered for subchannel number 1 :

Point number	'X' coordinate	'Y' coordinate
1	0.00	0.50
2	3.00	0.00
3	6.00	0.50

Manning's 'N' friction factor = 0.030

Sub-Channel flow = 2.564(CFS)
' ' flow top width = 5.295(Ft.)
' ' velocity= 2.195(Ft/s)
' ' area = 1.168(Sq.Ft)
' ' Froude number = 0.823

```
Upstream point elevation =   588.000(Ft.)
Downstream point elevation =   585.000(Ft.)
Flow length =   200.000(Ft.)
Travel time  =    1.52 min.
Time of concentration =   13.30 min.
Depth of flow =   0.441(Ft.)
Average velocity =   2.195(Ft/s)
Total irregular channel flow =     2.564(CFS)
Irregular channel normal depth above invert elev. =   0.441(Ft.)
Average velocity of channel(s) =   2.195(Ft/s)

Sub-Channel No. 1 Critical depth =      0.408(Ft.)
  '     '       '     Critical flow top width =      4.898(Ft.)
  '     '       '     Critical flow velocity=    2.565(Ft/s)
  '     '       '     Critical flow area =      1.000(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.550 given for subarea
Rainfall intensity =      3.040(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.550
Subarea runoff =      0.853(CFS) for    0.510(Ac.)
Total runoff =      2.968(CFS)  Total area =        1.71(Ac.)
End of computations, total study area =          1.710 (Ac.)
```

100-yr Peak Flow Analysis for Proposed 18 Inch Culvert within Beeler Canyon Road RoW

```
                San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology  program based on
San Diego County Flood Control Division 1985 hydrology manual
        Rational Hydrology Study        Date: 11/06/15
--------------------------------------------------------------------------
OFFSITE HYDROLOGY ANALYSIS
PROPOSED BEELER CANYON ROAD CULVERT
TIVYAN RESIDENCE


--------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

--------------------------------------------------------------------------


Program License Serial Number 6116

--------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity)  =  1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
--------------------------------------------------------------------------
User specified 'C' value of 0.900 given for subarea
Initial subarea flow distance  =   65.000(Ft.)
Highest elevation =  601.500(Ft.)
Lowest elevation =  601.000(Ft.)
Elevation difference =    0.500(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) =     3.17 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9000)*(  65.000^.5)/(   0.769^(1/3)]=   3.17
Setting time of concentration to 5 minutes
Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.900
Subarea runoff =      0.119(CFS)
Total initial stream area =        0.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
--------------------------------------------------------------------------
Estimated mean flow rate at midpoint of channel =      0.415(CFS)
Depth of flow =   0.094(Ft.), Average velocity =   1.353(Ft/s)
        ******* Irregular Channel Data ***********
--------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              0.50
       2              2.00              0.00
       3             15.00              0.20
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      0.415(CFS)
  '     '        flow top width =      6.503(Ft.)
  '     '    velocity=    1.353(Ft/s)
  '     '        area =      0.306(Sq.Ft)
  '     '        Froude number =     1.099

Upstream point elevation =   601.000(Ft.)
Downstream point elevation =   595.000(Ft.)
Flow length =   307.000(Ft.)
Travel time  =    3.78 min.
Time of concentration =    8.78 min.
Depth of flow =   0.094(Ft.)
Average velocity =   1.353(Ft/s)
Total irregular channel flow =     0.415(CFS)
Irregular channel normal depth above invert elev. =   0.094(Ft.)
Average velocity of channel(s) =   1.353(Ft/s)

Sub-Channel No. 1 Critical depth =      0.098(Ft.)
  '     '       '     Critical flow top width =      6.738(Ft.)
  '     '       '     Critical flow velocity=    1.261(Ft/s)
  '     '       '     Critical flow area =      0.329(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.900 given for subarea
Rainfall intensity =      3.537(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.900
Subarea runoff =      0.478(CFS) for    0.150(Ac.)
Total runoff =      0.596(CFS)  Total area =        0.18(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[SINGLE FAMILY area type                    ]
Time of concentration =     8.78 min.
Rainfall intensity =      3.537(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.550
Subarea runoff =      1.264(CFS) for    0.650(Ac.)
Total runoff =      1.860(CFS)  Total area =        0.83(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      1.995(CFS)
Depth of flow =   0.188(Ft.), Average velocity =   2.392(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
```

```
        1             0.00              0.50
        2             2.00              0.00
        3            15.00              0.30
Manning's 'N' friction factor =   0.020
-----------------------------------------------------------------
Sub-Channel flow  =      1.995(CFS)
  '     '        flow top width =      8.886(Ft.)
  '     '    velocity=    2.392(Ft/s)
  '     '        area =      0.834(Sq.Ft)
  '     '        Froude number =     1.376

Upstream point elevation =   595.000(Ft.)
Downstream point elevation =   590.000(Ft.)
Flow length =   205.000(Ft.)
Travel time  =    1.43 min.
Time of concentration =   10.21 min.
Depth of flow =   0.188(Ft.)
Average velocity =   2.392(Ft/s)
Total irregular channel flow =     1.995(CFS)
Irregular channel normal depth above invert elev. =   0.188(Ft.)
Average velocity of channel(s) =   2.392(Ft/s)

Sub-Channel No. 1 Critical depth =      0.213(Ft.)
  '     '       '     Critical flow top width =     10.077(Ft.)
  '     '       '     Critical flow velocity=    1.860(Ft/s)
  '     '       '     Critical flow area =      1.073(Sq.Ft)

 Adding area flow to channel
User specified 'C' value of 0.900 given for subarea
Rainfall intensity =      3.349(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.900
Subarea runoff =      0.362(CFS) for    0.120(Ac.)
Total runoff =      2.222(CFS)  Total area =        0.95(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
_________________________________________________________________________
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[SINGLE FAMILY area type                    ]
Time of concentration =    10.21 min.
Rainfall intensity =      3.349(In/Hr) for a   100.0 year storm
Runoff coefficient used for sub-area, Rational method,Q=KCIA, C = 0.550
Subarea runoff =      1.842(CFS) for    1.000(Ac.)
Total runoff =      4.064(CFS)  Total area =        1.95(Ac.)
End of computations, total study area =          1.950 (Ac.)
```

Culvert Report

18 Inch Culvert

Invert Elev Dn (ft)	=	100.00
Pipe Length (ft)	=	35.00
Slope (%)	=	2.71
Invert Elev Up (ft)	=	100.95
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

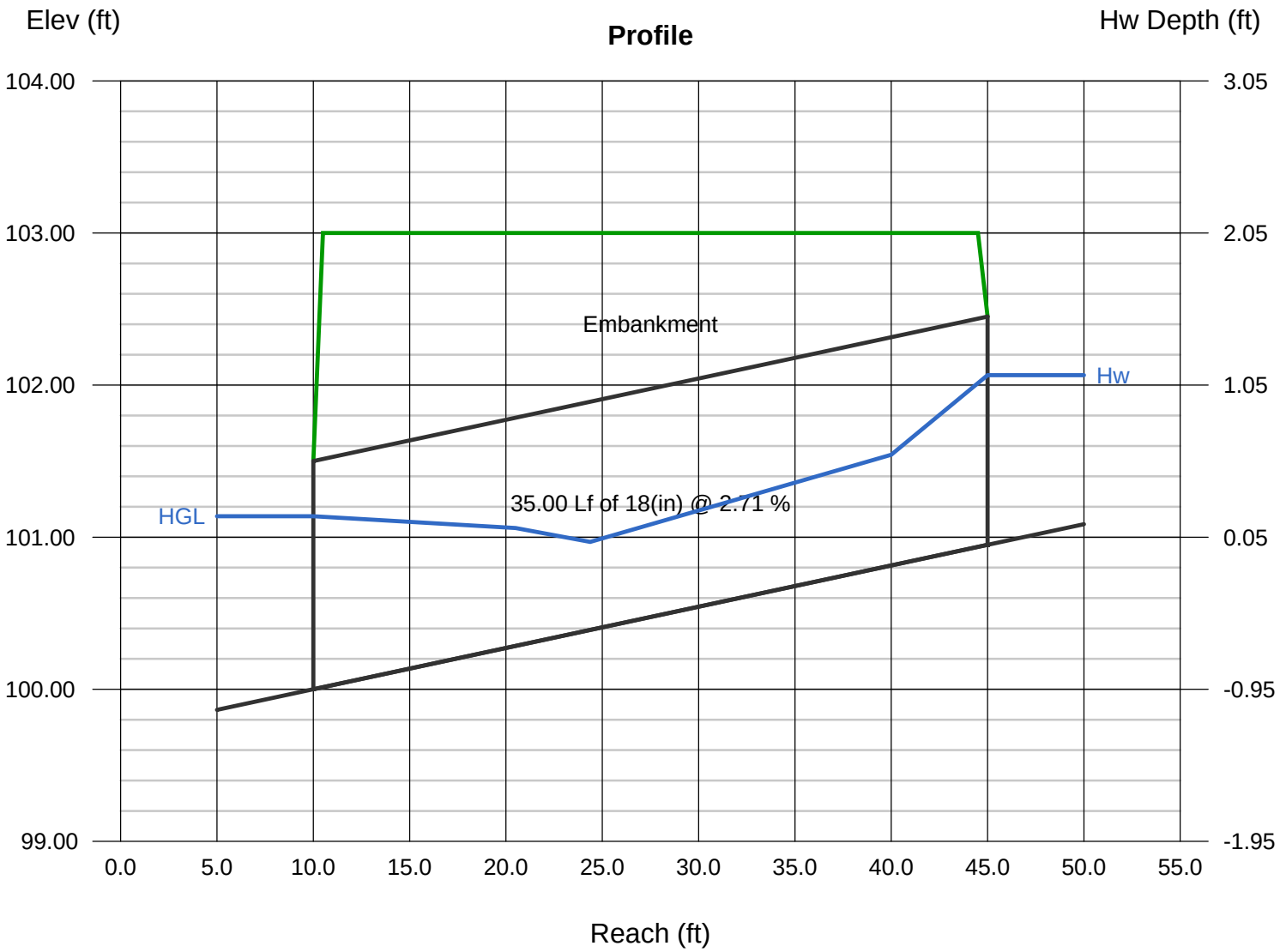
Top Elevation (ft)	=	103.00
Top Width (ft)	=	34.00
Crest Width (ft)	=	2.50

Calculations

Qmin (cfs)	=	4.10
Qmax (cfs)	=	5.30
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	4.10
Qpipe (cfs)	=	4.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.85
Veloc Up (ft/s)	=	4.45
HGL Dn (ft)	=	101.14
HGL Up (ft)	=	101.72
Hw Elev (ft)	=	102.07
Hw/D (ft)	=	0.74
Flow Regime	=	Inlet Control



RATIONAL METHOD HYDROGRAPH PROGRAM

Detention Analysis (Self-retaining Area 1)

RUN DATE 7/9/2015
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 12 MIN.
6 HOUR RAINFALL 3.3 INCHES
BASIN AREA 0.2 ACRES
RUNOFF COEFFICIENT 0.55
PEAK DISCHARGE 0.35 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 12	DISCHARGE (CFS) = 0
TIME (MIN) = 24	DISCHARGE (CFS) = 0
TIME (MIN) = 36	DISCHARGE (CFS) = 0
TIME (MIN) = 48	DISCHARGE (CFS) = 0
TIME (MIN) = 60	DISCHARGE (CFS) = 0
TIME (MIN) = 72	DISCHARGE (CFS) = 0
TIME (MIN) = 84	DISCHARGE (CFS) = 0
TIME (MIN) = 96	DISCHARGE (CFS) = 0
TIME (MIN) = 108	DISCHARGE (CFS) = 0
TIME (MIN) = 120	DISCHARGE (CFS) = 0
TIME (MIN) = 132	DISCHARGE (CFS) = 0
TIME (MIN) = 144	DISCHARGE (CFS) = 0
TIME (MIN) = 156	DISCHARGE (CFS) = 0
TIME (MIN) = 168	DISCHARGE (CFS) = 0
TIME (MIN) = 180	DISCHARGE (CFS) = 0
TIME (MIN) = 192	DISCHARGE (CFS) = 0.1
TIME (MIN) = 204	DISCHARGE (CFS) = 0.1
TIME (MIN) = 216	DISCHARGE (CFS) = 0.1
TIME (MIN) = 228	DISCHARGE (CFS) = 0.1
TIME (MIN) = 240	DISCHARGE (CFS) = 0.3
TIME (MIN) = 252	DISCHARGE (CFS) = 0.35
TIME (MIN) = 264	DISCHARGE (CFS) = 0.1
TIME (MIN) = 276	DISCHARGE (CFS) = 0.1
TIME (MIN) = 288	DISCHARGE (CFS) = 0
TIME (MIN) = 300	DISCHARGE (CFS) = 0
TIME (MIN) = 312	DISCHARGE (CFS) = 0
TIME (MIN) = 324	DISCHARGE (CFS) = 0
TIME (MIN) = 336	DISCHARGE (CFS) = 0
TIME (MIN) = 348	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 372	DISCHARGE (CFS) = 0

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hydrograph Report

Hyd. No. 1

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 0.350 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.20 hrs
Time interval	= 12 min	Hyd. volume	= 900 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (hrs	Outflow cfs)
3.20	0.100
3.40	0.100
3.60	0.100
3.80	0.100
4.00	0.300
4.20	0.350
<<	
4.40	0.100
4.60	0.100

...End

Hydrograph Report

Hyd. No. 2

Self-ret 1

Hydrograph type	= Reservoir	Peak discharge	= 0.178 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.40 hrs
Time interval	= 12 min	Hyd. volume	= 368 cuft
Inflow hyd. No.	= 1 - hydrograph 1	Reservoir name	= Self-Ret 1
Max. Elevation	= 608.32 ft	Max. Storage	= 699 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
4.20	0.350 <<	608.27	1.261	-----	-----	-----	0.039	-----	-----	-----	-----	0.040
4.40	0.100	608.31 <<	1.261	-----	-----	-----	0.179	-----	-----	-----	-----	0.178
4.60	0.100	608.29	1.261	-----	-----	-----	0.115	-----	-----	-----	-----	0.115
4.80	0.000	608.28	1.261	-----	-----	-----	0.069	-----	-----	-----	-----	0.069
5.00	0.000	608.26	1.261	-----	-----	-----	0.022	-----	-----	-----	-----	0.022
5.20	0.000	608.26	1.261	-----	-----	-----	0.018	-----	-----	-----	-----	0.018
5.40	0.000	608.25	1.261	-----	-----	-----	0.014	-----	-----	-----	-----	0.014
5.60	0.000	608.25	1.261	-----	-----	-----	0.012	-----	-----	-----	-----	0.012
5.80	0.000	608.24	1.261	-----	-----	-----	0.009	-----	-----	-----	-----	0.009
6.00	0.000	608.24	1.261	-----	-----	-----	0.007	-----	-----	-----	-----	0.007
6.20	0.000	608.24	1.261	-----	-----	-----	0.006	-----	-----	-----	-----	0.006
6.40	0.000	608.24	1.261	-----	-----	-----	0.005	-----	-----	-----	-----	0.005
6.60	0.000	608.24	1.261	-----	-----	-----	0.004	-----	-----	-----	-----	0.004
6.80	0.000	608.24	1.261	-----	-----	-----	0.003	-----	-----	-----	-----	0.003
7.00	0.000	608.23	1.261	-----	-----	-----	0.003	-----	-----	-----	-----	0.003
7.20	0.000	608.23	1.261	-----	-----	-----	0.002	-----	-----	-----	-----	0.002

...End

Pond Report

Pond No. 1 - Self-Ret 1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 608.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	608.00	2,290	0	0
0.33	608.33	2,290	756	756

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	Inactive	Inactive	Inactive
Span (in)	= 6.00	0.80	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 604.00	473.00	27.00	0.00
Length (ft)	= 85.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	Inactive	Inactive	Inactive
Crest El. (ft)	= 608.25	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	608.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.33	756	608.33	1.26 oc	0.00	0.00	---	0.30	---	---	---	---	---	0.301

RATIONAL METHOD HYDROGRAPH PROGRAM

Detention Analysis
(Self-retaining Area 2)

RUN DATE 7/9/2015
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 12 MIN.
6 HOUR RAINFALL 3.3 INCHES
BASIN AREA 0.14 ACRES
RUNOFF COEFFICIENT 0.55
PEAK DISCHARGE 0.25 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 12	DISCHARGE (CFS) = 0
TIME (MIN) = 24	DISCHARGE (CFS) = 0
TIME (MIN) = 36	DISCHARGE (CFS) = 0
TIME (MIN) = 48	DISCHARGE (CFS) = 0
TIME (MIN) = 60	DISCHARGE (CFS) = 0
TIME (MIN) = 72	DISCHARGE (CFS) = 0
TIME (MIN) = 84	DISCHARGE (CFS) = 0
TIME (MIN) = 96	DISCHARGE (CFS) = 0
TIME (MIN) = 108	DISCHARGE (CFS) = 0
TIME (MIN) = 120	DISCHARGE (CFS) = 0
TIME (MIN) = 132	DISCHARGE (CFS) = 0
TIME (MIN) = 144	DISCHARGE (CFS) = 0
TIME (MIN) = 156	DISCHARGE (CFS) = 0
TIME (MIN) = 168	DISCHARGE (CFS) = 0
TIME (MIN) = 180	DISCHARGE (CFS) = 0
TIME (MIN) = 192	DISCHARGE (CFS) = 0
TIME (MIN) = 204	DISCHARGE (CFS) = 0
TIME (MIN) = 216	DISCHARGE (CFS) = 0.1
TIME (MIN) = 228	DISCHARGE (CFS) = 0.1
TIME (MIN) = 240	DISCHARGE (CFS) = 0.2
TIME (MIN) = 252	DISCHARGE (CFS) = 0.25
TIME (MIN) = 264	DISCHARGE (CFS) = 0.1
TIME (MIN) = 276	DISCHARGE (CFS) = 0
TIME (MIN) = 288	DISCHARGE (CFS) = 0
TIME (MIN) = 300	DISCHARGE (CFS) = 0
TIME (MIN) = 312	DISCHARGE (CFS) = 0
TIME (MIN) = 324	DISCHARGE (CFS) = 0
TIME (MIN) = 336	DISCHARGE (CFS) = 0
TIME (MIN) = 348	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 372	DISCHARGE (CFS) = 0

