COMMENTS and RESPONSES on the FINAL EIR

This section includes comments received on the Final Environmental Impact Report (EIR) for the Zone 2 Landslide Moratorium Ordinance Revisions and responses to those comments. While there is no obligation under the California Environmental Quality Act (CEQA) to provide responses to comments on a Final EIR, the City has elected to do so in the interests of full disclosure and public participation as related to the Zone 2 Landslide Moratorium Ordinance Revisions project. The following comment letters and emails were received and are included.

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1.	Tony Baker	15
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No public or private agencies or citizens groups submitted written comments on the Final EIR.

These responses are being provided as supplemental information for the City Council in an appendix (Appendix H) to the Final EIR, but are not part of the Final EIR. CEQA does not require lead agencies to prepare responses to comments received on a Final EIR.

I. Topical Responses to Comments on the Final EIR

This subsection includes the Topical Responses, which provide responses to recurring written comments, or themes common to multiple comments, received by the City relating to the Final EIR. These responses should be considered along with Section 8.1 of the Final EIR, which addresses similar topics, some in greater detail. This is because most of the comments received on the Final EIR were similar to those received on the Draft EIR.

a. Topical Response: Geology.

These topical responses should be considered in conjunction with the topical responses in the Final EIR related to geology, which can be found in Section 8.1.b of the Final EIR.

1. Factor of Safety for Slopes.

Global Slope Stability.

The EIR and subsequent responses have indicated that the standard applied to the Zone 2 area from a global slope stability perspective is not the industry standard, but that the standard being applied appears reasonable under the circumstances.

With regard to global slope stability review, it is noteworthy that slope stability analysis is the synthesis of a qualitative and quantitative review process in which the resultant study is a value that compares the resisting forces to the driving forces (the higher the value, the greater the resisting forces). One of the main purposes for this value is that it results in an easy to convey number that allows for quick comprehension of the stability of slopes; the standard of practice is to try to achieve slopes that have 1.5 times greater resisting forces than driving forces; slope stability factor-of-safety of 1.5.

However, it should not be assumed that because a slope is calculated to have a stability factor of less than 1.5 that it is not stable; such a conclusion would be untrue. Slopes with factors of safety greater than 1.0 are generally assumed stable; they simply do not meet the standard of practice generally applied in southern California. Since the factor of safety for the Zone 2 area is unclear, applying a standard that leads with a qualitative approach instead of quantitative, but that takes into consideration the work done by previous studies including the various quantitative analyses and compares them to the potential effects to Zone 2 and adjacent areas due to the build-out of the Zone 2 area is reasonable in the opinion of the City's geology experts.

For this study, LGC Valley reviewed previous studies and conclusions by others with regard to the potential impact of the additional build-out of all Zone 2 area lots. Based on previous studies, due to the size and mass of the Ancient Portuguese Bend Landslide (APBL) and the various methods of reviewing qualitatively and quantitatively the development and adjacent area, these additional units would not affect global slope stability regardless of the current factor-of-safety for Zones 2, 5 or 6. Thus again, it is reasonable in this case to employ the qualitative approach for reviewing Zone 2 in lieu of the standard quantitative approach, especially since there is no agreement upon a quantitative value.

The court's Monks decision finding that the requirement that individual property owners prove a zone-wide factor of safety of 1.5 constituted a taking of property is a special case. At bottom, numerous independent geologic and geotechnical reviewers could not agree entirely on the complex geology and more importantly on the method in which to analyze the landslide mass and geology; slope stability review is expensive and difficult in complex geologic terrain.

The court generally found geologic merit in the interpretations and methods of review of several independent studies and generally concluded (from a geotechnical perspective) that 1) there was not and would not be a consensus in how to analyze the project area, and 2) that it appeared that the addition of more homes in Zone 2 would not alter the methods of review or their results, because the weight contribution from these home sites is insignificant in gross slope stability review.

Finally, it should be clear that neither the EIR nor the proposed ordinance revisions recommend that the city abandon the industry standard in lieu of the Monks Standard for any other project that is located outside of Zone 2. The city should not abandon the 1.5 factor-of-safety for slopes standard for other areas under its purview. This special case should not be used by others for establishing a new standard elsewhere because for many sites this standard can be analyzed, and because this special case is not intended to be used as a way to forego the work of researching and reviewing landslides and slope stability, but rather to bring some parity to the unique circumstances related to the various lots in Zone 2.

Local On-Lot Slope Stability.

Though global slope stability does not appear to be a factor in the buildout of Zone 2, local slope stability may be an issue for individual on-lot conditions. Each lot owner planning to construct a residence is required to have their property evaluated by a licensed geotechnical consultant in order to assess the potential risk from on-lot slope stability due to local on-lot grading/ construction. Such work is required to be reviewed by the City or City's consulting geologist to help ensure that potential local on-lot conditions are being addressed and that site grading would not adversely affect the stability of the particular lot that is the subject of the application or the stability of adjacent properties. The geologic/geotechnical section of the EIR is not a lot-specific document nor should it be used to review lot-specific issues because further project-specific information is necessary to undertake a meaningful review and analysis.

It should be noted that this recommendation is not intended to result in a review of the deep-seated global geologic conditions within the APBL, or to review the geologic conditions across many adjacent lots, but rather the near-surface surficial slope conditions and potential slope instabilities that could occur due to site grading and minor changes of lot elevation.

2. Inherent Risk, Groundwater, and Relationship Between Zones.

Building atop landslides carries risk (in this case, the build-out of Zone 2 atop the APBL). The risk to Zone 2 arises primarily from adjacent areas which may be further destabilized, thus lowering the quantitatively calculated factor-of-safety for Zone 2, which the EIR interprets is likely somewhere between 1.1 and 1.5.

Because Zone 2 slope stability is dependent in part on the stability of adjacent areas, primarily Zones 5 and 6 as these areas have historic land movement associated with landslides and they abut Zone 2, that major landslide movement in Zones 5 and 6 could impact Zone 2; this is the primary risk interpreted to Zone 2.

From a geotechnical perspective the item of greatest concern to Zone 2 and those areas adjacent to Zone 2 (especially Zones 5 and 6 as they are recently activated portions of the APBL) is the potential addition of water into the landslide mass, including through conduits (fissures) within Altamira Canyon in Zone 5, the main drainage for Zone 2. As mitigated, buildout under the proposed ordinance revisions would not add significant quantities of water into the landslide mass as compared to existing conditions.

As indicated by several other authors (Cotton Shires, 2001; Robert Stone 1979; Dick Meehan, 1984), the most economical and/or feasible manner in which to control land movement in the local area is to maintain low ground water levels in all landslide masses. Currently, numerous pumping wells are located within Zone 2 and Zones 5 and 6 which slowed landslide progression within Zones 5 and 6 (though there is some controversy whether Zone 2 has been directly impacted from movement in adjacent areas). Regardless, the EIR concludes that maintaining low groundwater levels is the primary consideration for the entire Portuguese Bend Community; therefore it is recommended that all property owners who build within Zone 2 join the community in striving to maintain these wells.

3. Soil Creep.

Near-surface soil on sloping ground undergoes movement; this is defined as creep. This creep effect occurs not only atop ancient landslide masses, but also atop soil slopes, engineered fill and various types of bedrock. Therefore, very small movements measured over time for the Zone 2 area are not surprising because the ground is sloping; the Portuguese Bend area is not a flat site like the Los Angeles Basin or Oxnard Plain. Further, site soils appear generally expansive in nature and expansive soils can be even more prone to creep effects than coarse-grained sandy soils.

LGC Valley reviewed the GPS data within the referenced GeoKinetics, 2007 report. Based on that review of the data, LGC Valley interprets that the measured changes within Zone 2 over time are very small – on the order of tenths to hundredths of an inch per year – and are in line with creep-style movements, not re-activation along a basal landslide rupture surface which would likely show significantly greater movement like those observed in the Abalone Cove Landslide area and Portuguese Bend Landslide area, among others.

4. Road Integrity and Construction Traffic.

The pavement section for the various roadways within the Portuguese Bend community is unknown. Thus it is unclear how future construction traffic would affect these roads. However, it is reasonable to assume that additional traffic above the norm would increase road wear that may include depressions ("bird baths"), alligator-style cracking, longitudinal cracking and other signs of wear.

With respect to slope stability, in general, traffic loads on slopes are considered transitory, that is they move and do not stay at one location for long periods of time like a house or road fill, and therefore such review is held to a much lower standard than long term slope stability review. Further, loads from vehicles such as trucks typically apply a load to the near surface

soils only; these loads do not transmit to the geology at depth and are considered to have a negligible or zero effect as they are temporary in nature.

5. Seismic Hazard Potential.

The risk from seismic hazards is unchanged whether the Zone 2 buildout occurs or not; the local area will experience shaking from a nearby earthquake during the design life of structures within the Portuguese Bend Community. The potential shaking to structures from seismic forces is incorporated into the structural elements of structures and determined in accordance with the latest building code by the geotechnical consultants hired by future home builders which must be reviewed and approved by the City.

b. Topical Response: Hydrology, Water Quality and Drainage.

1. Feasibility of Mitigation Measure HWQ-4.

Several commenters opined that the ability to mitigate infiltration and runoff impacts on a lot by lot basis would be difficult or impossible to achieve. Some commenters stated that zero runoff/infiltration from the sites would be impossible. However, the Final EIR does not propose zero runoff/infiltration from the potential new residences. Rather, no substantial change or increase in flow rate volumes, infiltration, and velocity after development of a lot is the intent of Mitigation Measure HWQ-4.

The ability to design a system that maintains post-development runoff and infiltration rates at pre-development levels is a relatively common requirement in Southern California, and procedures have been developed to achieve this goal. A detailed hydrological analysis prepared by a licensed civil engineer and approved by the City demonstrating no impacts on a lot by lot basis would be required for each subject lot.

There is substantial literature available nationally as well as locally regarding techniques for maintaining post-development hydrology at pre-development levels. Two manuals and calculation tools developed for Southern California includes the "County of Los Angeles Low Impact Design Manual (LID)," originally published in 2009 with the County's LID Ordinance and updated in 2014. Additionally, the "Low Impact Development Manual for Southern California" was prepared by The Low Impact Development Center, Inc. for the Southern California Stormwater Monitoring Coalition in cooperation with the State Water Resources Control Board. These manuals may be accessed at the following two web addresses, respectively:

- http://dpw.lacounty.gov/wmd/dsp_LowImpactDevelopment.cfm, and
- https://www.casqa.org/resources/lid/socal-lid-manual.

2. Existing Drainage Deficiencies and Erosion.

The Final EIR, in Section 4.8, *Hydrology and Water Quality*, acknowledges the lack of capacity in the existing streets and culverts for pre and post-development runoff rates and provides mitigation measures to eliminate increases in runoff and/or infiltration rates from the proposed

development of the 47 lots. Regarding the erosion in Altamira Canyon caused by upstream improvements, the Final EIR and Technical Appendix identify and provide mitigation for the impacts that would result from buildout of the 47 lots. No significant increase in runoff rates and volumes would occur with implementation of the identified mitigation measures. Impacts from the existing offsite improvements are acknowledged but not analyzed as part of the proposed project as they are captured as part of the baseline condition.

Several comments took issue with the assumption that the subdivision map from 1949 was intended to address the drainage for all of the lots created. The City is not aware of any specific drainage plan for the area, which would have been processed by the County prior to incorporation of the City. However, pursuant to County Ordinance No. 4478, adopted in 1945, and in effect in 1949 when the underlying subdivision was approved by the County, a subdivider was, among other things, required to "improve or agree to improve all land dedicated or to be dedicated on a final map for streets, highways, public ways, and easements with such improvements are necessary for the general use of the lot owners in the subdivision **and local neighborhood traffic and drainage needs**." (Los Angeles County Ordinance No. 4478, Section 191, related to subdivision improvement requirements (emphasis added.)) Not surprisingly, a similar requirement remains in effect in Los Angeles County Code of Ordinances Section 21.32.010.

The Los Angeles County ordinance requirement to make improvements necessary to meet drainage needs, which was in effect when the subdivision map for the area was approved by the County, supports the statements and assumptions in the Final EIR. With no evidence to the contrary having been presented, it is reasonable to assume that the County enforced its requirements at the time of map approval, and that the drainage needs of the subdivision were accommodated in the subdivision design.

c. Topical Response: Traffic and Circulation.

1. Access Roadways and Pavement Integrity.

The Portuguese Bend Community is a private development and all roadways, including the two main access roadways of Peppertree Drive and Narcissa Drive, are private streets. As such, the City of Rancho Palos Verdes does not have the responsibility nor the authority to maintain the roadways which were originally reviewed and approved by the County of Los Angeles. In addition, the State of California Vehicle Code specifically states in Section 21107.5(b) "No ordinance or resolution enacted under subdivision (a) shall apply to any road on which the owner has erected a notice of a size, shape and color as to be readily legible during daylight hours from a distance of 100 feet to the effect that the road is privately owned and maintained and that is not subject to public traffic regulations or control." Therefore, the Portuguese Bend Community and associated roadway system is private (as gates are provided north of Palos Verdes Drive South and the community is signed as such) and the City does not have the authority to enforce traffic regulations or maintain the roadways.

The Portuguese Bend Community Homeowner Association (PBCA) has the responsibility and authority to impose fees and assessments in order to maintain and improve facilities, including

the private roadway system. Therefore, the PBCA in its capacity as owners can study, monitor, and perform maintenance as required.

It is important to note that the roadway system was originally engineered for full development and buildout of the residential tract and as such the street improvement plans were prepared to accommodate the envisioned loading, including construction vehicles associated with the construction of the envisioned buildout, as originally reviewed and approved by the County of Los Angeles. Although several commenters questioned this, no evidence to the contrary was provided in the comments. It is reasonable to assume that the roads were designed to serve the subdivision, even if the approved plans from over 60 years ago are not readily available for reference. At the time of approval, roads were designed by engineers and reviewed by the County through the land division entitlement process as it existed at that time, to provide sufficient access to the lots in the development.

The County subdivision ordinances in effect at the time of map approval required, among other things, that the "subdivider shall improve or agree to improve all land dedicated or to be dedicated on a final map for streets, highways, public ways, and easements with such improvements are necessary for the general use of the lot owners in the subdivision **and local neighborhood traffic…."** (Los Angeles County Ordinance No. 4478, Section 191 (Emphasis added.))

The Los Angeles County ordinance requirement to make improvements necessary to meet local neighborhood traffic needs, which was in effect when the subdivision map for the area was approved, supports the statements and assumptions in the Final EIR. With no evidence to the contrary having been presented, it is reasonable to assume that the County enforced its requirements at the time of map approval, and that the traffic needs of the subdivision were accommodated in the subdivision design.

Finally, the traffic analysis in the EIR considered the roads as they exist today, applied modern construction trip generation factors, and did not identify significant impacts within Zone 2.

2. Emergency Access and Evacuation.

Existing Setting.

The Portuguese Bend area of Rancho Palos Verdes is a private community that is served by two primary access points; one access point via Narcissa Drive (on the west end) and one access point via Peppertree Drive (on the east end). Both of these access points are gated north of Palos Verdes Drive South and are used by residents to access other local roads and their respective homes. Field observations have been conducted in order to verify existing signage, traffic control and pavement widths associated with the private roadways within the Portuguese Bend area. Narcissa Drive has a pavement width of roughly 23 feet north of the existing gate (north of Palos Verdes Drive South) and the pavement width generally varies between 22 feet and 24 feet in width along its length. Peppertree Drive has a pavement width of roughly 22 feet north of the existing gate (north of Palos Verdes Drive South) and the pavement width generally varies between 22 feet and 24 feet in width along its length. Based on field observations conducted along the private roadways it is recommended that these access roads

be posted with "No Parking – Fire Lane" signs. The roadways are of sufficient width to allow large vehicles (i.e., fire engine type trucks) to access the Portuguese Bend area. It should also be noted that the majority of the roadways are not fully improved (e.g., with formal curb and gutter) thus, the above widths and measurements reflect the edge of pavement widths. Additional (i.e., unimproved) width is available along many portions of the roadways, however.

Two fire stations are located within the project study area: Fire Station #53 (located at 6124 Palos Verdes Drive South, Rancho Palos Verdes, CA 90275) and Fire Station #83 (located at 83 Miraleste Plaza, Rancho Palos Verdes, CA 90275). In addition, it is important to note that the County's Division I Batallion 14 Headquarters is located at Fire Station #106 in Rolling Hills Estates. These first response teams will utilize Palos Verdes Drive South to access either Narcissa Drive or Peppertree Drive as well as other fire access roads in order to respond to a fire incident. Further, it expected that the gates located at both access points will be set/controlled to remain open during an evacuation period.

Emergency Access/Evacuation Background.

By way of background, the City contracts with Los Angeles County for both fire and public safety services and emergency "first responder" responsibilities are implemented by the County without the requirement or need of City staff involvement. In the case of the August 27, 2009 brush fire in the Portuguese Bend area of the City, while the County was the primary responding agency, the City did play an important and supporting role during the incident to disseminate information to the residents, City Council and City staff. A summary report following the incident was prepared and presented to the City Council (report dated October 20, 2009). That report provided an overview of lessons learned as well as details regarding the Los Angeles County Emergency Mass Notification System, emergency communications procedures, the management and coordination of recovery operations, among others.

As part of the emergency evacuation analysis contained in the Final EIR, LLG conducted an exhaustive review of publications within the transportation planning industry as they relate to modeling a potential evacuation scenario. It became apparent early on the very little modeling analysis has been done and through LLG's research none were found for a community of less than 200 homes.

One modeling analysis, entitled *Modeling Small Area Evacuation: Can Existing Transportation Infrastructure Impede Public Safety?*[1], prepared by Vehicle Intelligence and Transportation Analysis Laboratory, University of California, Santa Barbara, was prepared in response to the 1991 Oakland Hills Fire, in which 25 lives were lost. Specifically, the Mission Canyon Hills neighborhood totaled over 400 homes and different evacuation scenarios were modeled and this approach was also utilized for analysis of a potential evacuation of the Portuguese Bend community.

[1] *Modeling Small Area Evacuation: Can Existing Transportation Infrastructure Impede Public Safety?*, Vehicle Intelligence and Transportation Analysis Laboratory, University of California, Santa Barbara, April 2002.

Summary of Emergency Access and Evacuation Assumptions.

As stated in LLG's May 12, 2011 memorandum and incorporated into the Final EIR, the following parameters and assumptions were identified prior to conducting the modeling analysis:

1. A total of approximately 165 homes are planned within the Portuguese Bend community/association, including 111 homes in the project area (i.e., which includes the 47 additional single family homes analyzed as part of the proposed project as well as 64 developed lots within the project area). The number of existing homes was documented through the use of aerial photography.

2. Two main points of ingress and egress to/from the community (i.e., to access Palos Verdes Drive South) exist. The access points are via Narcissa Drive and Peppertree Drive.

3. Each household was conservatively assumed to <u>evacuate two vehicles each</u>.

4. Each home (total of 165 homes) was assumed to be occupied at the time of an evacuation and that a total of at least two persons of driving age would also be present at the time of evacuation. This is very conservative in that it does not account for homeowners who are away at work, out running errands, or out of town due to varying circumstances (e.g., away on vacation).

5. The analysis assumes that no "early" or voluntary evacuations would occur. This is very conservative in the Los Angeles County Fire and/or Sheriff's will in all likelihood request voluntary evacuations once a brush fire has been confirmed to break out near the vicinity of the Portuguese Bend community.

6. It is assumed that traffic control will be present throughout the Portuguese Bend community during a mandatory evacuation and that exiting motorists on Narcissa Drive and Peppertree Drive at Palos Verdes Drive South will have priority and that through traffic along Palos Verdes Drive South will be diverted much in advance of these locations.

7. As part of controlling access to and from an evacuation area for a wildland fire within the Portuguese Bend area, it is assumed that nearby roadways will be closed by law enforcement agencies to inbound traffic with the exception for public safety vehicles. <u>Therefore, a minimum of one travel lane will remain open at all times</u>. Any closed roads or traffic closure points would be identified by County emergency personnel and fire staging areas would be set up for public safety officials and equipment. These staging areas would be located where resources can be placed while waiting for tactical assignment to combat wildland fires.

LLG's emergency evacuation analysis is consistent with modeling evacuation profiles used within the transportation planning industry. Specifically, it was assumed that after a mandate to evacuate is disseminated to the community the following exiting profile would occur:

- Within the first five minutes, thirty percent (30%) of households would evacuate,
- Within the second five minutes, fifty percent (50%) of households would evacuate, and
- Within the third five minutes, the remaining twenty percent (20%) of households would evacuate

Given past modeling contained in the above-referenced document, a discharge rate of roughly 75 vehicles per minute was assumed and assumes traffic control is present.

Emergency Evacuation Evaluation.

Summaries of the emergency access and evacuation evaluation are contained in LLG's May 12, 2011 memorandum as well as within the Final EIR. The evaluation and analysis determined the estimated amount of time (i.e., clearing time) needed for area residents of the Portuguese Bend community to evacuate the area in the event of a major incident (e.g., wildland fire). While the term "clearing time" was utilized, comments provided after the Final EIR was published as well as those expressed at the City Council's May 6, 2014 public hearing, indicated that the general public misunderstood the results to infer a conclusion that the entire Portuguese Bend Community could evacuate in 1.1 minutes. A clarification is therefore needed and is provided in the following paragraphs.

It was concluded in the LLG analysis that the entire Portuguese Bend Community could evacuate in less than 15 minutes. One commenter noted that the total time it takes to traverse the local street system from his home to reach the Narcissa Drive and Peppertree Drive gates at Palos Verdes Drive South is 3 and 3.5 minutes, respectively. The commenter noted that this travel time was obtained by driving the prevailing posted speed limit (25 miles per hour in most cases) and stopping at each intersection signed as such with little or no other traffic present. Given that the LLG analysis assumes traffic control will be present during the time of a potential emergency evacuation, it is likely that motorists will not need to stop at every posted stop sign. The conclusion of less than 15 minutes to evacuate the entire Portuguese Bend community is very conservative. It is recommended within the industry that a total evacuation time of 20 minutes or less is ideal, but in no case should exceed 30 minutes.

One commenter questioned what would happen if one of two main access points is closed. While not modeled, one could infer that a doubling of evacuation time would occur. Should this be the case, the expected evacuation time might near 30 minutes, but should not exceed it. Further, based on a review of a paper entitled *Public Safety in the Urban-Wildland Interface: Should Fire-Prone Communities Have a Maximum Occupancy?*[2], prepared by the Center for Natural and Technological Hazards, University of Utah, the total number of access points were reviewed. A table was included that summarized the proposed number of minimum exits for interface communities and noted the following:

- For between 1-50 households, the minimum number of exiting roads is 1 with a maximum number of households per exit of 50

[2] *Public Safety in the Urban-Wildland Interface: Should Fire-Prone Communities Have a Maximum Occupancy?*, prepared by the Center for Natural and Technological Hazards, University of Utah, National Hazards Review, August 2005.

- For between 51-300 households (the Portuguese Bend community falls within this range), the minimum number of exiting roads is 2 with a maximum number of households per exit of 150

As shown in LLG's May 12, 2011 analysis, a total of 86 and 79 households are projected to exit via the Narcissa Drive and Peppertree Drive gateways. Thus, as these totals are below 100 households and well below the maximum number of households per exit of 150 households, the presence of two exiting roadways is appropriate and adequate.

Equestrian Evacuation.

The Los Angeles County Equine Response Team has previously addressed the City of Rancho Palos Verdes Equestrian Committee regarding the Fire Department's coordination and request regarding preplans for equine evacuation in case of a wildland fire. The Equine Response Team has sites that can be used for emergency equine evacuation pick-up, thus allowing the Equine Response Team to pick-up the horse/s and transport them to emergency shelters. Given that one inbound travel lane will be maintained during an evacuation period to allow for entry of emergency vehicles, equestrian evacuation will be possible.

Construction Traffic Implications During an Evacuation.

Several comments received on the Final EIR noted concern regarding possible implications of construction traffic during an emergency evacuation. As summarized above, it was determined that the evacuation of all 165 homes within the Portuguese Bend community could occur in <u>less than 15 minutes</u> and these findings are found to be within an acceptable range for evacuation purposes.

Based on the construction analysis contained in the Final EIR, it was conservatively determined that the maximum construction activity in terms of construction trip generation would occur during the building construction phase given the highly unlikely scenario of all 47 homes being under construction at the same time. Accounting for the addition of the construction worker and construction truck trip generation/vehicles (while subtracting the future resident vehicles from the evacuation analysis), the above evacuation clearance times would increase slightly. It should also be noted that the provisions for resident evacuation would also apply to construction-related vehicles and personnel. (In addition, construction trucks not already on site, if aware of an emergency, may choose not to enter the gates during an emergency.) Therefore, it can be concluded that these clearance times would increase by 18 seconds and 12 seconds for the Narcissa Drive and Peppertree Drive access points, respectively.

Additional Considerations.

Additional research had also been conducted by LLG with respect to existing emergency evacuation procedures. Residents are directed to several preparedness documents and procedures, such as those contained in the *Ready! Set! Go! Your Personal Wildfire Action Plan*, published by the County of Los Angeles Fire Department. Several fire protection plans for various communities have also been researched as part of this section.

Further, with intervention (i.e., traffic control) and education, evacuation problems can be avoided. First, education is important so that neighborhood residents know to park their vehicles facing the street during high fire risk periods. Second, education is needed to convince residents that taking all of their vehicles, while it would save personal property, would add additional time beyond what is absolutely needed to clear the neighborhood during an emergency. Residents can also take action (e.g., clearing brush) that may mitigate the extreme conditions of a wildfire near their homes. Finally, in their comments on the Draft EIR, the Fire Department did not raise this issue, which indicates that, as experts on safety and emergency access, their staff did not consider it a significant environmental impact.

3. Analysis of Future Cumulative Development.

As discussed in Section 4.10 (Traffic and Circulation Section of the Draft EIR), page 4.10-22 of the Draft EIR and Section 6.0 of the Traffic impact Study contained in Appendix G of the Draft EIR, the forecast of future pre-project conditions was prepared in accordance with procedures outlined in Section 15130 of the California Environmental Quality Act (CEQA) Guidelines. Specifically, the CEQA Guidelines provides two options for developing the future traffic volume forecast:

> "(A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the [lead] agency, or
>
> (B) A summary of projections contained in an adopted local, regional or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect. Such plans may include: a general plan, regional transportation plan, or plans for the reduction of greenhouse gas emissions. A summary of projections may also be contained in an adopted or certified prior environmental document for such a plan. Such projections may be supplemented with additional information such as a regional modeling program. Any such document shall be referenced and made available to the public at a location specified by the lead agency."

The traffic analysis is conservative in that for the future year 2020 pre-project condition, both option "A" and "B" have been incorporated into the analysis as outlined the CEQA Guidelines for purposes of developing the future year 2020 forecasts.

As stated on page 31 of the Traffic Impact Study, the status of other known development projects (related projects) in the area at the time of the preparation of the Draft EIR was researched at the City of Rancho Palos Verdes, City of Rolling Hills Estates, and City of Los Angeles. With this information, the potential impact of the proposed project could be evaluated within the context of the cumulative impact of all ongoing development. Based on that research, 34 related projects were known at the time and located in the project vicinity that had either been built, but not yet fully occupied, or were being processed for approval. These 34 related projects were included as part of the cumulative background setting in Year 2020 and were conservatively assumed to all be completed by the year 2020.

In addition to the detailed list of related projects, horizon year, background traffic growth estimates were calculated by using an ambient traffic growth factor. The ambient traffic growth factor is intended to include unknown related projects in the study area, as well as account for typical growth in traffic volumes due to the development of projects outside the study area. The future growth in traffic volumes was calculated at 0.6 percent (0.6%) per year. The ambient growth factor was based on review of the background traffic growth estimates for the Palos Verdes area published in the *2010 Congestion Management Program for Los Angeles County*, which indicated that existing traffic volumes would be expected to increase at an annual rate of approximately 0.51 percent (0.51% per year) between years 2010 and 2020. However, in order to provide a conservative analysis, the higher ambient growth factor of 0.60 percent (0.60% per year) contained in the *2004 Congestion Management Program for Los Angeles County* was utilized in the traffic analysis. Application of the ambient traffic growth factor to existing traffic volumes (i.e., at 0.6 percent per year) resulted in a 6.0 percent (6.0%) increase in existing traffic volumes to horizon Year 2020.

It is important to note that application of this ambient growth factor in addition to the forecast traffic generated by the related projects allows for a conservative forecast of future traffic volumes in the project study area.

B. Comments and Responses on the Draft EIR

The comment letters and emails and the City's responses follow. Each comment letter has been numbered sequentially and each separate issue raised by the commenter, if more than one, has been assigned a number. The responses to each comment identify first the number of the comment letter, and then the number assigned to each issue. Response 2.1, for example, indicates that the response is for the first issue raised in comment Letter 2.

Letter 1

Abe Leider

From: Carolynn Petru <Carolynn@rpv.com>
Sent: Tuesday, May 06, 2014 1:12 PM
To: Eduardo Schonborn
Cc: Joel Rojas
Subject: FW: Zone 2 EIR

FYI

From: tony baker [mailto:tbake377@gmail.com]
Sent: Tuesday, May 06, 2014 11:00 AM
To: CC
Subject: Zone 2 EIR

Dear City Council Members
---I hope that you all have read the recently published book by Bob Douglas covering the geology and history of the Ancient Altamira Landslide Complex before making a decision on whether to certify the final Zone 2 EIR.
---Landslides have been in the news lately, but for residents of the Peninsula they are old news. I was 10 years old when my family home began moving with the Portuguese Bend Landslide and it's still going. Since then, we've witnessed Abalone Cove, Flying Triangle, San Ramon and White Point to name a few.
---The "factor of safety" for building construction is apparently not to be taken into account. How about threats to "life and limb? And the liability involved?
---A few years ago, I was hiking at the Ocean Trails Golf Course in an are that had been identified in the EIR as having the potential to slide and thus not suitable for buildings. Well, that day it did slide and I was evacuated by helicopter after a harrowing experience. Fortunately I was the only person there that day and capable of running my butt off. I was also there the previous day, which happened to be Memorial Day, and I walked the same trails with dozens of other visitors and families fishing from the rocks below the cliffs. Had the slide occurred 24 hours earlier we would have had a great tragedy.
---The geologists and hydrologists advising the City are making assurances that the added development, grading and storm run-off will not significantly affect the stability of the Altamira Landslide Complex. I remember a comment from Karl Vonder Linden, who wrote his doctoral thesis on the P.B. Landslide, that if you put 4 geologists in a room, they will come out with 5 opinions.
Sincerely
Tony Baker
16 Limetree Lane
Portuguese Bend

ATTACHMENT 1-15

Letter 1

COMMENTER: Tony Baker

RESPONSE:

The commenter provides background information and personal experience regarding historic landslides in the Portuguese Bend area. The commenter also states an opinion that the factor of safety for building construction has not been taken into account, and states concerns regarding threats to "life and limb." Please see Topical Response I.A, Geology, as well as the relevant discussions in the draft and final EIRs, for information on these topics, including Topical Response 8.1.B, *Geology*, in the Final EIR. The EIR specifically reviews the subject area in terms of a significant threat to life, limb and property. It is the City's opinion that the addition of residences within Zone 2, under the scenario and with the mitigation measures included in the EIR, would not significantly alter either the geological conditions or the risks already inherent within the project area.

Letter 2

Abe Leider

From: Don Christy <doncmusic@gmail.com>
Sent: Monday, May 05, 2014 4:18 PM
To: Eduardo Schonborn; CityClerk; CityManager; Carolynn Petru; Planning; Joel Rojas
Subject: allowing lot splits in zone 2

In 1989 my step-father John Vanderlip sold 75% of our 5 acre lot to Ted Chung.The remaining 25 % was intended to be kept and owned by the family,The top portion of the property has historical landmarks dating back to when Frank Vanderlip purchased Palos verdes in 1913.The landmarks include the 2 cages that the first peacocks were brought over in,a duck pond for birds to bathe in,an irrigation system to transfer water to the troughs for 500 birds in Frank Vanderlips collection and finally the last of the remaining pillars that were to be used for Frank Vanderlips huge mansion that would have been located at the west end of Narcissa Dr. This portion of the the 5 acres needs to be split so it can kept in the family as John Vanderlip would want it to be.This is the last of the last of the original Vanderlip property owned by our side of the family.It needs to be maintained and preserved for the future.As an author of 2 Palos Verdes history books this piece of property represents an oppurtunity to keep an important and vital part of Palos Verdes tha t dates back to1913.PLEASE ALLOW LOT SPLITS IN ZONE 2 so I can keep this property as the Vanderlip family would want me to. Sincerely Don Christy

ATTACHMENT 1-17

Letter 2

COMMENTER: Don Christy

RESPONSE:

The commenter provides background on his family's property in the project area, and requests that the City allow subdivisions within Zone 2. This request is noted, but does not pertain to the analysis or conclusions of the EIR.

Letter 3

Jeremy Davies OBE
36 Cinnamon Lane
Rancho Palos Verdes
California 90275
Email: jdavies@kuboaa.com

April 29, 2014

Mr Eduardo Schonborn
Planning Division, Community Development Department,
City of Rancho Palos Verdes,
30940 Hawthorne Blvd,
Rancho Palos Verdes, CA 90275

Dear Mr Schonborn,

FEIR FOR ZONE 2 LANDSLIDE PROPOSED MORATORIUM ORDINANCE REVISIONS

I am taking the liberty of sending this letter to the Mayor and Council Members. We hope they can fully appreciate and understand the extent and depth of our Community's concerns before considering expanding development in Zone 2.

We have resided at the above address for over 22 years. Upper Cinnamon Lane is a short cul de sac and will have 30% or 14 of the proposed new 47 residences constructed immediately adjacent to the existing four homes.

I summarize below topics that have not been addressed adequately in the FEIR or where the FEIR is deficient or inaccurate and/or does not comply with CEQA. These topics warrant careful consideration by the City Council before making their final decision. Quotes from the DEIR or FEIR are in italics and emphasis has been indicated by bold type in the quotes. 3.1

Additional support to the concerns addressed in this letter are attached as a separate document.

1) Access Roadways and Pavement Integrity

The FEIR makes unsubstantiated assumptions that the roadways, pavement integrity and drainage systems (as they use the roadway system) were engineered as though they were

public roads. This leads the reader to false conclusions. CEQA Section 15384 –Substantial Evidence requires that enough relevant information is provided to support a conclusion.

Section 8 Comments and Responses Page 10 of the FEIR states *"It is important to note that the roadway system was originally engineered for full development and build out of the residential tract and as such the street(s) were designed to accommodate the envisioned loading, including construction vehicles associated with the construction of the envisioned build out as originally reviewed and approved by the County of Los Angeles*".

On investigation this turns out to be pure conjecture as the City has no record of studies, reports etc. (confirmed to me in writing on April 4, 2014 by the City). The City's response on April 4, 2014 to my question about the original permit for development is "I researched our archives regarding the original approvals/documentation from LA County, but could not locate any studies, reports, etc". The City goes on to state that "it is reasonable to conclude that the subdivision was approved with improvements and infrastructure designed to the standards in place at the time to handle build out of the tract". This unsubstantiated answer has been used to respond to many other commenters who also expressed concern about the road infrastructure.

For the City to presume "reasonableness" at that time when only a few years later the Portuguese Bend landslide was reactivated due to County incompetence would appear inappropriate. This landslide resulted in the loss of 134 homes and still impacts others in our Community.

Furthermore, the assumptions made in referring to a LA County review and approval predates the reactivation of the Portuguese Bend and the Abalone Cove landslides. So even if a study did exist it is irrelevant since the County could not have foreseen the future impacts of the landslides and the destabilization of the Zones 2,5 and 6.

Without a detailed in depth infrastructural study of the roadway system that provides access to Zone 2, the City will be placing its reliance on approving the project as it applies to access road and pavement conditions, the impact of storm runoff on the road system and related safety issues based on a document that makes an assumption which has no supporting evidence.
"*CEQA requires specific performance standards that must be met and ways to meet those standards* "(Page 8-86 of the Comments and Responses section).

The City has discretionary authority over the proposed project (Page 2-12). If this infrastructural study is not carried out and the City continues to depend on unsubstantiated assumptions and conjectures, as explained above, and there is an accident or major failure of the road system resulting in harm to human life, the City, Council members and the consultants could be at best considered irresponsible for not carrying out this study, and at worst, grossly negligent. The City and Council members should carefully consider their fiduciary responsibility in this regard.

2) Hydrology

a) The FEIR contains conflicting statements regarding storm water runoff impacts. The FEIR admits that Altamira Canyon is a problem that should be addressed but claims infeasibility before full project build out without full discussion as to why and what mitigation measures could be taken. CEQA Sections 15141 and 15384 -Substantial Evidence and Standards for an EIR require information to be contained in the FEIR and enough information to support the conclusions.

The FEIR contains several conflicting statements regarding the impacts of storm run off, for example: 3.2
"Runoff rates, runoff volumes and infiltration would remain **generally** *the same as under existing conditions with adherence to mitigation measures in HWQ-4". "Localized flood effects* **may** *occur on an individual lot basis".* "**Increases** *in runoff from an individual lot* **would** *range from approximately 9.8% to 15.1%"* (Page 4.8-15*). "The proposed ordinance revisions* **would not significantly increase** *lot runoff or contribute significantly to the drainage system after mitigation" (Page 8-127). "***Regardless of the localized flooding that may occur** *under existing conditions,* **if** *no net change occurs due to the development of the 47 lots,…*"(Page 8-3). Several of the above statements are at variance with the assertion that there will be*"* **no increase** *in runoff rates and volumes to Altamira Canyon*"(Page 8-5).

By permitting development above Zone 2 e.g. Island View, Del Cerro and Valley View etc., the City has already added to the instability of the land in Zones 5,6 and 2 by creating conditions for additional infiltration from runoff from these developments into Altamira Canyon. The FEIR now denies the need for this situation to be fixed before further compounding the infiltration problem by approving further development. The need to resolve the Altamira Canyon issue before any additional development is well documented in City capital plans, the Horan settlement, public statements by Council members and a City workshop on landslides held in July 2012. All ignored or considered infeasible in the FEIR. 3.3

It should be noted that Page 8-79 acknowledges that mitigation at Altamira Canyon was discussed by the consultants with the City but no further explanation is given as to the nature of the discussions and conclusions and their rationale. *"While it may be desirable to resolve the site flooding and erosion in Altamira Canyon and other natural drainage courses, it is an existing condition affecting the larger area that* **would be addressed separately** *from these proposed ordinance revisions"* (Page 4.8-17). How is the City to address this issue raised in the FEIR but not explained? 3.4

The argument that it is infeasible from an economic perspective to line Altamira Canyon no longer is valid given the money being spent on remediation measures adopted in the case of San Ramon Canyon ($17.8 million as reported in the Daily Breeze April 2013). Furthermore, on February 18, 2014 alternative phased solutions to start to remedy the Altamira Canyon situation were proposed to the City Council which are not discussed in the FEIR.

City deliberations on this issue should consider recent slope failures and other major projects dealing with storm water conditions in the City and adjacent regions and their implications e.g. Paseo Del Mar in San Pedro, Trump Golf Course, the San Ramon project and Bluff Cove, PVE. In addition, national disasters involving slide failures such as Oso, Washington, Jackson, Wyoming and Laguna Niguel, draw additional attention to poor City development standards being adopted, sometimes under economic pressures, ultimate loss of life, property damage and liabilities resulting from these poor decisions. As ACLAD states *"The reactivation of the landslides in the Portuguese Bend area are all related to human activities that led to an increase in groundwater*" (ACLAD 2012).

The City and Council members personally have a fiduciary responsibility to deal with this matter before considering any additional development or alternatively to deny the project.

b) The FEIR uses LA County averages for its calculations for runoff from new construction rather than project specific conditions and makes assumptions on preconstruction conditions that do not reflect actual conditions. This conflicts with CEQA 15151 which requires a sufficient degree of analysis to support a conclusion.

"Post-construction lot infiltration and runoff rates and volume **shall be made equal** *to pre-construction conditions through use of appropriate low impact development principles…."* (GEO-3(a)-Page ES-14).

Pre-construction conditions are neither quantified nor spelled out in the FEIR. The calculations which the consultants have used are not reflective of local conditions in Zone 2 since they use County averages and soil conditions in a non-slide situation which are irrelevant to the project conditions (see HWQ-4 Page ES-19). The likelihood of new developments' storm water runoff creating damage to adjacent properties may constitute both a private and public nuisance. 3.5

In 22 years of living in Zone 2 we have not experienced flooding from the land above us in a pre-construction stage. The combination of trees, yucca plants, grasses and absorbent soil conditions (the nature of the landslide soil is capable of absorbing significant storm water before any runoff occurs) has protected us from flooding. By increasing the impervious surface area on the lots above us (steep slopes) by 38% it will not be possible to *"effect post-construction lot infiltration and runoff rates and volume equal to pre-construction condition"*. This comment is based on 22 years of experience of actual conditions and not on hypothetical calculations using County averages (as opposed to using actual conditions in Zone 2).

For example, runoff rates for 37 Cinnamon Lane in a 50 year storm rise to approximately 1400 gallons per minute. With a 1600 gallon holding tank capacity it is not logical that serious flooding conditions and potential damage to the properties below this site can be avoided (source

are the planning documents held by the City). Therefore the conclusion that *"runoff from all buildings and runoff areas not infiltrated or retained on site to match existing conditions* **shall be collected** *and directed to the street or to an approved drainage course as approved by the City"* (Page ES-14) is highly suspect.

3) Hydrology - Hold Harmless Agreement

The mitigation does not clarify if the hold harmless letter applies to damages suffered by residents outside the project area. The City is potentially opening itself up to a future Horan type litigation.

The City is to require a Hold Harmless Agreement to defend, indemnify and hold the City harmless from any claims or damages resulting from the requested project prior to issuance of a building permit. This is a distinct inequality of treatment in the event that the individual home owner and the PB Homeowners Association is also potentially damaged by flooding and other consequences etc. resulting from this City authorized and imposed project, if approved. It is noted that the City is required to approve the plan that demonstrates that the individual's lot's drainage does not impact the surrounding properties (Page 8-159). The City should require indemnification for homeowners and the PBCA for damages to existing homeowners and the PBCA as part of their indemnification letter. 3.6

4) Traffic and Circulation-Emergency Evacuation

a) The FEIR is deficient in that it ignores the possibility of fire closing one of the two access and egress roads and the estimated evacuation times used in the FEIR are unrealistic. CEQA Section 15384 in determining "substantial evidence" requires providing enough relevant information to support a conclusion. 3.7

Section 4.10 page 4.10-26 concludes that the design of the roadway system is adequate for emergency evacuation purposes. This is predicated on both Peppertree and Narcissi being open and available in the event of a fire. What the FEIR does not consider is if a fire starts at the lower part of Narcissa thus causing that street to be impassable. The City needs to restudy this eventuality and factor it into the FEIR calculations. The FEIR also "*concludes that additional width is available among many portions of the roadways"* (Page 4.10-25). This conclusion overlooks the fact that any additional width for streets cannot be obtained without a seizure of homeowners' property or obtainment of an easement. 3.8

The estimated clearance times contained on page 8-14 are totally unrealistic. On April 21 it took me 3 minutes to reach the Narcissa gate from my home and 3 and ½ minutes to reach the Peppertree gate. I drove at the posted speed and stopped at all stop signs. There were no other vehicles on the streets at the time, no equestrian evacuation, no construction vehicle evacuation 3.9

no other residence evacuation, no fire vehicles on the streets and it assumed that both streets were available for evacuation.

Furthermore the statement on Page 8-14 that *"it has been subsequently learned that the horse owners and horse boarders would likely shelter their horses in place and rely on sprinklers"* only applies to Portuguese Bend club members and not to a large number of other horse owners who are not within the club but are within and adjacent to the project . 3.10

b) The FEIR is deficient in that it does not address fire vehicle and team access to land above Upper Cinnamon Lane after the full build out. This appears to be a physical change resulting in a significant effect requiring mitigation under CEQA Section 15382. There is a lack of sufficient analysis under CEQA Section 15131. 3.11

Once full build out of the project is completed there is no access to land above Upper Cinnamon Lane, an area which has experienced previous brush fires.

5) Environmental Setting-Cumulative Projects Setting

Recent drillings have taken place in 2014 on two potential property developments which questions the FEIR conclusion that no projects are known that can be considered proposed.

The FEIR considers no projects are known that can be considered planned, apart from Downhill, for inclusion in the cumulative development setting (Page 8-51). The Response to several commenters regarding the impact of the cumulative development setting excludes any potential impact from the "Point View" or the "Beanfield" on the basis that these are speculative future projects. Yet there have been drillings taking place in early 2014 on both sites. It is unlikely that the owners would incur these costs if they did not plan to develop their properties. This raises the question of incompleteness of the FEIR and additional analysis of the impacts of these projects being required to be included in the FEIR. 3.12

6) CEQA requires all comments received during the circulation of the DEIR to be fully answered. This has not been done in all cases and in some cases answers have depended upon unsubstantiated evidence as described above.

In addition to the topics contained in items 1-5 above, the following questions raised in my letter of November 15, 2012 are either not answered or are incomplete in their content or are referred back to the City: 3.13

No response to question # 11 regarding drainage into Zones 5 and 6.
Response to question # 14 explaining that more restrictive construction times are contained in the PBCA architectural standards and as such should also be included in the mitigation measures is

merely "noted" (reference to other PBCA standards are referred to in the FEIR e.g. ranch house style homes).
The response to question #25 which refers to the City workshop is that no response can be given since no specifics have been provided. I assumed that the consultants had access to the workshop discussions, slides and conclusions and therefore already had specifics to which they could respond.
Response to my concern that a ban on constructors' employees from smoking be included in mitigation measures (question #28) is referred back to the City for their consideration. As a high fire hazard area it should not be so difficult to include such a ban since also it is posted at the gates.
Question #30 which reads "Are all Monks plaintiff plans that have been approved or are in the approval process required to comply with all the mitigation measures that will be in the FEIR in accordance with CEQA? If not which measures specifically are excluded? The response does not address this question.