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hydrograph Report

Hyd. No. 1

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 0.250 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.20 hrs
Time interval	= 12 min	Hyd. volume	= 540 cuft

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time -- (hrs	Outflow cfs)
3.60	0.100
3.80	0.100
4.00	0.200
4.20	0.250
4.40	0.100

<<

...End

Hydrograph Report

Hyd. No. 2

Self-ret 1

Hydrograph type	= Reservoir	Peak discharge	= 0.019 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.60 hrs
Time interval	= 12 min	Hyd. volume	= 67 cuft
Inflow hyd. No.	= 1 - hydrograph 1	Reservoir name	= Self-Ret 1
Max. Elevation	= 608.26 ft	Max. Storage	= 526 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
4.40	0.100	608.25	1.261	-----	-----	-----	0.010	-----	-----	-----	-----	0.010
4.60	0.000	608.26 <<	1.261	-----	-----	-----	0.019	-----	-----	-----	-----	0.019
4.80	0.000	608.25	1.261	-----	-----	-----	0.015	-----	-----	-----	-----	0.015
5.00	0.000	608.25	1.261	-----	-----	-----	0.012	-----	-----	-----	-----	0.012
5.20	0.000	608.24	1.261	-----	-----	-----	0.009	-----	-----	-----	-----	0.009
5.40	0.000	608.24	1.261	-----	-----	-----	0.007	-----	-----	-----	-----	0.007
5.60	0.000	608.24	1.261	-----	-----	-----	0.006	-----	-----	-----	-----	0.006
5.80	0.000	608.24	1.261	-----	-----	-----	0.004	-----	-----	-----	-----	0.004
6.00	0.000	608.24	1.261	-----	-----	-----	0.003	-----	-----	-----	-----	0.003
6.20	0.000	608.23	1.261	-----	-----	-----	0.003	-----	-----	-----	-----	0.003
6.40	0.000	608.23	1.261	-----	-----	-----	0.002	-----	-----	-----	-----	0.002
6.60	0.000	608.23	1.261	-----	-----	-----	0.002	-----	-----	-----	-----	0.002
6.80	0.000	608.23	1.261	-----	-----	-----	0.001	-----	-----	-----	-----	0.001
7.00	0.000	608.23	1.261	-----	-----	-----	0.001	-----	-----	-----	-----	0.001

...End

Pond Report

Pond No. 1 - Self-Ret 1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 608.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	608.00	2,035	0	0
0.33	608.33	2,035	672	672

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	Inactive	Inactive	Inactive
Span (in)	= 6.00	0.80	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 604.00	473.00	27.00	0.00
Length (ft)	= 85.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	Inactive	Inactive	Inactive
Crest El. (ft)	= 608.25	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	608.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
0.33	672	608.33	1.26 oc	0.00	0.00	---	0.30	---	---	---	---	---	0.301

RATIONAL METHOD HYDROGRAPH PROGRAM

Detention Analysis
(Underground Detention System

RUN DATE 7/9/2015
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 12 MIN.
6 HOUR RAINFALL 3.3 INCHES
BASIN AREA 0.16 ACRES
RUNOFF COEFFICIENT 0.55
PEAK DISCHARGE 0.28 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 12	DISCHARGE (CFS) = 0
TIME (MIN) = 24	DISCHARGE (CFS) = 0
TIME (MIN) = 36	DISCHARGE (CFS) = 0
TIME (MIN) = 48	DISCHARGE (CFS) = 0
TIME (MIN) = 60	DISCHARGE (CFS) = 0
TIME (MIN) = 72	DISCHARGE (CFS) = 0
TIME (MIN) = 84	DISCHARGE (CFS) = 0
TIME (MIN) = 96	DISCHARGE (CFS) = 0
TIME (MIN) = 108	DISCHARGE (CFS) = 0
TIME (MIN) = 120	DISCHARGE (CFS) = 0
TIME (MIN) = 132	DISCHARGE (CFS) = 0
TIME (MIN) = 144	DISCHARGE (CFS) = 0
TIME (MIN) = 156	DISCHARGE (CFS) = 0
TIME (MIN) = 168	DISCHARGE (CFS) = 0
TIME (MIN) = 180	DISCHARGE (CFS) = 0
TIME (MIN) = 192	DISCHARGE (CFS) = 0
TIME (MIN) = 204	DISCHARGE (CFS) = 0.1
TIME (MIN) = 216	DISCHARGE (CFS) = 0.1
TIME (MIN) = 228	DISCHARGE (CFS) = 0.1
TIME (MIN) = 240	DISCHARGE (CFS) = 0.3
TIME (MIN) = 252	DISCHARGE (CFS) = 0.28
TIME (MIN) = 264	DISCHARGE (CFS) = 0.1
TIME (MIN) = 276	DISCHARGE (CFS) = 0
TIME (MIN) = 288	DISCHARGE (CFS) = 0
TIME (MIN) = 300	DISCHARGE (CFS) = 0
TIME (MIN) = 312	DISCHARGE (CFS) = 0
TIME (MIN) = 324	DISCHARGE (CFS) = 0
TIME (MIN) = 336	DISCHARGE (CFS) = 0
TIME (MIN) = 348	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 372	DISCHARGE (CFS) = 0

Watershed Model Schematic

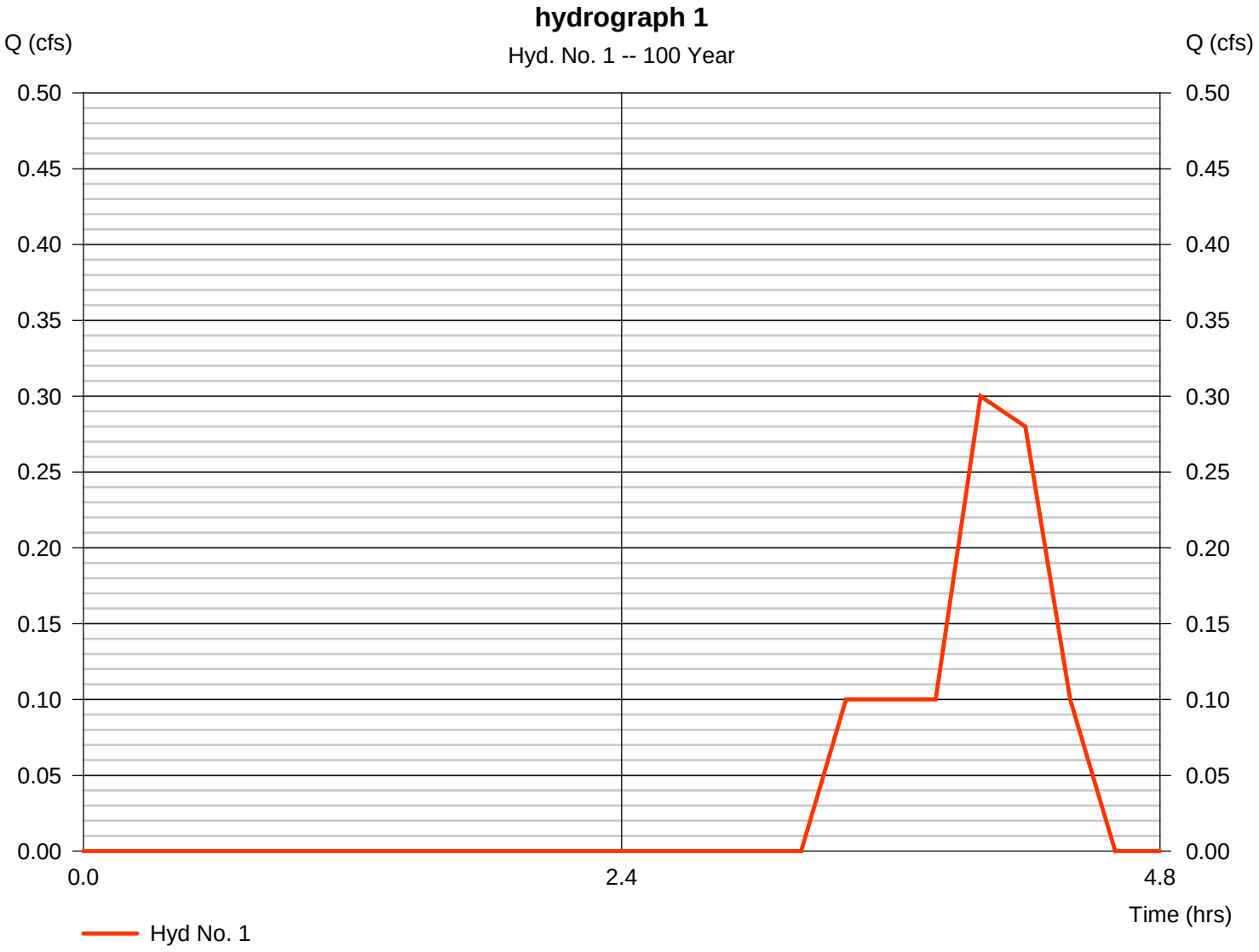
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2015 by Autodesk, Inc. v10.4

Hydrograph Report

Hyd. No. 1

hydrograph 1

Hydrograph type	= Manual	Peak discharge	= 0.300 cfs
Storm frequency	= 100 yrs	Time to peak	= 4.00 hrs
Time interval	= 12 min	Hyd. volume	= 706 cuft



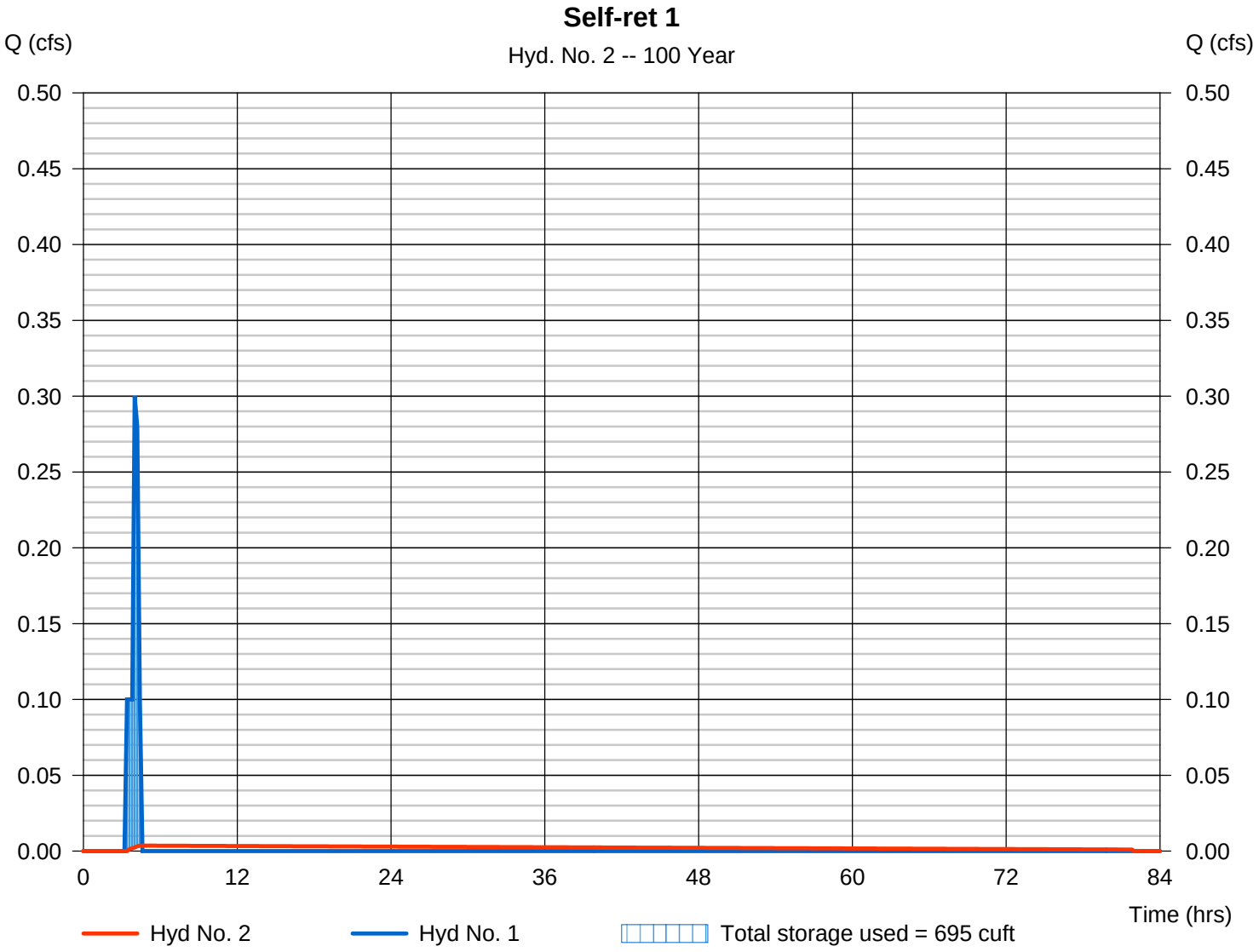
Hydrograph Report

Hyd. No. 2

Self-ret 1

Hydrograph type	=	Reservoir	Peak discharge	=	0.004 cfs
Storm frequency	=	100 yrs	Time to peak	=	4.60 hrs
Time interval	=	12 min	Hyd. volume	=	648 cuft
Inflow hyd. No.	=	1 - hydrograph 1	Max. Elevation	=	587.32 ft
Reservoir name	=	Detention 1	Max. Storage	=	695 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Detention 1

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	585.00	n/a	0	0
1.00	586.00	n/a	300	300
2.00	587.00	n/a	300	600
3.00	588.00	n/a	300	900

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.30	Inactive	Inactive
Span (in)	= 6.00	0.30	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 587.50	585.00	27.00	0.00
Length (ft)	= 85.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.30	0.60
Multi-Stage	= n/a	No	No	No

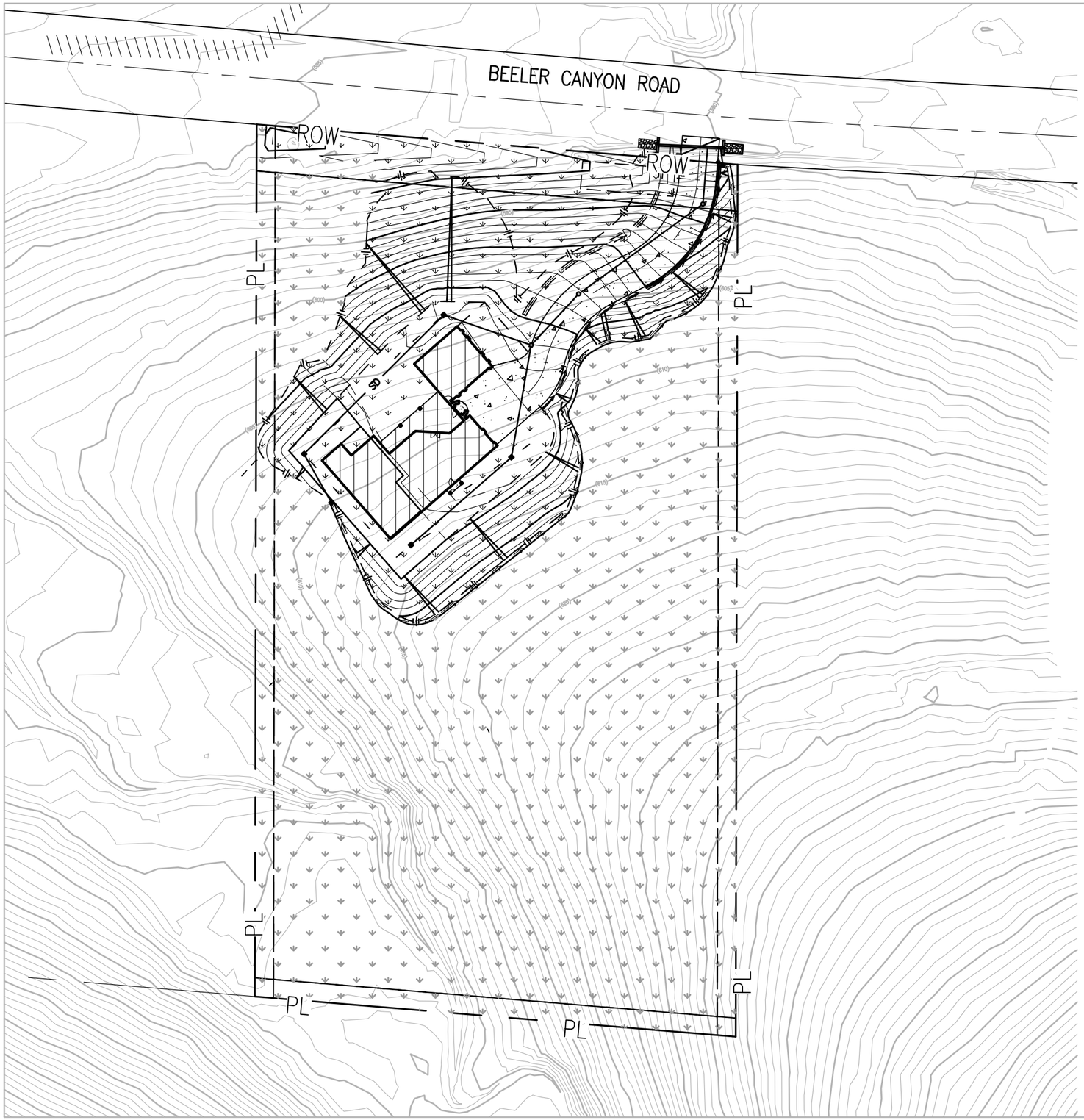
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	Inactive	Inactive	Inactive
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	585.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.00	300	586.00	0.00	0.00 ic	0.00	---	0.00	---	---	---	---	---	0.002
2.00	600	587.00	0.00	0.00 ic	0.00	---	0.00	---	---	---	---	---	0.003
3.00	900	588.00	0.47 ic	0.00 ic	0.00	---	0.00	---	---	---	---	---	0.477



LEGEND

PROPERTY/RIGHT OF WAY		
NEW CONCRETE PAVEMENT	0.10AC	
NEW LANDSCAPE/PLANTER AREA	0.71AC	
EXISTING LANDSCAPE AREA	1.89AC	
NEW ROOF AREA	0.10AC	
EXISTING CONTOUR		(XXX)

N

30 0 60 120

SCALE IN FEET
1 inch = 60 ft.