Sincerely,

Jeremy Davies OBE

Cc
Mayor Jerry.Duhovic@rpv.com
Mayor Pro Tem Jim.Knight@rpv.com
Councilwoman Susan.Brooks@rpv.com
Councilman Brian.Campbell@rpv.com
Councilman Anthony.Misetich@rpv.com

Letter 3

COMMENTER: Jeremy R. Davies

RESPONSE:

Response 3.1

The commenter states an opinion that the road system in Portuguese Bend is inadequate to serve the proposed project, and that the project could result in "major failure of the road system resulting in harm to human life." The commenter also states an opinion that the original road plan, which is assumed in the EIR to have been designed to serve the existing subdivision, is "irrelevant" because it predates a full understanding of the landslide activity in the area. The commenter questions the EIR analysis generally, but does not offer data or information supporting these statements. As stated in the Final EIR, the Portuguese Bend Community Homeowner Association (HOA) has the responsibility and authority to impose fees and assessments in order to maintain the private roadway system. Therefore, the HOA in its capacity as owners can study, monitor and perform maintenance as required. Please see also Topical Response I.c, Traffic and Circulation, for further discussion of this topic.

Response 3.2

The commenter lists various phrases from the EIR pertaining to pre- and post-development drainage conditions on subject lots. The commenter's confusion may result from a misunderstanding of the mitigation measures included in the EIR. The increases in runoff estimated in the Final EIR are based upon unmitigated development and were used to establish the project impacts as potentially significant. Mitigation Measure HWQ-4 is intended to reduce project-related infiltration and runoff impacts by requiring post-development hydrology to be maintained at pre-development rates. As mitigated, the project would not result in significant impacts to flooding, erosion or infiltration in Altamira Canyon, as runoff conditions would be generally unchanged. Please see Topical Response I.b, Hydrology, Water Quality and Drainage, as well as the relevant discussions in the draft and final EIRs, for further information on this topic, including Topical Response 8.1.a in the Final EIR.

Response 3.3

The commenter discusses past development in the subject watershed and states an opinion that the Final EIR "denies" the need for existing drainage deficiencies and issues with Altamira Canyon (presumably related to erosion, flooding and infiltration) to be addressed. The EIR does not deny the existence of existing deficiencies or concerns, which are discussed in sections 4.8 and 8.0 of the Final EIR, nor state that addressing such deficiencies is undesirable. The EIR does not identify addressing the existing deficiencies as required mitigation for the proposed project because, as discussed throughout the Final EIR, the project itself would not significantly contribute to these deficiencies such that it would result in potentially significant impacts requiring such mitigation. Please see Topical Response I.b, Hydrology, Water Quality and Drainage, as well as the relevant discussions in the draft and final EIRs, for further information on this topic, including Topical Response 8.1.a in the Final EIR.

Response 3.4

The commenter states an opinion that the City should address the larger issue of flooding and erosion in Altamira Canyon and surrounding areas. Although not directly relevant to the impacts of the proposed project, this comment is noted. It should also be noted that there are limitations on the City's ability to impose mitigation or conditions on projects when there is not a relationship to the project impact and the mitigation measure/condition, and when the requirement is not in proportion to the degree of the project's impacts.

Response 3.5

The commenter appears to question whether it is possible to engineer post-construction lot drainage to generally match pre-construction conditions. Because of the variability of the topography, geology, and potential project design, a detailed analysis was not prepared for the individual lots. Instead, an assumed "typical" lot was used based upon the County's hydrological criteria to establish possible impacts and develop mitigation measures. Because of the variability of the individual lots, lot-specific hydrology would be required for each permit application. The requirements and scope of the analysis would vary by lots, at the City's discretion, but would include analyzing existing drainage and soil conditions, as well pre- and post-development runoff rates. Please see Topical Response I.b, Hydrology, Water Quality and Drainage, and Topical Response 8.1.a in the Final EIR, for a response to this comment.

Response 3.6

The commenter states an opinion that "the mitigation does not clarify if the hold harmless letter applies to damages suffered by residents outside the project area." As the EIR does not include such mitigation, it is assumed that the commenter is referring to Section 15.20.050.G of the City of Rancho Palos Verdes Municipal Code, which requires that "A hold harmless agreement satisfactory to the city attorney promising to defend, indemnify and hold the city harmless from any claims or damages resulting from the requested project." This comment pertains to existing City regulations rather than the proposed project or EIR. Further, disputes between the Association and future developers of lots in Zone 2 regarding damages would be civil matters to be resolved among the parties and separate from City involvement.

Response 3.7

The commenter states an opinion that the EIR is deficient because it ignores the possibility of fire closing one of the two access and egress roads, and that the estimated evacuation times used in the Final EIR are unrealistic. Regarding the first point, it should be noted that CEQA does not require that every possible future scenario be examined. Nevertheless, while not modeled, one could infer that a doubling of evacuation time would occur in that situation. Should this be the case, the expected evacuation time might near 30 minutes, but would not be expected to exceed 30 minutes, which is considered within the industry as a duration to be avoided. Regarding the second point, please refer to Topical Response I.c, Traffic and Circulation, for a full discussion of the conservative nature of the emergency evacuation analysis contained in the Draft EIR. That evaluation is conservative in that it does not consider any early or voluntary evacuations; it

assumes that all residents/owners are present; that a total of two vehicles per household are evacuated; and that two persons of driving age are present at the time of the evacuation notice.

Response 3.8

The commenter states an opinion that additional width that may be required for private roads within Zone 2, should they need to be widened, would require recordation of an easement or other mechanism to obtain use. This may be true for some road segments in the project area. This comment is acknowledged but does not change the analysis or conclusions of the Final EIR.

Response 3.9

The commenter states an opinion that the estimated clearance times discussed in the Final EIR are unrealistic. Please see Topical Response I.c, Traffic and Circulation, for a discussion of this topic.

It was concluded in the LLG analysis that the entire Portuguese Bend Community could evacuate in less than 15 minutes. Given that the LLG analysis assumes traffic control will be present during the time of a potential emergency evacuation, it is likely that motorists will not need to stop at every posted stop sign. The conclusion of less than 15 minutes to evacuate the entire Portuguese Bend community is very conservative. It is recommended within the industry that a total evacuation time of 20 minutes or less is ideal, but that in no case should it exceed 30 minutes. That evaluation does not consider any early or voluntary evacuations, and it assumes that all residents/owners are present; that a total of two vehicles per household are evacuated; and that two persons of driving age are present at the time of the evacuation notice.

Response 3.10

The commenter states an opinion that horse owners that do not board their horses at the riding club might not shelter their horses in place and rely on sprinklers. Although this concern is noted, the potential for a limited number of horses to face additional evacuation challenges during an emergency is not considered a significant environmental impact pursuant to the City's CEQA thresholds and guidelines. This topic is also discussed in Topical Response I.c, Traffic and Circulation.

Response 3.11

The commenter states an opinion that the EIR is deficient because it does not address the potential for decreased access to land outside of Zone 2 above Upper Cinnamon Lane with project buildout. Buildout of the project would not close existing streets nor necessarily block access across private property, whose owners in any event are not currently precluded from erecting fences or other obstacles to access. In addition, the Los Angeles County Fire Department has reviewed the proposed project and Draft EIR and has not raised this concern.

Response 3.12

The commenter states an opinion that because the owners of certain properties have been observed carrying out "drilling" on their property, the City should conclude that there is planned,

proposed or pending development on these properties. Unspecified "drilling" activities do not constitute a substantial indication of proposed development, and any consideration of them as such would be unwarranted speculation.

Topical Response I.c, Traffic and Circulation, includes a discussion of the related projects and cumulative analysis contained in the Draft EIR Traffic Impact Study (contained in Appendix G of the Draft EIR). The status of other known development projects (related projects) in the area at the time of the preparation of the Draft EIR was researched at the City of Rancho Palos Verdes, City of Rolling Hills Estates, and City of Los Angeles. With this information, the potential impact of the proposed project could be evaluated within the context of the cumulative impact of all ongoing development. Based on that research, 34 related projects were known at the time and located in the project vicinity that had either been built, but not yet fully occupied, or were being processed for approval. These 34 related projects were included as part of the cumulative background setting in Year 2020 and were conservatively assumed to all be completed by the year 2020.

In addition to the detailed list of related projects, horizon year, background traffic growth estimates were calculated by using an ambient traffic growth factor. The ambient traffic growth factor is intended to include unknown related projects in the study area, as well as account for typical growth in traffic volumes due to the development of projects outside the study area. The future growth in traffic volumes was calculated at 0.6 percent (0.6%) per year. The ambient growth factor was based on review of the background traffic growth estimates for the Palos Verdes area published in the *2010 Congestion Management Program for Los Angeles County*, which indicated that existing traffic volumes would be expected to increase at an annual rate of approximately 0.51 percent (0.51% per year) between years 2010 and 2020. However, in order to provide a conservative analysis, the higher ambient growth factor of 0.60 percent (0.60% per year) contained in the *2004 Congestion Management Program for Los Angeles County* was utilized in the traffic analysis. Application of the ambient traffic growth factor to existing traffic volumes (i.e., at 0.6 percent per year) resulted in a 6.0 percent (6.0%) increase in existing traffic volumes to horizon Year 2020. It is important to note that application of this ambient growth factor in addition to the forecast traffic generated by the related projects allows for a conservative forecast of future traffic volumes in the project study area.

<u>Response 3.13</u>

The commenter states an opinion that several of his comments on the Draft EIR were not addressed in the Final EIR. These are discussed individually below.

- *No response to question # 11 regarding drainage into Zones 5 and 6.*

The commenter appears to be referring to Draft EIR Comment 10.12, which states the opinion that the Draft EIR does not "address the impacts of drainage into Zones 5 & 6." This comment is appropriately addressed under Response 10.12 in Section 8.0 of the Final EIR.

- *Response to question # 14 explaining that more restrictive construction times are contained in the PBCA architectural standards and as such should also be included in the mitigation measures*

is merely "noted" (reference to other PBCA standards are referred to in the Final EIR e.g. ranch house style homes).

The commenter appears to be referring to Draft EIR Comment 10.15, which requests that the Final EIR "reference that the Community has more restrictive times allowed for construction than the city's ordinance." By noting the comment and response (comment and response 10.15), the commenter's request that the community's construction times be referenced is fulfilled.

- *The response to question #25 which refers to the City workshop is that no response can be given since no specifics have been provided. I assumed that the consultants had access to the workshop discussions, slides and conclusions and therefore already had specifics to which they could respond.*

No inconsistencies between the Final EIR, including the clarifications and acknowledgments about existing drainage deficiencies therein, and the information presented in the workshop that would change the analysis or conclusions of the Final EIR were identified.

- *Response to my concern that a ban on constructors' employees from smoking be included in mitigation measures (question #28) is referred back to the City for their consideration. As a high fire hazard area it should not be so difficult to include such a ban since also it is posted at the gates.*

This comment is noted and has been forwarded to City staff and decision makers.

- *Question #30 which reads "Are all Monks plaintiff plans that have been approved or are in the approval process required to comply with all the mitigation measures that will be in the Final EIR in accordance with CEQA? If not which measures specifically are excluded? The response does not address this question.*

Response 10.31 in Section 8.0 of the Final EIR addresses this question by explaining the legal limitations on mitigation requirements for development on the Monks lots. Monks plaintiff "plans that have been approved or are in the approval process" are not required to comply with all the mitigation measures included in the Final EIR.

Letter 4

FEIR DETAILED ADDITIONAL SUPPORT-JEREMY DAVIES LETTER TO MR EDUARDO SCHONBORN –APRIL 29, 2014

References are to the items in the separate letter for the same date.

1) Access Roadways and Pavement Integrity

My letter to you of November 15, 2012 item #3 refers to Appendix D of the DEIR which states *"It should be plainly understood that because of the inherent potential for instability within adjacent landslides and the fact that Zone 2 is atop a landslide, that should additional significant movement occur in adjacent areas, it is our opinion that the loss of support currently provided from the Abalone Cove and Portuguese Bend Landslides could result in significant structural damage within Zone 2*." I added "and Zones 5 and 6" (FEIR Pages 8-56-8-58).

Within the context of the access roads and pavement integrity, I raised questions regarding the access road infrastructure for Zone 2 potential development. These access roads transit Zones 5 and 6 and the impact of large and heavy construction vehicles for which the roads were not designed and the potential impact on human life and safety requires further study. I requested an explanation and justification why the DEIR does not contain a detailed analysis of load bearing pressures on these two delicate road systems, potential impacts on slope stability, impacts on homes adjacent to the two roads and identifying any mitigation measures that are needed.

The Response (Page 8-66) of the consultants' (and presumably of the City) in the FEIR is to refer me to Section 8.1c Topical Response: Traffic and Circulation "Access Roadways and Pavement Integrity" which uses unsubstantiated evidence (see letter attached). 4.1

There is no evidence provided by the City or consultants to support their assumptions regarding the integrity of the current road system to bear safely the construction traffic for the build out that would be imposed on the PBCA if additional building permits are issued.

In addition, the consultants confirm that *"the performance of all possible roads and slopes can not be assessed here"* (Page 8-8). But they have already assumed that *"the roadway system was originally engineered for full development and build out of the residential tract and as such the street(s) were designed to accommodate the envisioned loading, including construction vehicles associated with the construction of the envisioned build out as originally reviewed and approved by the County of Los Angeles"* for which they have no evidence. These are conflicting statements.

The consultants also state that *"Surficial slope stability may be a potential hazard to some of the proposed home sites within the project area"* (Page 4.5-12).

"The material near the toe of the landslide has a distinctly different and chaotic structure with very low strength" (Page 4.5-3) which reinforces the need for an in depth assessment of the access roadways leading to Zone 2.

Therefore I repeat my request that an in depth infrastructural study be carried out on the road system including drainage based on current standards and best City practices for safety. Such study must be specific to the present road and underlying soil and slide conditions of Zones 2,5 and 6 for the following additional reasons:

Many of the homes constructed in the early years of development (and before the reactivated landslides took place) were no more that 1,200 square feet and many had only one bedroom. This compares with the average size of new permits under the Monks settlement of 3,500-4,000 square feet plus 600 square feet for garages.

Construction truck sizes and loads were much smaller and building materials lighter when the original development was started in the late 1940s.

The study must contain loading factor conclusions not based on average soils and compaction standards but specific to the road, soil and slide conditions in Zones 2, 5 and 6.

It should be noted that dewatering wells in Zone 5 adjacent to Narcissi have sheared (WW2 several times since the 1980s with continued land movement) indicating the danger to that road as an access for heavy construction traffic. This should be factored into the study as should additional storm water run off volume from new construction that runs into land adjacent to the road access systems. *"The uncertainty with regards to landslide control has been abated"*(Page 4.5-4). This contradicts conclusions of ACLAD.

2) Hydrology

The Palos Verdes General Plan states *"prohibit activities that --- increase canyon wall erosion"* (section 4.8 Page 4.8-6) and*" stringently regulate…natural drainage …in new development uses affecting existing or potential slide areas"*(Page 4.8-7). The FEIR contains several conflicting statements (in addition to those contained in the accompanying letter) regarding storm run off and drainage and related information and ignores totally or in part the two areas above contained in the General Plan:

4.2

"Runoff to match existing conditions" (ES-14)
"Avoid changes to the character of the runoff at property lines including increasing the concentration of flow out letting onto adjacent properties (HWQ-4 Page ES-20)
"By maintaining post-development drainage conditions at the same level as existing conditions, no increase in runoff rates and volumes to Altamira Canyon would occur" (Page 8-5).

"A detailed hydrological analysis be prepared for each individual lot demonstrating that no net increase in runoff rates and volumes leaving the site occurs, no increase in total infiltration occurs, and no diversion of flows occurs" (Page 8-5).
" Any new development would maintain, and would not exacerbate, the existing runoff and infiltration conditions" (Page 4.8-11 HWQ-3).
"Avoid changes to the character of the runoff at property lines". "Changes in character include …changing the depth and frequency of flooding, concentration of flow out letting onto adjacent properties or streets"(Page 4.8-18)
"Post development peak discharges will not substantially increase peak flood flows or increase flooding"(Page 4.8-20)
"Roof runoff from all buildings and structures on the site shall be contained and directed to the streets or an approved drainage course" (Page 4.5-14). However the FEIR is relying on an "approved" drainage course for which there are no records-see item 1 above.

Many commenters on the DEIR who have lived in the community for many years based on facts and observations indicated that the drainage system is inadequate. The FEIR (Page 4.8-1) concludes that *"the existing drainage system was designed for the entire Portuguese Development, including the 47 undeveloped lots*". As explained in item 1) above the consultants and City are unable to provide evidence of such drainage design.

Ground water *"is also the only factor that can be reasonably manipulated to minimize the slide movement for all areas within the Ancient Portuguese Bend Landslide (APBL) complex." "Control of groundwater is the only effective remediation for landslide instability, and that large- scale failure is otherwise possible outside of the landslides. The commenter is correct"* (Response 5.1 Page 8-39). Another reason for Altamira Canyon to be resolved.

4) Traffic and Circulation-Emergency Evacuation

The FEIR states *"the LLG analysis recommends that the City consider posting these access roads with "no parking-Fire Lane signs"* (Page 4.10-26). It would appear that the consultants did not visit the project site since such signs are posted and have been for many years. 4.3

Letter 4

COMMENTER: Jeremy R. Davies

RESPONSE:

Response 4.1

The commenter repeats and expands on concerns expressed in Comment 3.1 above. Please see Response 3.1 and Topical Response I.c, Traffic and Circulation.

Response 4.2

The commenter repeats and expands on concerns expressed in comments 3.2 through 3.5 above. Please see responses 3.2 through 3.5. The commenter also takes issue with the EIR statement that the existing drainage system was designed for the entire Portuguese Bend subdivision, including the 47 undeveloped lots. Please see Response 3.1 and Topical Response I.c, Traffic and Circulation.

Response 4.3

The commenter cites the Final EIR text which states "the LLG analysis recommends that the City consider posting these access roads with 'no parking-Fire Lane signs'" and states that such signs are posted and have been for many years. As the roadways within the Zone 2 Portuguese Bend Community Homeowner Association (PBCA) are private and the two entrances at Narcissa Drive and Peppertree Drive are gated, access could not be obtained to conduct a full signage survey as part of the Draft EIR. Based on a subsequent field review as well as review of aerial photography contained on the internet via Google Earth software, the commenter appears correct that some "No Parking" signs are posted but they appear to be more related to "No Parking Private Property" (with the additional language that violators cars will be towed away at owners expense per Section 22658 CVC) and are not posted on every local road and at regular intervals. At one location, and again certainly not on every local roadway and at regular intervals, it is noted that a sign was posted stating, "Danger - Extreme Fire Hazard Area - No Open Fire - No Smoking - Brush Clearance Deadline June 1."

While some signs of this nature could be helpful during a time of emergency evacuation, the signs recommended by the City's traffic consultant as part of the Draft EIR were related specifically to "No Parking on Red Flag Warning Days" which appear to be quite different than the two types of signs referenced above. The "No Parking Private Property Signs" are not placed consistently and there could be times whereby resident guests, maintenance workers or construction crews may elect to park along a particular segment that is not posted. The recommendation contained within the Draft EIR traffic study therefore still stands and remains a valid recommendation.

Letter 5

May 6, 2014

Honorable Mayor Duhovic, Mayor Pro Tem Knight, Councilpersons Brooks, Campbell and Misetich,

In consideration of the Final Environmental Impact Report (FEIR) for Zone 2, Portuguese Bend, I propose the following question:

Shouldn't a bedrock principle for a city in crafting and implementing policy be the preservation of the public's well-being and level of safety and not just the avoidance of unknown litigation risk?

If your answer to this most basic question is yes, then you have to admit that the current FEIR, with all it's deficiencies, deferred studies, rationalizations and lack of serious mitigations, flies in the face of this bedrock principal and should be voted against, without further delay.

Others have, undoubtedly, better described the many flaws of the FEIR, but to summarize the problems of further development without thoughtful and thorough mitigation is to basically state that such development will only exacerbate an already unstable condition.

Basically, it is known science, and not theory, that the stability of the entire area is directly related to and influenced by the level of groundwater. Without proper mitigation, further development will directly lead to a dramatic increase in these ground water levels and possible reactivation of landslides. All areas in Zone 2 eventually drain to Altimira Canyon and, by the City's own admission in previous Landslide Workshops, a vast majority of water entering the canyon recharges the groundwater via direct infiltration through fissures in the bottom of the canyon in the areas of Zones 2 and 5. 5.1

The Hydrology Section of the FEIR incorrectly assesses this impact because of the flawed assumption that significant runoff from undeveloped lots is an existing condition and that further development shouldn't result in an increase over this existing condition. I, personally have video shot on Sunday, December 19, 2010, showing little to no runoff occurring from the vacant up sloping lots on upper Cinnamon Lane, during rains on day 3 of a major rain event that occurred in December of that year (see video labeled **"Minimal Runoff"** shot from 40 Cinnamon to the vacant lots across the street). Specifically, on December 19, 2010, Los Angeles recorded 2.80" of rain. For the period of 12-16-2010 through 12-19-2010, Los Angeles International Airport recorded 5.09" of rain and also reported, along with Long Beach, the wettest December on record. Again, you do not see large amounts of water running off of these vacant, saturated lots, even after all of this heavy rain!

Compared to the aforementioned video it seems difficult to imagine that a significant increase in runoff will not occur with further development. I will also submit video taken during another rain event that demonstrates the runoff occurring from a single home at 75 Narcissa Dr (labeled **"Parks' Drainage"**, specifically from 0:43 to the end). This was the last home constructed sometime

between 2005 and the present, before construction began for the Monks' plaintiffs. What is readily apparent from this video is the vast amount of runoff generated from one property that is being directed to the streets and, ultimately, Altimira Canyon. Notice the volume of water emanating from the green, large diameter outlet pipe for the property. What size holding tank would be required to hold this volume, along with that sheet flowing from the driveway? Even with a holding tank, this volume of water will eventually make it to the streets, and Altimira canyon. Both videos will be submitted to City Hall today, May 6, 2014, for inclusion into the administrative record.

These videos, taken together, directly refute the assumptions made in the Hydrology section of the FEIR and render its conclusions regarding runoff invalid.

Another flawed assumption in this section is the statement that, since the roads were designed for the build out of the entire community, they are adequate to handle its drainage. As clearly demonstrated in the report submitted by Dr. Robert Douglass and ACLAD, the adequacy of the current road configuration for drainage is clearly lacking. Interestingly, the consultant formulating the FEIR has yet to respond to the questions raised by this report. Also, where are the engineering studies for the roads in question? It is my understanding that the administrative record contains no such studies, as they cannot be found! Yet another reason to invalidate this section's conclusions. 5.2

With regards to the Geology section, what is troubling is that the consultant removes the requirement of showing a 1.5 factor of safety for development, replacing this with the "nuisance" standard as stated by the Appellate Court in the Monks Decision. The Court never mandated that this standard be used beyond the Monks plaintiffs. When the City enacted Resolution 2002-43 on May 20, 2002, it deprived all 47 Zone 2 lot owners of "economic use". However, only the Monks plaintiffs filed suit within the 90-day limitations period. The other 31 Zone 2 lot owners failed to file suit within this time frame and, therefore, do not have a claim for a regulatory taking and the Monks decision holds no relevance for them. 5.3

Also, is it truly just a "nuisance" if someone's home is damaged to a point where it is unsaleable if not uninhabitable? I think not.
And if this standard is used in the FEIR, why shouldn't it be used on a citywide basis and even a statewide basis for that matter? 5.4

Unfortunately, recent and tragic landslide events in the states of Washington and Montana vividly illuminate the folly of ignoring known facts and science in the process of justifying development in areas with well known inherent risks.

I sincerely hope you do not make the same mistake.

Sincerely,

Lewis A. Enstedt

Letter 5

COMMENTER: Lewis A. Enstedt

RESPONSE:

Response 5.1

The commenter questions whether it is possible to engineer post-construction lot drainage to generally match pre-construction conditions and states an opinion that the project would significantly increase runoff from the subject lots. Because of the variability of soils, geological, and topographic conditions of the individual lots, a detailed hydrology analysis would be required for each lot to address actual conditions. Other homeowners have testified that they experienced significant runoff during rainfall event, further demonstrating the variability throughout the site. Please see also Topical Response I.b, Hydrology, Water Quality and Drainage, for a response to this comment.

Response 5.2

The commenter states an opinion that the EIR states that the existing roads are adequate to handle existing drainage. The commenter is referred to the following statement in Section 4.8 *Hydrology and Water Quality* of the Final EIR: "Based upon observations by the residents and a review of the overall drainage system, the existing drainage system is inadequate to convey runoff from the existing developed lots." The commenter also asks for "engineering studies" of the existing roads. Please see Response 3.1, above.

Response 5.3

The commenter states a concern regarding the threshold used in the EIR for assessing geologic hazards. This issued is discussed in detail in the Final EIR in Section 8.0 in Topical Response 8.1.b and also under Topical Response I.a, Geology, above.

Response 5.4

The commenter asks whether the threshold for geologic hazards used in the EIR should be applied citywide. Please see Topical Response I.a, Geology, above for a discussion of this topic.

Letter 6

5/6/2014

Good Evening Council, Mayor,

I am sure you are up to your ears with numbers and studies and photos and video, factors of safety, GPS, dewatering, Altamira, etc. I know you have read everything- you've had several years to do so, so I will just point out a few big picture items....Just some realistic and practical things, I think.

First, consider the reason for the EIR: It is stated that the reason is to avoid litigation. Will it? I am not aware of any input from the undeveloped lot owners about this EIR yet years have passed and opportunities have been plentiful. Are they ok with it? Is it onerous? Do they understand what is being asked of them? There is only one public comment from one undeveloped lot owner: LeeAnn Twidwell. She is concerned about the roads and drainage. She may want to build on the lot some day, but her lot, along with several of the Monks' lots by the way, lies in a natural drainage pathway and the current plan for more homes upstream threatens it. The only other lot owner representative you have heard from is the PBCA and it is concerned! The PBCA also represents lot owners! Everyone has had opportunity to comment and virtually all you hear is concern. The City itself is a healthy member of the PBCA, owning quite a number of lots being damaged by ground movement partially from water infiltrating Altamira Canyon. It should be concerned. 6.1

Second, the Staff Recommendation is for a Statement of Overriding Consideration for the one significant impact that you actually CAN mitigate: the traffic light. The other issues of dealing with the hydrology, the storm drains and infrastructure, the fire exit times, the underlying unstable geology, you know, the really hard stuff- all of that is somehow "mitigated" or ignored altogether in the EIR through methods that range from unproven to illogical. You have heard many of those ad nauseum. The one thing, the one true, concrete mitigation that YOU COULD ACTUALLY DO, is install traffic lights. Yet this is recommended against because, *and you will be signing your name and your political reputation to this*: it is recommended against *because it isn't pretty*. It's not esthetic, not semi-rural. What personal injury lawyer isn't going to say "ka-ching" the first time someone is picked off there because a required traffic light was not esthetic enough? 6.2

Lastly the staff recommendation of continuing the hearing another month to respond to more input is beyond belief. Do you really think somehow in a month that documents verifying the engineering, excuse me, the OVER engineering as Mr. Weber believes, of the infrastructure will somehow be found? The consultants have had knowledge of the ACLAD response for 8 or 9 months now. Do they really need another month to word craft themselves out of meaningful answers? Really? Just pull the Band-Aid off tonight. If you haven't already made up your minds on this EIR, then I cannot imagine what another month is going to suddenly clarify- will Island View abruptly go away? Will all the water in Altamira Canyon somehow make it all the way to the sea? (Actually that would be bad for the tidal areas...) Really? How could you need another month to explain how hundreds of cars can exit in a nanosecond and how building uphill from 6.3

unstable land is actually a good thing? Why do you feel you need to answer the comments again? What strange paper trail are you creating?

You should vote to Not Certify this EIR tonight and, as for No Project- certainly not THIS project. That is not to say you don't have a project at all. Through dealing with the interconnectedness of all the Zones, adequate sealing of the canyon, re-working the roads, installing proper storm drains, approving smaller houses with smaller hardscape footprints, more dewatering wells upslope and so on and so on, AND putting in a traffic light- you may have yourself a viable project. 6.4

Thank you for all your hard work and attention to this matter.

Cassie Jones
Rancho Palos Verdes

Letter 6

COMMENTER: Cassie Jones

RESPONSE:

Response 6.1

The commenter states an opinion that owners of properties in Zone 2 are or should be concerned about the proposed project, referring to drainage issues but without providing specifics. Drainage, flooding and erosion issues are discussed in the Draft EIR in Section 4.8 *Hydrology and Water Quality,* and in topical responses in Section 8.0, *Comments and Responses*, of the Final EIR as well as in Topical Response I.b, Hydrology, Water Quality and Drainage, above.

Response 6.2

The commenter appears to be expressing support for Mitigation Measure T-1(c), which would require installation of a traffic signal at Forrestal Drive/Palos Verdes Drive South and which was considered infeasible in the EIR. This comment is noted and will be forwarded to the City's decision makers for their consideration. It should be noted that the intent of a traffic signal was not to address traffic safety, which was not identified as a potential impact, but traffic congestion.

Response 6.3

The commenter opposes the continuance of the hearing on the proposed project. This comment is noted. The commenter also appears to question information in the Final EIR regarding drainage, traffic and geologic hazards, without providing specific information regarding these issues. Please see the topical responses above, as well as the draft and final EIRs, for analysis of the topics generally raised in this comment.

Response 6.4

The commenter implies that she might support the proposed project if the City "sealed" Altamira Canyon, "re-worked" the roads serving the project area, installed "proper" storm drains, further restricted allowable house size and hardscape, installed more dewatering wells upslope, installed a traffic light at Forrestal Drive/Palos Verdes Drive South, "and so on and so on." Please see the topical responses above, as well as the draft and final EIRs, for a discussion of why these requests are not required as project mitigation based on the potential impacts identified. These comments are noted and will be forwarded to the City's decision makers.

Letter 7

4/29/2014

Re: Zone 2 FEIR

Honorable Mayor and Council,

Thank you for taking the time to consider this significant issue before you now. I am writing because I feel that certifying the Zone 2 EIR in its current state would not be of benefit to the City or its residents and would actually be a detriment. Building homes on and adjacent to unstable land is not something you have to allow. It is the City's desire and the City's choice to do this and to produce this EIR. There is no court mandate to produce this EIR. Therefore, it is very important you be certain this is exactly what you want and how you want to do it. This decision will forever be a part of your political and service legacy. 7.1

The volume of printed matter is substantial yet much of it centers around a few incorrect assumptions that are then defended over and over again, though their initial premise was faulty. Some of these are as follows:

1) <u>The Portuguese Bend Community Association is responsible for the roads and the drainage for the homes in this project.</u> This is not true. The project is for homes in Zone 2, not Portuguese Bend. There are lots in this project that the PBCA has no jurisdiction over. Portions of this project are being ignored by the responsible parties and cast upon the PBCA.

2) <u>The roads were designed and built (two different actions) for a full build out of the project</u>. This is not true. There are no designs, no engineering plans or building permits or approvals found of any sort for any road or storm drain infrastructure. To base the majority of the building assumptions on this false premise is disturbing. 7.2

3) <u>The well established factor of safety can be replaced by a judge's opinion for a few lots</u>. No, it cannot. The opinion was for a few lots only. The recent landslide tragedy in Washington State resulted in substantial loss of life because science was ignored. When an uneducated judge sets a geologic 7.3

standard for economic reasons and you then take the questionable decision and apply it broadly, you run the risk of coming down on the wrong side of Mother Nature. What is known is that the factor of safety for this area is less than 1.5. Period. You cannot change that and you cannot allow that (sub)standard to replace the accepted norm for other residents in the City. The decision was only for a few lots, not carte blanche.

4) Zone 2 exists in a vacuum. It does not. It is abutted by other Zones and influences and is influenced by other areas. It is supported geologically by less and less stable land. It is only accessible through unstable land. It is surrounded by land that is zoned for development as well. Not to consider that potential is wrong. If you don't believe the other areas will be developed, like PlumTree, Point View, etc. then why would they be zoned for development? You control the zoning and so you must want those areas developed or you would have zoned it otherwise. Until any zoning is changed, their eventual development must be a part of your plan. 7.4

5)Altamira Canyon has nothing to do with the project. Nothing could be further from the truth. The water in that canyon feeds the landslides and there are only two ways of dealing with it. You can either put less in or take more out. And Mother Nature can put a lot more back in than you can take out, especially if the amount of hardscape increases as much as is proposed. The new homes would increase the number of residences by almost 75 % but the size of the home also almost doubles. The number of new dewatering wells proposed does not increase anywhere near proportionally (2 more may be added to the almost two dozen in service). Lining the canyon is another option but is dismissed, though it was originally one of the most important stabilizing recommendations given to the City. 7.5

For the rest of this letter, I cut sections from the document and explain what they say to me. My comments and interpretations there are bolded.

1) "Though both of these slides **(Abalone Cove and Portuguese Bend)** generally moved “at once,” surface monument data as well as historical data indicate that the first and greater movement occurred at the toe of the slide and then decreased up-slope such that the slides “shingle” up-slope with the toe area showing a greater “rubble” appearance than those areas higher up 7.6

(LGC Valley, Inc., 2011). Thus, the material near the toe of the landslide has a distinctly different and chaotic structure with very low strength as compared to the landslide debris higher uphill, which is more intact and has a greater inherent strength."

"As indicated above, the movement of lower land masses subsequently decreases support of the land higher up creating distinct zones within each landslide that are progressively less broken and therefore stronger up slope. The larger uphill masses provide significant support to up-slope property because it remains fairly intact." **This is another way of saying that the project is built on landslide debris that is supported by less and less stable land until you get to the ocean where the toe of the landslide no longer exists and it is not supported at all.**

2) "It should be noted that, because Altamira Canyon currently experiences erosion and will continue to experience erosion with or without adoption of the proposed ordinance revisions, the City has explored other measures to address the existing erosion but they have been rejected as infeasible, too costly, or an undue burden to be placed on remaining lots to be developed. These include streambed restoration / stabilization concepts and diversion drains. The former include lining the streambed with concrete or riprap, or installing drop structures and point and/or toe stabilizers to reduce the grade of the streambed to a stable grade. These were determined to be infeasible due to the damage to habitat that would result as well as cost. Construction of a diversion drain or ditches has also been considered, however a significant quantity of new pipeline would be required. This would require substantial excavation in streets as well as construction through some of the existing lots. In addition, the resulting benefit would be negligible because it would only divert the small contribution of the remaining lots that would become developable, and would not address the main cause of the erosion: the existing runoff currently outletting into Altamira Canyon from the entire watershed." **Just because the solution seems impossible, too expensive, too much work or just inconvenient is no reason to add to the problem. This is the crux of the unbelievable insanity of this FEIR. What this says is that because the problem and its solution is so huge, we can add a little more to it. It is too big and expensive to deal with so putting a few more homes in harms way isn't any major concern. This is no way for a city to conduct business. Knowing that water in Altamira Canyon is**

7.7

feeding the landslides and then feeding that beast by adding more is irresponsible government at its most irresponsible.

3).....the project, with the mitigation identified, would not result in a significant contribution to localized flooding or to the stormwater drainage system." **This is stated over and over and over again in the FEIR and comment section as if saying it enough times will make it true. One look at the volume of water running off one of newest, most comparable homes in the area and you realize it is impossible. The volume and rate of runoff from pure hardscape is tremendous- see the video provided.** 7.8

4) "Within Zone 2, pumping wells have lowered the groundwater table, drainage has been improved, and the movement on the adjacent ACL has slowed substantially. With the exception of differences of opinion with regard to why or even if there is true land movement in ACL and Zone 2, it appears that these conditions have generally been met, and that the uncertainty with regard to landslide control has been abated." **Seriously? With differences of opinion regarding why there is land movement in Abalone Cove you decide to declare the landslide has now been abated? The City only recently, the last couple years or so, repaired part of PV Drive South below the Wayfarer's Chapel for a crack that extends straight up to Narcissa and crosses it twice. As I noted above, the current number of homes in Zone 2 will be increased by almost 75% and the average home size will almost double. That amount of increase in hardscape and water runoff back into the landslide is not being met by a proportional increase in the ability to remove the additional water. Outside of Zone 2 the wells have not met with much, if any, success. These areas are intertwined with and abut Zone 2. All access to Zone 2 is through the more unstable lands.** 7.9

5) "mandatory compliance with applicable CBC requirements would reduce impacts to a less than significant level." **The subsequent adoption of the Nuisance standard for ground stability rather than the standard 1.5 factor of safety makes that statement of dubious worth and makes me wonder if the City is taking this seriously or not. I think the California** 7.10

Building Code does care about "life and limb" as well as whether your house cracks up.

"Generally speaking, a factor of safety of 1.5 is the condition to achieve for development projects with slopes that may affect the sites. However, professional judgment and review, geotechnical analysis, and a recent judicial decision regarding the project area have resulted in a consensus that the site has an uncertain factor of safety (LGC Valley, 2011)." **Enough said. And you want to start the rest of your political careers allowing this project to go forward as (un)planned on land with an uncertain factor of safety?** 7.11

6) "Post-construction lot infiltration and runoff rates and volume shall be made equal to pre-construction conditions through use of appropriate low impact development principles such as, but not limited to, detaining peak flows and use of cisterns, bio-retention areas, green roofs and permeable hardscape." **Sounds great but...There is a lot of history that shows very little if no runoff from many of the naturally planted lots. This FEIR does not require any study or documentation of the preconstruction runoff. Rather, that amount is assumed to be a mathematical calculation that I assure you- and you are welcome to view several hours of video documenting it, is not accurate. But, this is merely a stipulation with no meaning because if the runoff actually exceeds what it should, then here is the proposed solution:** "Runoff from all buildings and paved areas not infiltrated or retained/detained on site to match existing conditions shall be collected and directed to the street or to an approved drainage course as approved by the City EngineerDirector of Public Works." **So, you just dump it on the roads anyway....How exactly is that a mitigation? Many commenters noted this and the response was:** 7.12

"The commenter states an opinion that the existing drainage system for Zone 2 is substandard, and that land movement in the project area has affected grading slopes, compaction and contiguous drainage paths. As discussed in Section 4.8, Hydrology and Water Quality, and under Topical Response 8.1.a: Hydrology, Water Quality and Drainage in subsection 8.1, above, build out under the proposed ordinance revisions, with the mitigation identified, would not substantially change existing runoff amounts or rates and thus would not contribute to any deficiencies in the drainage system that may exist." **May exist? Isn't that why you are doing an EIR? Not**

knowing if deficiencies exist and to be the very agency wanting this project is disingenuous and that is being generous. Yet as we just read, if the project doesn't contain all its water, it is to be put on the street anyway, making a bad situation worse.

7) "It should be noted that the City is not in possession of a plan for the subdivision and infrastructure of the Zone 2 area that specifically states which lots were accommodated in the plan for drainage. However, it may be reasonably assumed that the roads and drainage system were constructed to service all of the lots that were created with the subdivision." **There was no plan as far as anyone can tell. The City makes a huge assumption here and bases a lot of the argument for ignoring the road and drainage problems on this assumption. There are road and drainage problems precisely because there never was an approved road plan. Even if there were, it would have been based on much smaller houses, fewer and smaller and lighter vehicles and never took in to consideration the upstream projects pouring massive amounts of water in to the area or the reactivation of two landslides. So, even if there had been a plan, it was a bad one. I would assume if you can't find any trace of a plan, then there wasn't one.** 7.13

8) "The EIR is a programmatic document that addresses impacts for the program as a whole; individual drainage studies would not be appropriate, as no specific projects are associated with the proposed ordinance revisions." **Too many times this concept of being programmatic is used to defer study. If the individual drainage studies are not appropriate then a global drainage study would be and that has not been done and is not proposed. Over and over throughout the comment section concerns about deferral of study for important aspects of the project are brushed off as "programmatic." For example, the statement that the design, approval and construction of wastewater conveyance facilities would be dependent upon the timing of development of the 47 undeveloped lots and that as proposals for development are submitted, each developer would be required to comply with City requirements, is very clearly deferring study. How can you not have a comprehensive plan in place first for something as vital wastewater management? Surely the last lot to be developed will face a very different set of circumstances than the first projects underway if you don't start with a plan in mind. Are the goals and regulations going to change with each subsequent house or is** 7.14

there going to be a plan that is followed? It really seems like the City will be making it up as they go along, rather than following a well thought-out plan.

I think a lot of time was spent in the preparation of this EIR to word things in a way that makes them sound sensible. However, when you read and decipher what is being said, I think and hope you come away with a different point of view. Thank you for your time. Certifying the EIR in this final form will be anything but final.

Cassie Jones

Rancho Palos Verdes

Letter 7

COMMENTER: Cassie Jones

RESPONSE:

Response 7.1

The commenter states an opinion that "There is no court mandate to produce this EIR." While the commenter is correct that there is no court mandate specifically to prepare this EIR, the Monks litigation conclusions could be applied to the Zone 2 area if further litigation ensues.

Referring to the information in the EIR about the Portuguese Bend Community Association's road maintenance responsibilities in the project area, the commenter states an opinion that there are lots in the project area that the PBCA does not serve. However, the commenter does not explain how this relates to road maintenance responsibilities and potential project-related environmental impacts. City staff has confirmed that all lots in Zone 2 are within the PBCA with the exception of property within the Vanderlip Estate area (accessible from Vanderlip Drive). The Vanderlip Estate area is not among the lots that would be further developable under the proposed project.

Response 7.2

The commenter states an opinion that the roads that serve the project area were not designed or built to serve the subdivision in a built-out condition. This opinion is noted, however the commenter does not provide information supporting this assertion. Please see Response 3.1 and Topical Response I.c., Traffic and Circulation, for further discussion of this topic.

Response 7.3

The commenter states a concern regarding the threshold used in the EIR for assessing geologic hazards. This issue is discussed in detail in the Final EIR in Section 8.0 Comments and Responses and also under Topical Response I.a, Geology, above.

Response 7.4

The commenter seems to suggest that properties zoned for development, i.e. a more intense use than currently exists on those properties, should be considered to be developed in the cumulative impact analysis regardless of whether there is proposed, pending or approved development on such properties, and that the City "wants" the land to be developed. Assuming development on lots where none is proposed would be speculative, and such speculation is discouraged in CEQA analysis.

Response 7.5

The commenter appears to question whether it is possible to engineer post-construction lot drainage to generally match pre-construction conditions and states an opinion that the project would significantly increase infiltration from the subject lots. Please see Topical Response I.b.,

Hydrology, Water Quality and Drainage, for a response to this comment. See also Topical Response 8.1.a.2 in Section 8.0 of the Final EIR regarding Altamira Canyon lining and erosion issues.

Response 7.6

The commenter states an opinion that she interprets the geologic information in the EIR to mean that "the project is built on landslide debris that is supported by less and less stable land until you get to the ocean where the toe of the landslide no longer exists and it is not supported at all." This interpretation is noted and is partially correct, although the commenter does not state which landslide she is referring to. Assuming it is the APBL, some geologists conclude that it may be near the beach interface while others suggest it is several tens of feet below. Please see Final EIR Section 4.5, *Geology*, particularly pages 4.5-1 through 4.5-6, for a specific description of the conditions on and around the project area related to the local landslides, including additional information to provide further context to the commenter's excerpted language.

Response 7.7

The commenter states an opinion that the project would add additional runoff to Altamira Canyon. The project as mitigated would not result in significant additional runoff to Altamira Canyon. Please see the Draft EIR in Section 4.8, *Hydrology and Water Quality*, and in topical responses in Section 8.0, Comments and Responses, of the Final EIR, as well as in Topical Response I.b, Hydrology, Water Quality and Drainage, above, for an explanation of this topic. The commenter also appears to support efforts to address the existing drainage and infiltration issues affecting Zone 2. This comment is noted.

Response 7.8

The commenter appears to question whether it is possible to engineer post-construction lot drainage to generally match pre-construction conditions and states an opinion that the project would significantly increase infiltration from the subject lots. Please see Topical Response I.b, Hydrology, Water Quality and Drainage, for a response to this comment.

Response 7.9

The commenter states an opinion that the project would add additional groundwater infiltration. The project as mitigated would not result in significant additional groundwater infiltration. Please see the Draft EIR in Section 4.8, *Hydrology and Water Quality*, and in topical responses in Section 8.0, Comments and Responses, of the Final EIR, as well as in Topical Response I.b, Hydrology, Water Quality and Drainage, above, for an explanation of this topic. The commenter also appears to support efforts to address the existing drainage and infiltration issues affecting Zone 2. This comment is noted.

Response 7.10

The commenter questions whether Building Code standards would adequately address seismic hazards to "life and limb." The requirement that individual lot owners comply with applicable

CBC requirements address on-lot issues that deal with specific final structure and site design, rather than the concept of gross slope stability.

Response 7.11

The commenter questions the conclusions of the EIR regarding geologic hazards given that professional judgment and review, geotechnical analysis, and a recent judicial decision regarding the project area have resulted in a consensus that the project area has an uncertain factor of safety. Please see Topical Response I.a, Geology, for a discussion of this issue. See also Topical Response 8.1.b in Section 8.0 of the Final EIR for additional information on this topic.

Response 7.12

The commenter states an opinion that requiring the non-infiltrated water from a developed lot be directed to the street or to an approved drainage course indicates that the overall mitigation will be ineffective. The amount of water directed to the street or to an approved drainage course would need to match the amount of water entering the street or to an approved drainage course pre-construction. This supports the goal of designing post-construction lot drainage to match pre-construction conditions. The commenter further opines that the mitigation program "does not require any study or documentation of the preconstruction runoff." The commenter does not provide support for the implied opinion that calculations based on site conditions (soil type and condition, vegetation, permeability of surfaces, etc.) would render inaccurate engineering. On the contrary, these are industry standard, proven engineering practices. Finally, the commenter appears to question whether the EIR acknowledges the existing drainage conditions in Zone 2. As stated in Section 4.8, *Hydrology and Water Quality*, of the Final EIR, "…the existing drainage system is inadequate to convey runoff from the existing developed lots." The mitigation would not require that each subject lot "contain all its water," as the commenter mistakenly states, but that the amount of runoff and infiltration, respectively, remain generally the same before and after construction. See Topical Response I.b, Hydrology, Water Quality and Drainage, above, for further explanation of this topic.

Response 7.13

The commenter states an opinion that the plan for the project area's roads was "based on much smaller houses, fewer and smaller and lighter vehicles and never took in to consideration the upstream projects pouring massive amounts of water in to the area or the reactivation of two landslides." As noted in Topical Response I.c, Traffic and Circulation, the traffic analysis was based on conservative assumptions, including two vehicles per house for the evacuation discussion, and current trip generation factors for construction traffic impacts. It should also be noted that today's vehicles are not, on average, substantially heavier than those from the 1940s and 50s.

Regarding the ability of the existing infrastructure to handle runoff, as discussed above the EIR acknowledges the existing deficiencies. However, again, as the proposed project would not substantially increase the amount of runoff from the subject lots, the impacts of the project itself, as mitigated, would be less than significant.

Response 7.14

The commenter states an opinion that it is inappropriate to require individual drainage studies or require that sewer connections comply with City requirements at the time of development. However, the commenter does not explain how such study could be performed without submittal of plans for buildout of each lot. Programmatic study is the standard CEQA approach for regulatory changes that could facilitate potential future development on multiple properties for which individual property owners have not submitted plans or applications. It should also be noted that the course of action discussed in the EIR and called out by the commenter is the same as it is currently for any undeveloped, but potentially developable, lot in the City of Rancho Palos Verdes and other cities. Individual lot development, drainage design and sewer connections are viewed as proposed, subject to programmatic mitigation measures and other existing regulations and policies that must be applied by the permitting agency or agencies. At bottom, conducting a global drainage study as suggested could require speculation as to what might be developed on the various lots, and CEQA does not require such speculation.

Letter 8

TO: City Council
FROM: Jim Knight, as a private citizen
REGARDING: Zone 2 FEIR and proposed development code changes
DATE: April 28, 2014

Mayor and Council Members,

My comments on the FEIR below are being presented to you as a private citizen and not as Mayor Pro Tem.

My recommendation is to ***not*** certify this FEIR. The FEIR contains unverifiable assumptions, missing information, failure to acknowledge or rely on substantial evidence to support conclusions as well as a lack of disclosure and analysis. This is a fundamental breach of CEQA's primary goal of disclosure in order to provide this Council and this community's right to assess the impact of the addition of the development of the 47 lots in the project area as well as impacts to the adjacent Zone 5 area.

Please don't interpret this as an "anti-development" letter. My concerns are about liability for the city and proper CEQA process.

I first will provide you with an introductory short list of my concerns followed by a more complete discussion of those concerns where I will quote sections of the FEIR followed by my comments in italics.

Summary of concerns on the FEIR:

8.1

1) This FEIR is using mitigation based upon a geological standard set forth by 3 Appellate Judges who admit they do not know much about geology and is contradictory to an industry standard of factor of safety used by all municipalities.

2) This FEIR has failed to disclose a landslide mass that could have significant impacts due to this project.

3) The FEIR failed to disclose the impact of the additional runoff from the project entering Altamira Cyn. and infiltrating into a series of fissures of which previous geological studies indicate could potentially significantly impact the stability of Zone 5 as well as Zone 2.

4) The FEIR focuses on sewer hookup as mitigations and does not provide adequate mitigation as to the previous geologist's opinion that the primary source of land instability is from the accumulative quantity of rainfall.

5) The FEIR does not offer any analysis nor mitigation for the fact that the project and adjoining areas are within a Seismic Hazard Zone for earthquake induced landslides.

6) Hydrologic studies used boiler plate soil assumptions resulting in erroneous conclusions despite site specific soil core samples as well as geologic reports being available for analysis.

7) The hydrology methodology will not put any analysis into the project's drainage impact upon an already deficient Altamira Cyn. and Zone 5 with the unjustifiable reason that it is in a "larger area" beyond the project description.

8) The conclusion that the current storm drain system was adequately designed to handle development of all 47 lots within the project description is unsubstantiated and is contrary to evidence presented to this FEIR.

9) The FEIR did not take into consideration the accumulative hydrological impact of several development tracts approved by the City after the project area's storm drain was in place.

10) The lack of Hydrological analysis to the adjacent Zone 5 does not address the potential significant impact of impairment of emergency access through some streets during storms.

11) Mitigations for significant impacts are described to occur in the future in a segmented fashion which avoids full analysis of accumulative impacts of this project.

Acronyms used in this comment letter:

ACL-Abalone Cove Landslide; the boundaries of Zone 5. The ACL is the predominate supporting land mass for the west side of Zone 2.

PBL-Portuguese Bend Landslide; the eastside of the Portuguese Bend community and the Portuguese Bend Preserve. The PBL is the predominate supporting land mass for the east side of Zone 2.

APBL-Ancient Portuguese Bend Landslide; the boundary of the larger landslide complex which includes all zones and the Portuguese Bend Preserve.

Appendix D Geotechnical Study-Scope of project

Please note that this geology report prepared more than 3 years ago and was not updated at a later date as was the Hydrology report.

The opening introductory statement is:
"Our work was performed to determine the potential geotechnical/geologic impacts to Zone 2 and the surrounding area from development of all 47 undeveloped lots."

8.2

Notice that the geologist's scope of study is to include geological impacts to both Zone 2 ***and the surrounding area****. But the detail of the FEIR, as I will point out below, clearly only focuses on*

impacts to the lots in Zone 2 and avoids any analysis of impacts of project drainage to the contiguous ACL and Zone 5.

Further explanation of comments 1-11 above:

1) Abandoning a geological industry standard for safety

FEIR: "Though significant in terms of the potential for cracking and separations to structures, flatwork and other block or concrete structures, the movement within the ACL is slow over enough time that it is **not considered by most geologists as a hazard to life and limb** as long as the abatement activities (ground water dewatering and monitoring) within the ACL continue." (Emphasis added)

Herein is a recommendation for the city to fundamentally change its geologic standards. The industry geologic standard is a factor of safety of 1.5 (to simplify, the downhill support land is 1.5 times the stability of the uphill driving force land). This FEIR has bypassed this industry standard and substituted the MONKS court case standard, which allows for structural damage as long as there is no loss of "life or limb". The potential significant impacts of this fundamental change in industry standard factor of safety have not been fully disclosed.

FEIR: P.14-15 3.10 Slope Stability Analysis for Zone 2 Area
"Based on our review and experiences we are of the position that the site slope stability is likely somewhere higher than 1.0, but less than 1.5. This is the position taken by Cotton Shires (2001)."

First, the Cotton Shires report commissioned by the City actually concluded that the factor of safety was unknown.
Second, the geologist here admits that the stability of Zone 2 is less than 1.5 which means this FEIR is recommending you as a City ignore the industry standard of a factor of safety of 1.5 and substitute the MONKS standard of nuisance for geologic review of entitlements. 8.3

The impact of changing this geological standard to Land Use and Planning was not analyzed by this FEIR.
CEQA requires that a fundamental question be answered: Would the project conflict with any applicable land use policy or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect?

The FEIR does not discuss why other RS2 zoned properties within the City boundaries would not be required to be treated equally with this new MONKS geologic standard. And, since there is no justification for having different geologic standards of one zone over another, this MONKS standard could have serious repercussions to ALL zoning classifications.

Imagine if another RS-2 property owner, maybe a neighbor of yours, wanted to tear down their house and excavate for a new house with a basement. With this MONKS case standard, the city would allow the grading so long as it did not threaten life or limb despite the fact it might cause a house next door to have foundation problems.

The FEIR does not address this wide ranging and possibly very significant Land Use consequence of using the MONKS geological standard instead of keeping its current widely accepted industry geological standard.

2) Failure to disclose a landslide mass influenced by this project

The geologic dynamics of a land mass moving between Portuguese Point and Inspiration point (PVDS ski jump area) has not been mentioned in this FEIR. Land movement in this area is influenced by both shoreline erosion and water draining down fissures into the subsurface in Altamira Cyn. which, with the addition of the runoff of this project, could potentially significantly impact not only PVDS but residents on Peppertree Dr. 8.4

3) FEIR only addresses impacts to Zone 2 and not Zone 5

FEIR: "…it should be plainly understood that because of the inherent potential for instability within adjacent landslides and the fact that Zone 2 is atop a landslide, that should additional significant movement occur in adjacent areas, it is our opinion the loss of support currently provided from the Abalone Cove and Portuguese Bend Landslides could result in significant structural damage within Zone 2."

First, this statement acknowledges that the adjacent ACL is critical to the support of Zone 2. Second, this impact analysis only considers impacts to Zone 2 property owners and not Zone 5 property owners. Evidence presented to this FEIR clearly shows that storm water runoff draining into Alatamira Cyn. infuses into the subsurface of the ACL and significantly contributes more to the land instability of Zone 5 than Zone 2.

Even before this Zone 2 proposed change, you have seen video of storm runoff affecting loss of property by Dan and Vicki Pinham.
One of the City's Founders, Betty Strauss, lives above Altamira Cyn. and is already experiencing some cracks in her home foundation.
Additional water in Altamira Cyn. from the project's hardscape runoff will only exacerbate these resident's situation and is not adequately addressed in this FEIR. 8.5

The city gave credence to San Ramon canyon eroding away support for PVDE. Why not the same credence to residents that are experiencing the same phenomena above Altamira Cyn.?

FEIR: "…historical landsliding of the PBL and ACL indicate that mass movements still occur in the area today. Thus it is reasonable to conclude that landsliding occurs nearly continuously, at least in geologic terms, throughout the APBL complex and that landsliding is a very real potential that will continue into the future."

The APBL complex includes all Zones, including Zone 2 and 5. The City cannot do much about existing homes, but why would a City give additional entitlements for habitable structures in an area that has a "very real potential" for future landsliding? Please read the warnings from geologists before the tragic land failure in Oso, Washington and Jackson, Wyoming.

A house breaks apart as a slow-moving landslide in Jackson, Wyo. Friday, April 18. 2014

FEIR: p. 11 3.6 Surface Water
"Based on our review of site studies for individual lots, typical lot drainage recommendations is to direct run-off toward the streets through controlled mechanisms such as roof gutters and down spouts. Because of the expansive soils in Zone 2, surface water runoff should be directed away from planned structures to reduce cracking that may occur to foundations and flatwork."

Again, the mitigation measure is only to get the rainfall to the street storm drain system so that is does not impact the Zone 2 structures with no consideration to impacts of this same runoff to the adjacent Zone 5 residents.

One of the mitigations is for the installation of roof rain barrel, but the FEIR does not address the capacity of that barrel. First, the size is inadequate for a series of heavy storms and second, the barrel only controls flow rate, not quantity of accumulative hardscape runoff from the project into an already deficient storm drain system.

8.6

FEIR: "Further, because of the underlying geologic conditions beneath the Zone 2 and adjacent areas, it is in the community's best interest to keep ground water low and under control."

The FEIR provides no mitigation as to how to "keep ground water low and under control". If anything, this project exacerbates an already deficient storm drain system adding accumulative water into fissures that feed subsurface instability.

FEIR: "…storm water run-off should not be allowed to percolate into
the ground in the Zone 2 area through the adoption of common BMP practices."

Again, only Zone 2 considered. What common BMP practices is being recommended here? The FEIR fails to provide any common BMPs that would apply to mitigate the hydrological impacts to the Zone 5 residents.

"…report by Robert Stone and Associates (1979)…recommended **against** further development in Zone 2 until slide movement was stopped within the ACL, the water table was lowered, and surface drainage was improved. …all but the slightest movement has ceased on the adjacent ACL… and the uncertainty with regard to landslide control has been abated. " (Emphasis added)

This FEIR ignores this geologist's recommendations from the 1979 report commissioned by the City stating that "No development in Zone 2" is to occur until the identified mitigations have taken place.

4) ***The FEIR focuses on sewer hookup for mitigations and ignores geologist's opinion that the primary source of land instability is from rainfall.***

FEIR : p.10 3.5 Groundwater
"The data and graphs prepared by Ehlig and Bean indicate a strong positive correlation between ground water levels in the slide mass and the rate of movement…The current sources of ground water are primarily rainfall."

The statement that "current sources of ground water are primarily rainfall " is accurate. But what this statement is also telling you is that having Zone 2 lots hooked up to the sewer system as mitigation is insignificant when compared to the impacts of rainwater to the storm drain system and land stability. Currently all homes in Zone 2 and Zone 5 are hooked up to a sanitary sewer system and the GPS data of land movement has not change since. This is not disclosed in this FEIR.

The FEIR fails to acknowledge that the data from the Abalone Cove shoreline GPS (near the toe) shows a significantly larger movement than uphill areas of the ACL as well as the ACLAD records of WW 18 showing that storm drain runoff is infusing directly into the subsurface of the ACL affecting land instability. This has nothing to do with sewer hookups. 8.7

In addition, the FEIR report does not fully disclose the impact of the variability of rainfall from year to year. The NOAA Climate Prediction Center has stated that there is a 66% chance of an El Nino weather pattern developing in the Southern Pacific by the end of this year. A Kelvin wave (10ºF warmer waters moving from Indonesia to South America) is currently larger and warmer than any record kept for 35 years and may exceed the 97-98 rainy season that was double our average and caused flooding and damage to local residents in Zone 2 and Zone 5. http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html

While this prediction is not 100% certain, what is certain is that our rainfall can at times be very heavy and may even have a greater variability due to climate change (Not addressed in the GHG section).

The FEIR also does not disclose the potential impact of converting open land that currently absorbs rainfall to post-development Zone 2 hardscape which transfers that stormwater "liability" from Zone 2 to Zone 5.

5) ***The FEIR offers neither analysis nor mitigation for the fact that the project and adjoining areas are within a Seismic Hazard Zone for earthquake induced landslides.***

FEIR: p.13-14 3.7.10 Earthquake Induced Landslides
"…the project site is located within a Seismic Hazard Zone for earthquake induced landslides. Depending on the intensity of seismic shaking, seismically-induced landsliding could occur in the subject area if ground shaking is very high. Therefore we conclude that the probability of seismically-induced landslides is at least a moderate risk."

If the FEIR has evidence that the probability of seismically-induced landslide is at least a moderate risk, why is this potential significant impact not addressed? If the FEIR cannot figure out a way to mitigate this potentially significant impact then the FEIR should at least disclose it as an immitigable impact. 8.8

When one adds up the accumulative list of possible inducements of landsliding in this project and adjacent areas, including seismic and hydrological, why would the City even consider taking such risks? Again, remember the risks that the cities of Oso, Washington and Jackson, Wyoming took with allowing development in their area. They now face their legacy with that disaster. If something goes wrong later, you can't go after the geologist. He has put in his standard disclaimer though out the document that there is the potential for changes in stability of the land masses that could result in significant damage. So this judgment call is now on the City's and taxpayer's shoulders using this faulty, incomplete FEIR.

6) **Failure to analyze project site specific soil conditions**

"The low permeability of the existing soils (clays) and steepness of the natural canyons, infiltration in the natural areas is likely to be low. For a given storm event, the total infiltration will not exceed the existing condition."

The erroneous conclusion that infiltration into natural steep canyons will be low is made because the FEIR ignored the unique soil conditions of the canyons and the numerous geologic studies that conclude the majority of storm water runoff infuses into the subsurface of the canyons through unique soil conditions including fissures. 8.9

This is no ordinary storm drain system. 60 to 70 percent of the discharge from storms can be lost down major fracture zones in Altamira Cyn. which act as direct conduits into the subsurface with potential negative impacts to land stability for both Zone 5 as well as the Zone 2 project area. Depending on the size and duration of the storm, only 1-18 percent of the storm water in Altamira Cyn. actually reaches the ocean leaving the rest to infiltrate into the subsurface. (From: "The Creepy (Slow Moving) Landslides of the Portuguese Bend Area" by Bob Douglas).

The FEIR also did not bother to collect all of the evidence made available including local core samples that show a mixture of clay with permeable landslide debris as opposed to their boiler plate model showing only non-permeable clay soils.

The FEIR has several charts that state storm water runoff of vacant lots is only 1-2% and developed lots are anywhere from 21-42%.
Observations by neighbors over many years, along with photos and videos made available to this FEIR, shows the vacant lots retaining storm water and hardscaped areas sheeting storm water into the streets.

There is enough evidence presented for this FEIR to conclude that the canyons and soils have high permeability and post development hardscape storm water runoff will exceed existing conditions.

As a matter of fact, the only occurrence of a mudflow documented (photos submitted to the City) was in conjunction with recent development entitlements of one lot on upper Cinnamon within this project area. That lot had an MND under CEQA with specific mitigations that should have avoided such mudflow impacts.

With the lack of acknowledgment of evidence and subsequent analysis of this FEIR and inadequate mitigations and monitoring with a previous MND, there is sufficient evidence for any member of the Council or public to question the adequacy of the analysis and efficacy of the mitigations and monitoring of this FEIR.

7) ***The hydrology methodology will not put any analysis into the project's drainage impact upon an already deficient Altamira Cyn. and Zone 5 with the unjustifiable reason that it is in a "larger area" beyond the project description.***

FEIR: P. 6 1.2 Methodology
"While it may be desirable to resolve the site flooding and erosion in Altamira Canyon and other natural drainage courses, it is an existing condition affecting the larger area and therefore is not addressed in this analysis." "Should any deficiencies exist, it is a regional issue and should be addressed accordingly."

This EIR acknowledges that deficiencies exist in adjacent areas to the project but dismisses them as an "existing condition" and a "regional" issue and therefore not to be addressed in this EIR. This is contrary to CEQA guidelines that require an EIR to analyze accumulative impacts of the project to the immediate and adjoining environments 8.10

The line of reasoning for this FEIR is not unlike saying that an EIR does not have to address the traffic impact of a project to "existing conditions" in the "larger area" surrounding that project because the roads in that larger area are already deficient. In other words, a Level E intersection (Poor operation - long delays, near or at capacity) cannot be analyzed if the project might lower it to Level F because the Level E road is already an "existing condition" and is a "regional issue" and not to be addressed within the EIR project impact analysis.

In the case of this FEIR, the description of the contiguous Zone 5 area as being a "larger regional" area is misleading and avoids proper analysis of impacts to Zone 5 from the project in Zone 2.

Under CEQA, hydrological impacts would be considered significant if the proposed project would either contribute runoff water that exceeded the capacity of an existing storm drain system or increase infiltration which could affect the stability of existing landslides in the project vicinity. Although the FEIR may not have to correct the existing deficient drainage, the FEIR nonetheless is required to analyze the project as to a potential significant accumulative impact above and beyond the existing drainage condition including impacts to areas outside the project area such as Zone 5.

There is enough evidence in the record to show that a full analysis of potential accumulative significant impacts from the project to the existing storm drain must be done. And CEQA does not allow an EIR to avoid analyzing potentially significant impacts by stating it should not address impacts to areas outside the project area or that those impacts will be studied with some unspecified future analysis and mitigation.

FEIR: "Since, the entire watershed drains through the project development, flood impacts are based upon changes relative to the entire watershed."

This is another fallacy in the FEIR analysis. Fundamental science acknowledges the importance of order of magnitude. There is a huge difference between comparing the quantity of runoff from hardscape of the project to the many acres of the entire Portuguese Bend watershed acreage than comparing project runoff to the acreage of the streets and storm drains. The percentage numbers will be significantly different leading to different conclusions as to impacts. 8.11

Also, this comparison of watershed drainage through the project area is not apples to apples. As demonstrated above, percolations rates vary in the watershed. The hardscape of the 47 lots has a much greater drainage impact than the many acres of pervious natural open space.

8) There is no evidence provided by this FEIR that the current storm drain system is adequately designed to handle the development of all 47 lots of the project

FEIR: Appendix E Hydrology P, 4 1.2 Project Description
"….since the existing drainage system was designed for the entire Portuguese Bend development, including the 47 undeveloped lots, each lot is allowed to drain into the existing drainage system" 8.12

The Hydrology report used in this FEIR assumes that the storm drain system was properly designed for all lots to be developed. But neither engineering nor design specifications are provided. The FEIR doesn't even provide evidence that the storm drain system was even engineered or designed by anyone. If anything, the evidence provided and acknowledged in this FEIR proves that the storm drain was not engineered as it is inadequate to handle even pre-project development, let alone accumulative impacts of the project runoff.

The FEIR comes to the conclusion that there is some kind of right for the undeveloped lot owners to accumulatively add stormwater to this already deficient stormdrain system without assessing potential negative impacts. I have never heard of such a justification for an EIR to deny an analysis of potential negative impacts, especially when the FEIR admits that the current storm drain is inadequate.

The FEIR also does not address the possibility of subdivision of any of those 47 lots. 8.13

FEIR: *Hydrological recommendations* "Reduce significant increases in runoff rates and volume in localized areas by low impact development principles such as, but not limited to, infiltration trenches, cisterns, bio-retention areas, or permeable pavement identified in the County's LID manual."

First, these suggested mitigations are boiler plate water quality mitigations, not water quantity impact mitigations. Second, these suggested mitigation measures, including "infiltration trenches, cisterns, bio-retention areas and permeable pavement" are contrary to the geologist's recommendation to mitigate against water infiltration for the development of the 47 lots and are contrary to the selected mitigations of this FEIR. 8.14
All of this confusion needs to be straightened out before the Council or the public can adequately review the adequacy of the mitigations of this FEIR.

FEIR: "Reference plans and design calculations were not available for confirmation of the capacity of the existing drains. A detailed hydrologic and hydraulic analysis of the existing drainage system, including culverts, streets, and open drainage courses was not prepared as a part of this analysis."

Section 15147 of CEQA states "The information contained in an EIR shall include summarized technical data, maps, plot plans, diagrams, and similar relevant information sufficient to permit full assessment of significant environmental impacts by reviewing agencies and members of the public."

This FEIR leaves the unanswered question of specifications as to the original storm drain design and states that it will not engage in an analysis to determine the amount of storm water the storm drain system can handle nor the accumulative impact of the project to that storm drain system. 8.15

Nor did the original storm drain system account for the 1980's ACL and subsequent fissures developing to infuse stormwater into the subsurface of the ACL in Altamira Cyn.

The report further admits that the FEMA Flood Zone "D"(Altamira Cyn.) has not had any flood hazard analysis leaving the question of potential impact to a homeowner's flood insurance unanswered.

Assumptions made by this FEIR as to any mitigation recommendations are therefore baseless, unverifiable and could have potential significant impacts of which are not being addressed.

FEIR: "The project shall address impacts to the immediate vicinity as well as downstream facilities, including culverts, roads, open drainage courses, and Altamira Canyon, and demonstrate there is no change from existing conditions."

This statement is begging for an accumulative Zone 2 project Hydrological Study, analysis of impacts and subsequent mitigations. Where are the FEIR mitigations that address "impacts to downstream facilities"? The FEIR has already stated it will not do any studies and does not have engineering for the storm drain system.
As stated in this comment letter, there is evidence that post-project drainage will accumulatively increase and have an impact to the environment which is opposite of this statement that there will be "no change from existing conditions". 8.16

FEIR 1: "Testimony and video provided by residents indicates that some culverts and roads are inadequate to convey existing runoff."

FEIR 2: "The combined impacts resulting from the development of the 47 lots is deemed to be insignificant for the following reasons: The existing (natural) drainage patterns are maintained and the combination of the natural and constructed drainage conveyances and surface flow has the capacity to convey the runoff from the project site."

These two FEIR statements as to the capacity of the storm drain system are in direct conflict with each other and do not justify the "no impact" conclusion of this FEIR. The FEIR has stated that there are no engineering plans to justify the second statement. 8.17

Full evidence has been presented to the EIR consultants to show that additional stormwater will accumulatively have a potential negative impact not only on the deficient storm drain system but potentially significant impacts to land stability for both Zone 2 and Zone 5.

All of this contradictory and missing information is in fundamental violation of CEQA's primary goal of disclosure in order to provide this community's right to assess the impact of the addition of the development of the 47 lots to the existing storm drain system, the safety of residents in Zone 5 and the safety of the proposed project residents in Zone 2.

9) The FEIR did not consider development tracts added to the project watershed after the storm drain system was put into place.

Appendix 9 of this FEIR shows that the City permitted development in the 1960's in Tract 27789, 28584, Tract 31716 in 1978 and (Tract 38848) Island View development in the early 1980's all of which drain into Altamira Cyn.
All of these tract storm drains were installed subsequent to when the Portuguese Bend storm drain system was put in place. This FEIR does not show any evidence that the existing storm drain system is designed to accumulatively handle this additional hundreds of acres of tract development runoff let alone the proposed project. 8.18

10) Emergency access impacts not considered 8.19

The majority of the storm drain system described in this FEIR is street surfaces. There are some streets in Zone 5 that are very steep and, because storm water runoff is concentrated on the street surfaces, residents during storms have had difficulty getting enough traction on those steep streets for emergency exit. This condition exists before the addition of the project's runoff.

This is especially important for residents of Figtree Rd. which receives the accumulative bulk of the street storm drain system and is one of the steepest streets in the community.

Public safety services could also have impaired access during an emergency on these slippery streets.

The FEIR does not discuss this potentially significant impact.

11) Mitigations for significant impacts are described to occur in the future in a segmented fashion which avoids full analysis of accumulative impacts of this project.

FEIR: "To identify and mitigate potential localized flood impacts to adjacent properties and facilities to a level not considered significant the project applicants must do the following: A detailed Hydrology Study shall be prepared by a Licensed Civil Engineer and approved by the City. The study shall address impacts to the proposed building site, as well as upstream and downstream properties. "

This Hydrology Study mitigation requirement of individual lots after this FEIR has been certified violates two fundamental CEQA guidelines. 8.20

a) An EIR cannot put off mitigation for stated significant impacts to sometime in the future,
b) This mitigation is avoiding addressing accumulative impacts of the project as a whole and instead segmenting the mitigation to individual lots.

This detailed Hydrological Study is precisely the kind of study that needs to be done for the ***entire*** *project under this EIR, not for each lot individually sometime in the future. Individual lot analysis of hydrological impacts by its nature is a segmentation of this project and this way of approaching a mitigation will eliminate the public's right to know the accumulative hydrological impact of all 47 lots of this project taken as a whole.*

CONCLUSION

As I hope I have shown, the impacts of this project are not adequately addressed meaning that neither this FEIR can be certified nor the project can be approved.

I offer you another way of looking at this FEIR. Imagine if instead of storm drain and geology issues, the significant impacts of the project revolved around inadequate fire hydrant infrastructure. Imagine the City has asked the Fire Marshal to accept new homes be added to an existing deficient hydrant system and accept a new Court ordered safety standard because: 8.21

-The FEIR made an unsubstantiated conclusion that currently undersized 4" lines were originally planned for full build out and thusly additional homes had a right to be added to that deficient hydrant capacity.

-The proportional number of hydrants in the proposed development area compared to hydrants in a much larger area outside of the project area is small enough so as to not be considered significant.

-To ignore the additional home's impact of the pressure drop in the already deficient 4" lines to the downhill properties because the hydrants for those downhill properties were a "regional" issue and thusly were not to be addressed in the FEIR.

-Upgrading the hydrant infrastructure to impacted areas of the project area was economically infeasible.

-To accept the mitigation that the impact of 47 homes on the hydrant infrastructure only be evaluated on a one by one individual lot basis, not the entire project's accumulative impact.

-And the FEIR asks the Fire Marshal to accept a new standard of safety from a Court order by three Appellate Judges even though they know very little about hydrant infrastructure needs. And that new Court standard spells out that the Fire Marshall has to put aside a duty to protection of public property and accept an allowance of some fire damage to structures as long as the deficient hydrant infrastructure did not cause harm of limb or life.

The Marshall would have to consider how that decision would affect the Marshall's current standards of safety, liability and reputation as well as consider the impact of future development proposals in other areas demanding they be treated equally with the same new Court standard.

I sincerely doubt the Fire Marshall would accept these conditions and excuses laid out in this scenario and would not certify the FEIR nor approve the project.

The Council is the decision maker now and has to weigh out similar recommendations and rationale of this FEIR and Zone change proposal.

I have confidence you will weigh all of the facts and make the right decision.

Thank you,
Jim Knight
Resident of Portuguese Bend

Letter 8

COMMENTER: Jim Knight

RESPONSE:

Response 8.1

The commenter expresses general opposition to certification of the Final EIR and lists his concerns. The concerns are expanded on later in the letter, and so are responded to in subsequent responses.

Response 8.2

The commenter states an opinion that the EIR "avoids any analysis of impacts of project drainage to the contiguous ACL and Zone 5." However, Zone 5, known as the Abalone Cove Landslide, and Zone 6, known as the Portuguese Bend Landslide, are located immediately adjacent to Zone 2 to the south and east, respectively. As indicated in the Final EIR, there is a common geologic link between these Zones in that they share the same basic underlying conditions of bedrock structure, make-up and strength. In addition, all these zones are a part of the Ancient Portuguese Bend Landslide Complex (APBLC). However, zones 5 and 6 are re-activated portions of the APBLC while Zone 2 is not. Because of their natural association, Zone 2 receives some of its overall stabilization from zones 5 and 6 because these massive areas provide a buttressing support.

As indicated in the Final EIR, it appears that landslide movement within the Portuguese Bend area results when groundwater levels rise and lower parcels of land, eroded by beach erosion, move, resulting in an insufficient buttressing of parcels uphill. Thus a "shingle" effect takes place where lower parcels move more frequently and more dramatically than up-slope properties. Maintaining low ground water levels within zones 5 and 6 is not only critical to reduce movement within these two active landslide masses, but to also maintain the additional natural support to Zone 2. The project as mitigated would not result in significant impacts related to drainage to zones 5 and 6 because post-construction runoff and infiltration rates would be required to generally match pre-construction rates, increasing neither runoff nor infiltration.

Response 8.3

The commenter states a concern regarding the threshold used in the EIR for assessing geologic hazards, and whether the same standards would apply city-wide. This issue is discussed in detail in the Final EIR in Section 8.1.b and also under Topical Response I.a, Geology, above.

The commenter also asserts that the land use and planning impact of the geological standard used in the EIR was not analyzed in the EIR. The commenter quotes the CEQA Guidelines Appendix G checklist question that asks whether the project would "conflict with any applicable land use policy or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect." The commenter does not explain which policy or regulation the geologic standard would conflict with. Land Use and planning impacts are

discussed in the Initial Study, which may be found in Appendix A to the Final EIR. As discussed therein, the proposed ordinance revisions would be generally consistent with the City's adopted regulations and policies relevant to the project. As discussed under Topical Response I.a, Geology, above, neither the EIR nor the proposed ordinance revisions recommend that the city abandon the industry standard in lieu of the Monks Standard for any other project. The city should not abandon the 1.5 factor-of-safety for slopes standard for other areas under its purview. This special case should not be used by others for establishing a new standard elsewhere because for many sites this standard can be analyzed, and because this special case is not intended to be used as a way to forego the work of researching and reviewing landslides and slope stability, but rather to bring some parity to the unique circumstances related to the various lots in Zone 2.

Response 8.4

The commenter states an opinion that "the geologic dynamics of a land mass moving between Portuguese Point and Inspiration point (PVDS ski jump area) has not been mentioned in this Final EIR." The project area was reviewed under the assumption that land is slowly moving in all areas located south of Zone 2 including the "ski jump" area of PVDS, such as the Abalone Cove Landslide area and Portuguese Bend Landslide area. The Abalone Cove Landslide condition, which is located immediately adjacent and down hill of Zone 2, is similar to land movement between Inspiration Point and Portuguese Point.

Inasmuch as slope stability analyses performed by others reviewed the Zone 2 condition in light of the Abalone Cove Landslide area, it could be reasonably concluded that similar conclusions would be reached, and possibly were reached, for the referenced area. In keeping with the analysis in the EIR, it is then reasonable to conclude that the build-out of Zone 2 would have no impact with respect to gross slope stability analyses to Zone 2 and other adjacent Zones. Geologic cross sections are drawn in an attempt to review the worst-case condition for a representative area, and several various cross sections reviewed for the EIR analysis extended from the ocean to those areas outside the APBL. It is thus reasonable to conclude that the "ski jump" area is not the worst-case scenario, or it is included incidentally in studies as a part of those analyses.

Response 8.5

The commenter states an opinion that the project would add additional groundwater infiltration and/or runoff. The project as mitigated would not result in significant additional groundwater infiltration or runoff. Please see the Draft EIR in Section 4.8, Hydrology and Water Quality, and in Topical Response 8.1.b in Section 8.0, *Comments and Responses*, of the Final EIR, as well as in Topical Response I.b, Hydrology, Water Quality and Drainage, above, for an explanation of this topic.

The commenter also implies that the proposed project would put potential new houses at risk and that the results would be similar to recent events in Oso, Washington and Jackson, Wyoming. This comment is noted. The soil, slope, development, infrastructure and climactic conditions in Oso, Washington and Jackson, Wyoming are different from those in Zone 2, and

such a comparison would not be instructive for purposes of assessing the impacts associated with the proposed project. Differences include:

- Locations (i.e., coastal vs. riverbank vs. inland valley);
- Different infrastructure and natural and man-made land formations based on property lay-out and engineering;
- Climatic differences due to their geographic position; and
- Different geologic formations.

The commenter does not identify any links geologically or otherwise between these areas and the project area, other than that landslides occurred there.

The geotechnical review for the EIR addresses impacts to Zone 2 and by inspection, all immediately adjacent Zones. This is because, as discussed in the EIR, there is an inherent recognized relationship between all land masses in the Portuguese Bend Community. When a review is performed it also incorporates the immediately surrounding area as geology typically does not end at project boundaries. Thus, it is assumed that the area under review is representative of a larger area, especially when slope stability analysis is performed.

Since it was concluded that the development of the additional lots within Zone 2 would not impact Zone 2 from a gross slope stability perspective, it is logically concluded by the City's geological consultant for the EIR, LGC Valley, that this determination would extend to Zones immediately outside of this area. Thus there is no significant contribution to existing conditions elsewhere and it can be reasonably concluded that potential buildout under the proposed ordinance revisions would not result in significant impacts to other zones.

<u>Response 8.6</u>

The commenter states an opinion that one of the mitigation measures is "only to get the rainfall to the street storm drain system so that is does not impact the Zone 2 structures with no consideration to impacts of this same runoff to the adjacent Zone 5 residents." However, the text quoted is not from an EIR mitigation measure.

The commenter also questions a measure requiring a "roof rain barrel." None of the EIR measures contain this requirement. However, similar capturing and retaining or detaining runoff from hard surfaces such as roofs may be a part of drainage plans prepared for individual lot development.

The commenter goes on to state an opinion that the Final EIR provides no mitigation to keep ground water low and under control, and that the project would exacerbate an already deficient storm drain system. As noted throughout the Final EIR, and discussed further under Topical Response I.b, Hydrology, Water Quality and Drainage, the project as mitigated would not result in an increase of runoff or infiltration. For this reason, mitigation to "keep ground water low and under control" would not be required to reduce project impacts to less than significant levels. Further, the City has limited ability to require projects to resolve existing conditions that the project is not impacting.

Finally, with respect to the Robert Stone and Associates report of 1979, it should be noted that there is much more data and analyses from which to render opinion about the Zone 2 and APBL area today than there was in 1979. Second, though there is debate about the amount of movement within various zones of the APBL it is generally concluded that Zone 2 is experiencing very little movement, if any at all in much of Zone 2 and that the ACL has decreased movement significantly since that time. Thirdly, it is also the general consensus that groundwater pumping and withdrawal throughout the APBL zones has significantly contributed to the general reduction in land movement in all areas. This is especially true in Zone 2 where there has been no historical land movement similar to those of Zones 5 or 6. Finally, groundwater run-off is not anticipated to change significantly with required adherence to the mitigation measures included in the Final EIR. Thus overall, the City's geological consultants have concluded that the general intent of Robert Stone and Associates' recommendations are met under the conditions and restrictions of the subject area.

Response 8.7

The commenter states an opinion that the EIR does not adequately address the impacts of rain on landslide instability, implying that the EIR focuses on wastewater rather than storm water. The effects of storm water on landslide stability are discussed in Section 4.5, *Geology*, at length. Neither the setting nor the impact analysis cites wastewater as a contributor to landslide instability.

The commenter also states an opinion that the Final EIR also "does not disclose the potential impact of converting open land that currently absorbs rainfall to post-development Zone 2 hardscape." On the contrary, this issue is discussed at length in the EIR in Section 4.8 *Hydrology and Water Quality,* and in Topical Response 8.1.b in Section 8.0, *Comments and Responses*, of the Final EIR as well as in Topical Response I.b, Hydrology, Water Quality and Drainage, above.

Response 8.8

The commenter states an opinion that The Final EIR "offers neither analysis nor mitigation for the fact that the project and adjoining areas are within a Seismic Hazard Zone for earthquake induced landslides." The purpose of the EIR in addressing potential seismic impacts is to help ensure that future home sites take into consideration strong ground motion in the design of structures, to make reviewers aware the fact that earthquakes can and do trigger landslides, and to support the recommendation of the review of on-lot slopes during the building permit process. Though these landslides could occur in many places within the Portuguese Bend Community, it should be clear that the buildout of additional homes within Zone 2 would not increase seismically-induced risk.

Response 8.9

The commenter provides several opinions about the permeability of soils within the project area and Altamira Canyon. As discussed in the EIR in Section 4.8 *Hydrology and Water Quality,* and in topical responses in Section 8.0, *Comments and Responses*, of the Final EIR as well as in Topical Response I.b, Hydrology, Water Quality and Drainage, above, with the mitigation identified in the Final EIR runoff from developed lots would be required to generally match existing

conditions; therefore, regardless of the specific permeability of individual areas, runoff and infiltration would remain essentially unchanged.

Response 8.10

The commenter states concerns about the project's drainage impacts upon an "already-deficient" Altamira Canyon and Zone 5. The existing deficiencies are discussed in Section 4.8 *Hydrology and Water Quality,* and in Topical Response 8.1.a in Section 8.0, *Comments and Responses*, of the Final EIR. The EIR does not identify addressing the existing deficiencies as required mitigation for the proposed project because, as discussed throughout the Final EIR, the project itself would not significantly contribute to these deficiencies such that it would result in potentially significant impacts requiring such mitigation. Please see Topical Response B, Hydrology, Water Quality and Drainage, as well as the relevant discussions in the draft and final EIRs, for further information on this topic. This issue is not analogous to a situation where project-related traffic reduces level of service from E to F, because in that situation the project results in impacts to traffic. Here, the Final EIR concludes that the project, as mitigated, would not result in impacts to drainage and canyon infiltration.

Response 8.11

The commenter appears to question the methodology for determining drainage impacts, implying that the changes in runoff should not be assessed on a watershed scale. This comment is noted; however, it is not clear whether the commenter is suggesting a different methodology. The comparison included the full range of conditions to better understand the hydrological characteristics of the watershed. Included in the analysis was the entire watershed, the project area, and a typical individual lot; the percentages do change as result of the type of development and topography within the comparative data set. Drainage increases from individual lots are discussed in Section 4.8, *Hydrology and Water Quality,* which states that "Impermeable surface area could increase by up to approximately 38% on individual lots as they are built out. The resulting increase in runoff from individual lots if drainage is not properly controlled could potentially range between 9.8% and 15.1% over existing conditions." The commenter also repeats the comment that percolation rates vary in the watershed; for this reason, Mitigation Measure HWQ-4 requires that a detailed hydrology study and drainage plan be prepared that takes into account each lot's soil conditions.

Response 8.12

The commenter questions whether the infrastructure in Zone 2 was designed to serve the subdivision and indeed whether it was "designed by anyone." Please see Response 3.1 and Topical Response I.c, Traffic and Circulation. The commenter also states an opinion that the project would "accumulatively add stormwater to this already deficient stormdrain system." As discussed in the EIR in Section 4.8 *Hydrology and Water Quality,* and in topical responses in Section 8.0, *Comments and Responses*, of the Final EIR as well as in Topical Response I.b, Hydrology, Water Quality and Drainage, above, with the mitigation identified in the Final EIR runoff from developed lots would be required to generally match existing conditions; therefore, runoff to the existing roads and drainages would not substantially increase.

Response 8.13

The commenter states that the EIR does not address the potential for subdivisions. On the contrary, the cumulative analysis setting in the Final EIR includes the proposed and pending subdivisions. Assuming additional subdivisions would be speculative. In addition, Section 6.3, *Subdivision of Larger Lots Alternative* in the EIR provides an analysis of impacts in the scenario that all potentially dividable lots are subdivided.

Response 8.14

The commenter states that water management techniques such as infiltration trenches, cisterns, bio-retention areas, or permeable pavement are "water quality mitigations, not water quantity impact mitigations." However, such measures can address both the quality and quantity of storm water runoff. These measures appear in Low Impact Development manuals precisely because they relate to hydromodification impacts, which are typically considered with the water quality design as opposed to peak flood flow and storm protection. Hydromodification addresses changes to a watershed impacting a drainage course. Depending upon the impairment within the water body, the impact could be the result of an increase or decrease in runoff, sedimentation, or erosion. These types of mitigation measures help reduce runoff flow and volume rates by capturing runoff for later reuse or release, or for infiltration.

The commenter also states an opinion that the EIR is unclear on the mitigation goals for storm water management, specifically that the kinds of measures listed above would aid infiltration, contrary to goals for managing groundwater. As discussed in the EIR in Section 4.8 *Hydrology and Water Quality,* and in topical responses in Section 8.0, *Comments and Responses*, of the Final EIR as well as in Topical Response B, Hydrology, Water Quality and Drainage, above, with the mitigation identified in the Final EIR runoff from developed lots would be required to generally match existing conditions, i.e. to increase neither infiltration nor runoff. This is clearly expressed in the relevant mitigation measures, HWQ-4 and GEO-3(a), which are clear that "Post-construction lot infiltration and runoff rates and volume shall be made equal to pre-construction conditions through use of appropriate low impact development principles such as, but not limited to, detaining peak flows and use of cisterns, bio-retention areas, green roofs and permeable hardscape."

Response 8.15

The commenter essentially restates the concern expressed in Comment 8.12. Please see Response 3.1 and Topical Response I.c, Traffic and Circulation.

Response 8.16

The commenter asks how the Final EIR mitigations would address impacts to downstream facilities. By controlling storm water (via Mitigation Measure HWQ-4) so that there is no substantial increase in runoff from the subject lots, buildout under the proposed ordinance revisions would not increase runoff to downstream facilities. The commenter also states an opinion that "there is evidence that post-project drainage will accumulatively increase." Although the commenter and others have expressed opinions on this subject, it is unclear specifically of

what the evidence referred to consists. Topical Response B, Hydrology, Water Quality and Drainage, explains in greater detail how HWQ-4 would be implemented.

Response 8.17

The commenter identifies language from the hydrology study (Appendix E to the EIR) that is inconsistent with the revised analysis as presented in the text of the Final EIR. These residual statements were intended to be corrected in a revised study for the Final EIR appendix, but the Draft EIR version of the study was used as a result of a production error. The revised corrected study is attached to this Appendix H document.

The commenter also opines again that "evidence has been presented to the EIR consultants to show that additional stormwater will accumulatively have a potential negative impact not only on the deficient storm drain system but potentially significant impacts to land stability for both Zone 2 and Zone 5." As discussed in the EIR in Section 4.8 *Hydrology and Water Quality,* and in topical responses in Section 8.0, *Comments and Responses*, of the Final EIR as well as in Topical Response B, Hydrology, Water Quality and Drainage, above, with the mitigation identified in the Final EIR runoff from developed lots would be required to generally match existing conditions, i.e. to increase neither infiltration nor runoff. Impacts would be less than significant after mitigation.

Response 8.18

The commenter again states an opinion that the existing drainage facilities are not adequate to handle existing runoff. The commenter is referred to the following statement in Section 4.8 *Hydrology and Water Quality* of the Final EIR: "Based upon observations by the residents and a review of the overall drainage system, the existing drainage system is inadequate to convey runoff from the existing developed lots."

Response 8.19

The commenter states an opinion that the streets may be slippery when wet and that this could result in safety impacts. The commenter is correct that vehicles may have reduced traction on steep roads when they are wet. However, potential buildout under the proposed ordinance revisions would increase neither the steepness of the roads serving the project area nor the amount of water on the roads. The incremental increase in the number of emergency vehicles that would use the project area roads in this respect would not result in a related significant environmental impact. It should also be noted that the likelihood of the overlap of a major fire occurrence (i.e., requiring an evacuation) with a high rainfall/run-off event is very low. Typically red flag warning days occur during the dry months, i.e., summer, when roads are not wet from storm water.

Response 8.20

The commenter states an opinion that requiring that impacts be mitigated for each lot that would be built out under the proposed ordinance revisions constitutes "segmentation" under

CEQA. As impacts of buildout of all subject lots are discussed in the EIR, it does not "segment" the project.