PROPOSED CONDITIONS MAP
TIVYAN RESIDENCE

DATE: JULY 2015

PLOT: M:\PROJECTS\11500\11900U1.00-BEELER CANYON ROAD - TIVYAN\DOCUMENTS\REPORTS\WQTR\PERV-IMPV MAP PR.DWG Min GC 7/1/2015 11:49 AM

LEGEND

- HYDROLOGY NODE (106)
- BASIN BOUNDARY
- EXISTING CONTOUR (XXX)
- PROPOSED CONTOUR (XXX)
- FLOW DIRECTION
- SPOT ELEVATION (x 245.0)
- NODE/CONTOUR ELEVATION (XXX.XX)
- ANALYSIS POINT (1)
- SUB-BASIN MARKER & AREA (AC) (X-X / X.XX)

NOTE: NODAL PEAK DISCHARGE RATE DOWNSTREAM OF THE 18" CULVERT ONLY SHOWS THE RUNOFF FROM ONSITE DRAINAGE AREA.

15 0 30 60

SCALE IN FEET
1 inch = 30 ft.

PROPOSED CONDITION HYDROLOGY MAP
TIVYAN RESIDENCE

DATE: NOVEMBER 2015

ATTACHMENT D:

Excerpts from Drainage Design Manual

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
	D
Residential:	
Single Family	.55
Multi-Units	.70
Mobile Homes	.65
Rural (lots greater than 1/2 acre)	.45
Commercial (2) 80% Impervious	.85
Industrial (2) 90% Impervious	.95

NOTES:

(1) Type D soil to be used for all areas.

(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%

Tabulated imperviousness = 80%

Revised C = $\frac{50}{80}$ x 0.85 = 0.53

ELEV.	FACTOR
0–1500	1.00
1500–3000	1.25
3000–4000	1.42
4000–5000	1.60
5000–6000	1.70
DESERT	1.25

To obtain correct intensity, multiply intensity on chart by factor for design elevation.

RAINFALL

INTENSITY – DURATION – FREQUEN

CURVES

for

COUNTY OF SAN DIEGO

APPENDIX

APPENDIX I

RATIONAL METHOD

Watersheds Less than 0.5 Square Mile

Method of Computing Runoff

Use the Rational Formula Q = CIA where:

Q is the peak rate of flow in cubic feet per second.

C is a runoff coefficient expressed as that percentage of rainfall which becomes surface runoff.

I is the average rainfall intensity in inches per hour for a storm duration equal to the time of concentration (T_c) of the contributing drainage area.

A is the drainage area in acres tributary to design point.

(1) Runoff Coefficient, C

Appendix I-A lists the estimated coefficients for urban areas.

For urban areas select an appropriate coefficient for each type of land use from Table, 2, Appendix I-A. Multiply this coefficient by the percentage of the total area included in that class. The sum of the products for all land uses in San Diego County is the weighted runoff coefficient.

(2) Rainfall Intensity, I

Intensity - duration - frequency curves applicable to all areas within San Diego County are given in Appendix I-B.

(3) Time of Concentration, Tc

The time of concentration is the time required for runoff to flow from the most remote part of the watershed to the outlet point under consideration.

Methods of calculation differ for natural watersheds (non-urbanized) and for urban drainage systems. Also, when designing storm drain systems, the designer must consider the possibility that an existing natural watershed may become urbanized during the useful life of the storm drain system.

(a) Natural watersheds: Obtain T_c from Appendices I-C and I-D.

(b) Urban drainage systems: In the case of urban drainage systems, the time of concentration at any point within the drainage area is given by:

$$T_c = T_i + T_f \text{ where}$$

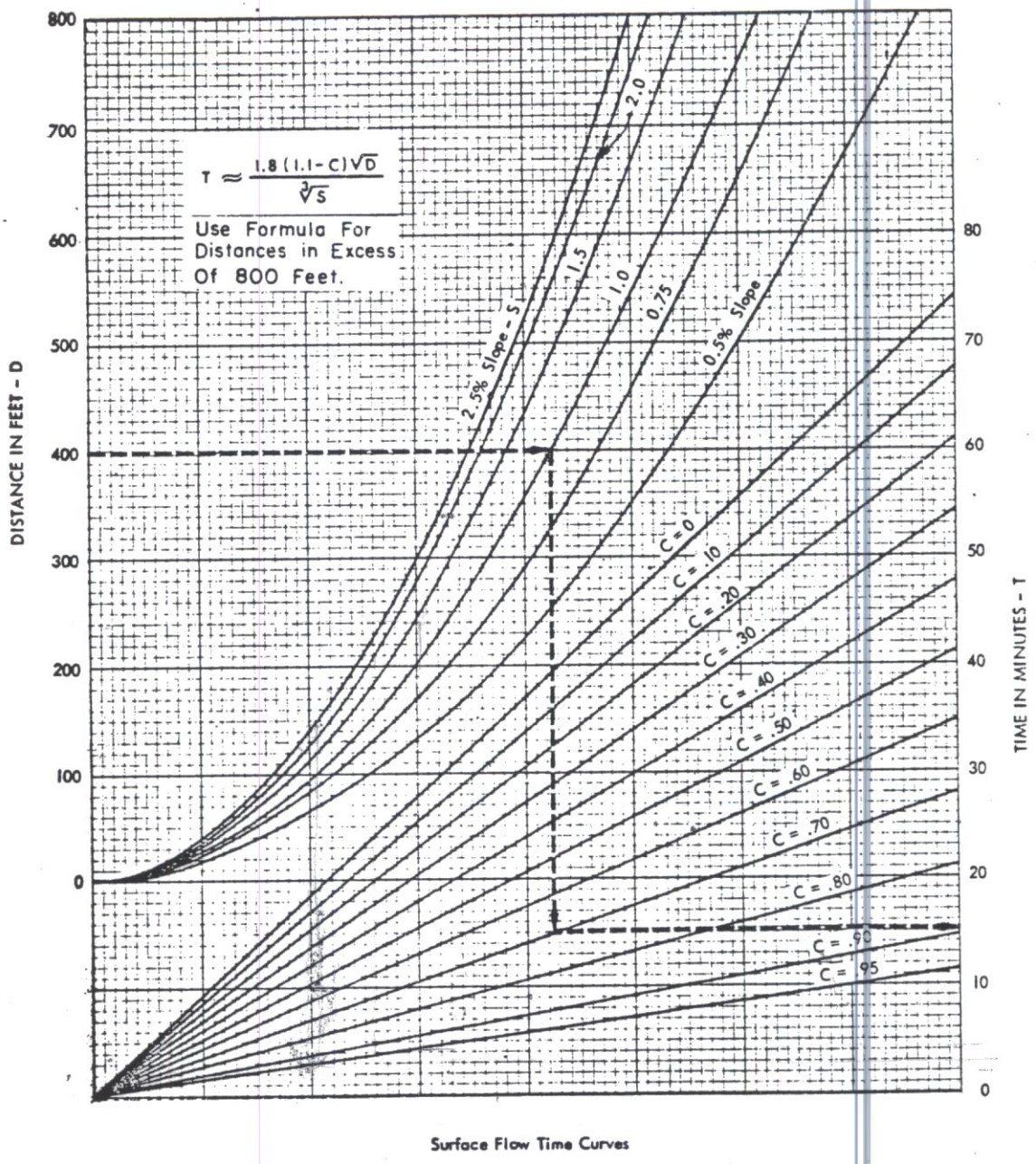
T_i is the inlet time or the time required for the storm water to flow to the first inlet in thesystem. It is the sum of time in overland flow across lots and in the street gutter.

T_f is the travel time or the time required for the storm water to flow in the storm drain from the most upstream inlet to the point in question.

Travel Time, T_f, is computed by dividing the length of storm drain by the computed flow velocity. Since the velocity normally changes at each inlet because of changes in flow rate or slope, total travel time must be computed as the sum of the travel times for each section of the storm drain.

The overland flow component of inlet time, T_i, may be estimated by the use of the chart shown in Appendix I-E. Use Appendix I-F to estimate time of travel for street gutter flow.

URBAN AREAS OVERLAND TIME OF FLOW CURVES



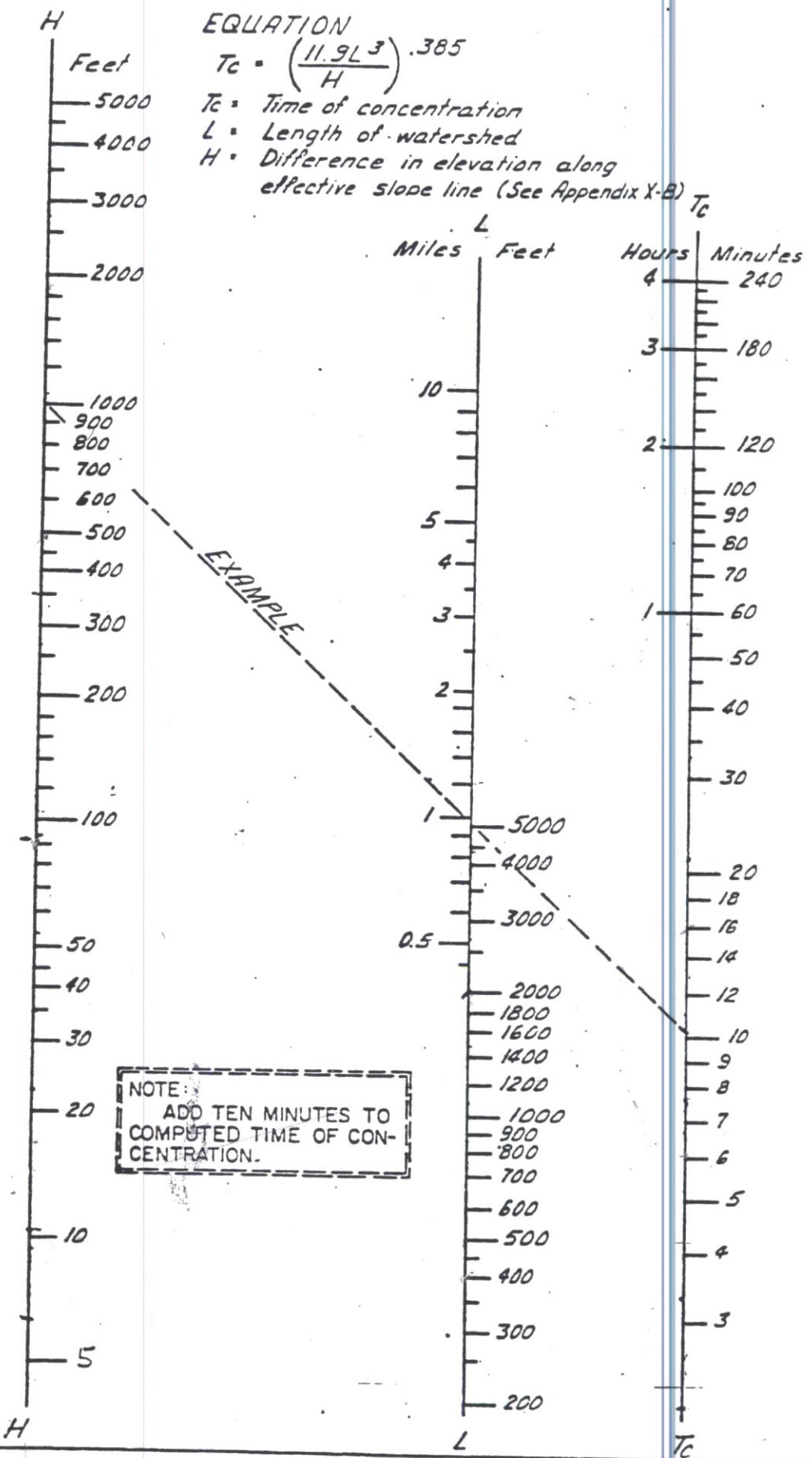
Surface Flow Time Curves

EXAMPLE:

GIVEN: LENGTH OF FLOW = 400 FT.
SLOPE = 1.0 %
COEFFICIENT OF RUNOFF C = .70

READ: OVERLAND FLOWTIME = 15 MINUTES

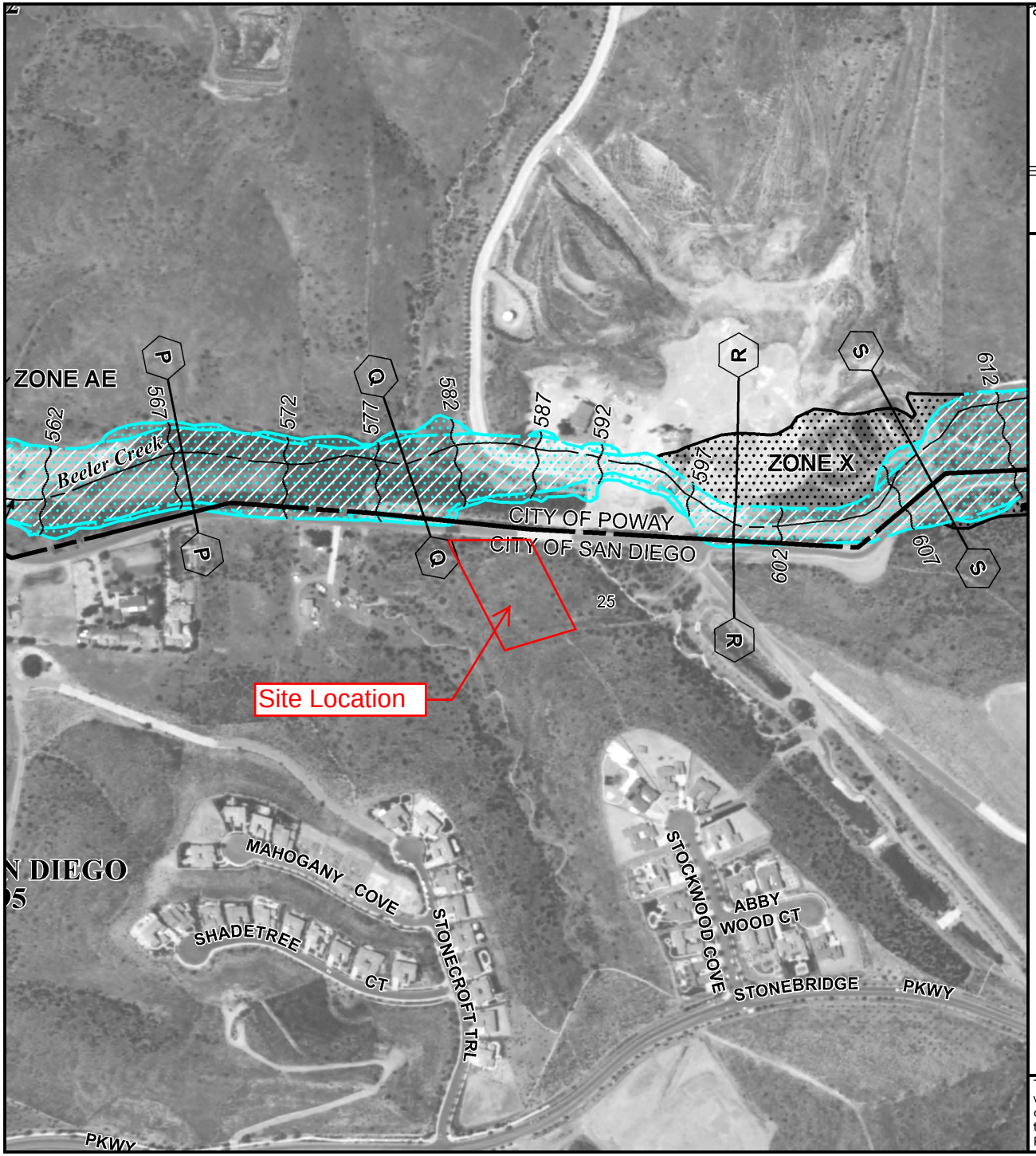
Appendix I-E



SAN DIEGO COUNTY DEPARTMENT OF SPECIAL DISTRICT SERVICES DESIGN MANUAL APPROVED	NOMOGRAPH FOR DETERMINATION OF TIME OF CONCENTRATION (T_c) FOR NATURAL WATERSHEDS DATE APPENDIX

ATTACHMENT E:

FEMA Flood Plain Map



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1366G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

PANEL 1366 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
POWAY, CITY OF	060702	1366	G
SAN DIEGO, CITY OF	060295	1366	G

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
06073C1366G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

The City of San Diego

PRIORITY DEVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR

TIVYAN RESIDENCE

Insert Permit Application Numbers

PROJECT NO.: 412254

ENGINEER OF WORK:

Carl M. Fiorica, RCE #64715

Provide Wet Signature and Stamp Above Line

PREPARED FOR:

ROMAN TIVYAN

8834 CAPCANO ROAD

SAN DIEGO, CA-92123

Insert Telephone Number

PREPARED BY:

BWE Inc.,

9449 Balboa Avenue, Suite 270

San Diego, CA-92123

(619) 299-5550

DATE:

April 4, 2016

Approved by: City of San Diego Date

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Project Name: TIVYAN RESIDENCE

TABLE OF CONTENTS

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ACRONYMS

APN	Assessor's Parcel Number
ASBS	Area of Special Biological Significance
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CGP	Construction General Permit
DCV	Design Capture Volume
DMA	Drainage Management Areas
ESA	Environmentally Sensitive Area
GLU	Geomorphic Landscape Unit
GW	Ground Water
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
HU	Harvest and Use
INF	Infiltration
LID	Low Impact Development
LUP	Linear Underground/Overhead Projects
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
POC	Pollutant of Concern
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWPPP	Stormwater Pollutant Protection Plan
SWQMP	Storm Water Quality Management Plan
TMDL	Total Maximum Daily Load
WMAA	Watershed Management Area Analysis
WPCP	Water Pollution Control Program
WQIP	Water Quality Improvement Plan

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CERTIFICATION PAGE

Project Name: Tivyan Residence
Permit Application Number: Insert Permit Application Number

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Work's Signature, PE Number & Expiration Date

Carl M. Fiorica
Print Name

BWE Inc.,
Company

April 4, 2016
Date

Engineer's Stamp

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Project Name: TIVYAN RESIDENCE

SUBMITTAL RECORD

Use this Table to keep a record of submittals of this SWQMP. Each time the SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments.