Programmatic study is the standard CEQA approach for regulatory changes that could facilitate potential future development on multiple properties for which individual property owners have not submitted plans or applications. The EIR is a programmatic document analyzing ordinance revisions rather than specific projects. Site plans or projects have not been submitted for each of the individual subject lots. The EIR therefore uses a programmatic approach to mitigation, setting overall goals and performance standards. Measures must include specific performance standards that must be met and ways to meet those standards, as those in the EIR do. As discussed in the Final EIR and the topical responses, each individual lot would have demonstrate compliance with the mitigation measures through site-specific plans and studies requiring City review and approval.

Response 8.21

The commenter summarizes his comments with an allegory. As this comment generally reflects the preceding comments, which are addressed specifically above, it does not require its own response. However, it should be noted that unlike a fire system, where incremental increases can change fire flow demands and affect the overall system, changes in drainage can be mitigated on a lot by lot basis. If a lot were left undeveloped, there would be no impact. If a lot were developed, and no net change in hydrology was allowed, there would be no impact to the hydrology of the area. Fire flow demand is an increase that can only be mitigated by an increase in supply, whereas potential changes to hydrology can be mitigated by incorporating project design features that result in no net change between pre- and post-development conditions.

Letter 9

Abe Leider

From: Carolynn Petru <Carolynn@rpv.com>
Sent: Tuesday, May 06, 2014 7:50 AM
To: Eduardo Schonborn
Cc: Joel Rojas
Subject: FW: Zone 2 additional comments
Attachments: RESOLUTION NO 2002-43.docx

FYI

-----Original Message-----
From: Jim Knight [mailto:knightjim33@gmail.com]
Sent: Monday, May 05, 2014 8:04 PM
To: CC
Subject: Zone 2 additional comments

Mayor and Council members:

My letter for the Agenda item 1 in the May 6, 2014 staff report only addresses the FEIR. In reading the staff report, the staff has raised some additional issues/impacts related to the Ordinance Revision that the FEIR has not addressed.

There is the statement on p1-9 #2 and #3 that the city could be exposed to a legal challenge from the owners of the 31 non-Monks parcels if these particular Ordinance revisions are not adopted.

I suggest to you, with the evidence presented, that you run a greater legal risk if you were to go forth with this Ordinance Revision for the following reasons:

1) There is enough evidence presented to this City that shows the Ordinance is not supported with an adequate FEIR and thusly mitigations are not sufficient to support such an Ordinance Revision leaving the City open for other legal challenges. 9.1

2) The non-industry geological standard you are being asked to adopt allows for some damage to properties both inside and outside the project area leaving the City open to legal challenges for real damages. In my FEIR comments I pointed out that if a property owner in another location in RPV wanted to tear down a house and excavate a basement, that the standard you are being asked to accept would allow for some damage to a neighbor's home foundation. 9.2

3) There is a reasonable expectation that other similar RS-1 and RS-2 property owners would demand the same Monks geological standard be used. As a matter of fact, this could impact all zones and could lead to an indefensible changes to our zoning and General Plan.

4) RPV City Council Resolution 2002-43 (attached) is signed by Mayor John McTaggart and was not included in your staff report. The Ordinance Revision before you in Agenda item 1 is in direct conflict with this clearly stated City policy of using the industry geological standard of a factor of safety of 1.5 which is used by the City and all other municipalities (Sec. C, D of the 2002 resolution). This 2002 Resolution further rejects other standards such as the Monks nuisance standard which is being presented to you on Agenda item 1 (Sec. E). 9.3

I fully understand that the 3 Appellate Judges rejected this policy and forced a non-industry geologic nuisance standard on the City but it was only for the 16 plaintiffs of the Monks case. That decision did not force the City to change their existing industry geological standard for the non-Monks litigants in Zone 2 nor the rest of the city.

The community has presented to the City evidence that extends far beyond the arguments used by the three Appellate Judges to make their decision. Any legal challenges by other Zone 2 lot owners would have to start a legal challenge de novo and would have to address those additional obstacles to convince another court to rule in their favor.

The fear of potential lawsuit by other Zone 2 lot owners should not over shadow the potential of possibly much larger legal issues of adopting a non-industry geological standard that allows for damage to structures.

There are currently legal challenges being presented to other cities such as Oso, Washington and Jackson, Wyoming for their approval of development despite warnings by geologists.

Thank you;

Jim Knight
Resident of Portuguese Bend

RESOLUTION NO. 2002·43 Signed by Mayor McTaggart on June 12, 2002

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF RANCHO PALOS VERDES SETTING FORTH CERTAIN FINDINGS REGARDING "ZONE 2" OF THE LANDSLIDE MORATORIUM AREA BASED UPON THE REPORT THAT WAS PREPARED BY COTTON, SHIRES &ASSOCIATES

WHEREAS, in 2001, the City Council approved a professional services agreement with Cotton, Shires &Associates to review existing geologic data to address certain issues regarding potential development in the area of the Landslide Moratorium that has been informally designated as "Zone 2"; and

WHEREAS, pursuant to the direction of the City Council, Cotton, Shires & Associates prepared a draft report in September, 2001, which was made available to all interested persons and the public for review and comment; and

WHEREAS, interested persons and members of the public submitted comments and questions on the draft report, which thereafter were reviewed by Cotton, Shires & Associates; and

WHEREAS, pursuant to the direction of the City Council, Cotton, Shires & Associates prepared a report dated January 14, 2002; and

WHEREAS, on May 20, 2002, at a duly noticed public meeting, the City Council of the City of Rancho Palos Verdes reviewed the report that was prepared by Cotton, Shires & Associates and discussed certain findings that should be made as a result of the report; and

WHEREAS, the City Council has directed staff to prepare a resolution setting forth its findings;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF RANCHO PALOS VERDES HEREBY FINDS, RESOLVES AND ORDERS AS FOLLOWS:

1. The City Council hereby accepts the following conclusions of the Cotton, Shires &Associates, January 14, 2002 Technical Review that:

A. There is insufficient subsurface information to properly characterize either the depth to the base of landslide, the strength properties of the landslide materials, or the groundwater levels. Without these data, no accurate slope stability analysis can be undertaken, no reliable factor of safety can be calculated and no dependable landslide mitigation scheme can be designed.

B. One cannot quantitatively determine the factor of safety and, therefore, cannot judge the level of risk of development in the prehistoric landslide area, which includes Zone 2.

C. The factor of safety of the landslide mass that underlies Zone 2 is above 1.00, but probably is less than the industry's standard safety threshold of 1.50 for residential development, which also is the standard that is used by the City of Rancho Palos Verdes.

D. The City Council finds that the accepted geotechnical standard for new residential construction, which is a Factor of Safety of 1.5 for slope stability that is applied throughout the City, also should be applied within the boundaries of the Landslide Moratorium Area. This is a common standard among geotechnical professionals and has been adopted by most, if not all, municipalities in Southern California. *(Cotton Report page* 5, 8-9, *Cotton Jan. 30, 2002, letter page 1.)*

E. No recognized geological agency or standard-setting body has adopted as a standard for determining whether or not to allow residential development a standard or test that is based on an inquiry as to whether or not the development of the property would "further destabilize" an area, or such similar standard. Accordingly, Rancho Palos Verdes declines to adopt such a standard within its jurisdiction. *(Cotton Jan. 30, 2002, letter page 1.)*

F. Geologically, the level of risk of allowing development of undeveloped residential lots in Zone 2 is presently unknown. The decision to allow new building upon undeveloped lots in that area, given the unknown level of risk, is a policy decision, which must be based on a willingness to accept the unknown risk. *(Cotton Jan. 30, 2002 letter, page 1.)*

G. The guidelines suggested by Dr. Perry Ehlig in his Memorandum of May 26, 1993, appear to be based on Dr. Ehlig's subjective assessment, based on his experience, judgment and expertise. However, Cotton, Shires uncovered no geotechnical slope stability analyses of Zone 2 in Dr. Ehlig's files. *(Cotton Jan 30, 2002 letter, page* 2, *Report page 2.)*

H. Although a number of mitigation measures have been employed, to date no quantitative geotechnical analysis to determine the effectiveness of these measures has been undertaken. *(Cotton Report page 2.)*

I. It has been noted by various individuals that the apparent long period of there being no recorded land movement in Zone 2 suggests that the

area is adequately stable to allow building on undeveloped properties in that Zone. Yet there is no clear evidence of the age of the landslide. Further, predicting the long-term stability of the landslide in advance of detailed surface and subsurface information is founded on ill-advised technical reasoning. *(Cotton Report page 3.)*

2. The conclusion noted in the Cotton, Shires January 2002 Report that the undeveloped ("vacant") lots could be developed "without further destabilizing the large regional landslide" is a conclusion that is not based on the application of the accepted standard that seeks a Factor of Safety of 1.5, but instead is based on the fact that it is feasible to construct new homes without significant redistribution of earth mass or contributing to groundwater rise. Hence, this conclusion is not based on an evaluation of the stability of the underlying geology. This response was the result of a request by the City Council that the report address the issue of whether or not the development would "further destabilize" the area. *(Cotton Jan. 30, 2002 letter page* 1-2.) Because this conclusion is not based on a standard that is recognized by a geological agency or standard-setting body, the City of Rancho Palos Verdes declines to adopt that conclusion.

3. Based on the foregoing, the City Council is directing City Staff to continue to deny requests for development permits for new homes in the Zone 2 area of the Portuguese Bend landslide complex, because of the current lack of evidence that the Zone 2 area has a factor of safety of 1.5 or greater, until an applicant submits a complete Landslide Moratorium Exclusion application that is supported by adequate geologic data demonstrating a factor of safety of 1.5 or greater of the Zone 2 area to the satisfaction of the City Geologist; the City Council approves the Landslide Moratorium Exclusion application, and all other required permits to develop are issued by the City.

PASSED, APPROVED AND ADOPTED this 12th day of June 2002.

/s/ John C. McTaggart Mayor

ATTEST:

/s/ Jo Purcell City Clerk

STATE OF CALIFORNIA COUNTY OF LOS ANGELES) ss CITY OF RANCHO PALOS VERDES
I, JO PURCELL, City Clerk of the City of Rancho Palos Verdes, do hereby certify that the above Resolution No. 2002-43 was duly and regularly passed and adopted by the said City Council at a regular meeting thereof held on June 12, 2002.
City Clerk

Letter 9

COMMENTER: Jim Knight

RESPONSE:

Response 9.1

The commenter states an opinion that the EIR is "inadequate," referring to "evidence" that it may be assumed is presented in the commenter's other letter (Letter 8). Responses to the comments in Letter 8 are provided above under Letter 8.

Response 9.2

The commenter states an opinion that the standards and thresholds used to assess the proposed project's geologic hazards impacts in the EIR would apply citywide. Please see Topical Response I.a, Geology, above for a discussion of this topic, as well as Final EIR Topical Response 8.1.b.1.

Response 9.3

The commenter states an opinion that the standards and thresholds used to assess the proposed project's geologic hazards impacts in the EIR conflict with City Council Resolution 2002-43, and suggests that there are legal risks in using these standards and thresholds . In the decision by the Court of Appeal in the Monks case, the Court found that the requirement in Resolution 2002-43 that a zone-wide factor of safety of 1.5 must be established before development can occur on a lot in Zone 2 causes a taking of property. In response to the Court of Appeal's decision, the City Council repealed Resolution No. 2002-43. Accordingly, that Resolution is of no further force or effect. See also Response 11.20.

Letter 10

Abe Leider

From: Jennifer Mendonca <jenni674@hotmail.com>
Sent: Tuesday, May 06, 2014 10:08 AM
To: Eduardo Schonborn
Cc: CC; Subhash Mendonca
Subject: Request to ratify and execute FEIR recommendations.

Dear Mr Schonborn,
We purchased a non-Monk lot at 86 Narcissa Dr on August 2013 since our family with three young children was looking to build our home in the beautiful community of Rancho Palos Verdes. We have been looking to own a home in Rancho Palos Verdes for more than two years so that we can be a part of this beautiful community where my children attend its fantastic schools.
We had a geological assessment done on our lot before we purchased it, to ensure we could build our dream home on the lot and were extremely pleased when the result of that assessment confirmed that we could build on the lot.
We are very excited that the FEIR recommends revising the City's Landslide Moratorium Ordinance to establish an exception category to allow the development of our lot to enable my family to build our dream home. We urge the City Council to pass this exception category so that our young children can firm their roots in the beautiful community of Portuguese Bend in Rancho Palos Verdes.
Sincerely yours,

Subhash & Jennifer Mendonca

Letter 10

COMMENTER: Subhash and Jennifer Mendonca

RESPONSE:

The commenter expresses support for the proposed ordinance revisions. Although not related to the analysis or conclusions of the EIR, this comment is noted.

Letter 11

Stuart Miller
Attorney at Law
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Admitted in CA and NY

April 28, 2014

Mr. Eduardo Schonborn
Department of Planning, Building & Code Enforcement
City of Rancho Palos Verdes
30940 Hawthorne Blvd.
Rancho Palos Verdes, CA 90275

Re: Comments on Final Environmental Impact Report
Zone 2 Landslide Moratorium Ordinance Revisions

Dear Mr. Schonborn:

Along with Scott Wellman of Wellman & Warren LLP, I represent the Portuguese Bend Community Association ("PBCA") with regard to the Final Environmental Impact Report ("FEIR") on the Zone 2 Landslide Moratorium Ordinance Revisions. We submit these comments to identify what we perceive as serious deficiencies in the FEIR.

In brief, we see five main problems:

1. The FEIR delegates to a variety of staff members and consultants the determination of whether there are significant impacts regarding water runoff and what the appropriate mitigation measures should be. Under the procedures outlined in the FEIR, these decisions will be made on an ad hoc basis without formal coordination among staff and the consultants, with no specific standards for them to follow, and with no objective means of testing the success of their decisions. This delegation violates well-established legal principles governing environmental impact reports. 11.1

2. The FEIR's substantive conclusions regarding runoff are based upon an unexplained and improbable projection that development on 47 lots will generate zero additional runoff, and upon speculation about a "design" purportedly made in 1949 that no one involved in the current project has ever seen.

3. The FEIR's substantive conclusions about the effects of development on the roads within Portuguese Bend are based on impossible projections regarding traffic flow out of Portuguese Bend and a refusal, despite legal requirements to the contrary, to study traffic and physical damage to the roads within Portuguese Bend.

4. On behalf of the Abalone Cove Landslide Abatement District, the President of its Board of Directors, Dr. Robert Douglas, submitted detailed comments to the consultant dated July 31, 2013. (These comments accompany this letter as Exhibit 1.) These comments provide important information challenging the consultant's assumptions and conclusions regarding hydrology, but the consultant did not include or respond to them in the FEIR. The consultant should respond to them now.

5. The FEIR misinterprets the effect of *Monks v. City of Rancho Palos Verdes* (2008) 167 Cal.App.4th 263 on the lots owned by the non-*Monks* plaintiffs.

I. INADEQUACY OF DEFINED MITIGATION

The FEIR is contrary to several related principles governing the definition of mitigation measures. We will first state those principles and then show in detail how six critical mitigation measures in the FEIR violate them.

11.2

A. General principles

1. Delegation of authority to determine significant impacts or mitigation measures. First, the lead agency (here, the City Council) may not delegate authority to determine mitigation measures "to a person or entity that is not a decision-making body." (*POET, LLC v. California Air Resources Board* (2013) 218 Cal.App.4th 681, 731.) As shown below, the FEIR violates this principle because it improperly "delegates [the City Council's] responsibility to assess the project's environmental impacts to the staff . . ." and outside consultants. (*Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 307.)

2. Deferral of determination of mitigation measures. Second, the agency may not defer the determination of mitigation measures (14 Cal. Code Regs. § 15126.4(a)(1)(B)) unless "three elements are satisfied. First, practical considerations prevented the formulation of mitigation measures at the usual time in the planning process. Second, the agency committed itself to formulating the mitigation measures in the future. Third, the agency adopted ***specific performance criteria*** that the mitigation measures were required to satisfy." (*POET*, *supra*, 218 Cal.App.4th at 736 [emphasis added].)

The requirement of specific performance criteria is not satisfied, for example, by a projection that "any new development would maintain, and would not exacerbate, the existing runoff and infiltration conditions." (FEIR p. 4.8-11.) Rather, the FEIR must explain in detail how this improbable result will be achieved and how success will be confirmed.

Communities for a Better Environment v. City of Richmond (2010) 184 Cal.App.4th 70 involved a study of greenhouse gas emissions. Like the FEIR does here with regard to runoff, the FEIR in *Communities for a Better Environment* anticipated no increase in emissions. The court held that the FEIR must provide "assurance that the plan for how the Project's greenhouse gas emissions would be mitigated to a net-zero standard was both feasible and efficacious." (*Id.* at 95.) In other words, the Zone 2 FEIR may not merely state there will be no additional runoff from the development of 47 more lots, as it does repeatedly. (*E.g.*, pp. 4.5-20, 4.8-11, 4.8-18, 8-5, 8-39-40.) Rather, it must explain the basis for this improbable conclusion.

In *POET*, *supra*, the EIR addressed increases in the emission of nitrogen oxide ("NOx"). The court held that "'no increase in NOx' is not a specific performance criterion." (*POET*, *supra*, 218 Cal.App.4th at 739.) Rather, as in *Communities for a Better Environment*, it held that the FEIR must state with specificity how the goal of zero emissions would be achieved and measured:

> We conclude that [the agency's] statement that its future rulemaking will "establish specifications to ensure there is no increase in NOx" suffers from the same defect as the net-zero standard for greenhouse gas emissions adopted in [*Communities for a Better Environment*]—it established ***no objective performance criteria for measuring whether the stated goal will be achieved***. As a result, we and members of the public have not been informed how [the agency] will determine that the requirements it adopts in a fuel specifications regulation will ensure that use of the biodiesel does not increase NOx emissions. To illustrate this point, ***it is unclear what tests will be performed and what measurements will be taken*** to determine that biodiesel use is not increasing NOx emissions.

(*Id.* at 740 [emphases added].)

The legal principles described above can be summarized as follows:

1. No delegation of authority to determine "significant impacts" or mitigation measures.

2. No deferral of determination of mitigation measures without "specific performance criteria."

3. "Specific performance criteria" require detailed explanations of how the goal will be achieved and how success will be tested.

4. "Zero emissions" and "zero runoff" in themselves are not specific performance criteria.

B. Improper delegation and deferral regarding water runoff.

1. **HWQ-1**: This mitigation measure is intended to address erosion. It requires each applicant to "prepare a Construction Erosion Control and Water Quality Plan for the review and approval of the Building Official." (FEIR p. 4.8-8.) No guidance or requirements are provided to assist the applicant in preparing the plan or to assist the Building Official in the "review and approval" process. On the contrary, the measure leaves the standards undefined, stating only that "The plan shall include Best Management Practices that ***may*** include . . . ." (*Ibid.* [emphasis added].) (Also, as we explain in the discussion of measure HWQ-2 below, the phrase "best management practices" as defined in the City's Municipal Code is such a broad and general concept that it provides no guidance to the applicant or the Building Official.) 11.3

Beyond that, measure HWQ-1 is an improper delegation because its goal is "to

reduce impacts related to water quality during construction activities to a less than significant level." (FEIR p. 4.8-8.) The City Council is responsible for determining in the FEIR what effects are "significant." (14 Cal. Code Regs § 15064(b).) However, this measure leaves that determination to the Building Official.

Measure HWQ-1 violates all four legal principles enumerated above.

2. **HWQ-2**: This measure addresses impermeable surfaces on the newly-developed lots, which cause the "significant" impact of excess pollution-bearing runoff unless mitigated. (FEIR p. 4.8-10.) If not mitigated, development can cause an increase in runoff of up to 38% on each lot. (*Ibid.*) The measure provides that any developmental proposal exceeding 2,500 square feet of impervious surface requires "review and approval by the City's National Pollutant Discharge Elimination System (NPDES) consultant." (FEIR p. 4.8-11.) It improperly delegates to the NPDES consultant the determination of what percentage of increase would be "less than significant" and what measures are required to achieve that reduction. (FEIR p. 4.8-11.) Contrary to the requirements of *POET*, *supra*, it does not explain how the decrease in runoff will be measured. 11.4

This measure also "require[s] adherence to the Municipal Code requirements related to the NPDES permit." (FEIR p. 4.8-10.) Section 13.10 of the Municipal Code governs NPDES issues. Although §§ 13.10.050(D)(3) and 13.10.65(B) require the use of "best management practices," "best management practices" is defined in terms other than what is suggested by its actual words:

> "Best management practices (BMP's)" means activities, practices, facilities, and/or procedures that when implemented to their maximum efficiency will ***prevent or reduce*** pollutants

> in discharges and any program technology, process, citing criteria, operational methods or measures, or engineered systems, which when implemented prevent, control, remove, or reduce pollution. Examples of BMP's may include public education and outreach, proper planning of development projects, proper cleaning of catch basin inlets, and proper sludge- or waste-handling and disposal, among others.

(Municipal Code § 13.10.030(D) [emphasis added].) In other words, "best management practices" include all measures that have ***any*** beneficial effect. They do not have to be the "best" in any sense, and neither mitigation measure HWQ-2 nor the Municipal Code provide the City's NPDES consultant with particular guidance in the "review and approval" process.

Beyond that, while HWQ-2 puts the "review and approval" process in the hands of "the City's National Pollutant Discharge Elimination System (NPDES) consultant" (FEIR p. 4.8-11), Municipal Code § 10.13.020(D) assigns the same function to an unidentified "authorized enforcement officer," while § 10.13.065(D) assigns it to the Director of Public Works. There are therefore three uncoordinated persons with uncertain and overlapping authority to determine what undefined "best management practices" are required for each lot to avoid undefined "significant" environmental impacts.

Measure HWQ-2 violates all four legal principles enumerated above.

3. **HWQ-3**: This measure addresses increases in the amount of impermeable surface and resulting increase in runoff. It incorporates measures GEO-3 and HWQ-4. (We address HWQ-4 below.) We perceive several problems with GEO-3: 11.5

First, it is circular and therefore meaningless. It provides that "individual project applicants shall comply with all recommendations contained within the Geotechnical

Study prepared by LGC Valley, Inc., dated March 29, 2011." (FEIR p. 4.5-19.) However, the LGC Valley Geotechnical Study (FEIR Appendix D) provides that "a geotechnical report must be submitted to and approved by the City's geotechnical reviewers indicating what, if any, lot-local and immediately adjacent geologic hazards must be addressed and/or corrected prior to, or during construction." (Appendix D p. 16.) In other words, the FEIR says the standards are set forth now in the LGC Valley report, but the LGC Valley report says the standards will be established on an ad hoc basis in the future by whoever the City's "geotechnical reviewers" happen to be at the time of each lot owner's application.

Second, it requires the following deferred and delegated evaluations lacking specific performance criteria:

• "If lot drainage deficiencies are identified by the director of public works, all such deficiencies shall be corrected by the applicant." (FEIR p. 4.8-17.) There is no explanation of what standards the Director will use, how "the deficiencies shall be corrected," or how the success of the correction will be measured.

• "Roof runoff from all buildings and structures on the site shall be contained and directed to the streets or an approved drainage course." (*Ibid.*) This task is presumably assigned to the Director of Public Works, although the FEIR does not actually say so. There are no specific standards defining how drainage courses are "approved." 11.6

• "If required by the city geotechnical staff, the applicant shall submit a soils report, and/or a geotechnical report, for the review and approval of the city geotechnical staff." (*Ibid.*) There are no standards to guide the geotechnical staff in demanding or

evaluating the reports or determining whether the impacts of development at that particular lot would be "significant."

• "All landscaping irrigation systems shall be part of a water management system approved by the director of public works." (*Ibid.*) There are no standards for the Director to follow in approving the systems and no means of testing the success of the systems the Director approves.

• "[S]torm drainage improvements that address drainage deficiencies and avoid increases infiltration of stormwater [shall] be designed to the satisfaction of the Director of Public Works prior to issuance of building permits on the individual subject lots." (*Ibid.*) Again, this provision leaves to the Director the task of defining what effects are "significant," and it is unclear what standards the Director will use or how the effectiveness of the Director's standards will be tested.

Measures HWQ-3 and GEO-3 violate all four legal principles enumerated above.

4. **HWQ-4**: This measure concerns flooding. It incorporates measure GEO-3 (FEIR pp. 4.8-12, 4.8-16), which suffers from the delegated and uncoordinated authority and lack of specific and testable standards described in detail above. Measure HWQ-4 also requires "Each of the property owners [to] prepare a detailed hydrologic analysis to demonstrate compliance with the mitigation measures listed below." (FEIR p. 4.8-16.) 11.7
Three of the four "mitigation measures listed below" require review by the Director of Public Works, while one requires review by "the city geotechnical staff." (FEIR p. 4.8-17.) The only one that seems to provide guidance is the fourth, concerning landscaping irrigation systems, which shall be limited to the amount of water "necessary to maintain

the yard or garden." (*Ibid.*) The other three, addressed in the discussion of measure GEO-3 above, provide no guidance for the Director or geotechnical staff in making their decisions and no way of testing their effect.

Even with these measures in place, the FEIR concludes that "impacts would be potentially significant." (*Ibid.*) To reduce these impacts "to a less than significant level" (*ibid.*), the FEIR expressly delegates to the Director of Public Works the City Council's job "to determine impacts" while providing the Director with no guidance other than the circular standard of "to the satisfaction of the Director" and such vague terms as "normalized," "appropriate," "adequately," "acceptable," and City "policies." (FEIR pp. 4.8-17-18.)

Measure HWQ-4 violates all four legal principles enumerated above.

5. **HWQ-5**: This measure regarding flooding requires the Building Official to determine whether "new construction [is] adequately anchored" and "resistant to flood damage." (FEIR p. 4.8-19.) There are no standards defining "adequately" or "resistant," and no explanation of how these qualities will be tested. Measure HWQ-5 violates all four legal principles enumerated above. 11.8

6. **U-1**: This measure addressing wastewater conveyance and treatment provides that "the capacity of the required holding tank system shall be subject to the review and approval of the City's Building Official." (FEIR p. 4-11.5.) It leaves to the Building Official the discretion to determine what capacity is necessary to mitigate this "significant but mitigable" environmental impact. (FEIR p. 4-11.3.) However, it provides the Building Official no standards for determining proper capacity and defines no means of testing the 11.9

Building Official's determination that a particular capacity will adequately mitigate the "significant" effect. Measure U-1 violates all four legal principles enumerated above.

C. Lack of coordination

These measures to identify and mitigate significant impacts from water assign tasks to seven different persons: the Director of Public Works, the Building Official, the NPDES consultant, the "authorized enforcement officer," LGC Valley Inc., the City's "geotechnical reviewers," and the City's "geotechnical staff." There is no required coordination among them, and in none of these cases is there any guidance for these officials and consultants to determine what impacts are "significant" or how they can be mitigated to a status of "less than significant." The problem is summarized in the following chart:

11.10

ISSUE	MEASURE	DELEGATEE	SPECIFIC STANDARDS
Erosion	HWQ-1	Building Official	None
Runoff	HWQ-2 → → MC13.10.030(D) → → MC13.10.065(D)	NPDES consultant "Authorized enforcement officer" Director of Public Works	None. Three people with overlapping authority; no coordination.
Amount of impermeable surface	HWQ-3/GEO-3	FEIR says LGC Valley sets standards, but LGC says City's "geotechnical reviewers" set them.	None
Drainage deficiencies	HWQ-3/GEO-3/ HWQ-4	Director of Public Works	None
Soils report	HWQ-3/GEO-3/ HWQ-4	"City geotechnical staff"	None
Water management	HWQ-3/GEO-3/ HWQ-4	Director of Public Works	None

Storm water infiltration	HWQ-3/GEO-3	Director of Public Works	None
Hydrology study	HWQ-4	Director of Public Works	None
Flooding	HWQ-5	Director of Public Works	None
Wastewater	U-1	Building Official	None

II. RUNOFF FROM THE UNDEVELOPED LOTS

The FEIR states repeatedly that there will be ***absolutely zero*** excess runoff caused by development of the undeveloped lots in Zone 2. For example:

> [A]ny new development would maintain, and would not exacerbate, the existing runoff and infiltration conditions . . . .

(FEIR pp. 4.5-20, 4.8-11.)

> Post-construction lot infiltration and runoff rates and volume shall be made equal to pre-construction conditions . . . .

11.11

(FEIR p. 4.8-18.)

> By maintaining post-development drainage conditions at the same level as existing conditions, no increase in runoff rates and volumes to Altamira Canyon would occur.

(FEIR p. 8-5.)

> [T]he project would not result in substantial increases of infiltration. . . . [T]he project, with the mitigation identified, would not result in a significant increase of groundwater infusion.

(FEIR pp. 8-39-40.)

The FEIR presents two bases for its assumption that the goal of zero increase is feasible, but neither one actually supports it:

A. False assumption that increase in runoff can be reduced to zero without providing specific performance criteria explaining how this result will be achieved and how success will be measured.

As we have explained above, an FEIR may not defer the determination of mitigation measures without providing specific performance criteria, which means (a) what the result is, (b) how it will be achieved, and © how its achievement will be measured. We have shown in detail how measures HWQ-1, HWQ-2, HWQ-3, GEO-3, HWQ-4, HWQ-5, and U-1 violate this principle.

The FEIR concedes that the existing drainage system is inadequate to convey runoff from the existing developed lots. (FEIR p. 4.8-1.) It estimates that development can cause an increase in runoff on each lot of up to 38%. (FEIR pp. 4.8-10, 4.8-16.) The notion that this massive percentage can be reduced not just by some significant fraction but to ***zero at each of 47 different locations comprising 43 acres*** (Appendix E p. 4) is counterintuitive and improbable. It requires far more justification than the FEIR's solution of leaving the uncoordinated determination of what effects are "significant" and how they will be mitigated to the City's Building Official (HWQ-1, HWQ-5, and U-1), NPDES consultant (HWQ-2), LGC Valley, Inc. (HWQ-3/GEO-3), geotechnical reviewers (HWQ-3/GEO-3), geotechnical staff (HWQ-3/GEO-3), and Director of Public Works (HQ-2, HWQ-3/GEO-3, HWQ-4, and HWQ-5).

Indeed, by the FEIR's terms, achievement of the goal of zero additional runoff is not just unlikely, but impossible. Measure HWQ-2, which requires review and approval of the City's NPDES consultant, does not apply at all to any development of less than

2,500 square feet. (FEIR pp. 4.8-10-11.) If there is even one such development on any of the 47 lots, the goal of zero increase in runoff cannot be achieved.

Beyond that, a standard of ***zero increase*** is not a specific performance criterion. (*POET*, *supra*, 218 Cal.App.4th at 739.) Rather, the FEIR must provide "assurance that the plan for ***how*** the Project's [discharge] would be mitigated to a net-zero standard was both feasible and efficacious." (*Communities for a Better Environment*, *supra*, 184 Cal.App.4th at 95 [emphasis added].) The FEIR's optimistic anticipation that the City's various staff members and consultants somehow will figure out how to achieve this ambitious goal through a series of ad hoc determinations that do not even require formal coordination among themselves does not satisfy this strict standard. Nor does it explain "what tests will be performed and what measurements will be taken to determine" if the goal of zero increase is actually achieved. (*POET*, *supra*, 218 Cal.App.4th at 740.)

B. False reliance on an assumed but nonexistent development plan from 1949.

The FEIR assumes that the existing drainage system was designed for all the lots in Zone 2. For example:

> The existing drainage system in the project area was designed for the 111 lots within the 112-acre Portuguese Bend area (the Zone 2 area), including the 47 lots that could be developed as part of the project.

11.12

(FEIR p. 4.8-1.)

> The existing drainage system in the project area was designed for all 111 lots in the 112-acre Zone 2 area.

(FEIR p. 4.8-12.)

> [T]he existing drainage system was designed for the entire

> Portuguese Bend development, including the 47 undeveloped lots.

(FEIR Appendix E p. 4.)[1]

This repetitive assumption about how the drainage system was "designed" is contrary to the consultant's admission that "Reference plans and design calculations were not available for confirmation of the capacity of the existing drains." (*Ibid.*) The consultant has never seen the "design" and "plans" it repeatedly relies upon.

In their comments on the draft environmental impact report ("DEIR"), multiple interested parties addressed the consultant's erroneous and speculative reliance on the 1949 "design." (*E.g.*, FEIR pp. 8-47, 8-55, 8-90-91, 8-204.) For example, Portuguese Bend resident Jeremy Davies wrote:

> [Section] 4.8a states "Since the existing drainage system was designed for the entire Portuguese Bend development, including the 47 undeveloped lots, each lot is assumed to have a proportional share of the existing drainage capacity provided for the Portuguese Bend development. In other words, regardless of when the lots are constructed, each lot is allowed to drain into the existing drainage system based upon the size of the lot." The original plan for Portuguese Bend goes back to 1949. The DEIR does not spell out where the assumption comes from nor the assumptions used regarding size of homes and garages, number of vehicles per home,

---

[1]The consultant is under the mistaken impression that "Portuguese Bend" is a synonym for "Zone 2." (FEIR p. 4.8-1.) A closer synonym for "Portuguese Bend" is what has been known as "the Landslide Moratorium Area." (*E.g.*, http://www.palosverdes.com/rpv/planning/Agendas_-_current_agendas/planningcommission/2011/2011_04_13_Planning_Commission_Agenda/Hypothetical-Policy-Scenario.pdf; Rancho Palos Verdes Ordinance 452U entitled "Evaluation of Portuguese Bend Landslide Moratorium Ordinance," http://www.palosverdes.com/rpv/planning/Evaluation_of_Portuguese_Bend_Landslide_and_Moratorium_Ordinance/ordinance-452U1.cfm.) Portuguese Bend consists of eight geologic zones, not one.

> hardscape and landscape areas, cumulative storm water run off, standards used for engineering the roads, etc. Please explain and justify the bases for the DEIR's conclusion that the drainage system is adequate for this proposed development 60 years later.

(FEIR p. 8-55.)

In response, the consultant repeated it admission that its statements about the 1949 "design" are based upon conjecture:

> [T]he City is not in possession of a plan for the subdivision and infrastructure of the Zone 2 area that specifically states which lots were accommodated in the plan for drainage. However, it may be reasonably ***assumed*** that the roads and drainage system were constructed to service all of the lots that were created with the subdivision.

(FEIR p. 8-65 [emphasis added].)

The consultant also errs in confusing Zone 2 with the greater Abalone Cove area, which encompasses Zone 2 and Zone 5. Although it says in two of the passages quoted above that the drainage system was designed for Zone 2 (FEIR pp. 4.8-1, 4.8-12), in fact the drainage system was designed (if it was "designed" at all) for Zone 2 and Zone 5 together. Zone 5 contains about 53 residential lots on 90 acres, bringing the total to 164 lots on 210 acres. The FEIR gives the effects on Zone 5 of runoff from Zone 2 minimal attention. Any analysis based solely on a calculation of 111 lots on 112 acres is invalid.

Moreover, if there ever was a drainage system "design," it was made in 1949 at the time of the subdivision. (FEIR pp. 8-90, 8-204.) In 1949 there were no such concepts as "Zone 2" and "Zone 5," the Portuguese Bend and Abalone Cove Landslides had not yet occurred, and CEQA had not yet been enacted. No one could rationally rely today on a

hypothetical and anonymously-prepared 65-year-old "design" that no one has seen and that would be obsolete in any event because of later geologic events and legal enactments.

These errors are exacerbated by the consultant's failure to consider extensive post-1949 development ***above*** the Landslide Moratorium Area. Hardscape in those developments causes additional runoff to Zones 2 and 5 and Altamira Canyon, further making any reliance on hypothetical plans from 1949 improper.

III. THE FEIR DOES NOT ADEQUATELY ADDRESS THE IMPACT OF DEVELOPMENT ON THE ROADS IN ZONES 2 AND 5.

A. Physical effects on the roads

The Portuguese Bend Community Association criticized the DEIR for ignoring the impacts of the project on the roads within Portuguese Bend. The Association observed that the roads are fragile, that they were designed for far less traffic than they would experience if all the lots were developed, and that they already show signs of extra wear just from construction on four *Monks* lots:

> The DEIR has excluded the Portuguese Bend private roads from its study stating that any necessary upgrades would be the responsibility of the community. Any decision to allow additional development, bears with it, the responsibility to identify all impacts and identify feasible mitigation measures. The private roads within the Portuguese Bend community were designed and constructed in a time when families owned a single vehicle, service and construction equipment were smaller and lighter, and most homeowners did not have gardeners and other daily hired services. The community roads are not adequate to withstand the added daily volume that would be created by 47 additional residences and especially the tremendous volume of heavy construction traffic associated with those construction activities. Visual deterioration is evident just from the four projects started in the last year.

11.13

(FEIR p. 8-10.)

The consultant responded by acknowledging that it was not formally studying the impacts of wear and traffic within Portuguese Bend because the roads there are private:

> [N]one of the private roads within the Portuguese Bend area were formally analyzed in the Draft EIR because they are private roads and located outside of the jurisdiction of the City of Rancho Palos Verdes . . . .

(FEIR p. 8-50.) (By "jurisdiction," the consultant apparently means "control," not "physical boundaries.")

The consultant has erred in many critical respects in declining to evaluate this area of potential significant impacts.

First, the environmental effects of a project that must be evaluated in an EIR are never limited to those occurring within the temporal or legal "jurisdiction" of the lead agency. Rather, "[t]he EIR ***shall*** . . . analyze ***any*** significant environmental effects the project might cause by bringing development and people into ***the area affected***." (14 Cal. Code Regs § 15126.2(a) [emphases added].) In other words, it must address conditions "from both a local and regional perspective." (14 Cal. Code Regs § 15125(a).) The temporal boundaries of Rancho Palos Verdes or its public road system are beside the point. 11.14

Second, there is no exception under CEQA for the impact of a project on "private roads." In *Masonite Corp. v. County of Mendocino* (2013) 218 Cal.App.4th 230, the project affected Kunzler Ranch Road, a "private road." (*Id.* at 233.) The court ordered the county to set aside its EIR and conduct a supplemental EIR addressing "the efficacy of the mitigation measures for truck traffic on Kunzler Ranch Road." (*Id.* at 242.) 11.15

Third, the consultant has made the same mistake it made regarding runoff by relying upon a hypothetical design prepared over half a century ago which neither the consultant nor anyone else has actually seen:

> It is important to note that the roadway system was originally engineered for full development and buildout of the residential tract and as such the street were designed to accommodate the envisioned loading, including construction vehicles associated with the construction of the envisioned buildout, as originally reviewed and approved by the County of Los Angeles.

(FEIR p. 8-10.) The consultant has never seen those plans, and they may not exist. Even if the consultant's speculation about engineering plans for Portuguese Bend as of 1949 were true, those plans could not have considered the effects of the following:

• The Abalone Cove Landslide in the 1970s caused extensive damage to the roads in Zone 5.[2]

• Typical ownership of cars has increased from one per family in 1949 to one for each adult and many teenagers in 2014. (FEIR p. 8-10.) The consultant agrees that "conservatively estimated," there are two vehicles per residence. (Appendix G § 1.2.2 [no page number; p. 198 on .pdf version].)[3]

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[2]Exhibit 2 accompanying this letter consists of excerpts from testimony at the *Monks* trial establishing that the roads in Zone 5 are seriously cracked. The testimony at 3209:20-3211:16 was by the City's geotechnical expert, Glenn Tofani. The testimony at 3474:8-3476:24 was by Dr. Robert Douglas, a resident of Zone 2 and a Professor of Earth Science at the University of Southern California. (*Monks v. City of Rancho Verdes*, supra, 267 Cal.App.4th at 291.) The photographs under discussion are no longer readily available.

[3]Appendix G, the traffic study, contains multiple sections with identical section numbers, and large passages without page numbers. In all citations to Appendix G the page number on the .pdf version is provided. These numbers are unrelated to any number actually appearing on the page.

• Construction vehicles are heavier than they were in 1949. (*Ibid.*)

• A far greater percentage of families in Portuguese Bend retain the services of gardeners, housekeepers, and other contractors today than did in 1949, and all of those non-residents use the roads. (*Ibid.*)

Fourth, an analysis of impacts under CEQA must normally use existing conditions as a baseline: "An EIR must include a description of the physical environmental conditions in the vicinity of the project . . . from both a local and regional perspective." (14 Cal. Code Regs § 15125(a).) That means the EIR must "compare what will happen if the project is built with what will happen if the site is left alone." (*Woodward Park Homeowners Assn. v. City of Fresno* (2007) 150 Cal.App.4th 683, 707.) The consultant therefore applied the wrong standard by evaluating the impacts of the project in comparison with its speculative understanding of the purpose for which "the roadway system was originally engineered." (FEIR p. 8-10.) The correct question is what will happen if the project is approved versus what is happening ***now***, not what will happen if the project is approved versus what some unknown developer may have had in mind 65 years ago. 11.16

B. Traffic

Another problem regarding traffic is the FEIR's evaluation of the ability of residents to evacuate the area in the event of an emergency such as a wildfire. The FEIR anticipates that in an emergency, vehicles can leave Portuguese Bend and enter traffic on Palos Verdes Drive South through the Narcissa Drive gateway at a rate of about three vehicles per second and through the Peppertree Drive gateway at a rate of about 2.5 per 11.17

second. (FEIR p. 4.10-25 and Appendix G Table 2 [no page number; page 202 on .pdf version].) In other words, it concludes that the entire population of Portuguese Bend, in 330 vehicles, can pass through the two gates in "1.1 minutes," or ***66 seconds!*** (FEIR p. 4.10-25; Appendix G § 1.2.2 [no page number; page 199 on .pdf version].) If there are construction vehicles exiting the area as well, the consultant estimates that the community's total evacuation time will be increased by a mere ***18 seconds!*** Of course, while these vehicles are hurtling through the narrow gateways onto a crowded highway at these impossible rates, they will be competing for space with fire trucks and police vehicles going in the opposite direction. (Appendix G § 1.4 [no page number; page 200 on .pdf version].) No one who has seen the "circuitous roadway[s]" in Portuguese Bend could consider this evaluation to be even remotely rational. (Appendix G p. 13.) In reality, with everyone trying to leave at once in a charged emotional state, the meandering roads of Portuguese Bend will be hopelessly congested. The addition of 94 additional vehicles will make evacuation even more difficult and dangerous. (The projection of 94 additional vehicles is based on calculations at FEIR p. 8.10-25 and Appendix G § 1.2.2 [no page number; page 198 on .pdf version].)

The FEIR relies for its conclusions on the traffic study prepared by Linscot, Law & Greenspan ("LLG"). (FEIR p. 4.10-25, citing Appendix G.) However, the LLG study did not actually study traffic within Portuguese Bend. Rather, it focused solely on the two gateways leading from Portuguese Bend to Palos Verdes Drive South and on other major highways in the general area but outside Portuguese Bend. (Appendix G pp. 3-4, 9-10 [pages 52-53 and 58-59 on .pdf version].) Thus, there was no consideration of actual

11.18

traffic conditions in Portuguese Bend at present or what the impact of 47 additional residences would be under ordinary circumstances or in the event of an emergency such as a wildfire.

IV. FAILURE TO RESPOND TO COMMENTS BY ABALONE COVE LANDSLIDE ABATEMENT DISTRICT

An FEIR must respond to public comments made about the DEIR. (Public Resources Code § 21091(d); 14 Cal. Code Regs §§ 15088(a), 15132.) The consultant has included and responded to many comments in § 8 of the FEIR, but it has neither included nor responded to important and timely comments made by the Abalone Cove Landslide Abatement District ("ACLAD") dated July 31, 2013. A copy of these comments accompanies this letter as Exhibit 1.

The author of the ACLAD comments is Dr. Robert Douglas, Professor of Earth Science at the University of Southern California. (*Monks v. City of Rancho Palos Verdes*, *supra*, 267 Cal.App.4th at 291.) He explains, with greater clarity and understanding than I can, why the consultant's assumptions and conclusions regarding infiltration and runoff are invalid. I refer you to his letter and the photographs attached to it for a lucid and compelling discussion of this topic. 11.19

V. MISINTERPRETATION OF THE *MONKS* DECISION

The public comments included in § 8 of the FEIR reveal a lot of confusion about the meaning and scope of the *Monks* decision. The EIR consultant likewise errs in its understanding of the decision by stating the following: 11.20

> The Draft EIR does not ignore the factor-of-safety (FOS) standard of 1.5. Because of the range of results in previous studies concerning the factor of safety for this area and the varying conclusions, and ***consistent with the [Monks] court decision to allow property owners the right to build on their properties, the Draft EIR reviews the subject area in terms of a significant threat to life, limb and property.***

(FEIR p. 8-6 [emphasis added].) The consultant misinterprets the *Monks* decision. (*Monks v. City of Rancho Palos Verdes, supra*, 167 Cal.App.4th 263.)[4]

The *Monks* decision did not invalidate the factor of safety standard of 1.5 in general. Rather, it stated that "We do not question the use or importance of factors of safety–as recognized by geotechnical professionals–in assessing whether land is suitable for residential construction." (*Id.* at 309.) It was only because of the unique circumstances of that lawsuit, in which the City had deprived the *Monks* plaintiffs' "land of all economically beneficial use" (*id.* at 270) in a recent enactment that the plaintiffs timely challenged (*id.* at 283-84), the City had to prove that the proposed development of the plaintiffs' lots would have been a public nuisance at common law. (*Id.* at 298-99, 305.) The Court of Appeal summarized the common-law standard as "a reasonable probability of significant harm." (*Id.* at 306.) The City was unable to prove this (*id.* at 305-309), so the Court of Appeal concluded the City had taken the plaintiffs' properties without compensation. (*Id.* at 309.) The City therefore had to buy the property at fair market value or allow development.

The common-law public nuisance standard of "a reasonable probability of

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[4]The author of this letter was lead counsel for the *Monks* plaintiffs throughout that litigation.

significant harm" does not extend to the owners of the 31 non-*Monks* lots because they are not engaged in a timely judicial challenge to a recent enactment depriving them of the use of their property. The City deprived all 47 vacant lots of economic use when it enacted Resolution 2002-43 on May 20, 2002. The *Monks* plaintiffs sued within the 90-day limitations period. (*Id.* at 279, 283-84.) The owners of the other 31 lots did not, so they have no claim of a regulatory taking, and the *Monks* decision has no relevance to them. They are obliged to obtain development permits under whatever municipal restrictions are in effect now.

Indeed, the Court of Appeal expressly limited its ruling to the sixteen *Monks* lots:

> [City expert geotechnical engineer Glenn] Tofani said that allowing construction on *all 47 undeveloped lots* "would have a tendency to further reduce the factor of safety." But that statement, without more, is not substantial evidence as to how or when the desired construction on *plaintiffs' 16 lots*–might affect anyone's health, safety, or property, if at all.

(*Id.* at 308 [emphases in original].)

The Court also emphasized that its ruling did not apply to the six vacant Zone 2 lots bordering Zone 5:

> [I]t appears that the [Zone 2] GPS stations that closely border the headscarp area of the [Abalone Cove landslide, near Zone 5] ... all exhibit slight instability and downslope movement when subject to a significant rainfall. . . . [I]t appears that movement in the northern margin of the [Abalone Cove landslide] may influence the southern, or downslope, region of the Zone 2 landslide terrane [sic].

(*Id.* at 292 [quoting 2002 report by Cotton, Shires & Associates; brackets in original].)

> Tofani testified that a house would sustain significant structural damage in about a decade if it was close to the

> uppermost part of a landslide or straddled a line demarking movement on one side and no movement on the other. None of plaintiffs' lots is anywhere near such an area . . . .

(*Id.* at 306-307 [emphasis omitted].)

The point of this demonstration is not to argue that any part of Zone 2 is susceptible to landsliding, but rather to show that the Court was addressing the plaintiffs' sixteen lots only and not all 47 vacant lots in Zone 2.

CONCLUSION

The proposed project as outlined and defended in the FEIR suffers from multiple infirmities:

• It defers the determination of what impacts are "significant" and how they are to be mitigated by delegating the task to a host of staff members and consultants with overlapping and uncoordinated authority.

• It provides those staff members and consultants with insufficient guidance for exercising their judgment. 11.21

• It provides no means of determining if the mitigation measures that staff and the consultants devise are successful.

• It is based on speculation about "plans" and "designs" that some unknown person may or may not have devised in the middle of the last century.

• It disregards the effects of extensive post-1949 development above Portuguese Bend.

• It anticipates an ambitious and improbable goal of absolutely no additional runoff without a concrete explanation of how it will be achieved or confirmed.

• It pays inadequate attention to the effects of the project on Zone 5.

• It refuses to consider traffic and physical impacts on the roads of Portuguese Bend although it is required by law to do so.

• Its projections about evacuating Portuguese Bend in an emergency are unfounded and impossible.

Any of these deficiencies would make the FEIR the likely subject of a judicial challenge. In their entirety, it is hard to imagine a court sustaining it.

We urge the City Council not to adopt this document.

Very truly yours,

Stuart Miller

Stuart Miller

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Rolling Hills Estates, CA 90274
(310) 787-7111, x3 FAX (310) 787-7193

To: Joel Rojas, Director, Community Development Department, City of RPV

From: Robert Douglas, Chairman, Board of Directors, ACLAD

Date: July 31, 2013

cc: Eduardo Schonborn, Planning Division, Community Development Department, City of RPV

Subject: **Follow-up to the Draft EIR for the Landslide Moratorium Ordinance Revision for Zone 2**

INTRODUCTION

In an earlier memorandum (Miscellaneous Document, November 16, 2012) ACLAD concluded after reviewing the Geology (including appendix D, Geotechnical Study) and Hydrology and Water Quality sections of the draft EIR for Zone 2 that there were important issues that were not fully addressed in the report. In reviewing the most recent draft EIR, we continue to have concerns that important issues are either not adequately addressed or are based on incorrect assumptions that alter the significance of the impacts. We address two issues: Flooding/ Hydrology and Geology

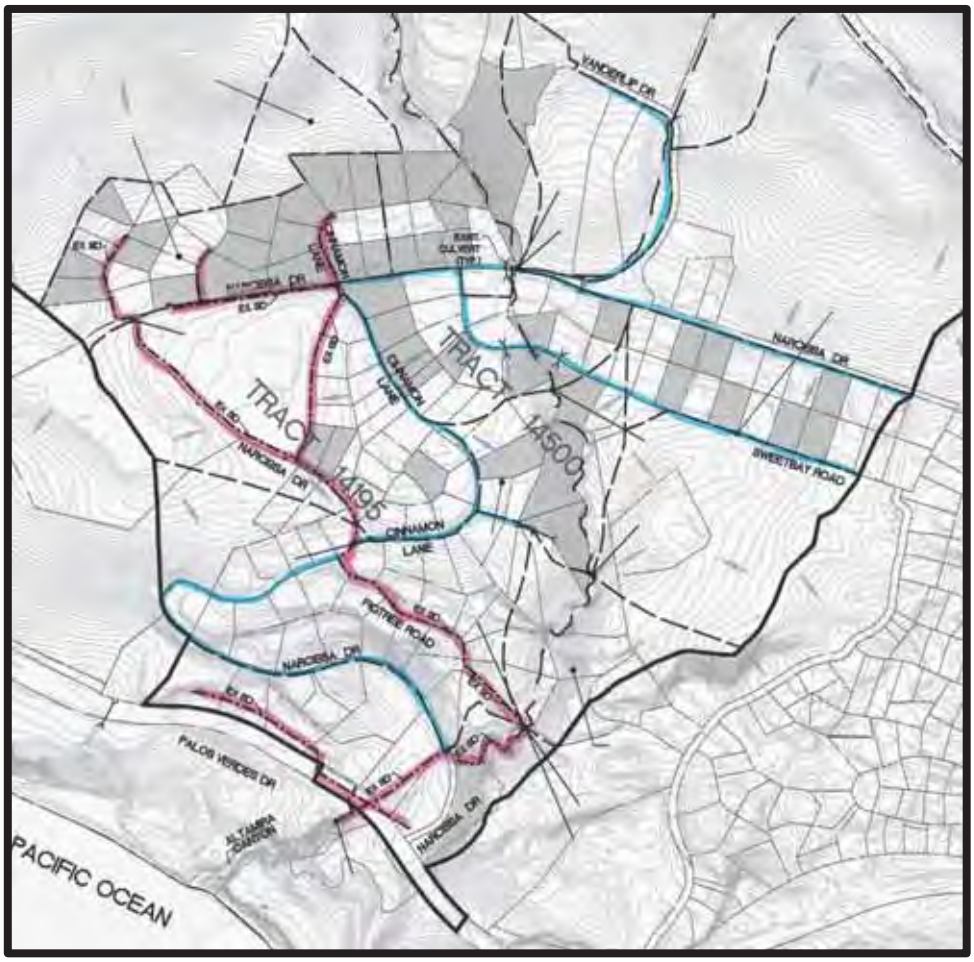
FLOOD /HYDROLOGY

Current Storm Drain System

The present storm drain system in Zone 2 and adjacent areas (shown below) is taken from the Draft EIR section on flooding and hydrology, figure 4.8-1. The storm drain system shown in red on the map is based on the City of RPV 2004 revised edition of the city's storm drains. Unfortunately, as shown it is incomplete and only covers the west side of the community. The

Draft EIR illustration omits the storm drain system in the rest of Zone 2, mostly the east side. In blue is the rest of the system covering Vanderlip Drive, upper Narcissa Drive, lower Cinnamon Lane, Sweetbay Road and lower Narcissa within the Abalone Cove landslide, all of which are important in conveying storm water runoff into Altamira Canyon. Also note that the 300 feet of Altamira Canyon located between the end of the culvert exiting Fig Tree Road and the 120" CMP culvert at the entrance (beneath the park) is included in the City/EIR's storm drain system.

It is important to recognize the complete system because all of the streets and culverts in the community are involved in conveying storm water runoff from houses and open lots into Altamira Canyon. All parts of the system are important and must function successfully in order to prevent flooding and the type of problems that have plagued the community for years.



The storm drainage system in Zone 2 and adjacent areas. Outlined in red is the system illustrated in the revised Draft EIR report (fig. 4.8-1). Shown in blue is the rest of the functioning storm drain system in Zone 2 and adjacent community.

Under-capacity of the Current Drainage System, Flooding and increased Infiltration

In the Conclusions and Recommendations (p.7), the EIR states that "flood/hydrology impacts would be considered significant if the proposed project would:

1. *Create or contribute runoff water which would exceed the capacity of existing or planned storm drain storm water drainage systems*
2. *Increase infiltration which could affect the stability of existing landslides in the project vicinity."*

ACLAD believes that both statements are in fact correct and therefore each one constitutes a significant impact. In **section A** we present evidence of the inadequacies of the storm drain system and in **section B** discuss the impact of runoff on groundwater infiltration:

Section A

A.1 Under-capacity of the Existing Storm Drain System

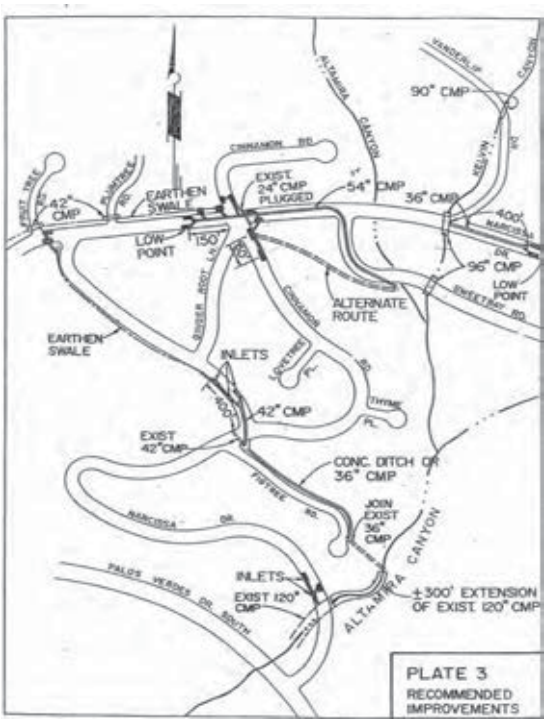
In the EIR, the hydrologic analyses determined that post-development conditions would result in an increase in storm drain runoff as a result of the increase in impervious area that would occur when the 47 lots are developed. However, they conclude that the combined impact from the development is insignificant for the following reason:

- The existing (natural) drainage patterns are maintained and the combination of natural and constructed drainage conveyance and the surface flow has the capacity to convey the runoff from the project site

The EIR report assumes that because the current drainage system has existed for many years that it is adequate to convey rainfall runoff. This assumption is incorrect and in fact the system does not have the capacity to convey storm runoff from the project area in major rain storms.

Background: The EIR states that the "existing drainage system was designed for the entire Portuguese Bend development, including the 47 undeveloped lots". Unfortunately, this is an overstatement. The storm drain system in Zone 2 is the streets in the community, with a few culverts that help convey storm water into Altamira Canyon. Based on aerial photos taken in the l920s and 30s, the main streets in Zone 2 are simply the paved over dirt roads established by farmers early in the 20th century and later addition and modification to the streets was for development in the 1940-l950s. The current street "system" is primarily to provide access to the community.

The inadequacy of the streets as a storm drain system was recognized in the past when significant flood events occurred in the community during the heavy rains of the late l970s and early l980s. Following reactivation of the Abalone Cove landslide, the Panel of Experts recommended upgrading the culverts and other



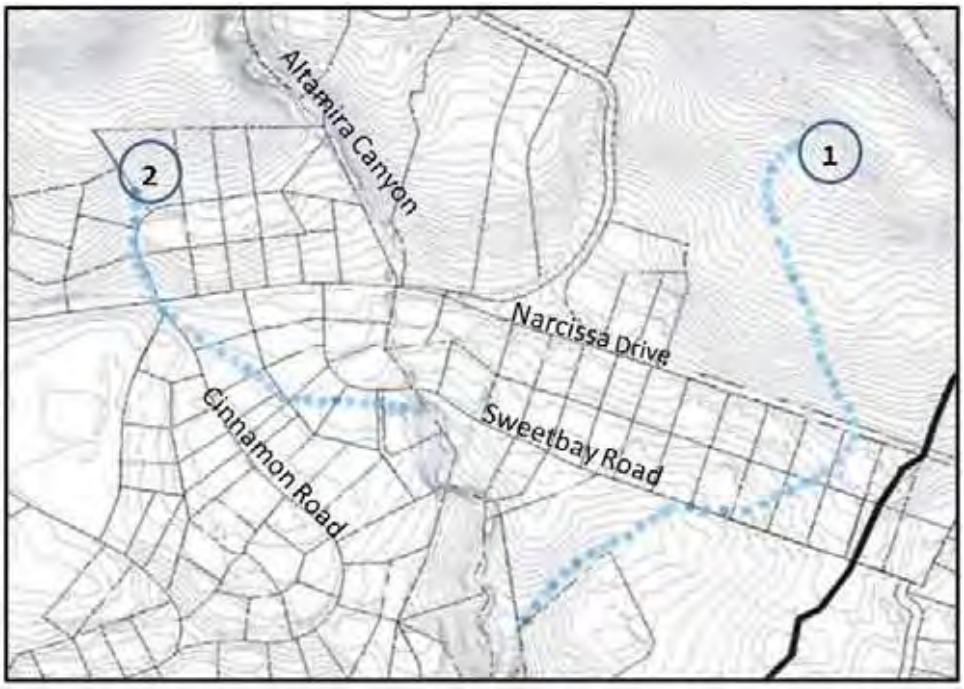
In 1990 ASL Consulting Engineers recommended eight major improvements to upgrading the storm drain system (left) but only two minor modifications to the then existing system were made and the system today remains basically as it was in pre-1990.

parts of the system to achieve better control of storm water runoff. In 1990 ASL consulting Engineers was retained by the Redevelopment Agency of the City of RPV to perform hydrology and hydraulic studies to determine the storm runoff for the area located in the Altamira Canyon watershed. The area they studied is the same as in the current EIR report. At the request of the City, the study examined the effects of runoff from storms having a probability of recurring once in 50 year and 100 year. The study highlighted serious deficiencies in the then existing storm runoff system and made recommendations to improve it. Except for a few modifications, the recommendations were never implemented and the system remains a slightly modified version of 1990. It is basically a make-do series of paved streets with berms added over the years to bandage the biggest problems. The major problems occur during major storms when rainfall exceeds 0.5 in/hr and storm totals are over 6 in/24 hours. During these rain storms such as occurred in 2005 and 2010, storm water fills and overflows the streets, causing significant local flooding and erosion. The development of the 47 lots will, as stated in the analyses, increase storm water runoff from individual lots by 10-15% and for the project by 2.9-4.5%. There is good reason to believe that this increase will be the proverbial straw to an already over burdened/under-capacity system.

(see Appendix A, For photographic examples of the problems and deficiencies in the storm drain system during the major storms of 2005 and 2010.)

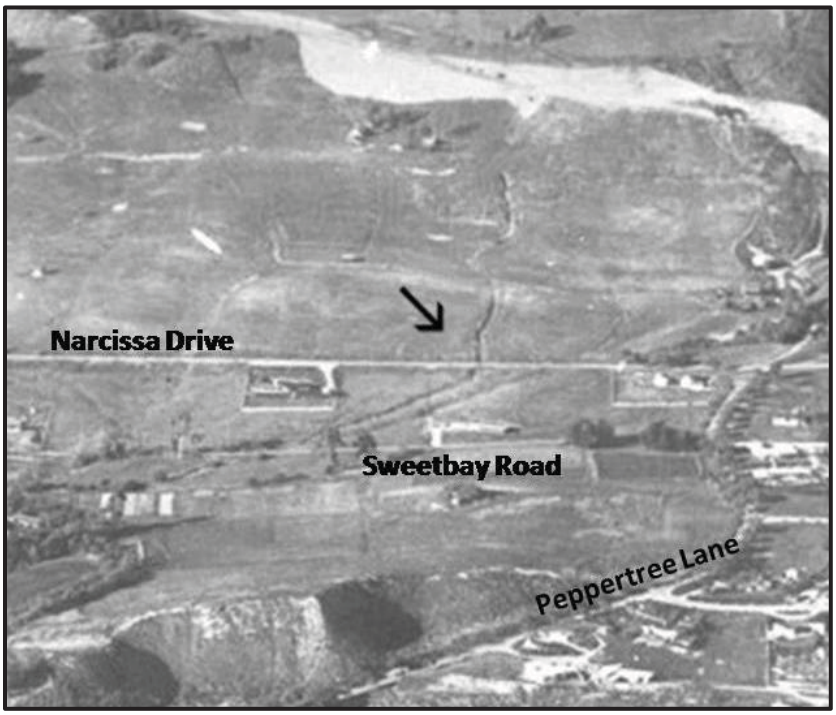
A.2 Unresolved drainage problems

There are two unresolved drainage problems that have affected the project area for many years and impact the adequacy of the current system. Both are old, natural drainage channels which collect rain water from upslope areas above Zone 2. They can be identified in old topographic maps, aerial photos and surface photographs and were never adequately addressed in development of the storm drain system. During major rain storms storm water flows through the channels, spills out on to adjacent lots (e.g. in 2005 and 2010; see photos in Appendix A) and causes local flooding and erosion. Both channels cross open, undeveloped lots and should be addressed before development of the lots.



The location of old, natural drainage channels (shown in blue) which drain upslope areas and convey surface runoff water in major rain storm events. Channel 1 drains subarea 143C (48.3 acres), and in some years, portions of 142C (23.3 acres) (see EIR fig 4.8-1 for location of subareas), the area generally south of the old Crenshaw Extension and Channel 2 drains upslope areas north of upper Cinnamon Road, subarea 154B (7.7 acres). Letters identify location of the photographs shown below. According to the hydrology calculations in the draft EIR, area 1, subarea 143C has a runoff potential (QB) of 122 cubic feet per second (cfs) and in excess of an estimated 200 cfs when storm water drainage from 142C jumps Crenshaw Extension and flows into subarea 143C. Area 2 drains subarea 154B and has a QB of 22.8 cfs.

A.2.1 Natural drainage channel at Location 1 which drains subarea 143C and in some years, portions of subarea 142C and conveys storm water to Altamira Canyon



Aerial photograph of a portion of the Zone 2 area taken in l955, prior to development on Narcissa Drive, showing the drainage channels. White "scar" in the upper part of the photo is the early excavation for the Crenshaw extension.

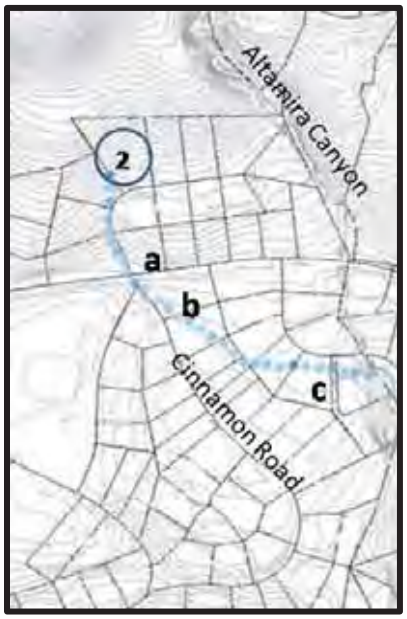
*Location **1a**, (left) drainage ditch cut into the slope to direct water into the inlet (lower right) to the culvert that runs under upper Narcissa Drive. Sheet flow from upslope areas overflowed the ditch and culvert and flooded Narcissa Lane during high rainfall years in the 1990s (e.g. 1995, 1998) and 2000s (2001, 2005, 2010). In the February, 2005 storm runoff that originated in the area north of Peacock Flats, flowed (raced) down the Crenshaw Extension dirt road, jumping the road at the sharp curve east of Kelvin Canyon and flowed down the slope above Narcissa Drive. The storm water flooded upper Narcissa Drive and over whelmed the channels between Narcissa and Sweetbay Road.*

1b *Channels crossing the open lots north of Sweetbay. The northern (left) channel was over two feet deep and conveyed a stream with 6-8 inches of water following the winter storm of 2005. In the area in the immediate foreground, next to Sweetbay Road, water ponds during storms and overflows onto the road. The two channels merge into one under the vegetation in the distance and eventually connect to the culvert that crosses Narcissa Drive (see 1a). Disking the fields for weed control has partially filled in the channels over the years.*

(left) The California Water Service water main exposed by erosion in the northern channel following the 2005 storm (it remains exposed today).

1c *(right) Storm water flows (west) across Sweetbay Road and exists at the trees (* ***1c)*** *into the continuation of the old channel. Storm water eventually flows into Altamira Canyon*

A.2.2 Natural drainage channel at Location 2, draining subarea 154B, and extending from upper Cinnamon to the five-point intersection to Sweetbay Road and Altamira Canyon



Path of the drainage channel which begins above upper Cinnamon and extends across 5-point intersection (a) , through the corral at "Right to Fly" and across the open lots (b) to the King property (c) that at Sweetbay Road , crosses another horse corral and finally empties into Altamira Canyon.

2a *Five-point intersection (view looking north) of Narcissa (right to left), Cinnamon (north to south) and Ginger Root Lane (off photo to the lower left). Originally, storm water drained down upper Cinnamon (towards the viewer), crossed Narcissa and exited to the right by the stop sign. A culvert (now buried) extends under Narcissa to convey the flow. Storm water continues across the horse corral of "Ride-to-fly" and then into a channel which crosses open lots before eventually exiting into Altamira Canyon south of Sweetbay Road. Because of repeated flooding, the roads at the intersection were re-pitched to force storm water to flow across the intersection and down Ginger Root Lane. During major storms, storm water splits at the intersection, part flowing along the course of the old channel and part down Ginger Root Lane.*

2b *Portions of the channel which extends from the corral at "Ride to Fly" (left) behind the houses which front onto Sweetbay Road and to the King property at Sweetbay Road.*

2b *Flooded backyards of the houses adjacent to the channel when the channel overflowed in the winter storm of 2005.* **2c** *(below) The continuation of the channel shown in 2b across the King lot at 24 Sweetbay Road, today (left) and flooded in the winter storm of 2005 (right) .*

2c *Continuation of the channel, today(left) and flooded during the winter storm of 2005 (right). To the left of this channel (towards Sweetbay Road) is located dewatering well WW 13 which was partially flooded by overflow water which flowed as a sheet across the lot to Sweetbay Road (below).*

Storm water from the channel (above) which overflowed onto Sweetbay Road (in the background)at 24 Sweetbay Road.

2c *Detail of the 15" CMP culvert (usually filled) that drains from the King lot, under the adjacent property and empties directly into the horse corral at 22 Sweetbay Road. During major winter rain storms the corral floods before the water flow exits into Sweetbay Road and Altamira Canyon.*

B. Increased infiltration

The EIR analysis indicates that "the addition of impervious areas (new houses) will reduce the total infiltration in the project site and due to the low permeability of the soils and steepness of the canyon sides, for a given storm event, the total infiltration will not exceed the existing condition". This hardly seems possible when, as the analyses states, more runoff water will be entering the streets with the development of the 47 lots and, eventually, into Altamira Canyon. Studies (Hill, 2000; Hill, et al, 2007) reveal that the infiltration in the bottom of Altamira Canyon is one of the major sources of recharging the groundwater. The photos below, taken about 15-20 minutes apart in December 2010, illustrate the problem: On the left is storm water discharging from the 120" CMP culvert in Altamira Canyon at the crossing with upper

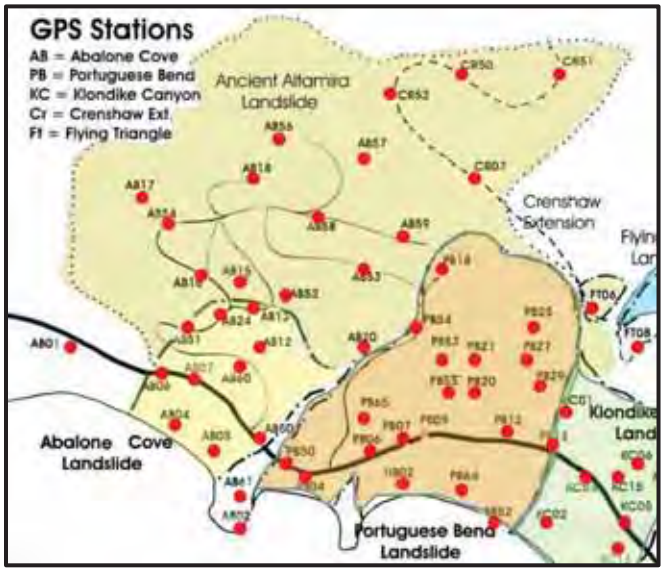
Storm water discharge in Altamira Canyon, December 2010. Both photos were taken on the same day, the one on the left is discharge from the 120" CMP at upper Narcissa Drive and taken about 15-20 minutes earlier than the one on the right which is in Altamira Canyon at the inlet to the 120" CMP that extends under the park at the entrance. The two sites are about 0.6 miles apart.

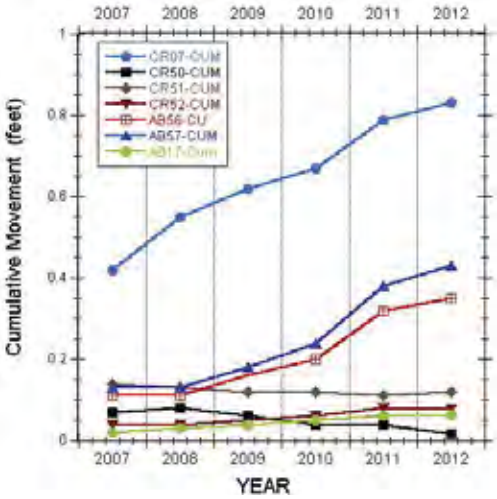
Narcissa Drive. The flow is estimated at several hundred cubic feet per second. The photo on the right, taken 15-20 minutes later is the flow in Altamira Canyon at the inlet to the 120" CPM that extends under Narcissa Drive near the entrance to the community. Where did the discharge water go? It infiltrated into the bottom of the canyon between upper Narcissa and the entrance, especially where the head scarp of Abalone Cove landslide and other major fractures cross the canyon. About 60-70% of the flow infiltrated over a distance of approximately 0.6 miles. Along that distance there are other sources of runoff water, from the Fig Tree Road drain (which drains all of the west side of the community) and tributaries entering the Altamira Canyon south of Sweetbay Road. Hill (2000) found that between 1-18% of the storm water discharge measured at the culvert at Sweetbay Road exited into the ocean. Her measurements and later ones collected by ACLAD, suggest that between 55 to 75% of the

discharge water in Altamira Canyon is infiltrating into the bottom of the canyon to recharge the ground water. Even small increases in the rain storm runoff entering the street storm-drain system are important as they ultimately feed into the ground water.

SLOPE-STABILITY AND LANDSLIDE MOVEMENT

The draft EIR report (based primarily on the Geology in the LGC Valley report) concludes that development of the 47 undeveloped lots within Zone 2 will not have a negative effect on the overall stability of the landslides, ancient and active provided that development of the lots is within the guidelines and conditions set by the City of RPV. They believe that the greatest threat to Zone 2 is the potential loss of lateral upslope support due to movement within the ACL and PBL. ACLAD is in general agreement with this conclusion but cautions that the older pre-2007 GPS data upon which their conclusion is based are of varying data quality. Since McGee Surveying began working with ACLAD and the City of RPV to improve and expand the GPS network in 2007, there has been a marked improvement in the GPS survey results. Damage or disturbances to monuments and errors in data collection and analysis have been





Distribution of the GPS stations in Zone 2 and adjacent areas (upper left). Of interest is the slow movement in the upslope area north of the Abalone Cove landslide, shown in cumulative movement in the seven northern stations (upper right graph) and contoured as "extremely slow and very slow" in the map that summarizes the GPS results of the past 19 years.

eliminated. These results show that all of Zone 2 and adjacent areas, with the exception of the area north of the anticline beneath Peacock Flats (CR50,51,52) and west of Fruit Tree Lane (AB17) are steadily creeping south-southeast at tenths to hundredths of a foot per year. It is safe to say that the entire area is undergoing slow movement and has been since the GPS network was installed and probably for much longer. Because most of these stations are located on fairly flat terrain, except for CR07 (located on Crenshaw Extension, next to Portuguese Canyon) the movement does not appear to be slope creep but rather primary movement. This interpretation indicates that the area, including portions of the Ancient Altamira landslide have minimum stability and by definition the FOS for the area is not greater than 1.0. The problem with slow moving landslides is that it takes decades to recognize and adequately diagnosis the level of instability. But, as illustrated by the Portuguese Bend landslide, they can be reactivated rather quickly (months) and once reactivated, the landslides have proven essentially impossible to stop.

Appendix A: Photographic evidence of problems with the Storm Drain System

Flooding: The existing storm drain system in the Zone 2 area is inadequate to handle storm water runoff during major storms. Local flooding is a typical problem.

a. A key storm drain is located at the junction of Cinnamon and Narcissa. This drain conveys all of the storm water from the west side of the community that drains from upper Cinnamon, upper Narcissa and Ginger Root to the Fig Tree drain and Altamira Canyon. The photos illustrate problems in the system during major storms in 2005 and 2010. (Photos courtesy of Cassie Jones, Lewis Enstedt, Gary Stokoe and Robert Douglas).

Storm drain (today) at the junction of Cinnamon and Narcissa showing the inlet (arrow) to the 42" CMP that conveys water to the Fig Tree Road drain. Storm water is supposed to be captured by this inlet and not flow further down Narcissa Drive.

Same location as above during the winter storm of 2005. Note that sheet flow flooding the street and (1) water overflowing and bypassing the inlet allowing water to flow further down Narcissa (2) and that the inlet to the culvert is filled (3) and overflowing.

b. *Flooding and overflow on upper Narcissa Drive.*

Street flooding in the storm of 2010 at upper Narcissa Lane, looking west from 76 Narcissa.

Flooding of dewatering well WW 15 along upper Narcissa during the winter 2010 storm.

Flooding at 60 Narcissa Drive during the winter storm of 2010. Shortly before this photo was taken storm water was overflowing Narcissa Drive and flowing down the driveway to the house. Note sand bags placed across the driveway in an attempt to impede the storm water.

Flooding at the intersection of Vanderlip Road and Narcissa Drive. The storm drain inlet was plugged with mud and debris conveyed down Vanderlip Drive.

Flooding during the same storm as above, looking west from 80 Narcissa. Because of the low gradient in the street, in major storms the runoff which comes from houses on the street and sheet flow from the adjacent open slopes in the PV Peninsula Land Conservancy land exceeds the capacity of the system. The water which overflows the berm (left side of the photo) floods the adjacent open lots.

c. Flooding at the intersection of Narcissa and Ginger Root and sheet flow from the PB Riding Club.

Entrance to the Riding Club at the corner of Ginger Root Lane and Narcissa Drive ((left, today) and during typical storm flooding.

During heavy rain storms runoff from the corrals and open space in the Club exists through the gate and contributes to flooding on Narcissa Drive and the overload at the Cinnamon-Narcissa culvert. Note the sand bags that have been placed at the gate in an attempt to control the storm runoff and the gravel which it carries onto Narcissa Drive.

Flooding at the intersection of Ginger Root Lane and Narcissa Drive, looking SW, with the Riding Club entrance gate just off to the right. Note that the road berm is completely submerged.

.

Heavy runoff flow on Ginger Root Lane following flooding conditions

d. Flooding along lower Narcissa due to reverse gradient in the street.

Two views of lower Narcissa which attempt to capture the reverse in the street gradient as it approaches the entrance to the community. Due to landslide movement, the original street gradient has been reversed and runoff water must flow "uphill" before entering the street culvert that empty into the 120" CMP culvert in Altamira Canyon. During major storms, storm runoff ponds along the street and then flows off-road and floods the depression where dewater well WW 2 is located (below) and creates a settling pond.

Storm water from Narcissa Drive which overflowed the berm and flooded the depression containing dewatering well WW2.

1 CASE NUMBER: YS010425
2 CASE NAME: MONK VS. RANCHO PALOS VERDES
3 TORRANCE, CALIFORNIA WEDNESDAY, FEBRUARY 14, 2007
4 DEPARTMENT SW E HON. CARY NISHIMOTO, JUDGE
5 REPORTER: DARCY S. SENFF, CSR NO. 11953
6 TIME: A.M. SESSION
7
8 APPEARANCES:
9 (AS HERETOFORE NOTED)
10
11 THE COURT: OH, ALL RIGHT. MR. WELLMAN.
12
13 GLEN TOFANI,
14 HAVING PREVIOUSLY BEEN DULY SWORN, TESTIFIED AS FOLLOWS:
15
16 CROSS-EXAMINATION RESUMED
17 BY MR. WELLMAN:
18 Q GOOD MORNING, MR. TOFANI.
19 A GOOD MORNING.
20 Q YESTERDAY I WAS GOING OVER YOUR CHRONOLOGY OF
21 KEY EVENTS. YOU RECALL THAT?
22 A YES.
23 Q AND I THINK THAT I FINISHED ON THE COTTON
24 LANGUAGE, AND THEN WHERE I POINTED OUT THAT PART OF THE
25 LANGUAGE WAS IN BUT SOME WAS NOT INCLUDED IN THE
26 CHRONOLOGY. DO YOU RECALL THAT TESTIMONY?
27 A I RECALL DISCUSSING THE COTTON REPORT AND THEIR
28 RECOMMENDATIONS FOR ADDITIONAL TESTING, YES.

A I DID NOT KNOW THAT, NO.

Q DID YOU KNOW THAT DAVID CUMMINGS WAS THE PAID CONSULTANT FOR PERONA, LANGER, AND BECK FOR THESE PLAINTIFFS BACK THEN?

A I THINK YOU ASKED ME THAT EARLIER, AND, NO, I WASN'T AWARE OF THAT.

Q CAN YOU THINK OF ANY REASON WHY MR. CUMMINGS WOULD BE DIRECTING THIS STATEMENT TO A LAW FIRM AS OPPOSED TO THE CITY?

MR. RICHARDS: SPECULATION. NO FOUNDATION.

THE COURT: SUSTAINED.

Q BY MR. WELLMAN: THIS STATEMENT WASN'T DIRECTED TO THE CITY, WAS IT?

MR. RICHARDS: SPEAKS FOR ITSELF.

THE COURT: WELL, IF THE WITNESS HAS PERSONAL INFORMATION, HE CAN ANSWER.

Q BY MR. WELLMAN: DO YOU HAVE ANY INFORMATION THAT THIS STATEMENT WAS DIRECTED TO THE CITY?

A I DO NOT KNOW IF IT WAS GIVEN TO THE CITY.

Q LET'S LOOK AT THESE PHOTOGRAPHS WHICH YOU HAVE IDENTIFIED AS 289. CAN YOU TAKE THOSE OUT?

A YES.

Q NOW, YOU SAID IN REDIRECT THAT YOU THOUGHT THESE PHOTOGRAPHS SHOWED CRACKS IN THE ROAD IN ZONE 5 AND ZONE 2; CORRECT?

A YES. AND NORTHERN -- CENTRAL TO NORTHERN PORTIONS OF ZONE 5 AND THE SOUTHERN PORTION OF ZONE 2.

Q CAN YOU SHOW ME WHICH PICTURE OF THIS 289 SHOWS

1 CRACKS IN ZONE 2?
2 A I BELIEVE, FOR EXAMPLE, LOOKING AT PHOTO 34
3 WHICH SHOWS A CRACK AND CLOSER UP VIEW OF THAT CRACK IN
4 35 AND 36, I BELIEVE THAT WOULD BE WITHIN ZONE 2.
5 ALTHOUGH I WOULD HAVE TO CHECK OUR SITE PLAN TO CONFIRM
6 THAT.
7 Q CAN YOU DO THAT, PLEASE.
8 A YES.
9 IN LOOKING AT OUR SITE PLAN, I WOULD SAY
10 THIS PHOTO WAS TAKEN VERY CLOSE TO THE BOUNDARY BETWEEN
11 ZONE 2 AND ZONE 5.
12 Q ISN'T IT TAKEN RIGHT HERE WHERE NARCISSA MEET.
13 A IT'S LOOKING TOWARD THAT INTERSECTION, BUT THE
14 INTERSECTION ISN'T VISIBLE IN THE PHOTO. SO IT'S TAKEN
15 FURTHER UP NARCISSA DRIVE JUST PRIOR TO THE START OF THE
16 BEND UP NEAR AB-16.
17 Q SO YOU THINK IT'S UP HERE?
18 A I THINK IT'S TAKEN UP IN THAT AREA, YES.
19 I COULDN'T TELL YOU IF IT WAS ON THE EXTREME
20 NORTH SIDE OF ZONE 5 OR THE SOUTH SIDE OF ZONE 2.
21 Q SO YOU'RE NOT SURE WHETHER IT WAS ZONE 2 OR
22 ZONE 5?
23 A IT PROBABLY SHOWS BOTH PORTIONS OF BOTH ZONE 2
24 AND ZONE 5.
25 Q IT SAYS LOOKING SOUTH ALONG NARCISSA?
26 A YES.
27 Q THIS IS NOT -- THIS IS NARCISSA. SO IT'S
28 LOOKING HERE, AND THEY'RE STANDING RIGHT AT THE CURVE,

RIGHT AT THE BEND; RIGHT?

A STANDING LOOKING TOWARDS THE BEND JUST BEFORE THE BEND.

Q SO IT WOULD BE UP IN HERE?

A BE VERY CLOSE TO WHERE THE TIP OF THE STICK WAS, YES.

Q AT ANY RATE ALL THE OTHER PHOTOGRAPHS ARE ALL IN ZONE 5; CORRECT?

A YES, I THINK SO.

Q OKAY. SO OTHER THAN POTENTIALLY ONE PICTURE, WHICH IS NUMBER 34, WHICH YOU'RE NOT SURE, UP HERE SOMEWHERE, THERE WERE NO PHOTOGRAPHS IN EXHIBIT 289 THAT SHOW CONDITIONS IN ZONE 2?

A OTHER THAN THE SERIES THAT BEGINS WITH 34, THERE'S SEVERAL PHOTOGRAPHS THERE OF THE SAME CRACK, BUT YES.

34 IS AN OVERVIEW. 35 IS A CLOSER-UP VIEW OF THE SAME CRACK, AS IS 36.

Q OKAY. NOW, DURING REDIRECT YOU SHOWED THIS PHOTOGRAPH OF THE AB-18 MONUMENT?

A YES.

Q WHAT NUMBER WAS THAT?

A I DON'T KNOW, BUT I CAN FIND IT FOR YOU.

GK-25.

Q IN THIS YOU SAID THAT YOU WOULD EXPECT -- BECAUSE THE TRENCHING CRACK IS ON THIS SIDE, YOU WOULD EXPECT THE MONUMENT TO BE SKEWED TOWARDS THE CRACK; RIGHT?

1 TORRANCE, CALIFORNIA; WEDNESDAY, FEBRUARY 21, 2007
2 1:43 P.M. SESSION
3 DEPARTMENT SW-E HON. CARY H. NISHIMOTO, JUDGE
4 (APPEARANCES AS NOTED ON TITLE PAGE.)
5 (CHANDRA R. KINCAID, OFFICIAL REPORTER.)
6
7 THE COURT: WE'RE BACK ON THE RECORD.
8 YOU'RE MR. DOUGLAS?
9 THE WITNESS: YES, I AM.
10 THE COURT: IF YOU'LL KINDLY STAND RIGHT WHERE YOU
11 ARE.
12 AND FACE THE CLERK AND RAISE YOUR RIGHT
13 HAND AND TAKE THE OATH.
14
15 ROBERT DOUGLAS,
16 CALLED BY THE PLAINTIFFS AS A WITNESS ON REBUTTAL, WAS
17 SWORN AND TESTIFIED AS FOLLOWS:
18 THE CLERK: DO YOU SOLEMNLY STATE THAT THE
19 TESTIMONY YOU MAY GIVE IN THE CAUSE NOW PENDING BEFORE
20 THIS COURT SHALL BE THE TRUTH, THE WHOLE TRUTH, AND
21 NOTHING BUT THE TRUTH, SO HELP YOU GOD?
22 THE WITNESS: I DO.
23 THE CLERK: WOULD YOU TAKE THE WITNESS STAND,
24 PLEASE, OR HAVE A SEAT.
25 WOULD YOU STATE YOUR NAME FOR THE RECORD,
26 PLEASE, AND THEN SPELL YOUR ENTIRE NAME.
27 THE WITNESS: MY NAME IS ROBERT DOUGLAS.
28 R-O-B-E-R-T, D-O-U-G-L-A-S.

1 HOW MUCH RAINFALL THERE IS ON AVERAGE IN ITS DISTRICT AND
2 IN THE SURROUNDING WATER SHED?
3 A NO, BUT THERE IS A WATER COLLECTOR METER.
4 MR. RICHARDS: OBJECTION.
5 MOVE TO STRIKE EVERYTHING.
6 THE COURT: STRICKEN.
7 Q BY MR. MILLER: FINAL TOPIC, SIR.
8 I'M GOING TO SHOW YOU WHAT HAS ALREADY BEEN
9 MARKED AS EXHIBIT, I BELIEVE, 289. THIS IS A SERIES OF
10 PHOTOGRAPHS THAT MR. TOFANI GAVE US. I'M GOING TO DIRECT
11 YOUR ATTENTION TO PHOTOGRAPH NUMBER 34 WHICH IS LABELED
12 LOOKING SOUTH ALONG NARCISSA TOWARDS CINNAMON.
13 DO YOU KNOW WHAT THAT IS A PICTURE OF, SIR?
14 A YES, I DO.
15 Q WHAT IS IT A PICTURE OF?
16 A IT IS A PICTURE ON CINNAMON LANE RIGHT IN
17 FRONT OF JIM KNIGHT'S HOUSE.
18 MR. MILLER: YOUR HONOR, WE HAVE A SET OF THREE
19 PHOTOGRAPHS WHICH I'VE MARKED FOR IDENTIFICATION 297-A,
20 -B AND -C.
21 THE COURT: ALL RIGHT.
22 MR. MILLER: WHICH COUNSEL HAS AND THE CLERK
23 HAS.
24 MR. RICHARDS: I'LL OBJECT.
25 I SAW THEM FOR THE FIRST TIME FIVE MINUTES
26 AGO. THEY'RE NOT ON THE WITNESS LIST. THEY WEREN'T
27 SHOWN TO ME AHEAD OF TIME. THEY'RE NOT EXHIBITS THAT WE
28 WERE NOTIFIED OF NOR INFORMED OF.

1 THE COURT: WELL, IF THEY'RE REBUTTAL, THEN I'LL
2 OVERRULE THE OBJECTION.
3 DID YOU GIVE THE CLERK --
4 MR. MILLER: YES, SIR.
5 THE COURT: ALL RIGHT.
6
7 (MARKED FOR IDENTIFICATION,
8 PLAINTIFFS' EXHIBITS 297-A, -B,
9 AND -C, PHOTOGRAPHS.)
10
11 Q BY MR. MILLER: HERE YOU ARE, DR. DOUGLAS.
12 WOULD YOU LOOK AT THE FIRST ONE, PLEASE,
13 MARKED 297-A.
14 A YES.
15 Q WHAT IS THAT A PICTURE OF?
16 A THE SAME LOCATION AS SHOWN HERE.
17 Q AND DO YOU KNOW WHEN THIS PICTURE WAS
18 TAKEN?
19 A YES.
20 Q WHEN?
21 A THIS WAS TAKEN ON SUNDAY. I WAS WITH
22 YOU.
23 Q AND WOULD YOU LOOK AT PICTURE -B, PLEASE.
24 A YES.
25 Q DOES THAT SHOW THE SAME CRACK?
26 A YES, IT DOES. THAT SHOWS THE DRIVEWAY IN
27 FRONT OF JIM KNIGHT'S HOUSE.
28 Q DO YOU SEE IN FRONT OF -- NEXT TO THE

1 DRIVEWAY, THERE'S A SERIES OF STEPS?
2 A YES.
3 Q TO THE LEFT OF THOSE THERE IS WHAT LOOKS
4 LIKE A SMALL SIGN?
5 A YES.
6 Q WOULD YOU LOOK AT PICTURE -C, PLEASE.
7 A YES.
8 Q IS THAT THE SAME SIGN?
9 A IT IS.
10 Q AND WOULD YOU APPROACH THIS EXHIBIT,
11 PLEASE, AND TAKE ONE OF THESE GREEN DOTS AND SHOW US
12 WHERE THIS LOCATION IS, PLEASE.
13 A IT'S RIGHT THERE.
14 Q THANK YOU.
15 THE COURT: THE WITNESS HAS PLACED THE GREEN DOT
16 IN ZONE 5.
17 MR. MILLER: YES, YOUR HONOR. IT'S IN ZONE 5.
18 Q BY MR. MILLER: AND SO THE INSCRIPTION ON
19 PHOTOGRAPH 34 SAYING THAT THAT'S ON NARCISSA IS
20 INCORRECT; IS THAT RIGHT?
21 A THAT IS NOT CORRECT.
22 Q IT'S ON CINNAMON?
23 A IT'S ON CINNAMON LOOKING TOWARDS
24 NARCISSA.
25 MR. MILLER: EXCUSE ME ONE MOMENT, PLEASE, YOUR
26 HONOR.
27 Q BY MR. MILLER: DOES ACLAD --
28 MR. MILLER: IF I MAY, YOUR HONOR, ANOTHER MINUTE.

Letter 11

COMMENTER: Stuart Miller

RESPONSE:

Response 11.1

The commenter provides a summary of the five main points raised in the comment letter. Responses to each point are contained in the responses below.