Submittal Number	Date	Project Status	Changes
1	4/4/16	◉ Preliminary Design/Planning/CEQA ○ Final Design	Initial Submittal
2	Enter a date.	○ Preliminary Design/Planning/CEQA ◉ Final Design	Click here to enter text.
3	Enter a date.	○ Preliminary Design/Planning/CEQA ◉ Final Design	Click here to enter text.
4	Enter a date.	○ Preliminary Design/Planning/CEQA ◉ Final Design	Click here to enter text.

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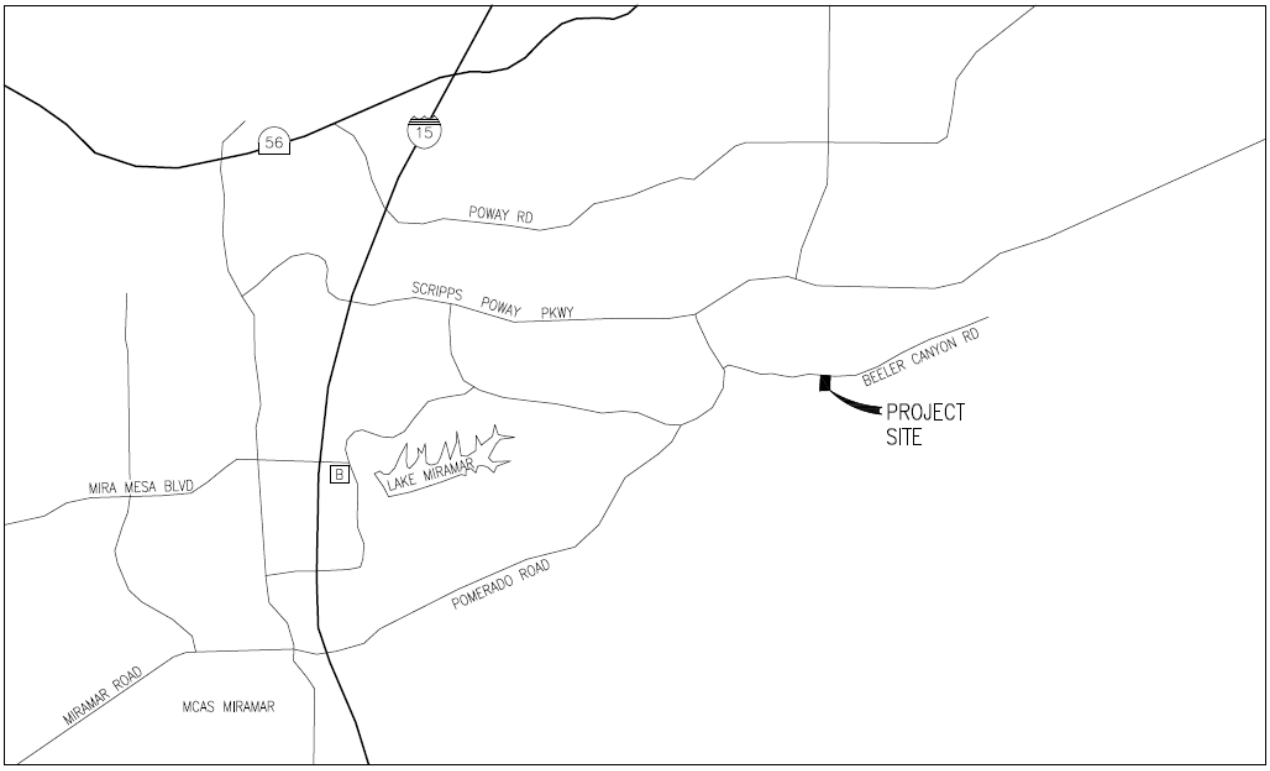
Project Name: TIVYAN RESIDENCE

PROJECT VICINITY MAP

Project Name: Tivyan Residence
Permit Application Number: Insert Application Number.



B NEAREST BUS STOP – MIRA MESA BLVD & SCRIPPS RANCH BLVD (4.8 MILES FROM SITE)

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Project Name: TIVYAN RESIDENCE

THE CITY OF SAN DIEGO	City of San Diego **Development Services** 1222 First Ave., MD-302 San Diego, CA 92101 (619) 446-5000	**Storm Water Requirements Applicability Checklist**	FORM **DS-560** December 2015

Project Address: APN: 320-030-31, San Diego, CA-92064	Project Number *(for the City Use Only)*: Click here to enter project number

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1], which is administrated by the State Water Resources Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with construction activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

   ○ Yes; SWPPP required, skip questions 2-4 ◉ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity that results in ground disturbance and contact with storm water runoff?

   ◉ Yes; WPCP required, skip questions 3-4 ○ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (projects such as pipeline/utility replacement)

   ◉ Yes; WPCP required, skip questions 4 ○ No; next question

4. Does the project only include the following Permit types listed below?
   - Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
   - Individual Right of Way Permits that exclusively include one of the following activities and associated curb/ sidewalk repair: water services, sewer lateral, storm drain lateral, or dry utility service.
   - Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, geotechnical borings, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes; no document required

Check one of the boxes to the right, and continue to PART B:

☐ If you checked "Yes" for question 1,
a SWPPP is REQUIRED. Continue to PART B

☒ If you checked "No" for question 1, and checked "Yes" for question 2 or 3,
a WPCP is REQUIRED. If the project processes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all question 1-3, and checked "Yes" for question 4
PART B **does not apply and no document is required. Continue to Section 2.**

More information on the City's construction BMP requirements as well as CGP requirements can be found at:
www.sandiego.gov/stormwater/regulations/swguide/constructing.shtml

Project Name: TIVYAN RESIDENCE

PART B: Determine Construction Site Priority.

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk. Determination approach of the Stat e Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete PART B and continued to Section 2

1. ☐ ASBS

a. Projects located in the ASBS watershed. A map of the ASBS watershed can he found here *<placeholder for ASBS map link>*

2. ☐ High Priority

a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.

b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☐ Medium Priority

a. Projects 1 acre or more but not subject to an ASBS or high priority designation.

b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☒ Low Priority

a. Projects not subject to ASBS, high or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	☐ Yes ☒ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	☐ Yes ☒ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	☐ Yes ☒ No

Project Name: TIVYAN RESIDENCE

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."
If "no" was checked for all questions in Part D, continue to Part E.

1. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:

   • Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;
   • Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;
   • Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?

   ☐ Yes; PDP exempt requirements apply ☉ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

   ☐ Yes; PDP exempt requirements apply ☉ No; PDP not exempt. PDP requirements apply.

PART E: Determine if Project is a Priority Development Project (PDP). Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".
If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Project".

1.	**New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☐ Yes ☉ No
2.	**Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☐ Yes ☉ No
3.	**New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface.	☐ Yes ☉ No
4.	**New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater.	☉ Yes ☐ No

Project Name: TIVYAN RESIDENCE

5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).**	☐ Yes ☒ No
6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).	☐ Yes ☒ No
7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging- directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).	☒ Yes ☐ No
8. **New development or redevelopment projects of a retail gasoline outlet that creates and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic of 100 or more vehicles per day.	☐ Yes ☒ No
9. **New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.	☐ Yes ☒ No
10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces.	☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1. The project is **NOT SUBJECT TO STORM WATER REQUIREMENTS**.	☐
2. The project is a **STANDARD PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
3. The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires hydromodification management.	☒

Name of Owner or Agent *(Please Print):* Click here to enter name.	Title: Click here to enter title
Signature:	Date: April 4, 2016

Project Name: TIVYAN RESIDENCE

Applicability of Permanent, Post-Construction Storm Water BMP Requirements (Storm Water Intake Form for all Development Permit Applications)	**Form I-1**

Project Identification

Project Name: Tivyan Residence	
Permit Application Number: Insert Application Number.	Date: 4/4/16

Determination of Requirements

The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.

Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop".
Refer to Part 1 of Storm Water Standards sections and/or separate forms referenced in each step below.

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Go to Step 2.
	○ No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes only interior remodels within an existing building): Click or tap here to enter text.		
Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, see Section 1.4 of the BMP Design Manual (Part 1 of Storm Water Standards) in its entirety for guidance, AND complete Storm Water Requirements Applicability Checklist.	○ Standard Project	Stop. Standard Project requirements apply.
	◉ PDP	PDP requirements apply, including PDP SWQMP. Go to Step 3.
	○ PDP Exempt	Stop. Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable: Click or tap here to enter text.		

Project Name: TIVYAN RESIDENCE

Form I-1 Page 2		
Step	Answer	Progression
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	☐ No	BMP Design Manual PDP requirements apply. Go to Step 4.
Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply): Click or tap here to enter text.		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	☐ No	Stop. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do not apply: Click or tap here to enter text.		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	☐ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. Stop.
Discussion / justification if protection of critical coarse sediment yield areas does not apply: Site is not located within the critical sediment yield areas		

Project Name: TIVYAN RESIDENCE

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Tivyan Residence
Project Address	Beeler Canyon, San Diego, CA-92064
Assessor's Parcel Number(s) (APN(s))	320-030-31
Permit Application Number	Click here to enter text.
Project Watershed	Select One: ☐ San Dieguito River ☉ Penasquitos ☐ Mission Bay ☐ San Diego River ☐ San Diego Bay ☐ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal paces (9XX.XX)	Miramar Reservoir #906.20
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	2.795 Acres (121,750 Square Feet)
Area to be disturbed by the project (Project Area)	0.77 Acres (33,541 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	0.207 Acres (9,025 Square Feet)
Project Proposed Pervious Area (subset of Project Area)	0.313 Acres (13,625 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	
The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition.	7.4 %

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):
☐ Existing development
☐ Previously graded but not built out
☐ Agricultural or other non-impervious use
☒ Vacant, undeveloped/natural
Description / Additional Information:
Site is currently undeveloped and in the natural state with shrubs and dense vegetative cover.

Existing Land Cover Includes (select all that apply):
☐ Vegetative Cover
☐ Non-Vegetated Pervious Areas
☐ Impervious Areas
Description / Additional Information:
Site area is comprised of fully grown vegetative cover.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):
☐ NRCS Type A
☐ NRCS Type B
☐ NRCS Type C
☒ NRCS Type D

Approximate Depth to Groundwater (GW):
◉ GW Depth < 5 feet
◉ 5 feet < GW Depth < 10 feet
◉ 10 feet < GW Depth < 20 feet
◉ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):
☒ Watercourses
☐ Seeps
☐ Springs
☐ Wetlands
☐ None
Description / Additional Information:
An unnamed natural drainage channel is situated at the southwest corner of the site. The flow from upstream tributary drainage area discharges to Beeler Canyon via this channel. The proposed development will not impact this channel.

Form I-3B Page 3 of 11

Description of Existing Site Topography and Drainage:

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

1. Whether existing drainage conveyance is natural or urban;
2. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site;
3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels;
4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Description / Additional Information:

The proposed development works include but are not limited to the construction of a new 2,950 sf single story residential building, access driveway, and new landscaping. The associated improvement work will also include drainage and dry & wet utilities construction.

The existing site is currently undeveloped and vacant with natural vegetation. The site topography is relatively steep which slopes from the south to the north direction. The majority runoff from the site discharges towards north into a swale located adjacent to Beeler Canyon Road. The existing swale situated along northerly property line ultimately discharges to the Beeler Creek located northerly side of the Beeler Canyon Road. The remaining portion of the site (southerly area) drains to existing natural channel sitiated southwest side of the site. The storm runoff originating from the site ultimately confluence at the westerly side of the site before being discharged to Beeler Creek through an existing culvert across Beeler Canyon Road. The Beeler Creek is a tributary to the Penasquitos Creek which ultimately discharges to the Pacific Ocean.

BMPs are designed to treat the water quality flows as well as to maintain the pre development peak flow rates in the proposed condition. Hydromodification control is also required for this priority development project.

Form I-3B Page 4 of 11

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

Proposed land use is single family residential (R-1). This project will construct a single family residential building, acces driveway from Beeler Canyon Road, new landscape, storm drain system and dry & wet utilities.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

The proposed impervious site features are building roof, concrete access road and driveway.

List/describe proposed pervious features of the project (e.g., landscape areas):

The proposed pervious features includes new landscape, and planters. The majority site area which is comprised of natural vegetation will also be preserved.

Does the project include grading and changes to site topography?

- [x] Yes
- [ ] No

Description / Additional Information:

A portion of the existing vacant land will be graded to construct a new residential building and associated improvements. The majority of the site area will be preserved in it's natural state. Therefore, the site topography will change in the proximities of the development footprint only.

Form I-3B Page 5 of 11

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

- (●) Yes
- ( ) No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural and constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Description / Additional Information:

The existing site is currently undeveloped and covered with natural vegetation. Therefore, the majority flow originating from the site surface flows down the slope before being captured by the existing swale situated along the southerly side of the Beeler Canyon Road. The on-site drainage pattern will be altered slightly in the proposed condition without altering the discharge location. A new storm drain system will be installed to convey the runoff from the site. An underground storm water detention facility is also proposed to control the the peak flow rate and the hydromidification impact due to the development.

The drainage improvement work also includes construction of an 18" RCP culvert within the southerly ROW of Beeler Canyon Road where new driveway is proposed.

Form I-3B Page 6 of 11

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

☒ On-site storm drain inlets
☒ Interior floor drains and elevator shaft sump pumps
☐ Interior parking garages
☒ Need for future indoor & structural pest control
☒ Landscape/Outdoor Pesticide Use
☐ Pools, spas, ponds, decorative fountains, and other water features
☐ Food service
☒ Refuse areas
☐ Industrial processes
☐ Outdoor storage of equipment or materials
☐ Vehicle and Equipment Cleaning
☐ Vehicle/Equipment Repair and Maintenance
☐ Fuel Dispensing Areas
☐ Loading Docks
☐ Fire Sprinkler Test Water
☒ Miscellaneous Drain or Wash Water
☒ Plazas, sidewalks, and parking lots

Description / Additional Information:

Activities which are unchecked above are not associated with this development.

Form I-3B Page 7 of 11

Identification and Narrative of Receiving Water

Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable)

The project discharges directly to the existing drainage swale situated along southerly ROW of the Beeler Canyon Road. The site runoff travels west through this swale to an existing culvert situated across Beeler Canyon Road before being discharged to the Beeler Creek. The runoff from the site ultimately discharges to the Penasquitos River/Lagoon and Pacific Ocean.

Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations.

Coastal Waters:

Las Penasquitos Lagoon (Basin 6.10): REC1, REC2, BIOL, EST, WILD, RARE, MAR, SPWN, SHELL (Existing beneficial uses)

Pacific Ocean: IND, NAV, REC1, REC2, COMM, BIOL, WILD, RARE, MAR, SPWN, AQUA, MIGR, SPWN, SHELL. (Existing beneficial uses)

Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations.

There are no receiving ASBS downstream of the project discharge location

Provide distance from project outfall location to impaired or sensitive receiving waters.

Los Penasquitos Creek, approximately 2.5 miles northhwest side of the site.

Sumarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands

Site is not located in the proximities of such areas.

Form I-3B Page 8 of 11

Identification of Receiving Water Pollutants of Concern

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs/ WQIP Highest Priority Pollutant
Los Penasquitos Lagoon	Sedimentation/Siltation	Benthic Algae, Enterococcus
Pacific Ocean Shoreline	Total Coliform	Poor IBI, Total Nitrogen
Los Penasquitos Creek	Enterococcus, Fecal Coliform	Total & Dissolved Phosphorus
Click or tap here to enter text.	Selenium, TDS, Toxicity,	TDS & Toxicity, Bifenthrin,
Click or tap here to enter text.	Total Nitrogen as N	Diazinon, fecal coliform, TSS
Click or tap here to enter text.	Click or tap here to enter text.	Turbidity
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Identification of Project Site Pollutants*

*Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)

Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see BMP Design Manual (Part 1 of Storm Water Standards) Appendix B.6):

Pollutant	Not Applicable to the Project Site	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	☐	☉	☐
Nutrients	☐	☉	☐
Heavy Metals	☉	☐	☐
Organic Compounds	☉	☐	☐
Trash & Debris	☐	☉	☐
Oxygen Demanding Substances	☐	☉	☐
Oil & Grease	☐	☉	☐
Bacteria & Viruses	☐	☉	☐
Pesticides	☐	☉	☐

Project Name: TIVYAN RESIDENCE

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

- ◉ Yes, hydromodification management flow control structural BMPs required.
- ○ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- ○ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- ○ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):
Click or tap here to enter text.

Critical Coarse Sediment Yield Areas*
*This Section only required if hydromodification management requirements apply

Based on the maps provided within the WMAA, do potential critical coarse sediment yield areas exist within the project drainage boundaries?

- ○ Yes
- ◉ No, No critical coarse sediment yield areas to be protected based on WMAA maps

If yes, have any of the optional analyses presented in Section 6.2 of the BMP Design Manual been performed?

☐ 6.2.1 Verification of Geomorphic Landscape Units (GLUs) Onsite
☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment
☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
☐ No optional analyses performed, the project will avoid critical coarse sediment yield areas identified based on WMAA maps

If optional analyses were performed, what is the final result?

- ○ No critical coarse sediment yield areas to be protected based on verification of GLUs onsite
- ○ Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 8 of the SWQMP.
- ◉ Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections 6.2.4 and 6.2.5 as applicable, and the areas are identified on the SWQMP Exhibit.

Discussion / Additional Information:
The critical coarse sediment yield areas do not present onsite. Therefore, hydromodification management requirements apply to only for flow control.

Form I-3B Page 10 of 11

Flow Control for Post-Project Runoff*

*This Section only required if hydromodification management requirements apply

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.

One biofiltration BMP is designed/proposed to treat the storm runoff generated from the site. The runoff from this BMP is directed to an underground detention basin/vault for peak flow and hydromodification control. Therefore the site will have only one point of compliance for HMP which is identified as POC #1. This POC is locaded at the northerly side of the site. The runoff from POC #1 is discharged to a natural channel via an existing storm storm drain system. See HMP exhibit in attachment 2a for details

Has a geomorphic assessment been performed for the receiving channel(s)?