Among the commenter's introductory remarks that summarize and precede the substantive comments within this comment letter, the commenter refers to an attached memorandum from Robert Douglas of the Abalone Cove Landslide Abatement District (ACLAD). As the commenter notes, this memorandum was sent to the City on July 31, 2013. As such, these ACLAD comments, which are explicitly labeled as comments on the Draft EIR, were received by the City eight months after the close of the Draft EIR comment period but *before* Mr. Douglas had an opportunity to review the Final EIR, which generally addresses the comments but was not provided to the City Council or the public until 2014. It should be noted that ACLAD did not submit comments on the Final EIR. Nevertheless, a summary of Mr. Douglas's July 2013 memorandum and responses to the general themes within follows.

- Mr. Douglas identifies several drainage facilities in Zone 2 that did not appear on EIR figures showing existing drainage facilities.

  Response: As the commenter acknowledges, the EIR's summary of existing drainage facilities is based on the most current information available from the City and on a site reconnaissance performed by Hunsaker & Associates. The additional facilities noted were neither readily visible in the field nor shown on the City's storm drain map. In any event, this additional information does not change the analysis or conclusions of the EIR. With mitigation identified in the Final EIR, buildout within Zone 2 as allowed by the proposed ordinance revisions would not add substantial additional runoff to the existing storm drainage system.

- Mr. Douglas states disagreement with statements in the Draft EIR related to the adequacy of the existing storm drainage system, and lists system deficiencies.

  Response: Please see Topical Response I.b., Hydrology, Water Quality and Drainage, above, and Topical Response 8.1.a.1 in Section 8.0 of the Final EIR for responses to these comments. The Final EIR has been revised accordingly to acknowledge inadequacy of drainage facilities and to include revised mitigation to address this issue. With mitigation identified in the Final EIR, buildout within Zone 2 as allowed by the proposed ordinance revisions would not add substantial additional runoff to the existing storm drainage system.

- Mr. Douglas states an opinion that the project would result in increased infiltration.

Response: Please see Topical Responses 8.1.a and 8.1.b in Section 8.0 of the Final EIR for responses to these comments. The Final EIR has been revised to include additional clarification and revised mitigation to address this issue. With mitigation identified in the Final EIR, buildout within Zone 2 as allowed by the proposed ordinance revisions would not add substantial additional runoff to the existing storm drainage system.

- Mr. Douglas expresses concerns regarding slope stability and landslide movement, referring to data gathered from GPS monitoring.

  Response: Please see Response 24.25 in Section 8.0 of the Final EIR, *Comments and Responses*, for a discussion of this topic.

Response 11.2

The commenter alleges various inadequacies in the mitigation measures identified in the Final EIR. However, as more fully explained below, the FEIR does not delegate authority to determine significant impacts or mitigation. Rather it establishes criteria and performance standards that must be demonstrated through site-specific studies and plans as each lot is developed, and must be verified by review of the studies and plans by qualified experts as well as through construction impactions processes.

Delegation

First, the commenter asserts that the FEIR impermissibly delegates determinations regarding mitigation measures to someone other than the decision making body. Contrary to Mr. Miller's assertion, there is no such delegation. In this case the City Council is called upon to review the FEIR and make findings, in its independent judgment, regarding the mitigation measures that should be adopted and implemented. Only after adoption of such mitigation measures would city staff and consultants implement the mitigation measures adopted by the City Council. Further, nothing in CEQA prohibits the use of qualified experts to prepare an environmental impact report or other environmental analysis of a project for consideration by the lead agency. There has been no impermissible delegation of authority in the preparation of the Final EIR.

Mr. Miller cites *POET, LLC v. California Air Resource Board* (2013) 218 Cal.App.4th 681, however the facts of that case are strikingly different from the Zone 2 case. The issue in *POET* was whether the California Air Resources Board (ARB) could separate the decision making function from the environmental review function. The court held it could not. At bottom, ARB violated this requirement by delegating to ARB's Executive Officer the responsibility of completing the environmental review process (which was an EIR equivalent document pursuant to a certified regulatory program), and by preliminarily approving the regulations at issue (Low Carbon Fuel Standards) before the environmental review process had been completed. CEQA requires that decision makers are informed before they make a decision, and if decision makers aren't completing the environmental review (by considering the documents and making findings) and instead are deferring those functions to staff, this policy is not being met. ARB argued that they had delegated the final rule making AND the final environmental review to the Executive Officer, and that statutes unique to ARB allowed this. The Court disagreed, because ARB had

in effect approved the standards in its preliminary action before completing the required CEQA review.

The facts in *Poet*, therefore are quite different from this case. Here it is the City Council that is being called upon to review the EIR and make appropriate findings (in its independent judgment) and the City Council that will be called upon to make the Zone 2 decision. There is no splitting of decision from environmental determination, and there is no delegation to staff of either part.

Mr. Miller also cites the *Sundstrom* case for the delegation proposition. In that case, the court found an improper delegation of hydrology analysis because the County Board issued a permit for construction of a sewage treatment plant with a condition of approval requiring the applicant to submit a hydrology study, subject to review and approval by the County's planning commission, and then to implement the mitigation measures identified therein. The court viewed this as tantamount to deferring decisions on significant impacts to the commission, when that duty fell to the Board.

Again, in the Zone 2 situation, the City Council is being called upon to review the Final EIR, in its independent judgment, and make a decision on Zone 2. If the Council certifies the Final EIR, it would be making the determinations regarding significance of environmental impacts, adopting mitigation measures, etc., and would not be delegating those functions to staff, consultants or anyone else.

Mitigation Measures

Second, Mr. Miller asserts that the determination of mitigation measures has been improperly deferred. The comment appears to take issue with Mitigation Measure HWQ-4, which requires a site specific and detailed hydrology study and drainage plan for each lot to demonstrate that:

- Post-construction lot infiltration and runoff rates and volume shall be made equal to pre-construction conditions through use of appropriate low impact development principles such as, but not limited to, detaining peak flows and use of cisterns, bio-retention areas, green roofs and permeable hardscape.
- Illustrate that point (concentrated) flow on each of the properties is either normalized, attenuated adequately, or will reach an acceptable conveyance such as a storm drain, channel, roadway or natural drainage course. All runoff shall be directed to an acceptable conveyance and shall not be allowed to drain to localized sumps or catchment areas with no outlet.
- Avoid changes to the character of the runoff at property lines. Changes in character include obstructing or diverting existing runoff entering the site, changing the depth and frequency of flooding, concentration of flow outletting onto adjacent properties or streets, and increasing the frequency or duration of runoff outletting onto adjacent properties or streets.
- Minimize "Dry Weather" infiltration which could add to the total infiltration from the project.

Preparation of site specific studies, taking into account the specific details of the proposed construction on the site, must demonstrate how the standards proposed in Mitigation Measure HWQ-4 will be met, and review of the plans and inspection of the construction for adherence to the plans is how success and compliance will be confirmed.

Contrary to Mr. Miller's assertions, the EIR does not simply assert that there will be no increase in runoff from the various lots, but instead explains the standards that must be satisfied for any residence that may be proposed in the Zone 2 area to ensure that there will not be an increased amount or concentration of runoff as the result of development within Zone 2.

Response 11.3

The commenter states an opinion that Mitigation Measure HWQ-1 includes improper delegation and deferral. Mitigation Measure HWQ-1 provides the following:

> **HWQ-1 Construction pollution, sediment and erosion control.** Prior to issuance of any Grading Permit or Building Permit, each applicant shall prepare a Construction Erosion Control and Water Quality Plan for the review and approval of the Building Official. The applicant shall be responsible for continuous and effective implementation of the plan during construction of each residence. The plan shall include Best Management Practices that may include, but not be limited to, the following:
>
> - Erosion Control. Eroded sediments from areas disturbed by construction and from stockpiles of soil shall be retained on site to minimize sediment transport from the site to streets, drainage facilities or adjacent properties via runoff, vehicle tracking or wind. Utilize erosion control techniques, such as soil stabilizers, covering soil during construction, wind blocking devices, cease grading during high winds, use of soil binders (watering graded soils should be avoided), filtration devices, and stabilizing ingress/egress points. Reduce fugitive dust to the maximum extent practicable.
> - Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs (as approved in Regional Board Resolution No. 99-03), such as the limiting of grading schedule during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.
> - Pollutant Detainment Methods. Protect downstream drainages from escaping pollutants by capturing materials carried in runoff and preventing transport from the site. Examples of detainment methods that retard movement of water and separate sediment and other contaminants are silt fences, hay bales, sand bags, berms, silt and debris basins.
> - Construction Materials Control. Construction related materials, wastes, spills or residues shall be retained on site to minimize transport from the site to streets, drainage facilities or adjoining properties by wind or runoff. Runoff from equipment and vehicle washing shall be contained at construction sites unless treated to remove sediment and pollutants. Non-

Stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the project site.

- Recycling/Disposal. Maintain a clean site. This includes proper recycling of construction-related materials and equipment fluids.
- Cleanup and dispose of small construction wastes (i.e., dry concrete) appropriately.

Contrary to the commenter's assertion, the mitigation measure provides detailed guidance regarding the content and methods to be considered and used when preparing the Construction Erosion Control and Water Quality Plan for each lot as it is to be developed. Any attempt to undertake the analysis without knowing the project details, including location of the proposed structure, lot coverage, building footprint, grading, hardscape and other project-specific details, would require speculation, and would not lead to reliable of meaningful information. CEQA does not require such speculation.

For the reasons set forth in Response 11.2 above, this mitigation measures is not an improper delegation.

Response 11.4.

The commenter states an opinion that Mitigation Measure HWQ-2 includes improper delegation and deferral. Mitigation Measure HWQ-2 provides the following:

> **HWQ-2 NPDES Review.** Any development proposal located within, adjacent to or draining into a designated Environmentally Sensitive Area (ESA) and involving the creation of two thousand five hundred square feet or more (> 2,500 SF) of impervious surface shall require the review and approval by the City's National Pollutant Discharge Elimination (NPDES) consultant prior to building permit issuance.

For the reasons set forth in Response 11.2 above, this is not impermissible delegation to the City's consultant. Further, the mitigation measure requires compliance with NPDES requirements, and provides another way in which to ensure project developers comply with the requirements.

Incorporation of NPDES requirements into the individual project, depending on the details of the specific project proposal, in combination with the other mitigation measures requiring runoff rates and volumes to be generally the same after construction as before, is appropriate mitigation.

Finally, the assignment of enforcement functions to various individuals is not uncoordinated or uncertain, as suggested in the comment. Rancho Palos Verdes Municipal Code Section 13.10.030 B. defines "authorized enforcement officer" as the director of the department of public works or his or her designee. With this definition, there is no inconsistency or lack of coordination. Further, the director of public works oversees the work of the NPDES consultant who has expertise and experience reviewing these issues for the City.

Response 11.5

This comment focuses on mitigation measure GEO-3. The commenter suggests that the mitigation measure is circular in that it requires compliance with the requirements of both the LGC Valley report prepared for the EIR as well as the requirements that may be identified in site-specific geotechnical reports required when specific development is proposed. The LGC Valley report and the future site specific reports, however, are intended to complement one another, and a lot developer must comply with the general requirements as well as the site-specific requirements.

Further, the allegation that Mitigation Measure GEO-3 defers and delegates analysis is unfounded. Mitigation Measure GEO-3 provides very specific standards that must be met, as set forth below:

> **GEO 3(a) Geotechnical Recommendations.** Prior to issuance of any Grading Permit or Building Permit, individual project applicants shall comply with all recommendations contained within the Geotechnical Study prepared by LGC Valley, Inc., dated March 29, 2011, including the following, which shall be reflected in the geotechnical/soils reports for individual projects:
>
> - Conform to the City of Rancho Palos Verdes Landslide Moratorium Ordinance (Rancho Palos Verdes Municipal Code Chapter 15.20).
> - Less than 1,000 cubic yards of grading (cut and fill combined) per lot, with no more than 50 cubic yards of imported fill per lot.
> - The property owners shall agree to participate in the Abalone Cove Landslide Abatement District and/or other recognized or approved districts whose purpose is to maintain the land in a geologically stable condition. No proposed building activity may cause lessening of stability in the zone.
> - Prior to issuance of a building permit, a geotechnical report shall be submitted to and approved by the City's geotechnical reviewers indicating what, if any, lot-local and immediately adjacent geologic hazards must be addressed and/or corrected prior to, or during construction. Said report shall specify foundation designs based on field and laboratory studies.
> - Post-construction lot infiltration and runoff rates and volume shall be made equal to pre-construction conditions through use of appropriate low impact development principles such as, but not limited to, detaining peak flows and use of cisterns, bio-retention areas, green roofs and permeable hardscape.
> - All houses shall connect to a public sanitary sewer system. Any necessary easements shall be provided.
> - All lot drainage deficiencies, if any, identified by the Director of Public Works shall be corrected.
> - Runoff from all buildings and paved areas not infiltrated or retained/detained on site to match existing conditions shall be collected and directed to the street or to an approved drainage course as approved by the Director of Public Works.

- All other relevant building code requirements shall be met.

Response 11.6

Regarding the commenters assertion that Measure GEO-3 constitutes delegation and deferral, the requirements of Mitigation Measure GEO-3, as set forth in response 11.5 above, provide the performance criteria for future plans and studies for each lot as it is developed, and the Director's determinations regarding deficiencies will be made in the overall context of the information provided in the Final EIR as augmented by the site-specific study and any comments that may result from review by the City prior to issuance of permits.

Mitigation Measure GEO-3 requires that "Post-construction lot infiltration and runoff rates and volume shall be made equal to pre-construction conditions through use of appropriate low impact development principles such as, but not limited to, detaining peak flows and use of cisterns, bio-retention areas, green roofs and permeable hardscape". Further, it requires that "Runoff from all buildings and paved areas not infiltrated or retained/detained on site to match existing conditions shall be collected and directed to the street or to an approved drainage course as approved by the Director of Public Works". Implementation of these two criteria results in preservation of the status quo, and ensuring drainage patterns are not changed as a result of development of properties in Zone 2.

The commenter cites the landscape irrigation system requirements, and asserts that there are no standards for the director to follow. However, the commenter's citation of the requirement omits the second half, which provides those performance standards. Specifically, Rancho Palos Verdes Municipal Code Section 15.20.050 I. states that "All landscaping irrigation systems shall be part of a water management system approved by the director of public works. Irrigation for landscaping shall be permitted only as necessary to maintain the yard and garden." The limitations on use for yard and garden areas provides the standard for design and review.

With respect to storm drain improvements, Mitigation Measures GEO-3(a) and HWQ-4 provide standards to be met, including that post construction lot infiltration and runoff rates and volumes must be equal to pre-construction conditions through the use of various development principles.

Response 11.7

Refer to responses 11.2 and 11.6 above regarding mitigation measure HWQ-4, and response 11.6 regarding mitigation measure GEO-3. Refer to Response 11.2 for an explanation of why the commenter's allegations regarding deferral are not accurate.

Response 11.8.

The commenter suggests that mitigation measure HWQ-5 lacks standards for implementation. The commenter is directed to the following requirements from HWQ-5 that provide the implementation standards to be met:

- All new construction shall be designed to be adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy
- All new construction shall be constructed with materials and utility equipment resistant to flood damage
- All new construction shall be constructed using methods and practices that minimize flood damage
- All new construction shall be constructed with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

Response 11.9

The commenter states an opinion that Mitigation Measure U-1 violates legal principles enumerated in the comment letter. Mitigation Measure U-1 addresses additional plumbing, and among several other requirements, requires installation of a holding tank in certain circumstances. The capacity of the holding tank would be determined by the City's Building Official when specific details of the proposed construction and development are known. The capacity would be determined taking into account various factors, including but not limited to the number of plumbing fixtures involved and the size and components of the addition or new structure. Determination of the specific size by the building official at the time when specific project details are know is an appropriate methodology contrary to the commenter's allegations.

Response 11.10

The commenter asserts that there is a lack of coordination when dealing with the various water related mitigation requirements. First, as noted in Response 11.4 above, the director of public works is also the authorized enforcement officer. Second, the building official, geotechnical staff and consultants, director of public works and the City's NPDES consultant (who reports to the Director of Public Works) coordinate on all such reviews. The commenter's assertions regarding a lack of coordination are unfounded and inaccurate.

Response 11.11

The commenter asserts that mitigation measures requiring that runoff from Zone 2 lots must be kept the same in pre- and post-construction conditions lack sufficient performance standards. However, the mitigation requirement requires use of methodologies outlined in the Los Angeles County Hydrology and Sedimentation Manual, the Los Angeles County Low Impact Development Manual, and the Los Angeles County Stormwater Best Management Practices Design and Maintenance Manual. Further, all drainage plans must meet the specific performance criteria as set forth in the mitigation measures, including, but not limited to, the following:

> Post construction lot infiltration and runoff rates and volume shall be made equal to pre-construction conditions through use of appropriate low impact development principles

such as, but not limited to, detaining peak flows and use of cisterns, bio-retention areas, green roofs, and permeable hardscape.

At bottom, the applicant/developer will need to demonstrate that pre- and post-construction drainage characteristics are the same, and those calculations and approaches will be reviewed by qualified professionals for the City to ensure accuracy and adequacy of the post construction drainage plans and the relationship to the pre-project conditions.

Further, as noted above, the City's team of professionals coordinate with review of projects such as these.

The mitigation measures have been reviewed by engineering professionals assisting with the preparation of the EIRs, and the measures have been found to be feasible, implementable, and capable of addressing the impacts they are designed to mitigate.

Response 11.12

The commenter takes issue with the assumption that the subdivision map from 1949 was intended to address the drainage for all of the lots created. The City is not aware of any specific drainage plan for the area, which would have been processed by the County prior to incorporation of the City. However, pursuant to County Ordinance No. 4478, adopted in 1945, and in effect in 1949 when the underlying subdivision was approved by the County, a subdivider was, among other things, required to "improve or agree to improve all land dedicated or to be dedicated on a final map for streets, highways, public ways, and easements with such improvements are necessary for the general use of the lot owners in the subdivision **and local neighborhood traffic and drainage needs**." (Los Angeles County Ordinance No. 4478, Section 191, related to subdivision improvement requirements (emphasis added.)) Not surprisingly, a similar requirement remains in effect in Los Angeles County Code of Ordinances Section 21.32.010.

The Los Angeles County ordinance requirement to make improvements necessary to meet drainage needs, which was in effect when the subdivision map for the area was approved by the County, supports the statements and assumptions in the Final EIR. With no evidence to the contrary having been presented, it is reasonable to assume that the County enforced its requirements at the time of map approval, and that the drainage needs of the subdivision were accommodated in the subdivision design.

Further, with implementation of the various mitigation measures requiring post construction lot infiltration and runoff rates and volume to be made equal to pre-construction conditions through use of appropriate low impact development principles such as, but not limited to, detaining peak flows and use of cisterns, bio-retention areas, green roofs, and permeable hardscape, the runoff from the Zone 2 lots, would be less than what would have been expected at the time the County approved the subdivision.

Finally, any alleged runoff from development above the Landslide Moratorium Area would be considered part of the existing baseline conditions, and would not be exacerbated by the contemplated Zone 2 project.

Response 11.13

The commenter states an opinion that the roads serving the project area were not designed to serve the subdivision. Refer to Topical Response C, Traffic and Circulation, for a discussion of the access roadways and Response 3.1 for additional discussion regarding the maintenance of the access roadways.

The traffic analysis study area is generally comprised of those locations which have the greatest potential to experience significant traffic impacts due to the proposed project as defined by the Lead Agency. In the traffic engineering practice, the study area generally includes those intersections that are in the vicinity of the project site that are forecast to experience a relatively greater percentage of project-related vehicular turning movements. The Portuguese Bend area of Rancho Palos Verdes is served by two primary access points; one access point via Narcissa Drive (on the west end) and one access point via Peppertree Drive (on the east end). Both of these access points are gated north of Palos Verdes Drive South and are used by residents to access other local roads and their respective homes. It can be reasonably assumed that the trips within the Portuguese Bend Community Association gates will dissipate to the individual Zone 2 lots. While the commenter is correct in that none of the internal private roadways were analyzed as they are private streets and outside of the control of the City of Rancho Palos Verdes, the two main access points at Palos Verdes Drive South were analyzed for potential traffic impacts and no significant traffic impacts were forecast to occur. The Narcissa Drive/Palos Verdes Drive South (Intersection No. 4) and Peppertree Drive/Palos Verdes Drive South (Intersection No. 5) intersections were analyzed as part of the traffic impact study. The intersections are projected to operate at Level of Service (LOS) C under the Existing With Project Conditions and LOS D under the Year 2020 With Project conditions. Based on the City of Rancho Palos Verdes significant impact criteria, the proposed project is not projected to create significant traffic impacts at these intersections.

Therefore, while the internal private roadways were not formally analyzed, no significant traffic impacts were forecast to occur due to the construction and occupancy of the project at the two main access points (i.e., at locations where all vehicles trips due to the potential future project development would be concentrated). As such, further analysis of the internal transportation system was not warranted as the gateway access intersections with Palos Verdes Drive South were not anticipated to be significantly impacted. Had either of these two access points been significantly impacted, further analysis would have been provided so as to disclose potential traffic impacts.

Finally, the Community Association can explore options available to it to address private road maintenance and construction traffic issues within the Community.

Response 11.14

The commenter states an opinion that private as well as public roads should be studied. As recognized in the Draft EIR, the Portuguese Bend Community Association is a private development and all roadways, including the two main access roadways of Peppertree Drive and Narcissa Drive, are private streets. Having said that, while the internal private roadways

were not formally analyzed, no significant traffic impacts were forecast to occur due to the construction and occupancy of the project at the two main access points (i.e., at locations where all vehicles trips due to the potential future project development would be concentrated). As such, further analysis of the internal transportation system was not warranted as the gateways access intersections with Palos Verdes Drive South were not anticipated to be significantly impacted. Had either of these two access points been significantly impacted, further analysis would have been provided so as to disclose potential traffic impacts.

Response 11.15

As noted in Response 11.14 above, the traffic analysis determined that there would not be significant impacts at either of the access points to the Portuguese Bend Community, and thus concluded that there would not be significant traffic impacts within the community, due to the dissipation of traffic to the various private streets within the Community. Further, a cumulative traffic analysis was completed to address the regional perspectives. The baseline conditions reported in the traffic study took into account current vehicle ownership and transportation trends as they were based on current manual traffic counts conducted within the traffic analysis study area. The traffic study also projected additional traffic from the expected development of Zone 2 utilizing industry standard trip generation rates, and concluded that no significant impacts would result from the project.

It is important to note that the resource used by traffic engineers (including the City of Rancho Palos Verdes) to forecast trip generation for development projects, including the proposed project, is the Institute of Transportation Engineers' (ITE) *Trip Generation* manual[3]. The latest ITE manual at the time that the traffic study was being prepared was utilized. ITE Land Use Code 210 (Single-Family Detached Housing) trip generation average rates were used to forecast traffic volumes for the proposed project. Further, the ITE manual states the following:

"Single-family detached units had the highest trip generation rate per dwelling unit of all residential uses because they were the largest units in size and had more residents and more vehicles per unit than other residential land uses; they were generally located farther away from shopping centers, employment areas and other trip attractors than other residential land uses; and they generally had fewer alternate modes of transportation available because they were typically not as concentrated as other residential land uses."

The single-family detached housing sites contained in the ITE publication were surveyed between the late 1960s and the 2000s, and thus are based on significantly more recent housing trend data than the year 1949, as inferred by the commenter. The ITE trip generation manual also examines the independent variable (i.e., number of units) and the number of vehicle trips in order to generate a coefficient of determination (i.e., referred to as the "R-square" value). The coefficient of determination is defined as the percent of the variance in the number of the trips associated with the variance in the size of the independent variable. If the value is 0.75, then 75 percent of the variance in the number of trips is accounted for by the variance in the size of the independent variable. As the value increases towards 1.0, the better the fit of the data. Conversely, as the value decreases towards 0, the worse the fit of the data. Further review of

[3] Institute of Transportation Engineers *Trip Generation* manual, 8th Edition, 2008.

the AM and PM peak hour trip generation rates used in the traffic impact study (i.e., morning peak hour of adjacent street traffic, one hour between 7:00 and 9:00 AM and afternoon peak hour of adjacent street traffic, one hour between 4:00 and 6:00 PM) shows coefficients of determination of 0.89 and 0.91, respectively, which are very well correlated. Adjustments to ITE trip generation rates were not necessary and the forecast of project-related vehicle trips was prepared in accordance with current single-family residential trends. Therefore, the conclusions of the traffic impact study remain valid.

The commenter asserts that CEQA requires analysis of potential impacts on private roads. Mr. Miller bases his assertion on an unpublished portion of a judicial decision that cannot be cited or relied upon. Even if the court's discussion in *Masonite Corp. v. County of Mendocino* (2013) 218 Cal.App.4th 230 of private road impacts was citable, the situation in that case is substantially different from the Zone 2 project. In *Masonite*, the issue dealt a sand and gravel quarry, which planned to remove the mined aggregate from the site using a private road providing the only point of access and egress for the site. The roadway needed to be upgraded and maintained to accommodate the 25-ton loaded vehicles associated with the quarry activities. The EIR concluded that there would be an impact based on the truck trips, and required mitigation which the Court found to be inadequate. It should be noted that the magnitude of the impact associated with a quarry with operations over a 30 year period vastly exceeded the potential impact of development of 47 single family residences, and particularly residences that would be subject to the limitations in Zone 2.

Here, on the contrary, the Final EIR concluded that there would not be any impacts on the Community roads, as demonstrated by the lack of impacts at the two Community access points. Further, the construction traffic analysis completed for the project analyzed the highly conservative (and unlikely) scenario under which all 47 lots would be constructed concurrently. Even under that highly conservative analysis, no impacts were identified.

The commenter also asserts that the Final EIR improperly relies on street plans from when the subdivision map was initially approved by the County. However, as noted in response 11.12 above, the County subdivision ordinances in effect at the time of map approval required, among other things, that the "subdivider shall improve or agree to improve all land dedicated or to be dedicated on a final map for streets, highways, public ways, and easements with such improvements are necessary for the general use of the lot owners in the subdivision **and local neighborhood traffic…."** (Los Angeles County Ordinance No. 4478, Section 191 (Emphasis added.))

The Los Angeles County ordinance requirement to make improvements necessary to meet local neighborhood traffic needs, which was in effect when the subdivision map for the area was approved, supports the statements and assumptions in the Final EIR. With no evidence to the contrary having been presented, it is reasonable to assume that the County enforced its requirements at the time of map approval, and that the traffic needs of the subdivision were accommodated in the subdivision design.

Response 11. 16

Contrary to the commenter's assertion, the traffic analysis is based on current baseline conditions, and not on the traffic expectations from the time of map approval. The commenter is referred to Section 4.3 of the Traffic Impact Study included in Appendix G of the Final EIR, which explains how the baseline traffic volumes were developed through the manual counts at the study intersections. Table 4-2 on Page 18 of the traffic study includes a table summarizing the existing traffic volumes that serve as the baseline conditions.

Response 11.17

The commenter questions the EIR analysis of emergency evacuation. Refer to Topical Response C, Traffic and Circulation, for a full discussion of the evaluation of emergency evacuation in the Draft EIR Traffic Impact Study.

It was concluded in the LLG analysis that the entire Portuguese Bend Community could evacuate in less than 15 minutes. Given that the LLG analysis assumes traffic control will be present during the time of a potential emergency evacuation, it is likely that motorists will not need to stop at every posted stop sign. The conclusion of less than 15 minutes to evacuate the entire Portuguese Bend community is conservative. It is recommended within the industry that a total evacuation time of 20 minutes or less is ideal, but in no case should exceed 30 minutes.

Refer also to Topical Response C, Traffic and Circulation, for a full discussion of the conservative nature of the emergency evacuation analysis contained in the Draft EIR. That evaluation does not consider any early or voluntary evacuations, it assumes that all residents/owners are present, and that a total of two vehicles per household are evacuated and two persons of driving age are present at the time of the evacuation notice.

Response 11.18

The commenter states an opinion that traffic impacts within Zone 2 were not studied. Refer to Topical Response C, Traffic and Circulation, for further discussion and Response 11.13 for further discussion of the traffic analysis. While the commenter is correct in that the internal private roadways were not formally analyzed as part of the Draft EIR traffic analysis, no significant traffic impacts were forecast to occur due to the construction and occupancy of the project at the two main access points (i.e., at locations where all vehicles trips due to the potential future project development would be concentrated). As such, further analysis of the internal transportation system was not warranted as the gateway access intersections with Palos Verdes Drive South were not anticipated to be significantly impacted. Had either of these two access points been significantly impacted, further analysis would have been provided so as to disclose potential traffic impacts.

Response 11.19

First the period in which to submit comments ran for 60 days from September 21, 2012 through November 20, 2012. Therefore, comments on the Draft EIR that were submitted on July 31,

2013, were not timely and did not require a response. Nonetheless, responses to the July 31, 2013 letter have been provided.

Response 11.20

The commenter asserts that the Court of Appeal's decision does not constrain the City's decision on the 31 remaining undeveloped lots. The premise of Mr. Miller's argument is that, whereas the *Monks* plaintiffs timely challenged the Resolution back in 2002, the non-*Monks* plaintiffs did not. According to Mr. Miller, by timely challenging the resolution, the *Monks* plaintiffs – and only the *Monks* plaintiffs – preserved and prevailed on their claim that they were deprived of all beneficial use of their properties. The Court concluded that the City could not evade takings liability because it was unable to establish that building homes on the *Monks* lots was a nuisance, as required by the holding of the United States Supreme Court in *Lucas v. South Carolina Coastal Commission*, 505 U.S. 1003 (1992). In contrast, the non-*Monks* owners did not timely challenge the ordinance; therefore, Mr. Miller argues that they are not entitled to assert a takings claim and the City need not – and in fact cannot – apply the same "significant threat" nuisance analysis and instead, should find that even a much lesser threat is enough to preclude construction on the non-*Monks* lots.

However, Mr. Miller's premise ignores the fact that the owners of the 31 non-*Monks* lots still can file an application for a Moratorium exclusion to develop their properties (as did the *Monks* plaintiffs) and then could challenge the denial of their application by filing a writ of administrative mandate lawsuit under California Code of Civil Procedure Section 1094.5. In such a lawsuit, the lot owners likely could challenge the application of the provisions of the Municipal Code to their property and could assert the very same total-takings arguments that were asserted by the plaintiffs in *Monks*. (See, *Travis v. County of Santa Cruz*, 33 Cal.4th 757, 767 (2004).) *Monks* 2 is a published decision by the Court of Appeal that "applies" to all lower courts throughout California. (See, Cuccia v. Superior Court, 153 Cal.App.4th 347, 353-54 (2007).) So, if an owner of an undeveloped non-*Monks* lot finds him/herself in the same or similar circumstances as the *Monks* plaintiffs, the Court of Appeal's decision in *Monks* very likely will govern the outcome of that lawsuit. Thus, Mr. Miller's claim that "the *Monks* decision has no relevance" to the non-*Monks* group is incorrect.

Turning to the commenter's discussion of the 1.5 factor of safety standard, after Resolution No. 2002-43 was repealed, the City no longer requires a zone-wide factor of safety analysis be performed in order to develop one of the 16 *Monks* lots within Zone 2. However, the City still requires the stability of each individual lot be analyzed as part of the development application for that particular lot, including the existing geologic conditions on that lot and the impact of development of the lot on adjacent property and upon the existing geologic conditions. If the current proposal were approved, these existing practices would apply to the development of any other lot in Zone 2, including the proximity of the lot to, and the effect of the development upon, any adjacent active landslide area.

Response 11.21

This comment summarizes the previous comments in the letter, and the comments should refer to the foregoing responses to those comments.

Letter 12

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May 2, 2014

Mayor Jerry Duhovic and Members of the City Council
City of Rancho Palos Verdes
30940 Hawthorne Blvd.
Rancho Palos Verdes, CA 90275

Re: Staff Report regarding Zone 2 Landslide Moratorium Ordinance Revisions
Response to Staff's comments regarding the *Monks* litigation

Dear Mayor Duhovic and Members of the City Council:

I represent the Portuguese Bend Community Association in its opposition to the Zone 2 Final Environmental Impact Report. I have already submitted the Association's comments to you and to City Staff.

I have just received the staff report for the meeting of May 6. On page 1-9, the staff report argues that the possibility of a legal challenge from the non-*Monks* lot owners may constitute an overriding consideration justifying allowing development of those lots regardless of potential environmental impacts. I was lead counsel for the *Monks* plaintiffs and am writing to explain to you why Staff's assessment of the legal situation is incorrect. 12.1

First, Staff's discussion presents just a generalized lay fear and contains no legal analysis.

Second, the situation of the *Monks* plaintiffs in 2002 and the situation of the non-*Monks* lot owners today are not analogous at all. As I explained briefly in my letter to you dated April 28, the *Monks* plaintiffs were able to claim a regulatory taking of property because they made a timely challenge to an enactment that made development of their lots impossible. In particular, the City Council adopted Resolution 2002-43 on May 20, 2002, which precluded all development of vacant lots in Zone 2. (*Monks v. City of Rancho Palos Verdes* (2008) 167 Cal.App.4th 263, 269.) Anyone aggrieved by that resolution had 90 days in which to sue. (*Id.* at 283-84.) The 31 12.2

non-*Monks* lot owners did not sue within that time period, so they have no claim of a regulatory taking unless the City now grants, and then revokes, the right to build. A rejection of the Final Environmental Impact Report will not have that effect.

Third, treating the *Monks*- and non-*Monks* lot owners equally will involve much more than allowing development. One of the claims in the *Monks* case was for a temporary taking, which is a component of all regulatory taking cases. A claim of a temporary taking requires payment of damages to compensate the owner for lost use of the property while the excessive regulation was in effect. (*Id.* at 270 and 293.) During the *Monks* trial, the City and the plaintiffs settled the plaintiffs' claim for temporary taking damages for $4,250,000, or ***more than a quarter of a million dollars per lot.*** Equal treatment of the non-*Monks* lot owners would cost the City about eight million dollars. 12.3

Fourth, John Monks, the lead plaintiff in the *Monks* litigation, tried valiantly to enlist all 47 lot owners in the litigation, but only 16 were willing to organize and sue. The reality is that if the other 31 would not coalesce when their case was strong, it will not be in their nature to do so when their case is weak. 12.4

I urge the City Council not to accept City Staff's lay and unexplained fear that the non-*Monks* lot owners can bring a meritorious action against the City.

Very truly yours,

Stuart Miller

Letter 12

COMMENTER: Stuart Miller

RESPONSE:

Response 12.1

The commenter asserts that he was lead counsel for the *Monks* plaintiffs and as such is explaining his disagreement with staff's analysis. The commenter's representation of the *Monks* plaintiffs is noted.

Response 12.2

Comment No. 12.2 is duplicative of Comment No. 11.20. Accordingly, see response to comment number 11.20.

Response 12.3

The commenter asserts that in order to treat the owners of the 31 undeveloped non-*Monks* lots the same as the owners of the 16 *Monks* lots, the City should pay the owners of the non-*Monks* lots for the temporary taking of their properties in an amount that is equal to the settlement that each of the owners of the *Monks* lots received, which was more than $250,000 per lot. The commenter's comment, however, ignores the fact that unlike the plaintiffs in *Monks*, the owners of the 31 undeveloped non-*Monks* lots have not filed an application with the City to develop their properties. Accordingly, any as-applied temporary taking claims for damages that they may have against the City have not yet ripened and, accordingly, the City is not obligated to pay damages to them for a temporary taking of their properties.

Response 12.4

The commenter asserts that since the owners of the 31 non-*Monks* lots in Zone 2 did not wish to join the *Monks* lawsuit when it was filed, it is unlikely that they would sue the City if the City Council does not adopt an exception to the Moratorium Ordinance by which they could apply to develop their lots. The commenter's comment is based entirely on unsupported conjecture and speculation and does not take into account that: 1) some of the non-*Monks* lots may have been sold to new owners since the time when the *Monks* lawsuit was filed, and those owners may have a different opinion about whether they should file a lawsuit against the City following the City Council's action on this proposal, and 2) some lot owners may wish to pursue litigation, due to the decision in the *Monks* case.

Letter 13

To: eduardos@rpv.com
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FROM: Dan and Vicki Pinkham
#1 Narcissa Drive
Rancho Palos Verdes, CA

April 7, 2014

Subject: Comments on Case No. ZON2009-00409 (Code Amendment & EIR)

IMPACT ANALYSIS

A bit of history—Portuguese Bend Gate House, AKA "Villa Palos Verdes"

Our home, #1 Narcissa Drive, commonly know as "The Portuguese Bend community Gate House", is historically, architecturally, and socially significant to this community and to California. The Gate House was designed after a 16th century Italian Chapel, and was one of the original Frank Vanderlip homes built in 1924 by the well-known architect, Gordon Kaufman. This Gate House, is the first home located on one of the two access roads to the proposed Zone 2 future development. The Narcissa Drive entrance road is located only INCHES from our front door and living room. Originally the Vanderlips's designed the Narcissa road ONLY to be the entrance for several 100-acre private estates. After the financial collapse in 1929, it became necessary to sub divide the lots into smaller parcels, causing a need to widen the road . Now with more 13.1

growth, our concern is that the entrance may again be too small to accommodate the future oversized construction traffic.

Impact of existing building

Since the existing construction for the Monk's property, we have already experienced very negative impacts due to the size and amount of heavy equipment trying to navigate the narrow entrance road. You may know already that a cement truck, working on one of the Monk's lots, demolished the original Vanderlip entrance cement wall; causing valuable historical damage. Our pillars, walls, and landscaping are constantly being hit by traffic trying to navigate the narrow width of the road. (see attached photos) .The EIR may have studied the projected number of construction trucks that could possibly enter Narcissa Drive over a 10 year period, however, it only takes only ONE oversized truck to hit a bicyclist, on coming car, a pedestrian, or our house to create a tragedy and an expensive law suit against the city in the future. 13.2

Mitigation suggested to the city

As one of the original "Vanderlip homes", our home is NOT part of the Portuguese Bend Community Association. We are in no way protected or represented by the PBCA. We purchased our home in huge disrepair. Since then we have spent years improving our home and the entrance to the community association, not to mention, creating a beautiful city landmark. In reality, there is a VERY 13.3

significant impact on our home and health. There was a building moratorium when we purchased our home; it was impossible to believe that future home development would occur in an ANCIENT LANDSLIDE.

We feel that the city of RPV should seriously consider some form of mitigation, compensation and or insurance for the significant and potential impact that this development will most certainly cause our family.

Fortunately, there does seem to be a mitigation solution for our dilemma. Years ago, we submitted several Myron Hunt /Gordon Kaufman entrance designs to the PBCA. These concepts were for a reconfigured Narcissa entrance that both the city of Rancho Palos Verdes and Portuguese Bend Community would laud as an asset to this one of a kind Southern California iconic community. Each set of plans was carefully designed with the utmost concern for the community, it's safety, historical importance and it's esthetics. Each design moved the Narcissa entrance road approx 36 feet from the existing road. Our designs have been disregarded because we are "not members of the association and the city permits would be too expensive." It has been suggested that the city could possibly work jointly with the association and us in efforts to move and improve the entrance road. Perhaps the city could wave the fees that would be necessary to make these engineering adjustments to the entrance. We would be more than happy to contribute to this effort in any necessary way. We could easily gather other professionals that would be more than happy to contribute their expertise. This could easily be

13.4

accomplished with the city's assistance and the PBCA's understanding and approval.

Please let it also be known that, in our 11/19/2012, DEIR comments, we have brought it to the city's attention that in a fire emergency, the earth moving fire equipment trucks are too large to enter the Narcissa and Peppertree roads. 13.5

Let it be know, also that we have provided evidence About the destabilization and erosion of our property in Altamira Canyon. 13.6

ATTACHMENT 1-155

ATTACHMENT 1-156

ATTACHMENT 1-157

UNIVERSAL

ATTACHMENT 1-159

ATTACHMENT 1-160

ATTACHMENT 1-161

ATTACHMENT 1-162

Letter 13

COMMENTER: Dan and Vicki Pinkham

RESPONSE:

Response 13.1

The commenter's house is adjacent to the Narcissa Drive entrance to the project area. The commenter states a concern that the entrance may be "too small to accommodate the future oversized construction traffic." Please note that construction vehicles employed for future buildout under the proposed ordinance revisions would be expected to be generally the same size and type as those used currently and in the recent past. In addition, the Portuguese Bend Community Association could require trucks to use the Peppertree Drive entrance.

Response 13.2

The commenter states concerns regarding construction traffic safety and past and potential future damage to the commenter's property. These concerns are noted and will be forwarded to the City's decision makers for their consideration. While understandably important to the commenter, and potentially a matter to be addressed with the PBCA, the concerns about damage to landscape features are not significant environmental impacts pursuant to CEQA. The safety concerns noted are also valid in general, but the commenter does not provide information or data to indicate that collisions between bicyclists, pedestrians or other cars and construction traffic would result from the project, given that drivers, cyclists and pedestrians are generally expected to follow existing traffic laws and safety precautions.

Response 13.3

The commenter requests "some form of mitigation, compensation and or insurance for the significant and potential impact that this development will most certainly cause our family." As noted above, the concerns, although understandable, are not significant environmental impacts pursuant to CEQA, and therefore such mitigation is not included in the EIR.

Response 13.4

The commenter suggests that the City could work jointly with the commenter and the PBCA to move and improve the entrance road, and that the City could wave the fees for permitting entrance improvements. This suggestion will be forwarded to the City's decision makers for their consideration. It should be noted that, based on the City of Rancho Palos Verdes significant impact criteria, the proposed project is not projected to create significant traffic impacts at this intersection.

Response 13.5

The commenter states an opinion that certain fire fighting equipment is too large to enter the project area via the existing driveways. This concern is noted. However, the proposed ordinance revisions would not change the existing gate or entrance road condition. In addition,

the Fire Department does have suitable vehicles that can access the narrow entry gate, and would be expected to use the appropriate equipment for future fire events.

Response 13.6

The commenter states an opinion that they have provided evidence of destabilization and erosion in Altamira Canyon. As noted throughout the Final EIR and these responses the proposed project, as mitigated, would not substantially increase runoff from developed lots and therefore impacts related to erosion in the canyon would be less than significant.

Letter 14

Abe Leider

From: ksnell0001@aol.com
Sent: Sunday, May 04, 2014 2:28 PM
To: Jerry Duhovic; Jim Knight; Susan Brooks; Brian Campbell; Anthony Misetich
Cc: Eduardo Schonborn; CC; CityClerk; CityManager; Carolynn Petru; Planning; Joel Rojas
Subject: Zone 2 Landslide Moratorium Ordinance Revisions Code Amendment Section 15.20.040 (May 6, 2014)

In 1984, the then Mayor Jackie Bacharach and City Council took away the right to split my four (4) acre parcel into zoned one (1) acre lots. At that time, she stated that it would be "temporary....just until the Abalone Cove slide is slowed down."

Well, the slide slowed down a long time ago, so it is time to allow the property owners in Zone 2 to split their parcels to "benefit" after paying thousands of dollars in yearly "benefit assessments" to ACLAD since 1981.

To save the residents of the City from suffering another Monks type lawsuit, the City needs to give back the ability to have lot splits in Zone 2. The California State Court of Appeal's decision in the Case of Monks v. Rancho Palos Verdes found that the City's prohibition against the development of lots in Zone 2 was a taking and an impermissible impediment to the development of the plaintiffs' lots.

It appears that entering into another lawsuit and gaining a ruling from the Court to allow lot splits will take far less time than waiting for the City Council to approve lot splits and go through an unnecessary EIR process for a developed community with already established zoning dating back to the early 1900's.

In 1973, I entered into an agreement to purchase four (4) acres on Vanderlip Driveway as a place to live and invest in. Over the years I have regarded the property as my retirement fund. I need to split the property so I can benefit from the land and retire. In 1989, John Vanderlip was allowed to split his property due to hardship. He applied for the lot split years after his right to split his property was taken away, and it was granted.

It is time to restore the right to have lot splits in Zone 2. The property on Vanderlip Driveway is far more stable than the other properties in Zone 2, reference GPS AB58. The sewer lines, capacity, and laterals were installed on the basis of future development in Zone 2. Having to pay yearly ACLAD assessments on acreage that cannot be split and developed is a true hardship and is not a benefit.

This EIR shows that the impact of lot splits will be minimal. In fact, ACLAD will be further funded from the assessments on the new square footage allowing for very valuable slide abatement work that has, in the past, been cost prohibitive.

Please include an Exception to Section 15.20.040 allowing lot splits within Zone 2.

Respectfully,

Kathy Snell

Letter 14

COMMENTER: Kathy Snell

RESPONSE:

The commenter requests that the City allow subdivisions within Zone 2. This request is noted, but does not question or challenge the analysis or conclusions of the EIR.

WEBER CONSULTING
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Letter 15

April 21, 2014

VIA E-MAIL

Mr. Joel Rojas, AICP
City of Rancho Palos Verdes
30940 Hawthorne Boulevard
Rancho Palos Verdes, CA 90275

RE: ZONE 2 - LANDSLIDE MORATORIUM ORDINANCE REVISIONS

Dear Mr. Rojas:

This letter is submitted on behalf of Mr. Jack Downhill, who owns a 6.94 acre parcel at 20 Vanderlip Drive. He acquired the property long before the concept of Landslide Zones was proposed by Dr. Ehlig in 1993. This letter is intended to augment other communications submitted by Mr. Downhill.

As you know, the "Guidelines" for Landslide Zones recommended by Dr. Ehlig in his May 26, 1993 memorandum established the underlying principles for the Landslide Zones. He provided a relatively detailed background and rationale for permitting development in the Moratorium Area. This important document is often overlooked when discussing development in Zone 2. Dr. Ehlig concluded that lots in Zone 2 "could be developed without adversely affecting the stability of the large ancient landslide" subject to certain "guidelines". A copy of Dr. Ehlig's memorandum is attached for your reference.

Since acquiring the property in 1968, Mr. Downhill has envisaged subdividing this property. However, since the adoption of the Landslide Moratorium Ordinance in 1978, Mr. Downhill's efforts to subdivide have been thwarted by regulatory impediments that preclude utilizing this "underdeveloped" property to the fullest extent. With the Superior Court's decision in the Monks case, Mr. Downhill believed that the Moratorium Ordinance would be amended to remove jurisdictional impediments and return property rights to <u>all</u> owners. The current Ordinance revisions have been crafted to allow a select group of Zone 2 owners the ability to develop their properties, however, it falls short of treating all Zone 2 owners equally.

Mr. Downhill's property exhibits virtually identical physical, environmental and jurisdictional characteristics and constraints as the 47 properties that have been selected to be part of the Ordinance revisions. The City's decision to treat the Downhill property differently than the select 47 lots is fundamentally wrong. Treating the Downhill property differently than the select 47 lots is no different than treating the 16 Monks properties differently than the 31 vacant lots. The decision to only address the smaller 47 lots is not consistent with the stated goal to broaden the scope of the "Moratorium Exception" process. The FEIR confirms that there are virtually no differences between the select 47 lots and the larger properties, nor are there discernible increased impacts if the larger lots are permitted to use the same Ordinance revisions. It is unfortunate that the Downhill property is not identified as "*underdeveloped*" (a term used in the FEIR), which, by any reasonable standard, is the case here.

In July 2012, Mr. Downhill filed a Moratorium Exclusion Application (ZON2012-00232) for the property. The LME application requests to subdivide the 6.94 acre lot into four lots, rather than the six that are statistically possible. Subsequent to the submittal of this request, Mr. Downhill was advised by letter (8/10/12) to "*submit all appropriate geotechnical reports and studies that address the property's*

specific geological conditions to support the requested exclusion. Note that the City Geologist will review the information on behalf of the City to ensure that the information is adequate to support the requested exclusion and that the City will not deem this application complete until the City Geologist approves the required geological reports". Based on past experience with the City Geologist's requirements for Moratorium Exclusion, the level of study required will far exceed the level of data required for the 16 Monks lots or the 31other Zone 2 lots. While we understand the logic, it is an oppressive requirement that other Zone 2 owners won't be required to meet. We don't believe it is the City's intent to treat a property owner differently than others in the same neighborhood, but that will be outcome of this Ordinance revision, if adopted as proposed.

It's important to point out that the Downhill property has had significantly more on-site geology investigation conducted than most (perhaps all) of the select 47 lots that are the subject of this Ordinance revision. For example, at least 4 deep borings have been drilled on the Downhill property and several more nearby. The most recent subsurface investigation was a 297 foot deep core boring drilled on the Downhill property by ACLAD to confirm the local geology, as well as the possibility of implementing a monitoring well. Previously, in 1968-9, Moore and Taber conducted comprehensive subsurface investigations on the Downhill property and throughout Portuguese Bend. The Moore and Taber study concluded " *that the factor of safety for most of the ancient slides are significantly and possibly substantially greater than one.*" This is consistent with EIR findings.

Another issue often expressed by opponents to allowing <u>any</u> new homes in Portuguese Bend is that the sewer system and drainage system are not designed to accommodate any additional homes. We fundamentally disagree. It is standard practice, and has been for years, for engineers to "overdesign" sewer, water and storm drain systems to accommodate changing use patterns, changing technology, physical characteristics and maintenance requirements. Moreover, increased use of state-of-the-art low flow toilets, low flow water fixtures, aerators and other devices that save water and thereby introduce less effluent into the sewer system. Similarly, current drainage and water quality regulations rigorously control the amount of runoff entering drainage systems, which makes the drainage system more efficient. These facts have long been overlooked.

We also note that when the Abalone Cove Sewer was installed, two laterals were constructed to serve the Downhill property and two additional lateral connections ("tees") are available in Narcissa Drive to serve the southern portion of the Downhill property. Clearly, someone anticipated further development of his property. Finally, he has been paying a higher benefit assessment for years, which assumes a higher development potential than a lot that can't be subdivided.

We respectfully request that the City Council adopt an Ordinance that permits all Zone 2 properties to be developed pursuant to the General Plan and Zoning. We are not suggesting that that the City permit subdivision of larger properties without the benefit of the standard entitlement process (Map Act, CEQA process, etc.), however, we respectfully request that the Moratorium Ordinance treat all Zone 2 owners equally.

Respectfully,

Gary S. Weber

Gary S. Weber
Weber Consulting

Attachment
CC: Jack Downhill, Eduardo Schonborn AICP, Mayor Duhovic and City Council

MEMORANDUM

TO: Trent Fulliam, Director of Public Works
City of Rancho Palos Verdes

May 26, 1993

FROM: Perry L. Ehlig, City Geologist

SUBJECT: Suggested Guidelines for Permitting Development in the Moratorium Area

ESTABLISHMENT OF MORATORIUM ZONES

For the purpose of these guidelines, the Moratorium area is divided into the eight zones listed below and shown on the Moratorium Map.

Zone 1 - Unsubdivided land unaffected by large historic landslides and located uphill or to the west of subdivided areas. (about 550 acres)

Zone 2 - Subdivided land unaffected by large historic landslides. (about 130 acres)

Zone 3 - Unsubdivided land unaffected by large historic landslides and located seaward of Sweetbay Road. (about 15 acres)

Zone 4 - Land affected by the Klondike Canyon landslide and adjacent land included in the Klondike Canyon Geologic Hazard Abatement District. (about 100 acres)

Zone 5 - Land affected by the Abalone Cove landslide and adjacent land where minor movement has occurred due to loss of lateral support. (about 90 acres)

Zone 6 - The uphill, westerly and central parts of the Portuguese Bend landslide, where movement can be stopped through mitigation without requiring shoreline protection. (about 210 acres)

Zone 7 - The seaward part of the Portuguese Bend landslide where control of movement requires shoreline protection. (about 75 acres)

Zone 8 - Land affected by the Flying Triangle landslide including immediately adjacent land. (about 25 acres)

DESCRIPTIONS OF ZONES AND SUGGESTED GUIDELINES FOR PERMITTING DEVELOPMENT

ZONE 1

Background

Zone 1 includes about 550 acres of undeveloped land. Most is within the uphill part of a large ancient landslide that was last active about 100,000 years ago. Landslide topography is modified by erosion of canyons, filling of slide depressions and smoothing and flattening of slide scarps. Zone 1 contains some broad areas where slopes are less than 5:1 (horizontal to vertical) but the majority of the area has slopes ranging between 5:1 and 2:1. Slopes steeper than 2:1 occur locally along the sides of canyons.

The large ancient landslide does not underlie all of Zone 1. Land adjoining Palos Verdes Drive South in the southwest part of the zone is unaffected by sliding and probably has a factor of safety in excess of 1.50. Land in the eastern part of the zone is also outside of the large landslide but it contains local landslides.

Extensive geotechnical studies have been conducted throughout Zone 1. Major goals of the studies include (1) locating and determining the configuration of the deepest slide plane, (2) determining ground water conditions beneath the area, and (3) analyzing the stability of the ancient landslide, and (4) evaluating methods of improving the areas stability. Geotechnical studies are essentially complete in the eastern half of Zone 1 but more are needed in the western half.

<u>Suggested Guidelines</u>

1. Any land in Zone 1 which can be shown to have a safety factor of 1.5 or greater in regard to landsliding, or is correctable to a factor of safety of 1.5 through remedial grading, and will upon development have no adverse impact on the stability of adjacent land, shall be granted an exception for habitable development upon completion of all necessary remedial work. (This is consistent with existing City code.)

2. Any land in Zone 1 which can be shown to have a safety factor between 1.30 and 1.50 in regard to the large ancient landslide and has a factor of safety of 1.50 or greater in regard to local slope stability shall be granted an exception for habitable development providing it meets all other requirements in guideline 1 (above) and the following stipulations:
   a. A network of monitoring and producing wells must be installed in accordance with a plan approved by the Rancho Palos Verdes Redevelopment Agency (RDA).
   b. A covenant must be attached to each deed agreeing to participate in the Abalone Cove Geologic Hazard Abatement District (ACLAD) and any other district established for the purpose of maintaining the land in a geologically stable condition.
   c. Surface drainage improvements must be installed in accordance with a plan approved by the RDA.
   d. A sewer system must be installed to serve all habitable structures.
   e. All other RDA and City requirements must be met.

3. Any land in Zone 1 which is to be used for purposes other than habitable structures may be granted an exception for nonhabitable development providing it has a safety factor of 1.15 or greater in regard to the large ancient landslide and it meets the following stipulations:
   a. No land modification may be made which will adversely affect the local or regional stability of the land.
   b. A network of monitoring and production wells must be installed in accordance with a plan approved by the RDA.
   c. A covenant must be signed agreeing to support and participate in ACLAD and any other district established for the purpose of maintaining the land in a geologically stable condition.
   d. Surface drainage improvements must be installed in accordance with a plan approved by the RDA.
   e. All other RDA and City requirements must be met.

ZONE 2

Background

Zone 2 includes about 130 acres within existing Tract 14195 and Tract 14500 (except lots 1, 2, 3 and 4 which are in the Portuguese Bend landslide), and the subdivided land served by Vanderlip Drive. It is an area of subdued topography within the central part of the large ancient landslide. Slopes of 5:1 and less prevail over most of the central and downhill parts of Zone 2. Slopes generally range between 5:1 and 3:1 in the uphill part.

The flattest parts of Zone 2 overlie a gentle trough in the bedrock structure beneath the slide. The slide base followed the bedrock structure as the slide mass translated across this area. This caused a surface hollow to develop in an east-west direction across this area while the slide was active. The hollow was subsequently filled by stream and slope wash deposits. This created the gentle slopes which drain toward the channels of Altamira Canyon.

Available geologic data indicate the base of the ancient landslide is at depths ranging from 180 to 260 feet below the ground surface in most parts of Zone 2. Four to six deep core holes would be desirable to more precisely establish the location of the slide base beneath parts of this area but new findings are unlikely to have a significant impact on existing interpretations. The slide base is sufficiently flat in the area seaward of upper Narcissa Drive that the overlying slide mass resists movement providing the water table does not rise above its historic levels. Based on well data, the water table was at a depth of 50 to 60 feet beneath most of this area prior to the start of pumping in 1980. The water table is currently at an average depth of about 70 feet.

The 25 undeveloped lots in Tract 14195 and 15 in Tract 14500, and an undetermined number in parcels served by Vanderlip Drive, could be developed without adversely affecting the stability of the large ancient landslide. In fact, if development were combined with installation of additional wells, stability would be improved. Most lots can be developed with minimal grading and without a net import or export of earth. Such grading would have no impact on the stability of the deep-seated slide.

Ground water is the only variable within Zone 2 which affects its stability. Zone 2 currently contains one monitoring well and four producing wells. Eight to ten more monitoring wells are needed to provide a detailed picture of ground water conditions within Zone 2. Four to six more producing wells are needed to better control ground water conditions. If the cost of the needed wells were funded from fees paid for permission to develop vacant lots, development would improve the stability of the large ancient landslide.

Suggested Guidelines

Development of undeveloped lots shall be permitted in existing Tract 14195 and Tract 14500 (except lots 1, 2, 3 and 4 which are in the Portuguese Bend landslide), and the subdivided land served by Vanderlip Drive subject to the following stipulations:

a. The lot owner must sign a covenant agreeing to participate in ACLAD and any other district whose purpose is to maintain the land in a geologically stable condition.

b. The lot owner must pay a fee to help defray the cost of installing additional monitoring and producing wells. Said fee shall not exceed the differential between the sum of ACLAD fees previously assessed to an equivalent sized developed lot and the sum previously assessed to the undeveloped lot. (The annual tax difference between a developed lot and an undeveloped of equal size is determined by the square footage of improvements.)
c. Prior to issuance of a building permit, a geotechnical report must be submitted to and approved by the City's geotechnical reviewers indicating what, if any, local geologic hazards must be corrected prior to construction, and shall specify foundation designs based on field and laboratory studies. Grading exceeding 250 cubic yards shall require special approval by the City staff.
d. If building occurs prior to installation of a sewer system; a covenant must be signed agreeing to a sewer system and providing necessary easements for one.
e. All lot drainage deficiencies, if any, identified by the City staff must be corrected.
f. Runoff from all buildings and paved areas must be contained and directed to the street or to an approved drainage course.
g. All other relevant building code requirements must be met.

ZONE 3

Background

About 15 acres of undevelop land is present within the area bounded by the main channel of Altamira Canyon on the west, Sweetbay Road on the north, and the edge of the Portuguese Bend landslide on the east and southeast. Most of this land has gentle rolling topography and could be developed into residential lots with only minor grading.

Available data indicates the base of the large ancient landslide is nearly horizontal beneath this area and is at a depth of 200 to 250 feet below the ground surface. Three to five deep core holes are needed to confirm this.

Ground water conditions are the main variable affecting the stability of the large ancient landslide beneath this area. The area should remain stable as long as the water table rises no higher than its historic high level. The area contains two producing wells but no monitoring wells. Data from the two wells and projections from wells in the adjoining area indicates the water table is 10 to 15 feet lower than it was in 1983. At present, the water table ranges from about 60 to as much as 130 feet below the ground surface. Three to five monitoring wells and one or two additional producing wells should be installed during development of this area.

Suggested Guidelines

Additional geologic studies are needed to accurately locate the base of the large ancient landslide beneath this area. If the results of such studies are favorable, development could be permitted contingent upon meeting all City requirements pertaining to development of residential tracts and subject to the following stipulations:
a. Ground water monitoring and production wells must be installed in accordance with a plan approved by the RDA.
b. Surface drainage channels must be paved in accordance with a plan approved by the RDA.

Letter 15

COMMENTER: Gary S. Weber

RESPONSE:

The commenter takes exception to the fact that the Final EIR does not include his client's property at 20 Vanderlip Drive in the list of lots considered to be vacant or underdeveloped, i.e., potentially developable, under the proposed ordinance revisions. The property at 20 Vanderlip Drive is not a vacant or underdeveloped lot. The property is currently developed with an existing, permitted, single-family residence.

The commenter further offers comments related to his client's ongoing coordination with the City regarding entitlements and other comments that do not question or challenge the EIR analysis or conclusions.

Conceptual Drainage and SUSMP (Water Quality) Report for Portuguese Bend Zone 2 Landslide Moratorium Ordinance Revisions EIR

City of Rancho Palos Verdes
County of Los Angeles

Hunsaker Project No: 0159-001-001
May 6, 2011
Revised ~~April 2013~~June 2014

Prepared for:

Rancho Palos Verdes
30940 Hawthorne Boulevard
Rancho Palos Verdes, CA 90275

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Wai Lan Lee

Under the supervision of:

Jason H. Fukumitsu RCE 40695 Exp. 3/31/15

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   D. Conceptual Drainage and SUSMP (Water Quality) Map

1.0 INTRODUCTION

1.1 REPORT SUMMARY

The purpose of this report is to present the Conceptual Drainage and Standard Urban Stormwater Mitigation Plan (SUSMP) analysis for the EIR for the "Zone 2 Landslide Moratorium Ordinance." The report analyzes pre and post-development conditions for the SUSMP, 2–year, 5-year, 10-year, 25-year, 50-year, and Capital Storms, as well as total debris load.

Drainage (flood) and water quality related impacts and mitigation are addressed consistent with City of Rancho Palos Verdes ordinances and policies. All calculations are based upon the procedures outlined in the County of Los Angeles 2006 Hydrology Manual, 2002 SUSMP Manual, and 2006 Sedimentation Manual.

This report identifies the pre and post-development runoff from the project. Since each lot would have to acquire permits individually, it would be the responsibility of the owner to adhere to the policies in place at the time permits are pulled. Since this EIR addresses the lots cumulatively, the project exceeds the threshold for mitigation and treatment. The individual homeowners will need to provide mitigation onsite prior to outletting runoff from their property.

Our analysis has determined that there would be an increase in runoff from the 2-year, 5-year, 10-year, 25-year and 50-year storm events. Treatment is required for the SUSMP event. See section 6.0 Standard Urban Stormwater Mitigation Plan for a definition of the SUSMP event.). Additionally, the lots may be required to employ Low Impact Development (LID) principles as well as hydromodification mitigation to minimize impacts to the natural water courses. See Section 7.0: Summary and Recommendations for a more detailed analysis.

This report is divided into several sections. Section 1 contains the introduction; Section 2 discusses the methodology used in the hydrologic analysis; Section 3 summarizes the design criteria used; Section 4 is a description of the hydrologic model and brief description of the watershed and its land uses; Section 5 summarizes the analysis for the Interim Peak Flow Runoff Criteria and LID analysis; Section 6 describes the Standard Urban Stormwater Mitigation Plan (SUSMP); Section 7 includes the conclusions and recommendations of this report; and Section 8 includes a list of the references used in the preparation of this report.

1.2 PROJECT DESCRIPTION

"Zone 2 Landslide Moratorium Ordinance" area (referred to as "project") is located north of the intersection of Palos Verdes Drive South and Narcissa Drive in the Portuguese Bend area of the Palos Verdes Peninsula, City of Rancho Palos Verdes, and County of Los Angeles, California. This area, located on the hills above the south-central coastline of the City, is within the City's larger Landslide Moratorium Area (LMA). Zone 2 consists of 111 individual lots. Of these, 64 are developed with residences and 47 are either undeveloped or underdeveloped. For the purposes of this drainage analysis, the "Project Site" is considered to be the entire Portuguese Bend development, while the "Project" is the 47 lots that are the focus of this EIR.

The project site is part of an 855± acre watershed that includes developed and undeveloped land uses. Offsite areas to the north of the project site include existing Tracts 27789, 31617 and 31714, as well as natural hillside and canyon open space areas. Palos Verdes Drive and the Pacific Ocean abut the southerly edge of the project site. Altamira Canyon is the main natural drainage course that drains the project site and offsite tributary areas. Altamira Canyon has and continues to experience erosion due to runoff from the existing on and off site developments.

The pre and post development drainage watersheds have identical limits and drainage patterns. The pre-development watershed within the project site boundary consists of 64 developed lots totaling 81 acres, and 47 undeveloped lots totaling 43 acres. The post – development condition includes development of the 47 undeveloped lots as single story, ranch-style residences with attached or detached three-car garages, with maximum 40% net lot coverage. ~~Since the existing drainage system was designed for the entire Portuguese Bend development, including the 47 undeveloped lots, each lot is assumed to have a proportional share of the existing drainage capacity provided for the Portuguese Bend development. Regardless of when the lots are constructed, each lot is allowed to drain into the existing drainage system based upon the size of the lot. Any deficiencies in the drainage system should be mitigated by the entire Portuguese Bend development rather than the last 47 lots to be constructed.~~ The existing drainage system in the project area is a private system originally permitted by the County. The system utilizes culverts, storm drains, open drainage courses, and the roads to convey runoff. Testimony and video provided by residents indicates that some culverts and roads are inadequate to convey existing runoff. However, since the existing drainage system was designed for the entire Portuguese Bend development, including the 47 undeveloped lots, each lot is allowed to drain into the existing drainage system

Existing storm drains (PD 407, 1382, 1403 and 1703) discharge from the existing offsite areas into the undeveloped canyon areas north of the project site. Runoff drains through the project site in a generally north to south direction, crosses Palos Verdes Drive South, and discharges into the Pacific Ocean.

Within the project site runoff is conveyed within existing drainage courses, storm drains, and culverts that traverse the site. The project site is divided into two major drainage watersheds by Cinnamon Lane. The area east of Cinnamon Lane drains a total of 637 acres, of which approximately 82 acres are located in the Zone 2. Drainage in the easterly watershed is conveyed by Altamira Canyon southwesterly to Narsissa Drive. The area west of Cinnamon Lane drains a total of 115 acres, of which approximately 42 acres are located in the Zone 2.

Drainage in the westerly watershed is conveyed by a combination of an existing subsurface storm drain system and surface flow in a southeasterly direction along Figtree Road to the cul-de-sac at the end of Figtree Road. The storm drain continues southeasterly in private lots to a junction with Altamira Canyon (the easterly watershed) approximately 400 feet north of Narcissa Drive. From the junction, the storm drain drains southwesterly across Narsissa Drive and Palos Verdes Drive South and outlets into the lower reaches of Altamira Canyon. Altamira Canyon drains directly into the Pacific Ocean from Palos Verdes Drive South.

The majority of the project area is located within FEMA Flood Zone “X,” and the canyon area is clarified as FEMA Flood Zone “D” on the FEMA FIRM Panel 06037C2025F and 06037C2026F, effective September 28, 2008. Flood Zone “X” is defined as an area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone “X” is the area determined to be outside the 500-year flood and protected by levee from 100-year flood. Flood Zone “D” is defined as an area with possible but undetermined flood hazards. No flood hazard analysis has been conducted.

2. METHODOLOGY

The analysis performed for this project was prepared at a programmatic level to determine the overall hydrological impact of the proposed project. Each of the individual property owners would need to prepare a detailed hydrologic analysis to demonstrate compliance with the mitigation measures listed below. The mitigation measures address individual site development impacts due to flooding and erosion. Although the project area currently experiences flooding and erosion, resolving existing conditions is not a part of the mitigation required for the proposed project's impacts. While it may be desirable to resolve the site flooding and erosion in Altamira Canyon and other natural drainage courses, it is an existing condition affecting the larger area and therefor is not addressed in in this analysis.

A detailed field survey was not conducted to determine the exact size and location of every drainage facility located on the site. The existing drainage facilities were based upon record data provided by the City and supplemented by a visual field inspection of the roads and areas immediately adjacent to the roads. Since the proposed project is the development of individual lots located within a developed neighborhood and no changes are proposed to the existing roads, culverts, storm drains, and open drainage conveyances (natural and constructed) at this time, a detailed survey and analysis was determined to be unnecessary at this time.

Reference plans and design calculations were not available for confirmation of the capacity of the existing drains. A detailed hydrologic and hydraulic analysis of the existing drainage system, including culverts, streets, and open drainage courses was not prepared as a part of this analysis. The impacts are described quantitatively for the overll project as increases in runoff rates and volumes, and mitigation is required to attenuate the increase in runoff so that no net change occurs. As such, regardless of the localized flooding that may occur in existing conditions, if no net change occurs due to the development of the 47 undeveloped lots, detailing the existing flooding is not required to determine project related impacts.

The project site is located within one watershed which, including offsite areas, covers a total of 855± acres. The drainage watershed was delineated based on existing topography and improvement plans, the existing City Master Plan of Drainage, Los Angeles County Drainage Watershed Maps, and a site visit. Two hydrologic methods were used for the drainage analysis - the Rational and Modified Rational Methods are included in Section 7.2 and 7.3 of the 2006 Los Angeles County Hydrology Manual, respectively. The SUSMP is based upon the Los Angeles County SUSMP Manual dated September 2002.

A 24-Hour storm analysis based upon the Los Angeles County Rational and Modified Rational Method of Hydrology was used for clear, burned, and burned and bulked conditions for the watershed(s).

The time of concentration (T_c) for each subarea was computed using the Los Angeles County approved Time of Concentration calculator based upon the Rational Method. The calculator evaluates several hydrologic parameters such as soil type, land use, imperviousness, storm frequency, length and slope of each reach to calculate a time of concentration. This data was used with the Los Angeles County approved LAR04 software application to determine peak flow rates for all storm events.

Using the times of concentrations for each subarea, the Modified Rational Method was then used to calculate the 50-Year, 24-Hour peak runoff flow for each subarea. The undeveloped tributary areas were analyzed using a burned coefficient to calculate peak runoff rates. Unburned coefficients were used for all developed conditions as well as undeveloped conditions for storms other than the 50-year Capital Storm event.

The project's land use and imperviousness was determined from the Land Use and Imperviousness Table provided in the Los Angeles County Hydrology Manual (see Appendix 9.B.3). Soil types and rainfall corresponding to each subarea were obtained from the Hydrologic Maps in the Los Angeles County Hydrology Manual. The maps used were maps 1-H1.3 and 1-H1.4 (see Appendix 9.B.1).

The project is located within the Coast Watershed and the undeveloped areas were analyzed for debris potential, as well as peak burned and bulked runoff rates utilizing the County's charts for the Los Angeles Basin. The watershed lies within Debris Potential Zone DPA-6. DPA6- has a debris potential of 48,000 cubic yards (cy) / mi^2 for areas less than or equal to 0.1 mi^2. Debris volumes were calculated for each undeveloped subarea based on this debris production rate. Bulking is the increase in flow rates that occur when debris is included in the runoff rates. Within the Los Angeles Basin, DPA-6 has a bulking factor of 1.61 for areas less than or equal to 0.1 mi^2. The burned and bulked peak runoff rates were calculated by factoring the peak burned runoff rates by the bulking factor.

A summary of the project's Q_{50} burned and bulk flows and debris volume can be found in Table 5: Debris and Burn & Bulked Flow Summary Table.

3. DESIGN CRITERIA

Los Angeles County requires that several design criteria be followed when using the Rational and Modified Rational Method of Hydrology to determine capital flood flow.

The 50-year, 24-hour rainfall isohyets used in the hydrologic calculations were obtained from the Los Angeles County Hydrology Manual's Hydrologic Maps. Watershed has 4.9" isohyet. Other storm events were determined by factoring the 50-year isohyets.

The soil types within the project site were determined to be 2 and 4 from the hydrologic maps.

The project was assumed to have 42 % imperviousness in single-family residential areas, 2% for base vacant undifferentiated (onsite undeveloped lots), 1% for offsite vacant areas and 40% for proposed residences. A weighted imperviousness was used for areas consisting of two or more land use types.

The project watershed falls in a debris potential area in the Los Angeles Basin, DPA-6. The respective debris and bulking rate factor are 48,000 cy / mi^2 and 1.61.

The design criteria used is summarized below:

Hydrology Method:	Los Angeles County Flood Control District Rational Method and Modified Rational Method.
Hydrology Modeling Software:	LAR04
Design Storm:	SUSMP, 2-Year, 5-Year, 10-Year, 25-Year, 50-Year, Capital Storm
50-Year Isohyet:	4.9"
Soil Types:	2 and 4
Land Use and Imperviousness:	Existing Single-Family (42 %) Proposed Single-Family (40 %) Base vacant undifferentiated – Onsite Undeveloped lots (2 %) Offsite vacant area (1%)
Debris Potential Zone:	DPA-6 - 48,000 cy / mi^2 for area $\leq$ 0.1 mi^2
Peak Bulking Rate:	DPA-6 - 1.61 – for area $\leq$ 0.1 mi^2

4. MODIFIED RATIONAL HYDROLOGY / FLOOD CONTROL

The hydrology analysis was based upon Los Angeles County design criteria for the Modified Rational Method, utilizing the LAR04 program. Drainage areas were determined and the corresponding sub-areas delineated based on the existing topography and existing improvements on the project site. Post-development conditions were identical to the pre-development conditions, with the exception that the 47 lots are assumed to be developed under post-development conditions.

The level of flood protection required ranges from a 10-year to a Capital Storm event depending upon the facility impacted. According to the Policy on Levels of Protection (Chapter 4, Hydrology Manual of Los Angeles County), public storm drains must at least carry flow from the 10-year storm event, the street or highway must carry the balance of the 25-year storm event. The capital flood level of protection applies to all facilities constructed to drain natural depressions or sumps, as well as natural drainage courses. In addition, all building pads must be a minimum of 1 foot above the maximum ponding level during the Capital Storm event. The Capital Storm event is defined as the burned and bulked runoff from a 50-year storm event with a 100% burn factor applied to all undeveloped areas within the watershed.

For the project site, a 10-year level of protection with the pads maintaining 1 foot of freeboard above the Capital Storm event is required. In sump conditions a 25-year level of protection is required.

5. INTERIM PEAK FLOW ANALYSIS / LOW IMPACT DEVELOPMENT (LID)

The Los Angeles County Interim Peak Flow Runoff Standard involves the analysis of the 2-Year, 24-Hour storm event for both existing and proposed conditions. The purpose of the analysis is to determine that the flow from the 2-Year, 24-Hour storm would not exceed the existing peak flow, burned, provided the proposed peak flow rates equals or exceeds five cubic feet per second. The Standard also requires the proposed runoff from the 50-Year Capital Storm shall not exceed the predevelopment peak flow rate, burned and bulked, from the 50-Year Capital Storm.

In order to verify compliance with the Interim Peak Flow Standard requirement for this site, both the 50-year, 24-Hour storm as well as the 2-year, 24-Hour storm events were analyzed for all of the subareas per the County's procedures. To comply with the current LID and Hydromodification requirements, the 5, 10, and 25 year storms were also calculated.

The hydromodification analysis specifically addresses all of the characteristics that may lead to drainage impacts to natural water courses, including changes in flow rates and volume, as well as flow velocity, depth of flow, frequency and duration of runoff, and limits of inundation.

The analysis is based upon the County of Los Angeles Low Impact Development Standards, dated January 2009. While the manual has not been adopted by the City of Rancho Palos Verdes, the procedures for the analysis are valid, and serve as the basis for this report. While the current Los Angeles County MS4 permit does not specifically require addressing hydromodification effects and Low Impact Development (LID) principles, an interim clarification letter sent in 2006 to the County of Los Angeles and its co-permittees specifically discussed shortcomings in the current MS4 Permit that required attention. The County of Los Angeles and City of Los Angeles have since adopted ordinances or policies that specifically address LID and hydromodification requirements. The County's Low Impact Development Ordinance adopted in January 2009 requires that impacts due to development be treated at the source.

Future MS4 permits will ~~most~~ likely incorporate these requirements specifically. All future construction on the site would need to comply with the ordinances and policies in place at the time the construction permits are applied for. We have provided the changes in runoff rates, treatment volumes, and treatment flow rates for the range of storm events currently in place. These rates can be prorated and utilized as the basis for mitigation for individual sites, or a new analysis prepared by the applicant.

Any post-development runoff rates that exceed existing runoff rates will require drainage acceptance letters and / or mitigation. Any hydromodification effects will need to be addressed onsite for areas tributary to natural watercourses subject to erosion.

6. STANDARD URBAN STORMWATER MITIGATION PLAN

The objective of implementing a Standard Urban Stormwater Mitigation Plan (SUSMP) is to effectively control or treat the pollutants from urban activities prior to outletting into receiving waters. The SUSMP requires that runoff volume or flow be treated and / or mitigated based upon one of the following criteria:

a. Runoff from the 85th percentile 24-hour runoff event.
b. Capture of 80% or more of the annual runoff.
c. 0.75 inch 24-hour storm event.

For this analysis, the 0.75 inch event was used.

Each of the individual sub-areas was analyzed to determine the peak mitigated flow rate, Q_{PM}, as well as the peak mitigated volume, V_M, from the new development based on the Rational Method. This was achieved by using the Los Angeles County approved Time of Concentration calculator developed for the SUSMP analysis (using a rainfall of 0.75 inches).

The SUSMP event was calculated for the entire watershed for the hydromodifcation / LID analysis. For treatment of runoff from the development, a treatment rate and volume was developed as a unit rate on a per acre basis, assuming 40% imperviousness for the 47 lots proposed to be developed.

The peak mitigated flow rate and volume would provide support for the design of the post construction Best Management Practices (BMPs) proposed for the development onsite, or at water quality basins located within the project site. Each individual lot can use the analysis as the basis for their design.

7. CONCLUSIONS & RECOMMENDATIONS

The Flood (Hydrology) / Water Quality (SUSMP) analysis was prepared for the range of design storms required by the City of Rancho Palos Verdes, and described in the sections above. The results are shown below for the range of storm events and compares pre and post-development runoff for the watershed, project site, and median lot.

The following tables identify the pre and post-development runoff from the Watershed (Table 1); the Project Site (Table 2); and the Median Lot (Table 3). Table 1 – the watershed data provides the cumulative impacts for the development. Table 2 - the project site table provides the project specific impacts. Table 3 – the median lot table provides the impacts and changes specific to a typical lot. The actual mitigation will vary by the size and extent of improvements on a specific lot.

The analysis for the Flood and Water Quality impacts are presented separately below.

Flood (Hydrology)

Flood / Hydrology impacts would be considered significant if the proposed project would:

- *Substantially alter the existing drainage pattern of the area such that substantial erosion or siltation occurs.*
- *Substantially alter existing drainage pattern or substantially increase the rate or volume of surface runoff in a manner that results in flooding.*
- *Create or contribute runoff water which would exceed the capacity of existing or planned storm drain storm water drainage systems.*
- *Increase infiltration which could affect the stability of existing landslides in the project vicinity.*

Changes to the peak runoff rates for the design storm events (SUSMP, 2, 5, 10, 25, 50-year, and Capital Storm) were analyzed to determine the project impacts.

The hydrologic analysis determined that the post-development condition c~~w~~ould result in an increase in runoff to the existing lots and natural watercourses. The increase in runoff would be~~is~~ due to an increase in impervious area that would occur when the 47 lots are developed. The combined impacts resulting from the development of the 47 lots is deemed to be insignificant for the following reasons:

- The existing ~~(natural)~~ drainage patterns are maintained.~~ and the combination of the natural and constructed drainage conveyances and surface flow has the capacity to convey the runoff from the project site~~.
- The existing drainage system for the Portuguese Bend development was designed for the entire development, including the 47 undeveloped lots. ~~Therefore, the lots have on a proportional basis, a share of the capacity of the existing drainage system.~~ Should any deficiencies exist, it is a regional issue and should be addressed accordingly.

- Changes to the peak runoff rates for the design storm events (SUSMP, 2, 5, 10, 25, 50-year, and Capital Storm) are minimal and insignificant. They range in between 0.5% and 1% for the entire watershed, and 2.9% - 4.5% for the project site. Since, the entire watershed drains through the project development, flood impacts are based upon changes relative to the entire watershed.
- The addition of impervious area will reduce the total infiltration from the site. Due to the low permeability of the existing soils (clays) and steepness of the natural canyons, infiltration in the natural areas is likely to be low. For a given storm event, the total infiltration will not exceed the existing condition.

However, on an individual lot basis, localized flood impacts may occur and may be considered significant. The analysis shows that increases in runoff from an individual lot ranges between 9.8% and 15.1%. Since each lot would acquire permits individually; it would be the responsibility of the owner to adhere to the policies and procedures in place at the time permits are pulled for all flood and water quality related impacts.

To identify and mitigate potential localized flood impacts to adjacent properties and facilities to a level not considered significant the project applicants must do the following:

- *A detailed Hydrology Study shall be prepared by a Licensed Civil Engineer and approved by the City. The study shall address impacts to the proposed building site, as well as upstream and downstream properties. The analysis will include the SUSMP. 2,5, 10, 25, 50-yeear, and Capital Storms to determine impacts. The analysis will follow the methodology outlined in the Los Angeles County Hydrology and Sedimentation Manual (latest edition), the Los Angeles County Low Impact Development Manual, and Los Angeles County Stormwater Best Management Practices Design and Maintenance Manual for preparation of the design calculations. Improvements will be based upon the policies and codes of the City.*
- ~~Prepare a hydrology consistent with City policies at the time the project is permitted that demonstrates that significant increases in runoff or impacts do not occur.~~
- The limits of the analysis should be to the point flow is either normalized or attenuated adequately to demonstrate no significant impacts will occur, or to the point the runoff has reached an acceptable conveyance such as a storm drain, channel, or natural drainage course. All runoff should be directed to an acceptable conveyance and not be allowed to drain to localized sumps or catchment areas with no outlet. *An acceptable conveyance is defined as one that is adequate to convey any increases in runoff without causing additional impacts such as flooding and erosion.*
- Maintain existing drainage patterns and outlet at historical outlet points.
- Minimize changes to the character of the runoff at property lines. Changes in character include *obstructing or diverting existing runoff entering the site, changing the depth and frequency of flooding,* concentration of flow outletting onto adjacent properties, ~~or~~ and increasing the frequency or duration of runoff outletting onto adjacent properties.
- Reduce significant increases in runoff *rates and volume* in localized areas by low impact development principles *such as, but not limited to, infiltration trenches, cisterns, bio-retention areas, or permeable pavement.* ~~identified in the County's LID manual.~~

- Provide onsite detention facilities*, infiltration facilities,* or conveyance to acceptable off-lot conveyance devices *to eliminate impacts from increases in runoff rates and volumes*.
- *The project shall address impacts to the immediate vicinity as well as downstream facilities, including culverts, roads, open drainage courses, and Altamira Canyon, or demonstrate there is no change from existing conditions.*
- Secure drainage acceptance letters from affected properties if mitigation cannot be achieved.
- Temporary impacts during construction can be minimized by performing grading during the dry season, or implement an erosion control plan that directs runoff away from exposed grading and property lines, or provides soil stabilization and desilting measures.
- Avoid watering graded soils during construction, use of soil blinders or other measure to minimize impact.
- Minimize "Dry Weather": runoff which could add to the total infiltration from the project.

Water Quality (SUSMP)

Changes to the runoff rates and volumes for the SUSMP and water quality treatment events 2, 5, 10, 25, and 50-year Storms were analyzed to determine the project impacts. The SUSMP event is used for stormwater pollutant treatment. The remaining events are utilized to determine hydromodification impacts.

Changes in water quality are considered significant and mitigation is required. Since, the entire watershed drains through the project development, erosion impacts are based upon changes relative to the entire watershed. Changes to the peak runoff rates for the design storm events (2, 5, 10, 25, 50-year and capital storm) are minimal and insignificant. They range in between 0.5% and 2.0% for the entire watershed. Changes to the total volume of runoff range between 2.8% and 5.3% and may be considered significant.

Water Quality impacts would be considered significant if the proposed project would:

- *Violate any water quality standards or water discharge requirements.*
- *Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the groundwater table level.*
- *Substantially alter the existing drainage pattern of the area such that substantial erosion or siltation occurs.*
- *Create or contribute runoff water which would provide substantial additional sources of polluted runoff.*

Current Los Angeles County ordinances require that water quality treatment occur for single-family hillside homes with development of one acre or more of surface area, or when developing ten or more unit homes, including single family homes, multifamily homes, condominiums and apartments. Since this EIR addresses the lots cumulatively, the project exceeds the threshold for mitigation and treatment. The individual homeowners would need to provide treatment onsite prior to outletting runoff from their property. Runoff from the SUSMP event or other acceptable criteria available at the time the permits are pulled will be utilized to size the onsite facilities.

Additional clarification to the current MS4 permit requires that Low Impact Development (LID) and hydromodification principles be incorporated into the project water quality management plans.

Hydromodification addresses increases in runoff that may change the characteristics of the natural watercourses, such as depth of flow, velocity, as well long term erosion in the watercourse due to an increase in the frequency and quantity of runoff during storm and dry weather conditions.

Mitigation measures related to Water Quality include the following:

- Prepare a SUSMP (Standard Urban Stormwater Management Plan) consistent with City policies at the time the project is permitted that demonstrates that water quality impacts are mitigated.

- Provide stormwater treatment measures that may include the use of bio-filters, filter strips, sand filters, roof drain filters, planter box filters, and other acceptable Best Management Practices (BMPs).
- Onsite treatment on a lot by lot basis meets the intent of Low Impact Development (LID) principles.
- Provide mitigation for hydromodification to local natural drainage courses though flow – duration control methods. Use of onsite detention facilities, cisterns, or underground storage devices may be used.
- Infiltrate on-lot, where feasible, runoff from the SUSMP event. However, the area is subject to geotechnical hazards and any mitigation utilizing infiltration will need the approval of a geotechnical engineer. Infiltration may be allowed on a lot by lot basis, or consistent with existing conditions if no hazard is determined to exist.
- If the SUSMP event cannot be infiltrated, a combination of detention and infiltration of the change in runoff volume will mitigate some of the impacts due to hydromodification.