- ◉ No, the low flow threshold is 0.1Q2 (default low flow threshold)
- ○ Yes, the result is the low flow threshold is 0.1Q2
- ○ Yes, the result is the low flow threshold is 0.3Q2
- ○ Yes, the result is the low flow threshold is 0.5Q2

If a geomorphic assessment has been performed, provide title, date, and preparer:
Default low flow threshold is used.

Discussion / Additional Information: (optional)
Click or tap here to enter text.

Form I-3B Page 11 of 11

Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

The site is comprised of Hydrologic Soil Group D which poses very low infiltration rate and high runoff potential. Therefore, infiltration based BMPs are not effective for this site. Further, the majority site area is situated in steeper terrain which restricts the use of infiltration based BMPs. There are no other known hydrologic conditions of concerns onsite.

Optional Additional Information or Continuation of Previous Sections As Needed

This space provided for additional information or continuation of information from previous sections as needed.

Click or tap here to enter text.

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Project Name: TIVYAN RESIDENCE

Source Control BMP Checklist for All Development Projects	Form I-4

Source Control BMPs

All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.

Source Control Requirement	Applied?		
SC-1 Prevention of Illicit Discharges into the MS4	☉ Yes	☐ No	☐ N/A
Discussion / justification if SC-1 not implemented: Click or tap here to enter text.			
SC-2 Storm Drain Stenciling or Signage	☉ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented: Click or tap here to enter text.			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☉ N/A
Discussion / justification if SC-3 not implemented: Such areas are not proposed.			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☉ N/A
Discussion / justification if SC-4 not implemented: Outdoor work areas are not proposed.			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☉ N/A
Discussion / justification if SC-5 not implemented: Outdoor trash storage area is not proposed.			

Project Name: TIVYAN RESIDENCE

Form I-4 Page 2 of 2			
Source Control Requirement	Applied?		
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☒ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☒ Yes	☐ No	☐ N/A
Interior parking garages	☐ Yes	☐ No	☒ N/A
Need for future indoor & structural pest control	☒ Yes	☐ No	☐ N/A
Landscape/Outdoor Pesticide Use	☒ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☒ N/A
Food service	☒ Yes	☐ No	☐ N/A
Refuse areas	☐ Yes	☐ No	☒ N/A
Industrial processes	☐ Yes	☐ No	☒ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☒ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☒ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☒ N/A
Loading Docks	☐ Yes	☐ No	☒ N/A
Fire Sprinkler Test Water	☐ Yes	☐ No	☒ N/A
Miscellaneous Drain or Wash Water	☒ Yes	☐ No	☐ N/A
Plazas, sidewalks, and parking lots	☒ Yes	☐ No	☐ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☒ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☒ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☒ N/A
SC-6D: Automotive-related Uses	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above. Click or tap here to enter text.			

Project Name: TIVYAN RESIDENCE

Site Design BMP Checklist for All Development Projects	Form I-5

Site Design BMPs

All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

A site map with implemented site design BMPs must be included at the end of this checklist.

Site Design Requirement	Applied?		
SD-1 Maintain Natural Draiange Pathways and Hydrologic Features	◉ Yes	○ No	○ N/A
Discussion / justification if SD-1 not implemented: Site is designed to maintain the existing drainage pattern to the maximum extent practicable. There are no natural drainage pathways and hydrologic features within the development fringe to be maintained/preserved.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	○ Yes	○ No	◉ N/A
1-2 Are street trees implemented? If yes, are they shown on the site map?	○ Yes	○ No	◉ N/A
1-3 Implemented street trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	○ Yes	○ No	◉ N/A
1-4 Is street tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	○ Yes	○ No	◉ N/A
SD-2 Have natural areas, soils and vegetation been conserved?	◉ Yes	○ No	○ N/A
Discussion / justification if SD-2 not implemented: This site is currently undeveloped. The majority of the site area and vegetation will be preserved in the proposed condition.			

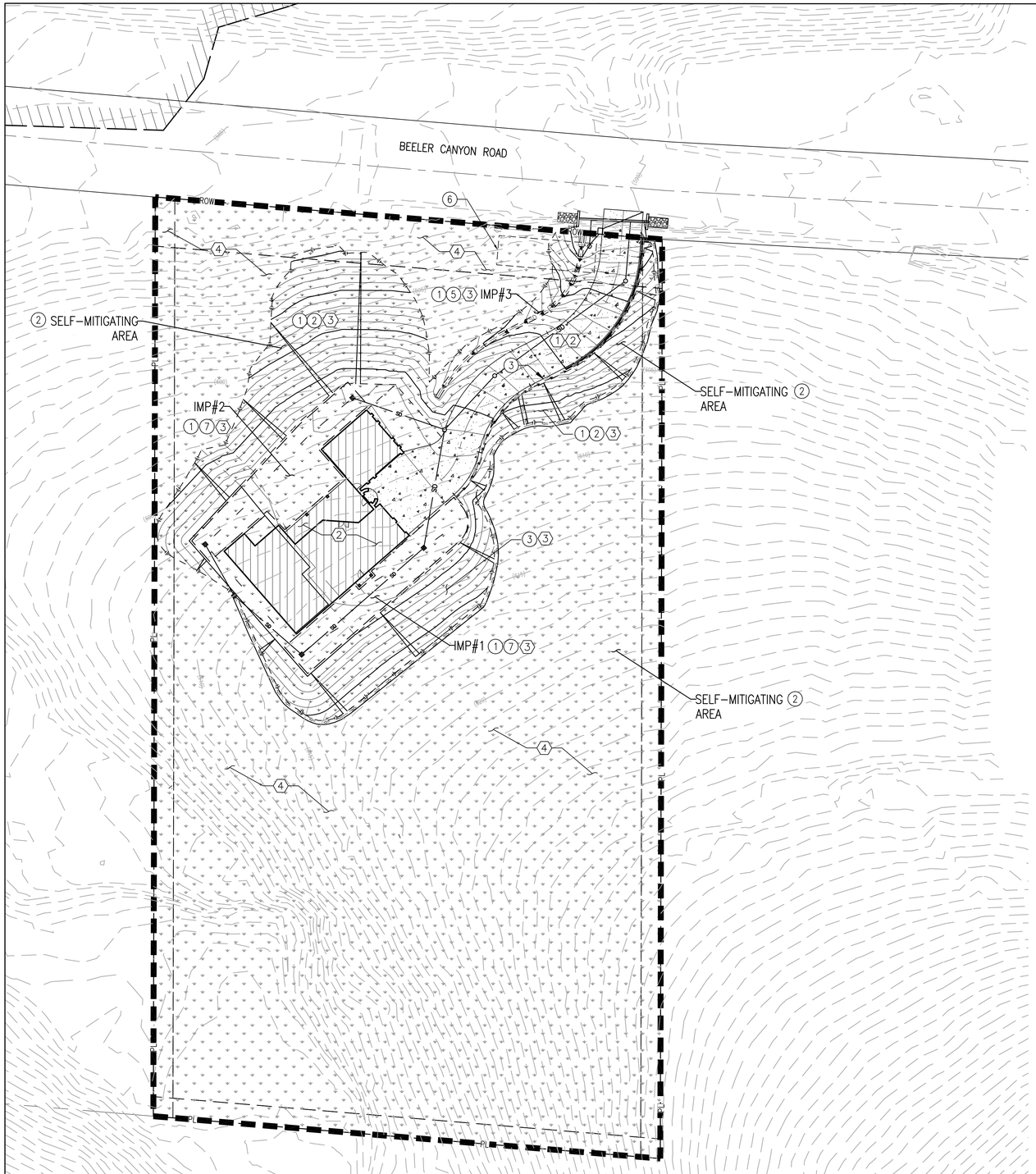
Project Name: TIVYAN RESIDENCE

Form I-5 Page 2 of 4			
Site Design Requirement	Applied?		
SD-3 Minimize Impervious Area	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-3 not implemented: Site is comprised of soil type D. Soil type D has very low infiltration potential. Therefore, infiltration based LID practices such as permeable pavement cannot be used for this site. The majority site area is kept undeveloped to minimize the impervious area due to the development.			
SD-4 Minimize Soil Compaction	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented: Click or tap here to enter text.			
SD-5 Impervious Area Dispersion	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-5 not implemented: Impervious area dispersion is not feasible because the landscape area is located in steep slope. There are no other opportunities onsite to implement this BMP. An alternative BMP is proposed.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☐ Yes	☒ No	
5-2 Does the pervious area satisfy the design criteria in SD-5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☒ No	
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and SD-5 Fact Sheet in Appendix E?	☐ Yes	☒ No	

Project Name: TIVYAN RESIDENCE

Form I-5 Page 3 of 4			
Site Design Requirement	Applied?		
SD-6 Runoff Collection	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-6 not implemented: An alternative approach is implemented. The biofiltration BMPs are proposed to capture and treat the runoff generating from the site. An underground detention facility is proposed to collect and release the peak flow rate in a controlled manner.			
6a-1 Are green roofs implemented in accordance with design criteria in SD-6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☒ No	☐ N/A
6a-2 Is green roof credit volume calculated using Appendix B.2.1.2 and SD-6A Fact Sheet in Appendix E?	☐ Yes	☐ No	☒ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in SD-6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☒ N/A
6b-2 Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E?	☐ Yes	☐ No	☒ N/A
SD-7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented: Note: The selection of the planting for the biofiltration BMPs will be governed by the City of San Diego Low Impact Development (LID) design manual.			
SD-8 Harvesting and Using Precipitation	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-8 not implemented: There is no reliable demand for harvesting and using precipitation onsite. The demand is less than 25% of the Design Capture Volume (DCV).			
8-1 Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☒ No	☐ N/A
8-2 Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E?	☐ Yes	☐ No	☒ N/A

Form I-5 Page 4 of 4
Insert Site Map with all site design BMPs identified:
Insert Site Map Here.



POST CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS

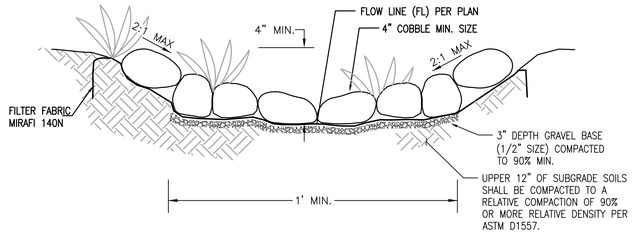
STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO.:

O&M RESPONSIBLE PARTY DESIGNEE: OWNER

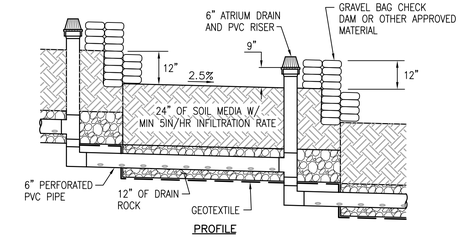
BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	SHEET NUMBER(S)
LID/SITE DESIGN					
• LANDSCAPING	REGULARLY	BIWEEKLY	EVALUATE VEGETATION, MULCH, REMOVE WEEDS & DEBRIS		2
SOURCE CONTROL					
• STREET/SIDEWALK SWEEPING	REGULARLY	MONTHLY	APPROPRIATE SWEEPING METHOD	N/A	2
• IRRIGATION	REGULARLY	MONTHLY	CHECK PRESSURE, REPAIR LINES & HEADS	N/A	2
POLLUTANT CONTROL					
• SELF–MITIGATING AREA	REGULARLY	BIANNUALLY	EVALUATE VEGETATION, MULCH, REMOVE WEEDS	2	2
• BIOFILTRATION BMP	REGULARLY	BIANNUALLY	EVALUATE VEGETATION, MULCH, REMOVE WEEDS & DEBRIS. CHECK FOR STANDING WATER.	3	2
HMP FACILITY					
UNDERGROUND DETENTION BASIN	REGULARLY	BIANNUALLY	EVALUATE FLOW CONDITION, CLEAN–OUT ORIFICE	1	2

PERMANENT POST-CONSTRUCTION BMP NOTES

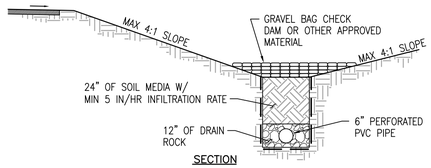
1. OPERATION AND MAINTENANCE SHALL BE SECURED BY AN EXECUTED AND RECORDED STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT (SWMDCMA), OR ANOTHER MECHANISM APPROVED BY THE CITY ENGINEER, THAT ASSURES ALL PERMANENT BMP'S WILL BE MAINTAINED IN PERPETUITY, PER THE LAND DEVELOPMENT MANUAL, STORM WATER STANDARDS.
2. ANY MODIFICATION(S) TO THE PERMANENT POST CONSTRUCTION BMP DEVICES/STRUCTURES SHOWN ON PLAN REQUIRES A CONSTRUCTION CHANGE TO BE PROCESSED AND APPROVED THROUGH DEVELOPMENT SERVICES DEPARTMENT BY THE ENGINEER OF WORK. APPROVAL OF THE CONSTRUCTION CHANGE IS REQUIRED PRIOR TO CONSTRUCTION OF THE PERMANENT BMP.



ROCK/VEGETATED SWALE (PVT) — A



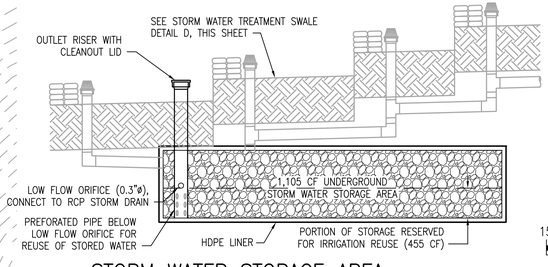
PROFILE



SECTION

STORM WATER TREATMENT SWALE (BIOSWALE) — B

NO SCALE



STORM WATER STORAGE AREA (DETENTION BASIN) — C

NO SCALE

LEGEND

- PROPERTY/RIGHT OF WAY
- NEW CONCRETE PAVEMENT
- NEW LANDSCAPE/PLANTER AREA
- EXISTING LANDSCAPE AREA
- NEW ROOF AREA
- DMA BOUNDARY
- EXISTING CONTOUR — XXX
- FLOW DIRECTION
- SPOT ELEVATION — x 245.0
- NODE/CONTOUR ELEVATION — XXX.XX

SOURCE CONTROL BMPs

1. SWEEPING
2. DISCONNECTED IMPERVIOUS AREA
3. USE SMART IRRIGATION SYSTEMS (TYP.)
4. PRESERVE NATURAL LANDSCAPE

LID, AND TREATMENT CONTROL STRATEGIES:

1. MINIMIZE SOIL COMPACTION. RESTRICT HEAVY CONSTRUCTION EQUIPMENT ACCESS TO PLANNED GREEN/LANDSCAPE AREAS
2. SELF–MITIGATING AREA
3. VEGETATED SWALE PER DETAIL A
4. SELF–RETAINING AREA
5. BIOFILTRATION BMP PER DETAIL B
6. DETENTION BASIN PER DETAIL C
7. BIOFILTRATION BMP

NOTE: EXACT LOCATIONS OF IMPs 1 & 2 ARE NOT SHOWN. THESE LOCATIONS TO BE FINALIZED IN THE FINAL ENGINEERING

DMA #	Tributary Area (ac)	Tributary Area (sf)	Effective Area (sf)	Design Capture Volume (DCV), cf	Pollutant Control BMP Sizing: Min. Sizing Factor	Pollutant Control BMP Sizing: Required Area (sf)
A-1	0.20	8712	3,833	192	0.018	75
A-2	0.14	6098	3,232	162	0.012	65
A-3	0.18	7841	5,174	259	0.03	160

N

15 0 30 60

SCALE IN FEET
1 inch = 30 ft.

SITE MAP
TIVYAN RESIDENCE

DATE: MARCH 2016

Project Name: TIVYAN RESIDENCE

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

Storm Water Pollutant Control BMP Selection Flow Charts (Figure 5-1 and 5-2) of the City of San Diego BMP Design Manual are utilized to select and sizie the pollutant control BMPs for this project. Since the storm runoff from the site discharges to the natural canyon prior to discharging into the exempt water body, the City's hydromodification requirements applies to this project. Therefore, BMPs are sized to comply with the pollutant control as well as hydromodification control requirements. Feasibility study of all retention based BMPs (harvest and use, full and/or partial infiltration) is performed prior to selecting the biofiltration BMP to comply with the pollutant control requirements. It is determined that the harvest and use of precipitation is infeasible because the site has very low water demand for irrigation and toilets flushing. But, a portion of the runoff volume is proposed to be reuse for irrigation. Similarly, infiltration based BMPs are not feasible because the site consists of soil type D which has very low infiltration and high runoff potential. Further, majority of the site area is situated in steep terrain which restricts the use of infiltration BMPs. Therefore, biofiltration BMPs are designed to capture, and treat the runoff from the site. The hydromodification control is provided through an underground detention basin. The treated runoff from the biofiltration BMPs is directed to the underground detention basin for this purpose.

Biofiltration BMP (BF-1): As discussed previously, this BMP is selected to comply with the pollutant control requirements of the new permit. Stepped bioswale with check dams is proposed for this purpose. This type of configuration is suitable for the steep terrain. A minimum treatment area equal to 3% of the effective DMA area is provided for this BMP. Design Capture Volume (DCV) is calculated for each drainage management area (DMA) considering 85th percentile, 24-hr rainfall depth of 0.6" for this site.

(Continue on page 2 as necessary.)

Form I-6 Page 2 of X

(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)

(Continued from page 1)

All BMPs are designed to exceed the minimum treatment area requirement for Biofiltration BMPs per the City of San Diego BMP Design Manual. The DCV and BMP sizing results are summarized in the table 1 below (see Attachment 1e for details). All BMPs are designed to have a minimum of 6" of ponding and 4" of free board along with an overflow riser pipe to bypass the runoff generated from larger storm event. Planting media is comprised of 18" of engineered soil which is underlain by 12" of gravel with a 6" perforated pipe to collect the filtered runoff. An energy dissipater such as splash block or cobble is also provided at the downspout discharge location to dissipate the energy. The runoff from DMAs A-1, 2, & 3 is treated through biofiltration BMPs #1, 2, & 3 respectively. DMAs A-4 & 5 are self-mitigatina DMAs which do not require flow control and pollutant control BMPs.

Table 1

DMA #	Tributary Area		Effective Area (sf)	Design Capture Volume (DCV), cf	Pollutant Control BMP Sizing	
	(ac)	(sf)			Min. Sizing Factor	Required Area (sf)
A-1	0.20	8712	3,833	192	0.018	75
A-2	0.14	6098	3,232	162	0.012	65
A-3	0.18	7841	5,174	259	0.03	160

Underground Detention Basin (HMP #1): The treated runoff from BMPs 1, 2 & 3 is directed to an underground detention basin for HMP control. A total storage volume of 2,078 cf is required to control hydromodificatio impacts due to the development. The provided storage volume of 2,100 cf exceeds the required minimum storage volume for HMP control. Detention basin is designed to have a minimum of 0.5' of free board and a 6" overflow pipe to bypass the runoff generated from larger storm event. The low flow control is provided through a 0.5" outlet pipe. Low flow outlet will be placed at a certain height from the bottom of the structure so that the storage below the orifice can be reused for irrigation purpose. See attachment 2 for details.

Project Name: TIVYAN RESIDENCE

Form I-6 Page 3 of X (Copy as many as needed)
Structural BMP Summary Information
Structural BMP ID No. IMP #1, 2, and 3
Construction Plan Sheet No. Click or tap here to enter text.
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☉ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)
Purpose: ☉ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	To be determined
Who will be the final owner of this BMP?	Roman Tivyan & Nikki Sayavanh
Who will maintain this BMP into perpetuity?	Owner
What is the funding mechanism for maintenance?	To be determined

Form I-6 Page 4 of X (Copy as many as needed)
Structural BMP ID No. HMP #1
Construction Plan Sheet No. Click or tap here to enter text.
Discussion (as needed): Underground Detention Basin (HMP #1): The treated runoff from BMPs 1, 2, & 3 is directed to an underground detention basin for HMP control. A total storage volume of 2,078 cf is required to control hydromodificatio impacts due to the development. The provided storage volume of 2,100 cf exceeds the required minimum storage volume for HMP control. Detention basin is designed to have a minimum of 0.5' of free board and a 6" overflow pipe to bypass the runoff generated from larger storm event. The low flow control is provided through a 0.5" outlet pipe. Low flow outlet will be placed at a certain height from the bottom of the structure so that the storage below the orifice can be reused for irrigation purpose. See attachment 2 for details. The maintenance and funding mechanism for this facility willl be determined in the final engineering design phase.

Project Name: TIVYAN RESIDENCE

THE CITY OF SAN DIEGO City of San Diego **Development Services** 1222 First Ave., MD-302 San Diego, CA 92101 (619) 446-5000	**Permenant BMP Construction** **Self Certification Form**	FORM DS-563 December 2015

Date Prepared: Click here to enter text.	Project No.: Click here to enter text.
Project Applicant: Click here to enter text.	Phone: Click here to enter text.
Project Address: Click here to enter text.	
Project Engineer: Click here to enter text.	Phone: Click here to enter text.

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Quality Management Plan (SWQMP) documents and drawings.

This form must be completed by the engineer and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of San Diego.

CERTIFICATION:

As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and structural BMP's required per the approved SWQMP and Construction Permit No. Click here to enter text.; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 of the San Diego Regional Water Quality Control Board.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: _____

Date of Signature: _ Insert Date___

Printed Name: _Click here to enter text.__

Title: _Click here to enter text.__

Phone No. _Click here to enter text.__

Engineer's Stamp

DS-563 (12-15)

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ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

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Project Name: TIVYAN RESIDENCE

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☒ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☐ Included on DMA Exhibit in Attachment 1a ☐ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☐ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1d	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☐ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☒ Included

LEGEND

- PROPERTY/RIGHT OF WAY
- NEW CONCRETE PAVEMENT
- NEW LANDSCAPE/PLANTER AREA
- EXISTING LANDSCAPE AREA
- NEW ROOF AREA
- DMA BOUNDARY
- EXISTING CONTOUR (XXX)
- FLOW DIRECTION
- SPOT ELEVATION x 245.0
- DMA MARKER & AREA (AC) X-X / X.XX

NOTES:
1. ALL DMAS ARE ASSUMED TO BE COMPRISED OF HYDROLOGIC SOIL GROUP D FOR THE ANALYSIS.
2. GROUND WATER DEPTH IS ASSUMED TO BE > 15' PER FIGURE C.3 OF THE COUNTY OF SAN DIEGO BMP DESIGN MANUAL. THE ACTUAL DEPTH TO BE CONFIRMED.
3. BMPs ARE LINED THEREFORE GROUND WATER DEPTH DETERMINATION IS OPTIONAL.
4. HYDROMODIFICATION POINTS OF COMPLIANCES (POCs) ARE ASSUMED AT THE OUTLET LOCATIONS OF THE HMP BMPs.
5. DMAs 4, & 5 ARE SELF-MITIGATING DMAs AND DO NOT REQUIRE HMP CONTROL BMPs (SEE PROJECT'S DMA-BMP MAP FOR DETAILS)

15 0 30 60

SCALE IN FEET
1 inch = 30 ft.

DMA EXHIBIT
(ATTACHMENT 1a)

DATE: MARCH 2016

PLOT: M:\PROJECTS\11500\11900JJ00-BEELER CANYON ROAD - TWVAN\DOCUMENTS\REPORTS\SWQMP\EXHIBIT\DMA SITE.DWG Mm 02. 3/30/2016 3:29 PM

Project Name: TIVYAN RESIDENCE

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

☒ Underlying hydrologic soil group
☒ Approximate depth to groundwater
☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☐ Critical coarse sediment yield areas to be protected
☒ Existing topography and impervious areas
☒ Existing and proposed site drainage network and connections to drainage offsite
☒ Proposed grading
☒ Proposed impervious features
☒ Proposed design features and surface treatments used to minimize imperviousness
☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
☒ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
☒ Structural BMPs (identify location, type of BMP, and size/detail)

Attachment 1b: BMP Sizing Summary Table

DMA #	Tributary Area		Effective Area (sf)	Design Capture Volume (DCV), cf	Pollutant Control BMP Sizing	
	(ac)	(sf)			Min. Sizing Factor	Required Area (sf)
A-1	0.20	8712	3,833	192	0.018	75
A-2	0.14	6098	3,232	162	0.012	65
A-3	0.18	7841	5,174	259	0.03	160
Total	**0.52**			**613**		

Attachment 1c: Harvest and Use Feasibility Screening

<table>
<tr><th colspan="2">Harvest and Use Feasibility Screening</th><th>Worksheet B.3-1</th></tr>
<tr><td colspan="3">1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?
☒ Toilet and urinal flushing
☒ Landscape irrigation
☐ Other:</td></tr>
<tr><td colspan="3">2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.

The demand is =110 cf</td></tr>
<tr><td colspan="3">3. Calculate the DCV using worksheet B-2.1.

The total DCV is = 613 cf
0.25 DCV = 153 cf
(See attachment 1e for DCV calculation)</td></tr>
<tr><td>3a. Is the 36-hour demand greater than or equal to the DCV?
☐ Yes / ☒ No
⇨
⇩</td><td>3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV?
☐ Yes / ☒ No ⇨
⇩</td><td>3c. Is the 36-hour demand less than 0.25DCV?
☒ Yes
⇩</td></tr>
<tr><td>Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.</td><td>Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.</td><td>Harvest and use is considered to be infeasible.</td></tr>
</table>

Attachment 1d: Categorization of Infiltration Feasibility Condition (Worksheet C.4-1)

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 – Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	**Screening Question**	**Yes**	**No**
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		**No**
Provide basis: **The site is comprised of hydrologic soil type D with low infiltration rate. Therefore, infiltration based BMPs are not feasible for this project. Therefore, infiltration feasibility is not applicable for this project.** Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Attachment 1d: Contd.

Worksheet C.4-1 Page 2 of 4			
Criteria	**Screening Question**	**Yes**	**No**
3	Can infiltration greater than 0.5 inches per hour be allowed without risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 – 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Attachment 1d: Contd.

Worksheet C.4-1 Page 3 of 4			
Part 1 – Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?**			
Criteria	**Screening Question**	**Yes**	**No**
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
6	Can infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Attachment 1d: Contd.

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 2 Results*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings

Attachment 1e:

Automated Worksheet B.3-1: Project-Scale BMP Feasibility Analysis (V1.1)

Category	#	Description	Value	Units
Capture & Use Inputs	0	Design Capture Volume for Entire Project Site	613	cubic-feet
	1	Proposed Development Type	Residential	unitless
	2	Number of Residents or Employees at Proposed Development	4	#
	3	Total Planted Area within Development	24,007	sq-ft
	4	Water Use Category for Proposed Planted Areas	Moderate	unitless
Infiltration Inputs	5	Is Average Site Infiltration Rate Less than 0.5 Inches per Hour?	Yes	yes/no
	6	Is Retention of the Full DCV Anticipated to Produce Negative Impacts?	Yes	yes/no
	7	Is Retention of Any Volume Anticipated to Produce Negative Impacts?	Yes	yes/no
Calculations	8	36-Hour Toilet Use Per Resident or Employee	0.37	cubic-feet
	9	Subtotal: Anticipated 36 Hour Toilet Use	1	cubic-feet
	10	Anticipated 1 Acre Landscape Use Over 36 Hours	196.52	cubic-feet
	11	Subtotal: Anticipated Landscape Use Over 36 Hours	108	cubic-feet
	12	Total Anticipated Use Over 36 Hours	110	cubic-feet
	13	Total Anticipated Use / Design Capture Volume	0.18	cubic-feet
	14	Are Full Capture and Use Techniques Feasible for this Project?	No	unitless
	15	Is Full Retention Feasible for this Project?	No	yes/no
	16	Is Partial Retention Feasible for this Project?	No	yes/no
Result	17	Feasibility Category	5	1, 2, 3, 4, 5

Worksheet B.3-1 General Notes:

A. Applicants may use this optional worksheet to gauge the feasibility of implementing capture and use techniques on their project site. User input should be provided for yellow shaded cells, values for all other cells will be automatically generated. Projects demonstrating feasibility or potential feasibility via this worksheet are encouraged to incorporate capture and use features in their project.

Automated Worksheet B.1-1: Calculation of Design Capture Volume (V1.1)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	A-1	A-2	A-3								unitless
	1	Basin Drains to the Following BMP Type	Biofiltration	Biofiltration	Biofiltration								unitless
	2	85th Percentile 24-hr Storm Depth	0.60	0.60	0.60								inches
	3	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	2,035	2,290	4,700								sq-ft
	4	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)	6,677	3,808	3,140								sq-ft
	5	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	6	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	8	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	9	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion, Tree Well, & Rain Barrel Inputs (Optional)	10	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	11	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	12	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	13	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	14	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	16	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	17	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	18	Number of Tree Wells Proposed per SD-A											#
	19	Average Mature Tree Canopy Diameter											ft
	20	Number of Rain Barrels Proposed per SD-E											#
	21	Average Rain Barrel Size											gal
Final Adjusted Runoff Factor Calculations	22	Total Area Tributary to BMP	8,712	6,098	7,840	0	0	0	0	0	0	0	sq-ft
	23	Composite Runoff Factor for Standard Drainage Areas	0.44	0.53	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	24	Initial Composite Runoff Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	unitless
	25	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	26	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	27	Dispersed Impervious Area / Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	28	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	29	Final Adjusted Tributary Runoff Factor	0.44	0.53	0.66	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
Volume Reduction Calculations	30	Final Effective Tributary Area	3,833	3,232	5,174	0	0	0	0	0	0	0	sq-ft
	31	Initial Design Capture Volume	192	162	259	0	0	0	0	0	0	0	cubic-feet
	32	Volume Reduction per Tree Well	0	0	0	0	0	0	0	0	0	0	cubic-feet
	33	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	34	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Result	35	Design Capture Volume Tributary to BMP	192	162	259	0	0	0	0	0	0	0	cubic-feet

Worksheet B.1-1 General Notes:

A. Applicants may use this worksheet to calculate design capture volumes for up to 10 drainage areas User input must be provided for yellow shaded cells, values for all other cells will be automatically generated, errors/notifications will be highlighted in red and summarized below. Upon completion of this worksheet, proceed to the appropriate BMP Sizing worksheet(s).

B. Impervious surfaces include roofs, concrete, asphalt, or pervious pavements with an impervious liner. Semi-pervious surfaces include decomposed granite, cobbles, crushed aggregate, or compacted soils such as unpaved parking. Engineered pervious surfaces include pervious pavements providing full retention of the 85th percentile rainfall depth, or areas with soils that have been amended and mulched per Section 86.709 of the Landscape Ordinance. Dispersion areas are pervious or semi-pervious surfaces that receive runoff from impervious surfaces (C=0.90) and reduce stormwater runoff as outlined in Fact Sheet SD-B.

Automated Worksheet B.5-1: Sizing Biofiltration BMPs (V1.1)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	A-1	A-2	A-3	-	-	-	-	-	-	-	unitless
	1	Effective Tributary Area	3,833	3,232	5,174	-	-	-	-	-	-	-	sq-ft
	2	Minimum Biofiltration Footprint Sizing Factor	0.013	0.009	0.030	-	-	-	-	-	-	-	ratio
	3	Design Capture Volume Tributary to BMP	192	162	259	-	-	-	-	-	-	-	cubic-feet
	4	Provided Biofiltration Surface Area	75	75	160								sq-ft
	5	Provided Surface Ponding Depth	6	6	6								inches
	6	Provided Soil Media Thickness	18	18	18								inches
	7	Provided Gravel Storage Thickness	12	12	12								inches
	8	Hydromodification Orifice Diameter of Underdrain	n/a	n/a	n/a								inches
Biofiltration Calculations	9	Max Hydromod Flow Rate through Underdrain	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	CFS
	10	Max Soil Filtration Rate Allowed by Underdrain Orifice	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	in/hr
	11	Soil Media Filtration Rate	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	12	Soil Media Filtration Rate to be used for Sizing	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	13	Depth Biofiltered Over 6 Hour Storm	30.00	30.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	14	Soil Media Pore Space	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	unitless
	15	Gravel Pore Space	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	16	Effective Depth of Biofiltration Storage	16.2	16.2	16.2	0	0	0	0	0	0	0	inches
	17	Drawdown Time for Surface Ponding	1	1	1	0	0	0	0	0	0	0	hours
	18	Drawdown Time for Entire Biofiltration Basin	3	3	3	0	0	0	0	0	0	0	hours
	19	Total Depth Biofiltered	46.20	46.20	46.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	20	Option 1 - Biofilter 1.50 DCV: Target Volume	288	243	389	0	0	0	0	0	0	0	cubic-feet
	21	Option 1 - Provided Biofiltration Volume	288	243	389	0	0	0	0	0	0	0	cubic-feet
	22	Option 2 - Store 0.75 DCV: Target Volume	144	122	194	0	0	0	0	0	0	0	cubic-feet
	23	Option 2 - Provided Storage Volume	101	101	194	0	0	0	0	0	0	0	cubic-feet
	24	Percentage of Performance Requirement Satisfied	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	25	**Deficit of Effectively Treated Stormwater**	**0**	**0**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

Worksheet B.5-1 General Notes:

A. Applicants may use this worksheet to size Lined Biofiltration BMPs (BF-1) for up to 10 basins. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red and summarized below. BMPs fully satisfying the pollutant control performance standards will have a deficit treated volume of zero and be highlighted in green.

Automated Worksheet B.5-3: Alternate Minimum Biofiltration Footprint Ratio (V1.1)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Drainage Basin Inputs (Optional)	0	Drainage Basin ID or Name	A-1	A-2	A-3	-	-	-	-	-	-	-	unitless
	1	Total Tributary Area	8,712	6,098	7,840	-	-	-	-	-	-	-	sq-ft
	2	Final Adjusted Runoff Factor	0.44	0.53	0.66	-	-	-	-	-	-	-	unitless
	3	Average Annual Precipitation	10.0	10.0	10.0								inches
	4	Load to Clog (default =2.0)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	lb/sq-ft
	5	Allowable Period to Accumulate Clogging Load (default =10)	10	10	10	10	10	10	10	10	10	10	years
	6	Pretreatment Measures Included?	Yes	Yes	No								yes/no
	7	Commercial: TSS=128 mg/L, C= 0.80											sq-ft
	8	Education: TSS=132 mg/L, C= 0.50											sq-ft
	9	Industrial: TSS=125 mg/L, C= 0.90											sq-ft
	10	Low Traffic Areas: TSS=50 mg/L, C= 0.50											sq-ft
	11	Multi-Family Residential: TSS=40 mg/L, C= 0.60											sq-ft
	12	Roof Areas: TSS=14 mg/L, C= 0.90	2,035	2,290									sq-ft
	13	Single Family Residential: TSS=123 mg/L, C= 0.40			7,840								sq-ft
	14	Transportation: TSS=78 mg/L, C= 0.90											sq-ft
	15	Vacant/Open Space: TSS=216 mg/L, C= 0.10	6,677	3,808									sq-ft
Minimum Footprint Calculations	16	Effective-Area Based on Specified Land Use Coefficients	2,499	2,442	3,136	0	0	0	0	0	0	0	sq-ft
	17	Average TSS Concentration for Tributary	68	46	123	0	0	0	0	0	0	0	mg/L
	18	Effective Tributary Area	3,833	3,232	5,174	0	0	0	0	0	0	0	sq-ft
	19	Average Annual Runoff	3,194	2,693	4,312	0	0	0	0	0	0	0	cubic-feet
	20	Average Annual TSS Load	14	8	33	0	0	0	0	0	0	0	lb/yr
	21	Average Annual TSS Load After Pretreatment Measures	10	6	33	0	0	0	0	0	0	0	lb/yr
Result	22	Minimum Allowable Biofiltration Footprint Ratio	0.013	0.009	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	ratio

Worksheet B.5-3 General Notes:

A. Applicants may use this worksheet to calculate Alternate Minimum Biofiltration Footprint Ratios for up to 10 basins. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red and summarized below.

Summary of Stormwater Pollutant Control Calculations (V1.1)

Category	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Drainage Basin Inputs	Drainage Basin ID or Name	A-1	A-2	A-3	-	-	-	-	-	-	-	unitless
	Total Area Tributary to BMP	8,712	6,098	7,840	-	-	-	-	-	-	-	sq-ft
	Composite Runoff Factor for Standard Drainage Areas	0.44	0.53	0.66	-	-	-	-	-	-	-	unitless
	85th Percentile 24-hr Storm Depth	0.6	0.6	0.6	-	-	-	-	-	-	-	inches
	Initial Design Capture Volume	192	162	259	-	-	-	-	-	-	-	cubic-feet
Volume Reductions	Final Adjusted Tributary Runoff Factor	0.44	0.53	0.66	-	-	-	-	-	-	-	unitless
	Final Effective Tributary Area	3,833	3,232	5,174	-	-	-	-	-	-	-	sq-ft
	Tree Well and Rain Barrel Reductions	0	0	0	-	-	-	-	-	-	-	cubic-feet
	Design Capture Volume Tributary to BMP	192	162	259	-	-	-	-	-	-	-	cubic-feet
BMP Sizing	Basin Drains to the Following BMP Type	Biofiltration	Biofiltration	Biofiltration	-	-	-	-	-	-	-	unitless
	Deficit of Effectively Treated Stormwater	0	0	0	-	-	-	-	-	-	-	cubic-feet

Summary Notes:

All fields in this summary worksheet are populated based on previous user inputs. Drainage basins achieving full compliance with performance requirements for onsite pollutant control are highlighted in green. Drainage basins not achieving full compliance are highlighted in red and summarized below. Please note that drainage areas using De Minimis, Self-Mitigating, and/or Self-Retaining classifications may be required to provide additional supporting information.

-Congratulations, all specified drainage basins and BMPs are in compliance with stormwater pollutant control requirements. Include 11x17 color prints of this summary sheet and supporting worksheet calculations as part of the SWQMP submittal package.

ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

HYDROMODIFICATION MANAGEMENT PLAN
FOR
TIVYAN RESIDENCE (SDP)

Purpose

This project falls under PDP category and required to manage hydromodification impacts due to the development. Hydromodification management plan is required for all Priority Development Projects (PDPs) to demonstrate that the project is designed to manage increases in runoff discharge rates and durations in the proposed condition. Increased flow rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force. The results of a hydromodification management analysis must comply with the following design criteria:

- Post-project flow rates and durations must not exceed pre-development runoff flow rates and durations by more than 10 percent (for the range of flows that result in increased potential for erosion, or degraded instream habitat downstream of PDPs).

- Each PDP must avoid critical sediment yield areas known to the City or identified by the optional WMAA, or implement measures that allow critical coarse sediment to be discharged to receiving waters, such that there is no net impact to the receiving water.

Method of Analysis

The hydromodification analysis within this report utilizes Sizing Factor Method also known as "San Diego BMP Sizing Calculator Methodology," developed by Brown and Caldwell under the 2007 MS4 Permit. The analysis is performed by utilizing the following information:

- Rainfall basin information for the project site from Figure G.2-1, Rainfall Basin Map
- Hydrologic soil group at the project site (soil maps published by the Natural Resources Conservation Service is sued)
- Pre-development and post-project slope categories (low = 0% – 5%, moderate = 5% – 10%, steep = >10%)
- Area tributary to the structural BMP
- Area weighted runoff factor (C) for the area draining to the BMP from Table G.2-1.
- Fraction of Q_2 to control: $0.1Q_2$ to Q10 for projects discharging to streams with high susceptibility to erosion (default range of flows to control when a stream susceptibility study has not been prepared).

Although the sizing factors were developed under the 2007 MS4 Permit, the unit runoff ratios and some sizing factors developed for flow control facility sizing can still be applied to 2013 MS4 Permit. Due to the new MS4 Permit requirement to control flow rates to pre-development condition instead of pre-project condition, unit runoff ratios for "impervious" soil cover categories cannot be used when determining pre-development Q2. Therefore, unit runoff ratios for "urban" and "impervious" cover categories are removed in the revised unit runoff ratios for sizing factor method table G.2-2 of this manual. HMP calculations are performed to comply with the new permit requirements by using the Sizing Factor Worksheet G.2-1 of the storm water standards manual dated 2016.

An HMP facility is designed/sized using land use type and slope, for the pre- and post-project condition. In the post-project condition, the site area is broken down into multiple drainage management areas (DMAs). Each DMA is provided with a pollutant control BMP for treatment purpose when applicable. The treated runoff from these DMAs is routed to an HMP facility located at the northerly side of the site for flow control. The runoff from the site is attenuated through this facility before leaving the site.

The post-project land use and slope values for this project are calculated and are illustrated on hydromodification exhibit. See attachment 2a for details. The pre-project land use and slope is vacant and steep respectively.

Rainfall Basin

Sizing factors were created based on three rainfall basins: Lindbergh Field, Oceanside, and Lake Wohlford. Per the Rainfall Basins Map, the site is located within the Oceanside rainfall basin. Therefore, sizing factor corresponding to Oceanside rainfall basin are used for this analysis.

Point of Compliance (POC)

POC for flow control analysis for this project is assumed at the project boundary because the runoff from the project site does not meet a natural or un-lined channel onsite. The flow will discharge to a natural channel at the project boundary.

Calculations

Pollutant control BMPs are designed separately from the HMP facility. Sizing factors for Cistern BMP are used to determine the storage volume required to meet the hydromodification requirements. In this context, the cistern is a detention facility that temporarily stores the runoff and release it at a controlled rate. Multiple biofiltration BMPs are proposed for storm water treatment purpose. The treated runoff from these BMPs is directed to the HMP facility for flow control. The results are summarized in table below. See Attachment 2d for calculations. A default range of flows i.e., $0.1Q_2$ to Q10-yr is used in the analysis. Q2 & Q-10 yr sizing factors are determined to be 0.244 and 0.571 cfs/acre respectively. These factors correspond to the pre-project scrub land cover, steep slope, soil type D and Oceanside rainfall basin as stated in Table G.2-2 of the storm water standards.

HMP #	HMP Volume (cf)		Low Flow Orifice (in)	$Q_{2\text{-yr}}$ (cfs)	$Q_{10\text{-yr}}$ (cfs)	Low Flow Threshold ($0.1Q_2$, cfs)
	Required	Provided				
1	2,078	2,100	0.53	0.13	0.30	0.013

Drawdown analysis: An underground storage system is proposed for HMP control. 96 hour drawdown time does not apply to underground storage system that are not accessible to mosquitoes. All entry points to the detention system will be fitted with traps or screens, or sealed to make the system inaccessible to mosquitoes. This requirement also does not apply for water retained within the soil media & gravel layer of biofiltration BMPs. The above ground ponding is approximately 6” for the proposed biofiltration BMPs which is comprised of 18” of soil media with 5”/hour of infiltration rate. Therefore, the drawdown time will be very minimal for the surface storage.

Furthermore, site is planning to reuse a portion of the stored runoff for the irrigation purpose. Approximately 455 cf of runoff will be reserved for this purpose. See detail C in the Site Map for BMP configuration.

Summary

This study has demonstrated that the proposed HMP facility provided for the Tivyan residence site is sufficient to meet the current HMP criteria if the volume and orifice size recommended in this report are incorporated. The drawdown calculation is not required because the storage is provided through an underground detention.

Should a project propose alternative BMPs, or any variation to the assumptions made within this report, then the project will need to provide additional modeling and analysis to demonstrate that the project will still be in compliance with the hydromodification requirements.

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Project Name: TIVYAN RESIDENCE

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☒ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☐ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	◉ Not Performed ○ Included ○ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	◉ Included ○ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	○ Included ◉ Not required because BMPs will drain in less than 96 hours

LEGEND

PROPERTY/RIGHT OF WAY

NEW CONCRETE PAVEMENT

NEW LANDSCAPE/PLANTER AREA

EXISTING LANDSCAPE AREA

NEW ROOF AREA

DMA BOUNDARY

EXISTING CONTOUR (XXX)

FLOW DIRECTION

SPOT ELEVATION x 245.0

DMA MARKER & AREA (AC) X-X / X.XX

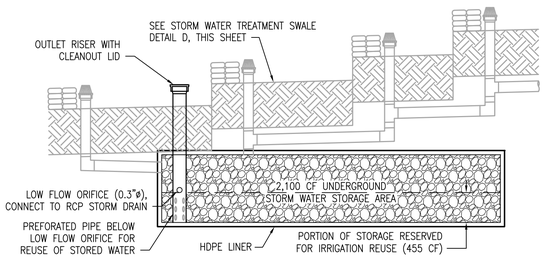
HMP BMP:

1. UNDERGROUND DETENTION BASIN PER DETAIL A THIS SHEET
2. HMP POINT OF COMPLIANCE (POC)
3. NEW STORM DRAIN

NOTES:
1. ALL DMAS ARE ASSUMED TO BE COMPRISED OF HYDROLOGIC SOIL GROUP D FOR THE ANALYSIS.
2. GROUND WATER DEPTH IS ASSUMED TO BE > 15' PER FIGURE C.3 OF THE COUNTY OF SAN DIEGO BMP DESIGN MANUAL. THE ACTUAL DEPTH TO BE CONFIRMED.
3. BMPs ARE LINED THEREFORE GROUND WATER DEPTH DETERMINATION IS OPTIONAL.
4. HYDROMODIFICATION POINTS OF COMPLIANCES (POCs) ARE ASSUMED AT THE OUTLET LOCATION OF THE HMP BMP.
5. DMAs 4, & 5 ARE SELF-MITIGATING DMAs AND DO NOT REQUIRE HMP CONTROL BMPs (SEE PROJECT'S SITE MAP FOR DETAILS)

POST-DEVELOPEMENT LAND USE AREA BREAKDOWN

DMA #	LAND USE/SLOPE				TOTAL (AC)
	PERVIOUS		IMPERVIOUS		
	(0-5%)	(>15%)	(0-5%)	(>15%)	
A-1	2,035	4,642	2,035	–	0.20
A-2	2,290	1,518	17,261	2,290	0.14
A-3	715	2,425	1,370	3,330	0.18



STORM WATER STORAGE AREA (DETENTION BASIN) — A

NO SCALE

HMP #	HMP Volume (cf)		Low Flow Orifice (in)	$Q_{2\text{-yr}}$ (cfs)	$Q_{10\text{-yr}}$ (cfs)	Low Flow Threshold ($0.1Q_2$, cfs)
	Required	Provided				
1	2,078	2,100	0.53	0.127	0.30	0.0127

N

15 0 30 60

SCALE IN FEET
1 inch = 30 ft.

HMP EXHIBIT
(ATTACHMENT 2a)

DATE: MARCH 2016

Project Name: TIVYAN RESIDENCE

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

☒ Underlying hydrologic soil group
☒ Approximate depth to groundwater
☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☐ Critical coarse sediment yield areas to be protected
☒ Existing topography
☒ Existing and proposed site drainage network and connections to drainage offsite
☒ Proposed grading
☒ Proposed impervious features
☒ Proposed design features and surface treatments used to minimize imperviousness
☒ Point(s) of Compliance (POC) for Hydromodification Management
☒ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
☒ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)

SUMMARY OF HMP BMP

HMP #	HMP Volume (cf)		Low Flow Orifice (in)	$Q_{2\text{-yr}}$ (cfs)	$Q_{10\text{-yr}}$ (cfs)	Low Flow Threshold ($0.1Q_2$, cfs)
	Required	Provided				
1	2,078	2,100	0.53	0.127	0.30	0.0127

Attachment 2d:
Worksheet G.2-1: HMP Sizing Factor Worksheet

Site Information			
Project Name:	Tivyan Residence	Hydrologic Unit	Penasquitos
Project Applicant:		Rain: Gauge:	Oceanside
Jurisdication:	City of San Diego	Total Project Area:	0.52 Ac
Assessor's Parcel Number:	320-030-31	Low Flow Threshold:	0.1Q2
BMP Name:	HMP #1	BMP Type:	Cistern (Detention)

Areas Draining to BMP			Sizing Factors					Minimum BMP Size		
DMA Name	Area (sf)	Soil Type/Slope	Post Project Surface Type	Runoff Factor (From Table G.2-1)	Surface Area	Surface Volume, V1	Subsurface Volume, V2	Surface Area (sf)	Surface Volume (cf)	Subsurface Volume (cf)
1	9,025	D/Flat	Impervious (Roof, Asphalt, Concrete)	1.0	N/A	0.20	N/A	N/A	1,805	N/A
	13,625	D/Flat	Pervious	0.1	N/A	0.20	N/A	N/A	273	N/A
Total DMA Area	22,650							Minimum BMP Size*	2,078	
								Proposed BMP Size*	**2,100**	

*Minimum BMP Size = Total of rows above.
*Proposed BMP Size > Minimum BMP size.

Orifice Sizing

Equations:

(1) $Q=C_d \times A \times (2gH)^{0.5}$ Orifice Discharge Equation

(2) $A = [0.1Q_2 \times A_{DMA}]/C_d \times (2gH)^{0.5}$ Orifice Area Equation (0.1Q2 is low flow threshold)

Cd=	0.6		dimensionless
H=	3	ft	(for custom underground detention basin)
g=	32.2	ft/s^2	
$(2gH)^{0.5}$=	13.89964		

Cd = Orifice Discharge Coefficient
g = Gravitational Acceleration
H = Effective Head Above Orifice (ft)
A = Cross Sectional Area of Orifice
Q10 Sizing Factor: 0.571 cfs/ac

	Rain Gage	Soil type	Exist. Cover	Slope	Q2 Sizing Factor	DMA Area (ac)	Q2 (cfs)	Q10 (cfs)
DMAs-1, 2, & 3	Oceanside	D	Scrub	Steep	0.244	0.52	0.13	0.30
							0.00	0.00
							0.00	0.00
							0.00	0.00
							0.00	0.00
Total							**0.13**	**0.30**

Channel Susceptibility to Erosion

High	Medium	Low
	Orifice Area (in^2)	
0.22	0.66	1.10
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.22	**0.66**	**1.10**
	Orifice Diameter (in)	
0.53	**0.91**	**1.18**

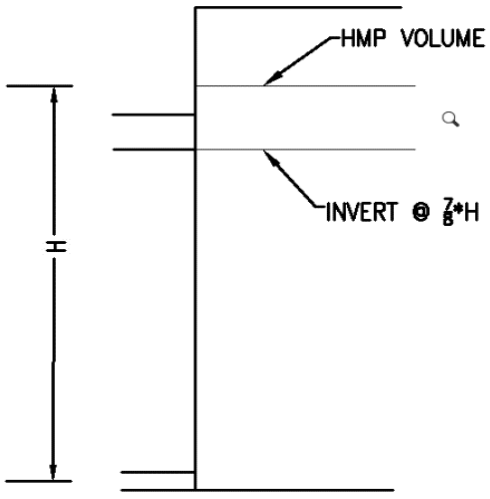


Table G.2-2: Unit Runoff Ratios for Sizing Factor Method

Unit Runoff Ratios for Sizing Factor Method					
Rain Gauge	Soil Group	Cover	Slope	Q_2 (cfs/acre)	Q_{10} (cfs/ac)
Lake Wohlford	A	Scrub	Low	0.136	0.369
Lake Wohlford	A	Scrub	Moderate	0.207	0.416
Lake Wohlford	A	Scrub	Steep	0.244	0.47
Lake Wohlford	B	Scrub	Low	0.208	0.414
Lake Wohlford	B	Scrub	Moderate	0.227	0.448
Lake Wohlford	B	Scrub	Steep	0.253	0.482
Lake Wohlford	C	Scrub	Low	0.245	0.458
Lake Wohlford	C	Scrub	Moderate	0.253	0.481
Lake Wohlford	C	Scrub	Steep	0.302	0.517
Lake Wohlford	D	Scrub	Low	0.253	0.48
Lake Wohlford	D	Scrub	Moderate	0.292	0.516
Lake Wohlford	D	Scrub	Steep	0.351	0.538
Oceanside	A	Scrub	Low	0.035	0.32
Oceanside	A	Scrub	Moderate	0.093	0.367
Oceanside	A	Scrub	Steep	0.163	0.42
Oceanside	B	Scrub	Low	0.08	0.365
Oceanside	B	Scrub	Moderate	0.134	0.4
Oceanside	B	Scrub	Steep	0.181	0.433
Oceanside	C	Scrub	Low	0.146	0.411
Oceanside	C	Scrub	Moderate	0.185	0.433
Oceanside	C	Scrub	Steep	0.217	0.458
Oceanside	D	Scrub	Low	0.175	0.434
Oceanside	D	Scrub	Moderate	0.212	0.455
Oceanside	D	Scrub	Steep	0.244	0.571
Lindbergh	A	Scrub	Low	0.003	0.081
Lindbergh	A	Scrub	Moderate	0.018	0.137
Lindbergh	A	Scrub	Steep	0.061	0.211
Lindbergh	B	Scrub	Low	0.011	0.134
Lindbergh	B	Scrub	Moderate	0.033	0.174
Lindbergh	B	Scrub	Steep	0.077	0.23
Lindbergh	C	Scrub	Low	0.028	0.19
Lindbergh	C	Scrub	Moderate	0.075	0.232
Lindbergh	C	Scrub	Steep	0.108	0.274
Lindbergh	D	Scrub	Low	0.05	0.228
Lindbergh	D	Scrub	Moderate	0.104	0.266
Lindbergh	D	Scrub	Steep	0.143	0.319

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

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Project Name: TIVYAN RESIDENCE

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☒ Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Maintenance Agreement (Form DS-3247) (when applicable)	☐ Included ☒ Not Applicable

Attachment 3a

	PROPOSED OPERATION AND MAINTENANCE PROCEDURE DETAILS (LID/SITE DESIGN AND SOURCE CONTROL BMPs)				
	O&M RESPONISBLE PARTY DESIGNEE : Owner				
	ROUTINE ACTION	**MAINTENANCE INDICATOR**	**FIELD MEASUREMENT**	**MEASUREMENT FREQUENCY**	**MAINTENANCE ACTIVITY**
LID/SITE DESIGN: - LANDSCAPE/PLANTER AREA	REFUSE/TRASH PICK-UP, MOWING, FERTILIZER	TRASH, TALL GRASS, WEDS, DEAD OR POORLY GROWING LANDSCAPE	VISUAL	BIWEEKLY	REMOVE TRASH & DEAD VEGETATION, REMOVE WEEDS, MOW AND APPLY FERTILIZER
SOURCE CONTROLS:					
- STREET/SIDEWALK SWEEPING	SWEEPING REGULARLY	DIRT ACCUMULATION	VISUAL	MONTHLY	REMOVE ACCUMULATED DIRT USING APPROPRIATE SWEEPING METHOD
- IRRIGATION SYSTEM	REPAIRING OR REPLACING SPRINKLERS	EFFECTIVENESS LOSS, BROKEN OR MALFUNCTIONING	VISUAL	MONTHLY	CHECK SYSTEM PRESSURE, REPAIR SPRINKLERS OR LINES AS NEEDED

Attachment 3a

PROPOSED OPERATION AND MAINTENANCE PROCEDURE DETAILS (POLLUTANT CONTROL BMPs)

O&M RESPONISBLE PARTY DESIGNEE : Owner

	ROUTINE ACTION	MAINTENANCE INDICATOR	FIELD MEASUREMENT	MEASUREMENT FREQUENCY	MAINTENANCE ACTIVITY
TC BMP: - BIOFILTRATION BMP	INSPECT FOR STANDING WATER AND DRAINAGE PROBLEMS	WHEN WATER STANDS BETWEEN STORM AND REMAINS ON THE SURFACE MORE THAN 48 HRS AFTER A STORM	VISUAL	BIANNUALLY	CHECK FOR CLOGGED OR SLOW-DRAINING SOIL MEDIA, A CRUST FORMED ON THE TOP LAYER, OR OTHER CAUSES OF INSUFFICIENT FILTERING TIME AND RESTORE PROPER FILTRATION CHARACTERISTICS. REMOVE SEDIMENT OR TRASH BLOCKAGE, OR ADD UNDERDRAIN IF NECESSARY
	INSPECT FOR VEGETATION	DEAD, DISEASED AND/OR OVERGROWN VEGETATION	VISUAL	BIANNUALLY	REMOVE AND REPLACE THE DEAD & DISEASED PLANTS WITH HEALTHY PLANTS. TRIM AND PURNE EXCESS VEGETATION
	INSPECT FOR MULCH	MULCH IS MISSING OR PATCHY IN APPEARANCE	VISUAL	BIANNUALLY	RE-MULCH ANY VOID AREAS, MAKE SURE MULCH IS EVEN IN APPEARANCE AT A DEPTH OF 3 INCHES. ADD FRESH MULCH LAYER EVERY 6 MONTHS. ONCE EVERY 2 TO 3 YEARS REMOVE OLD MULCH LAYER BEFORE APPLYING NEW ONE.

Project Name: TIVYAN RESIDENCE

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Preliminary Design / Planning / CEQA level submittal:

- Attachment 3a must identify:

  ☒ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual

- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

Final Design level submittal:

Attachment 3a must identify:

☐ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
☐ How to access the structural BMP(s) to inspect and perform maintenance
☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
☐ Recommended equipment to perform maintenance
☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For private entity operation and maintenance, Attachment 3b must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

☐ Vicinity map
☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
☐ BMP and HMP location and dimensions
☐ BMP and HMP specifications/cross section/model
☐ Maintenance recommendations and frequency
☐ LID features such as (permeable paver and LS location, dim, SF).

Project Name: TIVYAN RESIDENCE

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s):Click or tap here to enter text..

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s)Click or tap here to enter text..

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibits(s):Click or tap here to enter text.

(Owner Signature)

Click or tap here to enter text.

(Print Name and Title)

Click or tap here to enter text.

(Company/Organization Name)

Click or tap to enter a date.

(Date)

THE CITY OF SAN DIEGO

APPROVED:

(City Control engineer Signature

(Print Name)

(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDMENTS PER CIVIL CODE SEC. 1180 ET.SEQ

ATTACHMENT 4
COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

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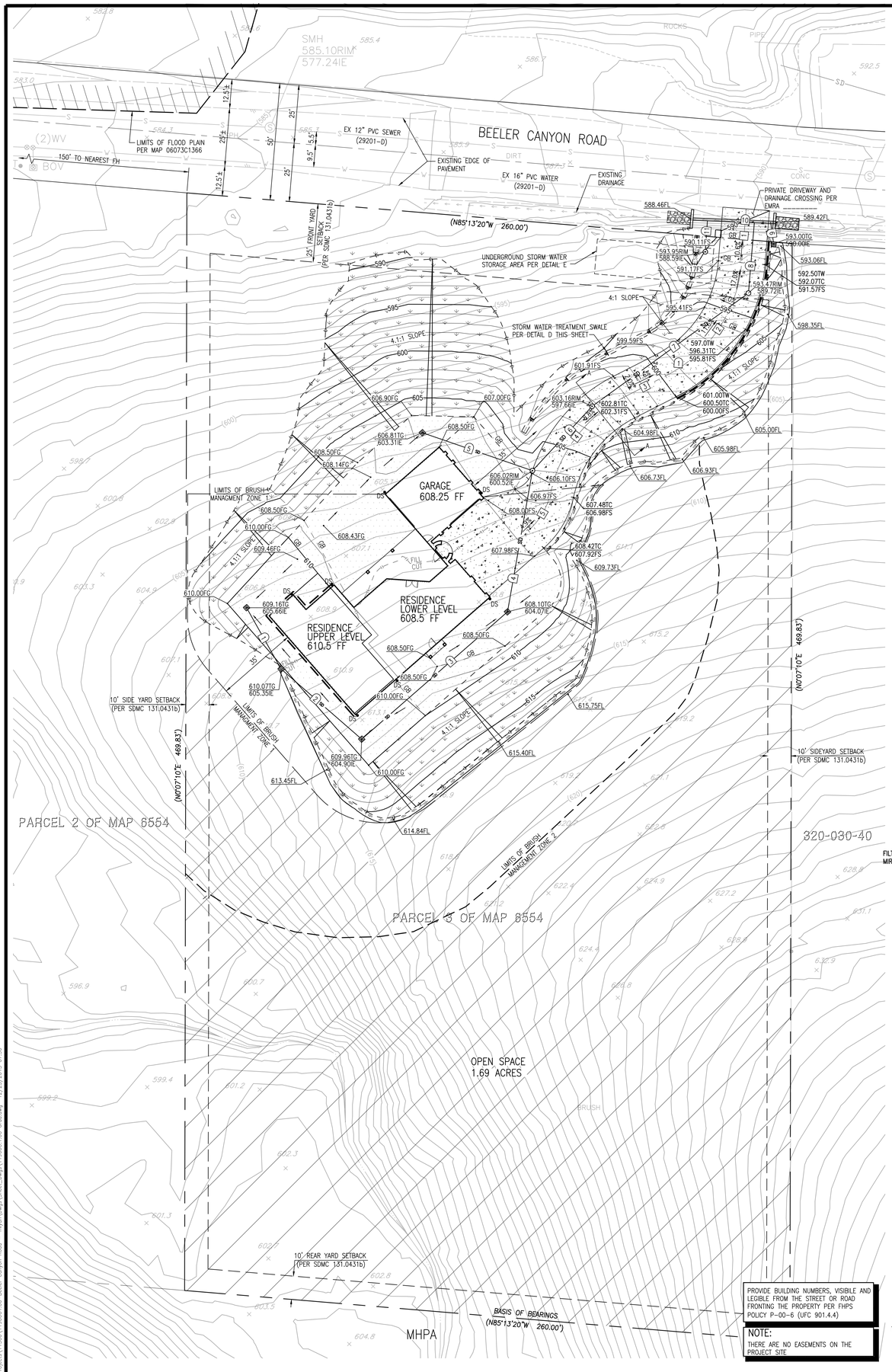
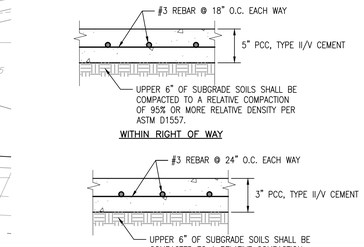
Project Name: TIVYAN RESIDENCE

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

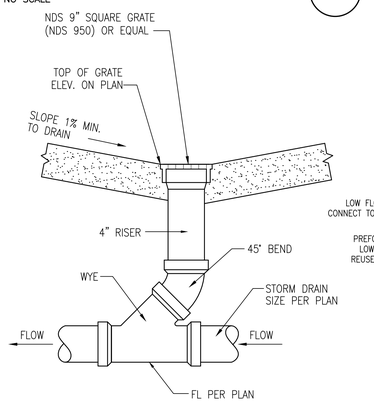
☒ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
☒ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
☒ Details and specifications for construction of structural BMP(s)
☒ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
☐ How to access the structural BMP(s) to inspect and perform maintenance
☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
☒ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
☐ Recommended equipment to perform maintenance
☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
☒ All BMPs must be fully dimensioned on the plans
☒ When propritery BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.



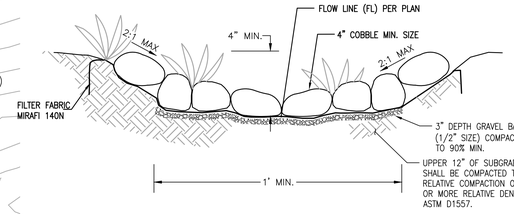


NOTES:
1. CONSTRUCT EXPANSION JOINTS AT CURB RETURNS, ADJACENT TO STRUCTURES AND AT 45' INTERVALS. (SEE SDRSD G-10).
2. CONSTRUCT CONTROL JOINTS PER SDRSD G-10, MAXIMUM SPACING SHALL BE 8' ON CENTER IN EACH WAY.
3. CONCRETE SHALL HAVE A MEDIUM BROOM FINISH.
4. CONCRETE SHALL BE 4000 PSI IN 28 DAYS.
5. THE ABOVE PAVEMENT SECTION IS BASED ON GEOTECHNICAL RECOMMENDATIONS. THE SECTION CAN BE REPLACED WITH AN ASPHALT PAVEMENT SECTION PROVIDED THAT AN R-VALUE TEST IS PERFORMED AND A NEW GEOTECHNICAL PAVEMENT RECOMMENDATION.

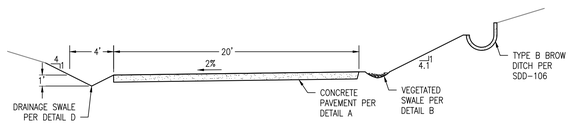
CONCRETE PAVEMENT SECTION(PVT) AUTOMOBILE DRIVEWAY — A
NO SCALE



AREA DRAIN (PRIVATE) — B
NO SCALE



ROCK/VEGETATED SWALE (PVT) — C
NO SCALE



SECTION A–A
NO SCALE

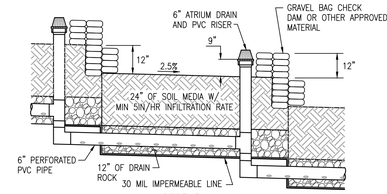
STORM DRAIN DATA

NO	BEARING/DELTA	RADIUS	LENGTH	SLOPE (%)	SIZE/TYPE (CLASS)
1	N29°23'52"W	--	30.14'	1.00	6" PVC
2	N48°58'10"W	--	45.73'	1.00	6" PVC
3	N48°52'01"E	--	82.86'	1.00	6" PVC
4	N1°01'03"E	--	61.36'	5.79	6" PVC
5	N70°58'41"E	--	49.84'	5.59	6" PVC
6	N42°50'29"E	--	37.59'	7.60	6" PVC
7	N54°05'29"E	--	82.61'	9.61	6" PVC
8	N04°46'40"E	--	30.21'	1.00	6" PVC
9	N07°46'24"W	--	9.68'	5.00	8" PVC
10	N85°46'41"W	--	35.34'	2.71	18" RCP (1500-D)
11	N03°57'51"E	--	13.30'	1.00	6" PVC

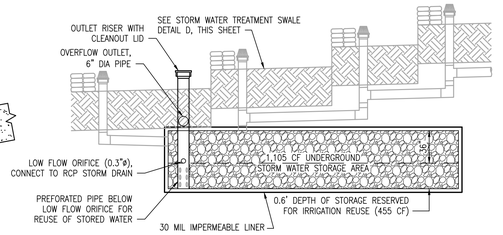
CENTERLINE DATA

NO	BEARING/DELTA	RADIUS	LENGTH	TYPE
1	N 04°46'40" E	--	23.11'	CENTERLINE
2	D=58°13'00"	60.00'	60.96'	CENTERLINE
3	N 62°59'40" E	--	20.00'	CENTERLINE
4	D=50°52'30"	60.00'	53.28'	CENTERLINE
5	D=36°39'55"	30.00'	19.20'	CENTERLINE

10 0 20 40
SCALE IN FEET
1 inch = 20 ft.



STORM WATER TREATMENT SWALE — D
NO SCALE



STORM WATER STORAGE AREA — E
NO SCALE

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND THE SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.

STANDARD SPECIFICATIONS:

DOCUMENT NO.	DESCRIPTION
PITS070112-01	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK), 2012 EDITION
PITS070112-02	CITY OF SAN DIEGO STANDARD SPECIFICATIONS FOR PUBLICWORKS CONSTRUCTION (WHITEBOOK), 2012 EDITION
PITS070112-04	CALIFORNIA DEPARTMENT OF TRANSPORTATION MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, 2012 EDITION
PITS070112-06	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S CUSTOMARY STANDARD SPECIFICATIONS, 2010 EDITION

STANDARD DRAWINGS:

DOCUMENT NO.	DESCRIPTION
PITS070112-03	CITY OF SAN DIEGO STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, 2012 EDITION
PITS070112-05	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S CUSTOMARY STANDARD PLANS, 2010 EDITION

LEGEND

PROPERTY LINE
EXISTING SPOT ELEVATION 500.00
EXISTING CONTOURS 96
NEW SPOT ELEVATION 500.00 555.00FS
NEW CONTOURS 96 95
LIMIT OF WORK/DEVELOPMENT
VEGETATED/ROCK SWALE PER DETAIL C
BROW DITCH TYPE B PER SDRSD SDD-106
HEADWALL SD
AREA DRAIN (PVT) PER DETAIL B SD
SEWER TYPE CLEAN OUT PER DETAIL A/SHT 3 SD
GRADED SLOPE
GRADE BREAK
FIRE RATED OPENINGS FOR ALTERNATIVE COMPLIANCE
CONCRETE PAVEMENT PER DETAIL A
TYPE 2 RIP RAP PER SDRSD SDD-104 ENERGY DISSIPATER L=10', W=4'
GRAVITY RETAINING WALL, (MAX H = 3') PER SDRSD C-9(TYPE B)
TURF/LANDSCAPE
LANDSCAPED SLOPE
HOUSE/BUILDING

STORM WATER NOTES:

- RUNOFF FROM ROOF WILL BE DIRECTED TO LANDSCAPE AREAS FOR TREATMENT PRIOR TO CAPTURE BY THE STORM DRAIN SYSTEM.
- AT THE STORM DRAIN DISCHARGE LOCATION, A SUITABLE ENERGY DISSIPATOR IS TO BE INSTALLED TO REDUCE THE DISCHARGE TO NON-ERODIBLE VELOCITIES.
- NO ADDITIONAL RUN-OFF IS PROPOSED FOR THE DISCHARGE LOCATION.
- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE ONWER/PERMITTEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE SATISFACTORY TO THE CITY ENGINEER.
- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.
- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT THE OWNER/PERMITTEE SHALL SUBMIT A WATER POLLUTION CONTROL PLAN (WPCP). THE WPCP SHALL BE PREPARED IN ACCORDANCE WITH THE GUIDELINES IN APPENDIX E OF THE CITY'S STORM WATER STANDARDS MANUAL.
- THIS PROJECT WILL NOT DISCHARGE ANY INCREASE IN STORM WATER RUN-OFF ONTO THE EXISTING HILLSIDE AREAS OR ADJACENT PROPERTIES.

TOPOGRAPHY NOTES

- TOPO SOURCE: PHOTO GEODETIC
  - DATE: 5/20/2006
  - BENCHMARK: POMERADO ROAD & SEMILLON BLVD; NWBP
  - ELEVATION: 781.635 MSL
- VERIFIED BY BWE, INC. 3/10/2014

GRADING TABLE

TOTAL DEVELOPED AREA 35,520 SF
(INCLUDING ZONE 1 BRUSH MANAGEMENT)

TOTAL GRADED AREA	32,770 SF
BUILDING AREA	3,747 SF
IMPERVIOUS/HARDSCAPE	4,710 SF
CUT	1,450 CY
FILL	1,030 CY
CUT/FILL (EXPORT)	420 CY
MAX FILL DEPTH	4.8'
MAX CUT DEPTH	4.8'

EARTHWORK QUANTITIES SHOWN ARE FOR BONDING AND PERMIT PURPOSES ONLY. ACTUAL QUANTITIES MAY VARY WITH SHRINKAGE, LOSSES DUE TO CLEARING OPERATIONS, REMOVAL & RECOMPACTION, SETTLEMENT, ETC. CONTRACTOR SHALL VERIFY EXACT QUANTITIES PRIOR TO BIDDING. QUANTITIES DO NOT INCLUDE TRENCHING, EXISTING IMPROVEMENT DEMOLITION, OVEREXCAVATION REMOVALS OR SLOPE CUTBACKS.

REVISIONS:

BWE
BURKETT&WONG ENGINEERING
9449 BALBOA AVE. STE 270
SAN DIEGO, CA 92123 * (619) 299-5550

BUILDER:

TITLE: SITE PLAN AND GRADING PLAN

PROJECT AND LOCATION: TIYAN RESIDENCE PARCEL 3 OF MAP 6554

REGISTERED PROFESSIONAL ENGINEER — CARL M. FIORICA — No. 64715 — Exp. 06-30-17 — CIVIL — STATE OF CALIFORNIA

DRAWN BY CF
CHECKED BY
DATE 04/2015
JOB NO. 11900U

SHEET NUMBER 2

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ATTACHMENT 5
DRAINAGE REPORT

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

N/A
SUBMITTED SEPARATELY

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ATTACHMENT 6
GEOTECHNICAL AND GROUNDWATER INVESTIGATION REPORT

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

N/A
PRELIMINARY DESIGN (SDP) SUBMITTAL

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