Table 1 - Watershed (Cumulative) Drainage Runoff Summary

Year		Pre-development	Post-development	Delta	% change
SUSMP	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	37.4	40.1	2.70	6.7%
	q (cfs/ac)	0.044	0.047	0.003	6.7%
	Vol (ac-ft)	12.0	12.9	0.90	7.0%
	vol (ac-ft/ac)	0.014	0.015	0.001	7.0%
2-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	276.7	282.5	5.78	2.0%
	q (cfs/ac)	0.324	0.331	0.007	2.0%
	Vol (ac-ft)	53.4	55.4	2.00	3.6%
	vol (ac-ft/ac)	0.062	0.065	0.002	3.6%
2-year (Burn)	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	312.0	317.3	5.3	1.7%
	q (cfs/ac)	0.365	0.371	0.006	1.7%
	Vol (ac-ft)	65.2	68.2	3.0	4.4%
	vol (ac-ft/ac)	0.076	0.080	0.004	4.4%
5-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	579.62	587.37	7.75	1.3%
	q (cfs/ac)	0.678	0.687	0.009	1.3%
	Vol (ac-ft)	91.44	96.56	5.12	5.3%
	vol (ac-ft/ac)	0.107	0.113	0.006	5.3%
10-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	876.86	885.38	8.52	1.0%
	q (cfs/ac)	1.026	1.036	0.010	1.0%
	Vol (ac-ft)	121.6	126.68	5.08	4.0%
	vol (ac-ft/ac)	0.142	0.148	0.006	4.0%

Table 1 - Watershed (Cumulative) Drainage Runoff Summary (continuous)

Year		Pre-development	Post-development	Delta	% change
25-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	1230.7	1237.3	6.63	0.5%
	q (cfs/ac)	1.440	1.448	0.008	0.5%
	Vol (ac-ft)	164.78	170.7	5.92	3.5%
	vol (ac-ft/ac)	0.193	0.200	0.007	3.5%
50-year	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	1505.4	1515.53	10.13	0.7%
	q (cfs/ac)	1.761	1.773	0.012	0.7%
	Vol (ac-ft)	197.98	204.58	6.60	3.2%
	vol (ac-ft/ac)	0.232	0.239	0.008	3.2%
Capital	Area (ac)	854.7	854.7	0.00	0.0%
	Q (cfs)	2116.30	2128.40	12.10	0.6%
	q (cfs/ac)	2.476	2.490	0.014	0.6%
	Flow Vol (ac-ft)	228.3	234.91	6.61	2.8%
	Debris Vol (ac-ft)	20.3	20.3	0.00	0.0%
	total Vol (ac-ft)	230.8	237.4	6.62	2.8%
	vol (ac-ft/ac)	0.270	0.278	0.008	2.8%

Table 2 – Project Site (Zone 2) Drainage Runoff Summary

Year		Pre-development	Post-development	Delta	% change
SUSMP	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	9.7	12.0	2.30	19.2%
	q (cfs/ac)	0.067	0.082	0.016	19.2%
	Vol (ac-ft)	3.1	3.8	0.70	18.4%
	vol (ac-ft/ac)	0.021	0.026	0.005	18.4%
2-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	62.4	70.8	8.40	11.9%
	q (cfs/ac)	0.428	0.486	0.058	11.9%
	Vol (ac-ft)	9.7	12.7	3.00	23.6%
	vol (ac-ft/ac)	0.067	0.087	0.02	23.6%
5-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	129.3	138.9	9.60	6.9%
	q (cfs/ac)	0.887	0.953	0.066	6.9%
	Vol (ac-ft)	16.3	21.4	5.10	23.8%
	vol (ac-ft/ac)	0.112	0.147	0.03	23.8%
10-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	187.9	196.7	8.80	4.5%
	q (cfs/ac)	1.289	1.349	0.060	4.5%
	Vol (ac-ft)	21.2	26.2	5.00	19.1%
	vol (ac-ft/ac)	0.145	0.180	0.03	19.1%
25-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	263.2	271.1	7.87	2.9%
	q (cfs/ac)	1.805	1.859	0.054	2.9%
	Vol (ac-ft)	27.8	33.9	6.10	18.0%
	vol (ac-ft/ac)	0.191	0.233	0.04	18.0%
50-year	Area (ac)	145.8	145.8	0.00	0.0%
	Q (cfs)	314.3	324.45	10.15	3.1%
	q (cfs/ac)	2.156	2.225	0.070	3.1%
	Vol (ac-ft)	35.9	39.8	3.90	9.8%
	vol (ac-ft/ac)	0.246	0.273	0.03	9.8%

Table 3 – Median Lot Drainage Runoff Summary

Year		Pre-development	Post-development	Delta	% change
SUSMP	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	0.02	0.06	0.04	64.8%
	q (cfs/ac)	0.03	0.08	0.053	64.8%
	Vol (ac-ft)	0.01	0.02	0.01	62.3%
	vol (ac-ft/ac)	0.01	0.03	0.016	62.3%
2-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	0.22	0.36	0.14	40.1%
	q (cfs/ac)	0.29	0.49	0.195	40.1%
	Vol (ac-ft)	0.01	0.06	0.05	79.9%
	vol (ac-ft/ac)	0.02	0.09	0.07	79.9%
5-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	0.54	0.70	0.16	23.4%
	q (cfs/ac)	0.73	0.95	0.223	23.4%
	Vol (ac-ft)	0.02	0.11	0.09	80.6%
	vol (ac-ft/ac)	0.03	0.15	0.12	80.6%
10-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	0.85	1.00	0.15	15.1%
	q (cfs/ac)	1.14	1.35	0.204	15.1%
	Vol (ac-ft)	0.05	0.13	0.09	64.6%
	vol (ac-ft/ac)	0.06	0.18	0.12	64.6%
25-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	1.24	1.38	0.14	9.8%
	q (cfs/ac)	1.68	1.86	0.183	9.8%
	Vol (ac-ft)	0.07	0.17	0.10	60.9%
	vol (ac-ft/ac)	0.09	0.23	0.14	60.9%
50-year	Area (ac)	0.74	0.74	0.00	0.0%
	Q (cfs)	1.47	1.65	0.17	10.6%
	q (cfs/ac)	1.99	2.23	0.235	10.6%
	Vol (ac-ft)	0.14	0.20	0.07	33.1%
	vol (ac-ft/ac)	0.18	0.27	0.09	33.1%

Table 4 - Debris Summary Table

SUB AREA	AREA (Ac)	QB (cfs) (Burned flow rate)	Capital (cfs) (Burned and Bulked flow rate)	DEBRIS (CY)
125A	60.0	156.8	252.4	4,500
132B	68.7	200.0	321.9	5,153
141C	61.2	154.4	248.6	4,590
142C	23.3	91.6	147.4	1,748
143C	48.3	121.8	196.1	3,623
151B	21.6	53.9	84.5	1,588
154B	7.7	22.8	47.9	566
156B	64.9	180.6	283.2	4,770
162A	11.5	27.1	43.7	863

Table 5- Imperious Area Summary Table

Pre-development Imp. Area (ac)	115
Post-development Imp. Area (ac)	122.1
Δ Imp. Area (ac) (Δ%)	7.1 (6.2%)
Overall Watershed Area (ac)	854.7
Pre-development % Imp in Overall Watershed	13.46%
Post-development % Imp in Overall Watershed	14.29%
Δ % Imp. in Overall Watershed	0.83%

8. REFERENCES

i. Los Angeles County Department of Public Works Hydrology Manual, January 2006

ii. Los Angeles County Department of Public Works Sedimentation Manual, March 2006

iii. Interim Peak Flow Runoff Criteria for New Development, January 31, 2005

iv. County of Los Angeles Low Impact Development (LID) Standard Manual, January 2009

v. Los Angeles County Department of Public Works SUSMP Manual, September 2002

9. APPENDICES

A. Capital Storm Hydrologic Summary Table

1. Capital Storm Hydrologic Summary Table
2. TC Calculations
3. SUSMP Calculations
4. 2-year, 2-year (burn), 5-year, 10-year, 25-year, 50-year and 50-year (burn) Storm Modified Rational of Hydrology Result and Hydrograph

9.A.1. Capital Storm Hydrologic Summary Table

SUB AREA	NODE	AREA (Ac)	Sub-total Area (Ac)	% IMPERVIOUSNESS (Existing Condition)	% IMPERVIOUSNESS (Proposed Condition)	SOIL TYPE	ISOHYET	50-YR TC (min)	QB (cfs) (Pre-development)	Capital (cfs) (Pre-development)	QB (cfs) (Post-development)	Capital (cfs) (Post-development)	DEBRIS (CY)
108A		8.1		21	21	002	4.9	13		18.9		18.9	
	109A												
110A		46.7		2	2	002	4.9	18		91.3		91.3	
	111A												
112B		16.2		21	21	004	4.9	18		28.1		28.1	
	113AB												
114B		23.8		42	42	004	4.9	18		43.6		43.6	
	115AB												
116A		27.9		21	21	004	4.9	21		44.2		44.2	
117B		8.8		42	42	004	4.9	22		14.1		14.1	
	118AB												
119A		7.0		21	21	004	4.9	6		21.2		21.2	
	120A												
121B		3.5		21	21	004	4.9	6		10.6		10.6	
	122B												
	123AB		**142.0**							**170.0**		**170.0**	
	124A												
125A		60.0		1	1	004	4.9	9	156.8	252.4	156.8	252.4	4500.0
	126A												
127B		14.5		42	42	004	4.9	9		37.0		37.0	
	128B												
129C		53.3		42	42	004	4.9	13		112.4		112.4	
	130C												
	131BC		**67.8**							**147.5**		**147.5**	
132B		68.7		1	1	002	4.9	9	200.0	321.9	200.0	321.9	5152.5
	133AB		**338.5**						**598.8**	**737.7**	**598.8**	**737.7**	
	134A												
135B		15.8		42	42	004	4.9	17		29.0		29.0	
	136B												
137C		1.3		21	21	004	4.9	5		4.4		4.4	
	138BC		**17.1**							**32.7**		**32.7**	
139B		59.1		2	2	004	4.9	12	132.8	213.8	132.8	213.8	4432.5
140B		16.5		38	40	002	4.9	9					
141C		61.2		1	1	002	4.9	12	154.4	248.6	154.4	248.6	4590.0
142C		23.3		1	1	002	4.9	5	91.6	147.4	91.6	147.4	1747.5
143C		48.3		5	5	002	4.9	12	121.8	196.1	121.8	196.1	3622.5
	144BC		**225.5**						**499.2**	**723.9**	**499.2**	**723.9**	
	145B												
146A		31.6		13	23	002	4.9	7					
	147AB		**595.6**						**1076.0**	**1464.0**	**1076.3**	**1464.4**	
148A		16.2		22	40	004	4.9	8					
	149A												
150B		13.9		26	40	004	4.9	7					
151B		21.6		2	2	005	4.9	10	53.9	84.5	53.9	84.5	1587.6
152A		12.5		18	40	004	4.9	7					
	153AB		**659.8**						**1102.7**	**1483.7**	**1165.7**	**1568.4**	
154B		7.7		2	2	004	4.9	7	22.8	36.7	51.9	47.9	566.0
155B		21.3		13	40	005	4.9	7					
156B		64.9		2	2	002	4.9	10	180.6	283.2	180.6	283.2	4770.2

9.A.1. Capital Storm Hydrologic Summary Table

SUB AREA	NODE	AREA (Ac)	Sub-total Area (Ac)	% IMPERVIOUSNESS (Existing Condition)	% IMPERVIOUSNESS (Proposed Condition)	SOIL TYPE	ISOHYET	50-YR TC (min)	QB (cfs) (Pre-development)	Capital (cfs) (Pre-development)	QB (cfs) (Post-development)	Capital (cfs) (Post-development)	DEBRIS (CY)
	157B												
158B		33.8		16	20	004	4.9	12					
	159B												
160B		33.8		36	36	004	4.9	11					
	161B												
162A		11.5		2	2	004	4.9	11	27.1	43.7	27.1	43.7	862.5
	163AB		932.8						1541.5	**2025.2**	1585.9	**2083.5**	
	164A												
165A		21.9		42	42	004	4.9	11					
	166A		854.6						1577.2	**2092.5**	1586.3	**2128.4**	

9.A.2. TC Calculations

- Pre-development
- SUSMP
- 2-year
- 5-year
- 10-year
- 25-year
- 50-year

Portuguese Bend: Tc Calculator (SUSMP- Pre-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	SUSMP	2	1360	0.02	0.75	30	0.19	0.26	0.39	0.6
HPB	110A	46.7	0.02	SUSMP	2	2500	0.05	0.75	30	0.19	0.26	0.27	2.4
HPB	112B	16.2	0.21	SUSMP	4	1860	0.04	0.75	30	0.19	0.1	0.27	0.83
HPB	114B	23.8	0.42	SUSMP	4	2220	0.05	0.75	30	0.19	0.1	0.44	1.99
HPB	116A	27.9	0.21	SUSMP	4	1880	0.02	0.75	30	0.19	0.1	0.27	1.43
HPB	117B	8.8	0.42	SUSMP	4	2000	0.01	0.75	30	0.19	0.1	0.44	0.74
HPB	119A	7	0.21	SUSMP	4	540	0.11	0.75	30	0.19	0.1	0.27	0.36
HPB	121B	3.5	0.21	SUSMP	4	425	0.08	0.75	30	0.19	0.1	0.27	0.18
HPB	125A	60	0.01	SUSMP	4	1260	0.40	0.75	30	0.19	0.1	0.11	1.25
HPB	127B	14.5	0.42	SUSMP	4	780	0.04	0.75	30	0.19	0.1	0.44	1.21
HPB	129C	53.3	0.42	SUSMP	4	1570	0.07	0.75	30	0.19	0.1	0.44	4.46
HPB	132B	68.7	0.01	SUSMP	2	1580	0.33	0.75	30	0.19	0.26	0.27	3.52
HPB	135B	15.8	0.42	SUSMP	4	2120	0.05	0.75	30	0.19	0.1	0.44	1.32
HPB	137C	1.3	0.21	SUSMP	4	290	0.05	0.75	30	0.19	0.1	0.27	0.07
HPB	139B	59.1	0.02	SUSMP	4	1922	0.32	0.75	30	0.19	0.1	0.12	1.35
HPB	140B	16.5	0.38	SUSMP	2	1350	0.16	0.75	30	0.19	0.26	0.52	1.63
HPB	141C	61.2	0.01	SUSMP	2	2170	0.19	0.75	30	0.19	0.26	0.27	3.14
HPB	142C	23.3	0.01	SUSMP	2	630	0.27	0.75	30	0.19	0.26	0.27	1.2
HPB	143C	48.3	0.05	SUSMP	2	2020	0.18	0.75	30	0.19	0.26	0.29	2.66
HPB	146A	31.6	0.13	SUSMP	2	920	0.30	0.75	30	0.19	0.26	0.29	1.74
HPB	148A	16.2	0.22	SUSMP	4	590	0.04	0.75	30	0.19	0.1	0.28	0.86
HPB	150B	13.9	0.26	SUSMP	4	760	0.20	0.75	30	0.19	0.1	0.31	0.82
HPB	151B	21.6	0.02	SUSMP	4	1140	0.20	0.75	30	0.19	0.1	0.12	0.49
HPB	152A	12.5	0.18	SUSMP	4	750	0.14	0.75	30	0.19	0.1	0.24	0.57
HPB	154B	7.7	0.02	SUSMP	4	700	0.26	0.75	30	0.19	0.1	0.12	0.18
HPB	155B	21.3	0.13	SUSMP	4	750	0.13	0.75	30	0.19	0.1	0.2	0.81
HPB	156B	64.9	0.02	SUSMP	2	1680	0.26	0.75	30	0.19	0.26	0.27	3.33
HPB	158B	33.8	0.16	SUSMP	4	1000	0.03	0.75	30	0.19	0.1	0.23	1.48
HPB	160B	33.8	0.36	SUSMP	4	1185	0.09	0.75	30	0.19	0.1	0.39	2.5
HPB	162A	11.5	0.02	SUSMP	4	1220	0.15	0.75	30	0.19	0.1	0.12	0.26
HPB	165A	21.9	0.42	SUSMP	4	1170	0.06	0.75	30	0.19	0.1	0.44	1.83

Portuguese Bend: Tc Calculator (2-year Pre-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	2	2	1360	0.02	1.9	30	0.49	0.56	0.63	2.5
HPB	110A	46.7	0.02	2	2	2500	0.05	1.9	30	0.49	0.56	0.57	13.04
HPB	112B	16.2	0.21	2	4	1860	0.04	1.9	30	0.49	0.2	0.35	2.78
HPB	114B	23.8	0.42	2	4	2220	0.05	1.9	30	0.49	0.2	0.49	5.71
HPB	116A	27.9	0.21	2	4	1880	0.02	1.9	30	0.49	0.2	0.35	4.78
HPB	117B	8.8	0.42	2	4	2000	0.01	1.9	30	0.49	0.2	0.49	2.11
HPB	119A	7	0.21	2	4	540	0.11	1.9	16	0.66	0.35	0.47	2.17
HPB	121B	3.5	0.21	2	4	425	0.08	1.9	15	0.68	0.36	0.47	1.12
HPB	125A	60	0.01	2	4	1260	0.40	1.9	30	0.49	0.2	0.21	6.17
HPB	127B	14.5	0.42	2	4	780	0.04	1.9	22	0.56	0.27	0.53	4.3
HPB	129C	53.3	0.42	2	4	1570	0.07	1.9	30	0.49	0.2	0.49	12.8
HPB	132B	68.7	0.01	2	2	1580	0.33	1.9	23	0.55	0.58	0.58	21.92
HPB	135B	15.8	0.42	2	4	2120	0.05	1.9	30	0.49	0.2	0.49	3.79
HPB	137C	1.3	0.21	2	4	290	0.05	1.9	12	0.75	0.41	0.51	0.5
HPB	139B	59.1	0.02	2	4	1922	0.32	1.9	30	0.49	0.2	0.21	6.08
HPB	140B	16.5	0.38	2	2	1350	0.16	1.9	20	0.59	0.59	0.71	6.91
HPB	141C	61.2	0.01	2	2	2170	0.19	1.9	30	0.49	0.56	0.56	16.79
HPB	142C	23.3	0.01	2	2	630	0.27	1.9	12	0.75	0.65	0.65	11.36
HPB	143C	48.3	0.05	2	2	2020	0.18	1.9	29	0.5	0.56	0.58	14.01
HPB	146A	31.6	0.13	2	2	920	0.30	1.9	16	0.66	0.61	0.62	12.93
HPB	148A	16.2	0.22	2	4	590	0.04	1.9	22	0.56	0.27	0.41	3.72
HPB	150B	13.9	0.26	2	4	760	0.20	1.9	18	0.62	0.31	0.46	3.96
HPB	151B	21.6	0.02	2	4	1140	0.20	1.9	30	0.49	0.2	0.21	2.22
HPB	152A	12.5	0.18	2	4	750	0.14	1.9	22	0.56	0.27	0.38	2.66
HPB	154B	7.7	0.02	2	4	700	0.26	1.9	25	0.53	0.25	0.26	1.06
HPB	155B	21.3	0.13	2	4	750	0.13	1.9	25	0.53	0.24	0.33	3.73
HPB	156B	64.9	0.02	2	2	1680	0.26	1.9	25	0.53	0.57	0.58	19.95
HPB	158B	33.8	0.16	2	4	1000	0.03	1.9	30	0.49	0.2	0.31	5.13
HPB	160B	33.8	0.36	2	4	1185	0.09	1.9	28	0.5	0.22	0.46	7.77
HPB	162A	11.5	0.02	2	4	1220	0.15	1.9	30	0.49	0.2	0.21	1.18
HPB	165A	21.9	0.42	2	4	1170	0.06	1.9	28	0.5	0.22	0.51	5.58

Portuguese Bend: Tc Calculator (5-year Pre-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	5	2	1360	0.02	2.5	24	0.71	0.63	0.69	3.97
HPB	110A	46.7	0.02	5	2	2500	0.05	2.5	30	0.64	0.61	0.62	18.53
HPB	112B	16.2	0.21	5	4	1860	0.04	2.5	30	0.64	0.33	0.45	4.67
HPB	114B	23.8	0.42	5	4	2220	0.05	2.5	30	0.64	0.33	0.57	8.68
HPB	116A	27.9	0.21	5	4	1880	0.02	2.5	30	0.64	0.33	0.45	8.04
HPB	117B	8.8	0.42	5	4	2000	0.01	2.5	30	0.64	0.33	0.57	3.21
HPB	119A	7	0.21	5	4	540	0.11	2.5	12	0.99	0.49	0.58	4.02
HPB	121B	3.5	0.21	5	4	425	0.08	2.5	11	1.03	0.5	0.58	2.09
HPB	125A	60	0.01	5	4	1260	0.40	2.5	20	0.78	0.42	0.42	19.66
HPB	127B	14.5	0.42	5	4	780	0.04	2.5	16	0.86	0.45	0.64	7.98
HPB	129C	53.3	0.42	5	4	1570	0.07	2.5	24	0.71	0.38	0.6	22.71
HPB	132B	68.7	0.01	5	2	1580	0.33	2.5	17	0.84	0.68	0.68	39.24
HPB	135B	15.8	0.42	5	4	2120	0.05	2.5	30	0.64	0.33	0.57	5.76
HPB	137C	1.3	0.21	5	4	290	0.05	2.5	9	1.13	0.52	0.6	0.88
HPB	139B	59.1	0.02	5	4	1922	0.32	2.5	30	0.64	0.33	0.34	12.86
HPB	140B	16.5	0.38	5	2	1350	0.16	2.5	16	0.86	0.68	0.76	10.78
HPB	141C	61.2	0.01	5	2	2170	0.19	2.5	24	0.71	0.63	0.63	27.37
HPB	142C	23.3	0.01	5	2	630	0.27	2.5	9	1.13	0.75	0.75	19.75
HPB	143C	48.3	0.05	5	2	2020	0.18	2.5	23	0.73	0.64	0.65	22.92
HPB	146A	31.6	0.13	5	2	920	0.30	2.5	12	0.99	0.73	0.74	23.15
HPB	148A	16.2	0.22	5	4	590	0.04	2.5	15	0.89	0.46	0.56	8.07
HPB	150B	13.9	0.26	5	4	760	0.20	2.5	12	0.99	0.49	0.6	8.26
HPB	151B	21.6	0.02	5	4	1140	0.20	2.5	21	0.76	0.41	0.42	6.89
HPB	152A	12.5	0.18	5	4	750	0.14	2.5	14	0.92	0.47	0.55	6.33
HPB	154B	7.7	0.02	5	4	700	0.26	2.5	13	0.95	0.48	0.49	3.58
HPB	155B	21.3	0.13	5	4	750	0.13	2.5	15	0.89	0.46	0.52	9.86
HPB	156B	64.9	0.02	5	2	1680	0.26	2.5	19	0.8	0.66	0.66	34.27
HPB	158B	33.8	0.16	5	4	1000	0.03	2.5	26	0.69	0.37	0.45	10.49
HPB	160B	33.8	0.36	5	4	1185	0.09	2.5	19	0.8	0.42	0.59	15.95
HPB	162A	11.5	0.02	5	4	1220	0.15	2.5	23	0.73	0.4	0.41	3.44
HPB	165A	21.9	0.42	5	4	1170	0.06	2.5	20	0.78	0.42	0.62	10.59

Portuguese Bend: Tc Calculator (10-year Pre-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	10	2	1360	0.02	3.5	18	1.14	0.75	0.78	7.2
HPB	110A	46.7	0.02	10	2	2500	0.05	3.5	24	1	0.73	0.73	34.09
HPB	112B	16.2	0.21	10	4	1860	0.04	3.5	24	1	0.49	0.58	9.4
HPB	114B	23.8	0.42	10	4	2220	0.05	3.5	24	1	0.49	0.66	15.71
HPB	116A	27.9	0.21	10	4	1880	0.02	3.5	29	0.91	0.46	0.55	13.96
HPB	117B	8.8	0.42	10	4	2000	0.01	3.5	30	0.9	0.46	0.64	5.07
HPB	119A	7	0.21	10	4	540	0.11	3.5	8	1.67	0.61	0.67	7.83
HPB	121B	3.5	0.21	10	4	425	0.08	3.5	8	1.67	0.61	0.67	3.92
HPB	125A	60	0.01	10	4	1260	0.40	3.5	13	1.33	0.55	0.55	43.89
HPB	127B	14.5	0.42	10	4	780	0.04	3.5	12	1.38	0.56	0.7	14.01
HPB	129C	53.3	0.42	10	4	1570	0.07	3.5	18	1.14	0.52	0.68	41.32
HPB	132B	68.7	0.01	10	2	1580	0.33	3.5	12	1.38	0.77	0.77	73
HPB	135B	15.8	0.42	10	4	2120	0.05	3.5	23	1.02	0.5	0.67	10.8
HPB	137C	1.3	0.21	10	4	290	0.05	3.5	6	1.92	0.65	0.7	1.75
HPB	139B	59.1	0.02	10	4	1922	0.32	3.5	18	1.14	0.52	0.53	35.71
HPB	140B	16.5	0.38	10	2	1350	0.16	3.5	12	1.38	0.77	0.82	18.67
HPB	141C	61.2	0.01	10	2	2170	0.19	3.5	17	1.17	0.75	0.75	53.7
HPB	142C	23.3	0.01	10	2	630	0.27	3.5	7	1.78	0.82	0.82	34.01
HPB	143C	48.3	0.05	10	2	2020	0.18	3.5	16	1.21	0.75	0.76	44.42
HPB	146A	31.6	0.13	10	2	920	0.30	3.5	9	1.58	0.79	0.8	39.94
HPB	148A	16.2	0.22	10	4	590	0.04	3.5	11	1.44	0.57	0.64	14.93
HPB	150B	13.9	0.26	10	4	760	0.20	3.5	9	1.58	0.58	0.66	14.49
HPB	151B	21.6	0.02	10	4	1140	0.20	3.5	14	1.29	0.54	0.55	15.33
HPB	152A	12.5	0.18	10	4	750	0.14	3.5	10	1.51	0.58	0.64	12.08
HPB	154B	7.7	0.02	10	4	700	0.26	3.5	9	1.58	0.59	0.6	7.3
HPB	155B	21.3	0.13	10	4	750	0.13	3.5	11	1.44	0.57	0.61	18.71
HPB	156B	64.9	0.02	10	2	1680	0.26	3.5	13	1.33	0.77	0.77	66.46
HPB	158B	33.8	0.16	10	4	1000	0.03	3.5	18	1.14	0.52	0.58	22.35
HPB	160B	33.8	0.36	10	4	1185	0.09	3.5	14	1.29	0.54	0.67	29.21
HPB	162A	11.5	0.02	10	4	1220	0.15	3.5	15	1.25	0.54	0.55	7.91
HPB	165A	21.9	0.42	10	4	1170	0.06	3.5	15	1.25	0.54	0.69	18.89

Portuguese Bend: Tc Calculator (25-year Pre-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	25	2	1360	0.02	4.3	15	1.53	0.79	0.81	10.04
HPB	110A	46.7	0.02	25	2	2500	0.05	4.3	20	1.34	0.77	0.77	48.19
HPB	112B	16.2	0.21	25	4	1860	0.04	4.3	20	1.34	0.55	0.62	13.46
HPB	114B	23.8	0.42	25	4	2220	0.05	4.3	20	1.34	0.55	0.7	22.32
HPB	116A	27.9	0.21	25	4	1880	0.02	4.3	23	1.25	0.54	0.62	21.62
HPB	117B	8.8	0.42	25	4	2000	0.01	4.3	25	1.2	0.53	0.69	7.29
HPB	119A	7	0.21	25	4	540	0.11	4.3	7	2.19	0.68	0.73	11.19
HPB	121B	3.5	0.21	25	4	425	0.08	4.3	6	2.35	0.69	0.73	6
HPB	125A	60	0.01	25	4	1260	0.40	4.3	10	1.85	0.64	0.64	71.04
HPB	127B	14.5	0.42	25	4	780	0.04	4.3	10	1.85	0.64	0.75	20.12
HPB	129C	53.3	0.42	25	4	1570	0.07	4.3	15	1.53	0.59	0.72	58.72
HPB	132B	68.7	0.01	25	2	1580	0.33	4.3	10	1.85	0.82	0.82	104.22
HPB	135B	15.8	0.42	25	4	2120	0.05	4.3	19	1.37	0.56	0.7	15.15
HPB	137C	1.3	0.21	25	4	290	0.05	4.3	5	2.57	0.7	0.74	2.47
HPB	139B	59.1	0.02	25	4	1922	0.32	4.3	14	1.58	0.59	0.6	56.03
HPB	140B	16.5	0.38	25	2	1350	0.16	4.3	10	1.85	0.82	0.85	25.95
HPB	141C	61.2	0.01	25	2	2170	0.19	4.3	14	1.58	0.79	0.79	76.39
HPB	142C	23.3	0.01	25	2	630	0.27	4.3	6	2.35	0.85	0.85	46.54
HPB	143C	48.3	0.05	25	2	2020	0.18	4.3	13	1.64	0.8	0.81	64.16
HPB	146A	31.6	0.13	25	2	920	0.30	4.3	7	2.19	0.85	0.85	58.82
HPB	148A	16.2	0.22	25	4	590	0.04	4.3	9	1.95	0.66	0.71	22.43
HPB	150B	13.9	0.26	25	4	760	0.20	4.3	8	2.06	0.67	0.73	20.9
HPB	151B	21.6	0.02	25	4	1140	0.20	4.3	11	1.77	0.63	0.64	24.47
HPB	152A	12.5	0.18	25	4	750	0.14	4.3	8	2.06	0.67	0.71	18.28
HPB	154B	7.7	0.02	25	4	700	0.26	4.3	7	2.19	0.68	0.68	11.47
HPB	155B	21.3	0.13	25	4	750	0.13	4.3	9	1.95	0.66	0.69	28.66
HPB	156B	64.9	0.02	25	2	1680	0.26	4.3	11	1.77	0.81	0.81	93.05
HPB	158B	33.8	0.16	25	4	1000	0.03	4.3	14	1.58	0.59	0.64	34.18
HPB	160B	33.8	0.36	25	4	1185	0.09	4.3	12	1.7	0.61	0.71	40.8
HPB	162A	11.5	0.02	25	4	1220	0.15	4.3	12	1.7	0.61	0.62	12.12
HPB	165A	21.9	0.42	25	4	1170	0.06	4.3	12	1.7	0.61	0.73	27.18

Portuguese Bend: Tc Calculator (50-year Pre-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	50	2	1360	0.02	4.9	13	1.87	0.83	0.84	12.72
HPB	110A	46.7	0.02	50	2	2500	0.05	4.9	18	1.6	0.8	0.8	59.78
HPB	112B	16.2	0.21	50	4	1860	0.04	4.9	18	1.6	0.6	0.66	17.11
HPB	114B	23.8	0.42	50	4	2220	0.05	4.9	18	1.6	0.6	0.73	27.8
HPB	116A	27.9	0.21	50	4	1880	0.02	4.9	21	1.49	0.58	0.65	27.02
HPB	117B	8.8	0.42	50	4	2000	0.01	4.9	22	1.46	0.57	0.71	9.12
HPB	119A	7	0.21	50	4	540	0.11	4.9	6	2.68	0.71	0.75	14.07
HPB	121B	3.5	0.21	50	4	425	0.08	4.9	6	2.68	0.71	0.75	7.04
HPB	125A	60	0.01	50	4	1260	0.40	4.9	9	2.22	0.68	0.68	90.58
HPB	127B	14.5	0.42	50	4	780	0.04	4.9	9	2.22	0.68	0.77	24.79
HPB	129C	53.3	0.42	50	4	1570	0.07	4.9	13	1.87	0.64	0.75	74.75
HPB	132B	68.7	0.01	50	2	1580	0.33	4.9	9	2.22	0.85	0.85	129.64
HPB	135B	15.8	0.42	50	4	2120	0.05	4.9	17	1.64	0.6	0.73	18.92
HPB	137C	1.3	0.21	50	4	290	0.05	4.9	5	2.92	0.73	0.77	2.92
HPB	139B	59.1	0.02	50	4	1922	0.32	4.9	12	1.94	0.66	0.66	75.67
HPB	140B	16.5	0.38	50	2	1350	0.16	4.9	9	2.22	0.85	0.87	31.87
HPB	141C	61.2	0.01	50	2	2170	0.19	4.9	12	1.94	0.83	0.83	98.54
HPB	142C	23.3	0.01	50	2	630	0.27	4.9	5	2.92	0.88	0.88	59.87
HPB	143C	48.3	0.05	50	2	2020	0.18	4.9	12	1.94	0.83	0.83	77.77
HPB	146A	31.6	0.13	50	2	920	0.30	4.9	7	2.5	0.86	0.86	67.94
HPB	148A	16.2	0.22	50	4	590	0.04	4.9	8	2.34	0.69	0.74	28.05
HPB	150B	13.9	0.26	50	4	760	0.20	4.9	7	2.5	0.7	0.75	26.06
HPB	151B	21.6	0.02	50	4	1140	0.20	4.9	10	2.11	0.67	0.67	30.54
HPB	152A	12.5	0.18	50	4	750	0.14	4.9	7	2.5	0.7	0.78	24.38
HPB	154B	7.7	0.02	50	4	700	0.26	4.9	7	2.5	0.7	0.7	13.48
HPB	155B	21.3	0.13	50	4	750	0.13	4.9	8	2.34	0.69	0.72	35.89
HPB	156B	64.9	0.02	50	2	1680	0.26	4.9	10	2.11	0.84	0.84	115.03
HPB	158B	33.8	0.16	50	4	1000	0.03	4.9	12	1.94	0.66	0.7	45.9
HPB	160B	33.8	0.36	50	4	1185	0.09	4.9	11	2.02	0.67	0.75	51.21
HPB	162A	11.5	0.02	50	4	1220	0.15	4.9	11	2.02	0.67	0.67	15.56
HPB	165A	21.9	0.42	50	4	1170	0.06	4.9	11	2.02	0.67	0.77	34.06

9.A.2. TC Calculations

- Post-development
  - SUSMP
  - 2-year
  - 5-year
  - 10-year
  - 25-year
  - 50-year

Portuguese Bend: Tc Calculator (SUSMP-year Post-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	SUSMP	2	1360	0.02	0.75	30	0.19	0.26	0.39	0.6
HPB	110A	46.7	0.02	SUSMP	2	2500	0.05	0.75	30	0.19	0.26	0.27	2.4
HPB	112B	16.2	0.21	SUSMP	4	1860	0.04	0.75	30	0.19	0.1	0.27	0.83
HPB	114B	23.8	0.42	SUSMP	4	2220	0.05	0.75	30	0.19	0.1	0.44	1.99
HPB	116A	27.9	0.21	SUSMP	4	1880	0.02	0.75	30	0.19	0.1	0.27	1.43
HPB	117B	8.8	0.42	SUSMP	4	2000	0.01	0.75	30	0.19	0.1	0.44	0.74
HPB	119A	7	0.21	SUSMP	4	540	0.11	0.75	30	0.19	0.1	0.27	0.36
HPB	121B	3.5	0.21	SUSMP	4	425	0.08	0.75	30	0.19	0.1	0.27	0.18
HPB	125A	60	0.01	SUSMP	4	1260	0.40	0.75	30	0.19	0.1	0.11	1.25
HPB	127B	14.5	0.42	SUSMP	4	780	0.04	0.75	30	0.19	0.1	0.44	1.21
HPB	129C	53.3	0.42	SUSMP	4	1570	0.07	0.75	30	0.19	0.1	0.44	4.46
HPB	132B	68.7	0.01	SUSMP	2	1580	0.33	0.75	30	0.19	0.26	0.27	3.52
HPB	135B	15.8	0.42	SUSMP	4	2120	0.05	0.75	30	0.19	0.1	0.44	1.32
HPB	137C	1.3	0.21	SUSMP	4	290	0.05	0.75	30	0.19	0.1	0.27	0.07
HPB	139B	59.1	0.02	SUSMP	4	1922	0.32	0.75	30	0.19	0.1	0.12	1.35
HPB	140B	16.5	0.4	SUSMP	2	1350	0.16	0.75	30	0.19	0.26	0.52	1.63
HPB	141C	61.2	0.01	SUSMP	2	2170	0.19	0.75	30	0.19	0.26	0.27	3.14
HPB	142C	23.3	0.01	SUSMP	2	630	0.27	0.75	30	0.19	0.26	0.27	1.2
HPB	143C	48.3	0.05	SUSMP	2	2020	0.18	0.75	30	0.19	0.26	0.29	2.66
HPB	146A	31.6	0.23	SUSMP	2	920	0.30	0.75	30	0.19	0.26	0.29	1.74
HPB	148A	16.2	0.4	SUSMP	4	590	0.04	0.75	30	0.19	0.1	0.28	0.86
HPB	150B	13.9	0.4	SUSMP	4	760	0.20	0.75	30	0.19	0.1	0.43	1.14
HPB	151B	21.6	0.02	SUSMP	4	1140	0.20	0.75	30	0.19	0.1	0.12	0.49
HPB	152A	12.5	0.4	SUSMP	4	750	0.14	0.75	30	0.19	0.1	0.43	1.02
HPB	154B	7.7	0.02	SUSMP	4	700	0.26	0.75	30	0.19	0.1	0.12	0.18
HPB	155B	21.3	0.4	SUSMP	4	750	0.13	0.75	30	0.19	0.1	0.43	1.74
HPB	156B	64.9	0.02	SUSMP	2	1680	0.26	0.75	30	0.19	0.26	0.27	3.33
HPB	158B	33.8	0.2	SUSMP	4	1000	0.03	0.75	30	0.19	0.1	0.23	1.48
HPB	160B	33.8	0.36	SUSMP	4	1185	0.09	0.75	30	0.19	0.1	0.39	2.5
HPB	162A	11.5	0.02	SUSMP	4	1220	0.15	0.75	30	0.19	0.1	0.12	0.26
HPB	165A	21.9	0.42	SUSMP	4	1170	0.06	0.75	30	0.19	0.1	0.44	1.83

Portuguese Bend: Tc Calculator (02-year Post-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	2	2	1360	0.02	1.9	30	0.49	0.56	0.63	2.5
HPB	110A	46.7	0.02	2	2	2500	0.05	1.9	30	0.49	0.56	0.57	13.04
HPB	112B	16.2	0.21	2	4	1860	0.04	1.9	30	0.49	0.2	0.35	2.78
HPB	114B	23.8	0.42	2	4	2220	0.05	1.9	30	0.49	0.2	0.49	5.71
HPB	116A	27.9	0.21	2	4	1880	0.02	1.9	30	0.49	0.2	0.35	4.78
HPB	117B	8.8	0.42	2	4	2000	0.01	1.9	30	0.49	0.2	0.49	2.11
HPB	119A	7	0.21	2	4	540	0.11	1.9	16	0.66	0.35	0.47	2.17
HPB	121B	3.5	0.21	2	4	425	0.08	1.9	15	0.68	0.36	0.47	1.12
HPB	125A	60	0.01	2	4	1260	0.40	1.9	30	0.49	0.2	0.21	6.17
HPB	127B	14.5	0.42	2	4	780	0.04	1.9	22	0.56	0.27	0.53	4.3
HPB	129C	53.3	0.42	2	4	1570	0.07	1.9	30	0.49	0.2	0.49	12.8
HPB	132B	68.7	0.01	2	2	1580	0.33	1.9	23	0.55	0.58	0.58	21.92
HPB	135B	15.8	0.42	2	4	2120	0.05	1.9	30	0.49	0.2	0.49	3.79
HPB	137C	1.3	0.21	2	4	290	0.05	1.9	12	0.75	0.41	0.51	0.5
HPB	139B	59.1	0.02	2	4	1922	0.32	1.9	30	0.49	0.2	0.21	6.08
HPB	140B	16.5	0.4	2	2	1350	0.16	1.9	20	0.59	0.59	0.72	7.01
HPB	141C	61.2	0.01	2	2	2170	0.19	1.9	30	0.49	0.56	0.56	16.79
HPB	142C	23.3	0.01	2	2	630	0.27	1.9	12	0.75	0.65	0.65	11.36
HPB	143C	48.3	0.05	2	2	2020	0.18	1.9	29	0.5	0.56	0.58	14.01
HPB	146A	31.6	0.23	2	2	920	0.30	1.9	16	0.66	0.61	0.62	12.93
HPB	148A	16.2	0.4	2	4	590	0.04	1.9	22	0.56	0.27	0.41	3.72
HPB	150B	13.9	0.4	2	4	760	0.20	1.9	15	0.68	0.36	0.58	5.48
HPB	151B	21.6	0.02	2	4	1140	0.20	1.9	30	0.49	0.2	0.21	2.22
HPB	152A	12.5	0.4	2	4	750	0.14	1.9	17	0.64	0.33	0.56	4.48
HPB	154B	7.7	0.02	2	4	700	0.26	1.9	25	0.53	0.25	0.26	1.06
HPB	155B	21.3	0.4	2	4	750	0.13	1.9	17	0.64	0.33	0.56	7.63
HPB	156B	64.9	0.02	2	2	1680	0.26	1.9	25	0.53	0.57	0.58	19.95
HPB	158B	33.8	0.2	2	4	1000	0.03	1.9	30	0.49	0.2	0.31	5.13
HPB	160B	33.8	0.36	2	4	1185	0.09	1.9	28	0.5	0.22	0.46	7.77
HPB	162A	11.5	0.02	2	4	1220	0.15	1.9	30	0.49	0.2	0.21	1.18
HPB	165A	21.9	0.42	2	4	1170	0.06	1.9	28	0.5	0.22	0.51	5.58

Portuguese Bend: Tc Calculator (05-year Post-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	5	2	1360	0.02	2.5	24	0.71	0.63	0.69	3.97
HPB	110A	46.7	0.02	5	2	2500	0.05	2.5	30	0.64	0.61	0.62	18.53
HPB	112B	16.2	0.21	5	4	1860	0.04	2.5	30	0.64	0.33	0.45	4.67
HPB	114B	23.8	0.42	5	4	2220	0.05	2.5	30	0.64	0.33	0.57	8.68
HPB	116A	27.9	0.21	5	4	1880	0.02	2.5	30	0.64	0.33	0.45	8.04
HPB	117B	8.8	0.42	5	4	2000	0.01	2.5	30	0.64	0.33	0.57	3.21
HPB	119A	7	0.21	5	4	540	0.11	2.5	12	0.99	0.49	0.58	4.02
HPB	121B	3.5	0.21	5	4	425	0.08	2.5	11	1.03	0.5	0.58	2.09
HPB	125A	60	0.01	5	4	1260	0.40	2.5	20	0.78	0.42	0.42	19.66
HPB	127B	14.5	0.42	5	4	780	0.04	2.5	16	0.86	0.45	0.64	7.98
HPB	129C	53.3	0.42	5	4	1570	0.07	2.5	24	0.71	0.38	0.6	22.71
HPB	132B	68.7	0.01	5	2	1580	0.33	2.5	17	0.84	0.68	0.68	39.24
HPB	135B	15.8	0.42	5	4	2120	0.05	2.5	30	0.64	0.33	0.57	5.76
HPB	137C	1.3	0.21	5	4	290	0.05	2.5	9	1.13	0.52	0.6	0.88
HPB	139B	59.1	0.02	5	4	1922	0.32	2.5	30	0.64	0.33	0.34	12.86
HPB	140B	16.5	0.4	5	2	1350	0.16	2.5	16	0.86	0.68	0.77	10.93
HPB	141C	61.2	0.01	5	2	2170	0.19	2.5	24	0.71	0.63	0.63	27.37
HPB	142C	23.3	0.01	5	2	630	0.27	2.5	9	1.13	0.75	0.75	19.75
HPB	143C	48.3	0.05	5	2	2020	0.18	2.5	23	0.73	0.64	0.65	22.92
HPB	146A	31.6	0.23	5	2	920	0.30	2.5	12	0.99	0.73	0.74	23.15
HPB	148A	16.2	0.4	5	4	590	0.04	2.5	15	0.89	0.46	0.56	8.07
HPB	150B	13.9	0.4	5	4	760	0.20	2.5	12	0.99	0.49	0.66	9.08
HPB	151B	21.6	0.02	5	4	1140	0.20	2.5	21	0.76	0.41	0.42	6.89
HPB	152A	12.5	0.4	5	4	750	0.14	2.5	12	0.99	0.49	0.66	8.17
HPB	154B	7.7	0.02	5	4	700	0.26	2.5	13	0.95	0.48	0.49	3.58
HPB	155B	21.3	0.4	5	4	750	0.13	2.5	13	0.95	0.48	0.65	13.15
HPB	156B	64.9	0.02	5	2	1680	0.26	2.5	19	0.8	0.66	0.66	34.27
HPB	158B	33.8	0.2	5	4	1000	0.03	2.5	26	0.69	0.37	0.45	10.49
HPB	160B	33.8	0.36	5	4	1185	0.09	2.5	19	0.8	0.42	0.59	15.95
HPB	162A	11.5	0.02	5	4	1220	0.15	2.5	23	0.73	0.4	0.41	3.44
HPB	165A	21.9	0.42	5	4	1170	0.06	2.5	20	0.78	0.42	0.62	10.59

Portuguese Bend: Tc Calculator (10-year Post-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	10	2	1360	0.02	3.5	18	1.14	0.75	0.78	7.2
HPB	110A	46.7	0.02	10	2	2500	0.05	3.5	24	1	0.73	0.73	34.09
HPB	112B	16.2	0.21	10	4	1860	0.04	3.5	24	1	0.49	0.58	9.4
HPB	114B	23.8	0.42	10	4	2220	0.05	3.5	24	1	0.49	0.66	15.71
HPB	116A	27.9	0.21	10	4	1880	0.02	3.5	29	0.91	0.46	0.55	13.96
HPB	117B	8.8	0.42	10	4	2000	0.01	3.5	30	0.9	0.46	0.64	5.07
HPB	119A	7	0.21	10	4	540	0.11	3.5	8	1.67	0.61	0.67	7.83
HPB	121B	3.5	0.21	10	4	425	0.08	3.5	8	1.67	0.61	0.67	3.92
HPB	125A	60	0.01	10	4	1260	0.40	3.5	13	1.33	0.55	0.55	43.89
HPB	127B	14.5	0.42	10	4	780	0.04	3.5	12	1.38	0.56	0.7	14.01
HPB	129C	53.3	0.42	10	4	1570	0.07	3.5	18	1.14	0.52	0.68	41.32
HPB	132B	68.7	0.01	10	2	1580	0.33	3.5	12	1.38	0.77	0.77	73
HPB	135B	15.8	0.42	10	4	2120	0.05	3.5	23	1.02	0.5	0.67	10.8
HPB	137C	1.3	0.21	10	4	290	0.05	3.5	6	1.92	0.65	0.7	1.75
HPB	139B	59.1	0.02	10	4	1922	0.32	3.5	18	1.14	0.52	0.53	35.71
HPB	140B	16.5	0.4	10	2	1350	0.16	3.5	12	1.38	0.77	0.82	18.67
HPB	141C	61.2	0.01	10	2	2170	0.19	3.5	17	1.17	0.75	0.75	53.7
HPB	142C	23.3	0.01	10	2	630	0.27	3.5	7	1.78	0.82	0.82	34.01
HPB	143C	48.3	0.05	10	2	2020	0.18	3.5	16	1.21	0.75	0.76	44.42
HPB	146A	31.6	0.23	10	2	920	0.30	3.5	9	1.58	0.79	0.8	39.94
HPB	148A	16.2	0.4	10	4	590	0.04	3.5	11	1.44	0.57	0.64	14.93
HPB	150B	13.9	0.4	10	4	760	0.20	3.5	9	1.58	0.59	0.72	15.81
HPB	151B	21.6	0.02	10	4	1140	0.20	3.5	14	1.29	0.54	0.55	15.33
HPB	152A	12.5	0.4	10	4	750	0.14	3.5	10	1.51	0.58	0.71	13.4
HPB	154B	7.7	0.02	10	4	700	0.26	3.5	9	1.58	0.59	0.6	7.3
HPB	155B	21.3	0.4	10	4	750	0.13	3.5	10	1.51	0.58	0.71	22.84
HPB	156B	64.9	0.02	10	2	1680	0.26	3.5	13	1.33	0.77	0.77	66.46
HPB	158B	33.8	0.2	10	4	1000	0.03	3.5	18	1.14	0.52	0.58	22.35
HPB	160B	33.8	0.36	10	4	1185	0.09	3.5	14	1.29	0.54	0.67	29.21
HPB	162A	11.5	0.02	10	4	1220	0.15	3.5	15	1.25	0.54	0.55	7.91
HPB	165A	21.9	0.42	10	4	1170	0.06	3.5	15	1.25	0.54	0.69	18.89

Portuguese Bend: Tc Calculator (25-year Post-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	25	2	1360	0.02	4.3	15	1.53	0.79	0.81	10.04
HPB	110A	46.7	0.02	25	2	2500	0.05	4.3	20	1.34	0.77	0.77	48.19
HPB	112B	16.2	0.21	25	4	1860	0.04	4.3	20	1.34	0.55	0.62	13.46
HPB	114B	23.8	0.42	25	4	2220	0.05	4.3	20	1.34	0.55	0.7	22.32
HPB	116A	27.9	0.21	25	4	1880	0.02	4.3	23	1.25	0.54	0.62	21.62
HPB	117B	8.8	0.42	25	4	2000	0.01	4.3	25	1.2	0.53	0.69	7.29
HPB	119A	7	0.21	25	4	540	0.11	4.3	7	2.19	0.68	0.73	11.19
HPB	121B	3.5	0.21	25	4	425	0.08	4.3	6	2.35	0.69	0.73	6
HPB	125A	60	0.01	25	4	1260	0.40	4.3	10	1.85	0.64	0.64	71.04
HPB	127B	14.5	0.42	25	4	780	0.04	4.3	10	1.85	0.64	0.75	20.12
HPB	129C	53.3	0.42	25	4	1570	0.07	4.3	15	1.53	0.59	0.72	58.72
HPB	132B	68.7	0.01	25	2	1580	0.33	4.3	10	1.85	0.82	0.82	104.22
HPB	135B	15.8	0.42	25	4	2120	0.05	4.3	19	1.37	0.56	0.7	15.15
HPB	137C	1.3	0.21	25	4	290	0.05	4.3	5	2.57	0.7	0.74	2.47
HPB	139B	59.1	0.02	25	4	1922	0.32	4.3	14	1.58	0.59	0.6	56.03
HPB	140B	16.5	0.4	25	2	1350	0.16	4.3	10	1.85	0.82	0.85	25.95
HPB	141C	61.2	0.01	25	2	2170	0.19	4.3	14	1.58	0.79	0.79	76.39
HPB	142C	23.3	0.01	25	2	630	0.27	4.3	6	2.35	0.85	0.85	46.54
HPB	143C	48.3	0.05	25	2	2020	0.18	4.3	13	1.64	0.8	0.81	64.16
HPB	146A	31.6	0.23	25	2	920	0.30	4.3	7	2.19	0.85	0.85	58.82
HPB	148A	16.2	0.4	25	4	590	0.04	4.3	9	1.95	0.66	0.71	22.43
HPB	150B	13.9	0.4	25	4	760	0.20	4.3	7	2.19	0.68	0.77	23.44
HPB	151B	21.6	0.02	25	4	1140	0.20	4.3	11	1.77	0.63	0.64	24.47
HPB	152A	12.5	0.4	25	4	750	0.14	4.3	8	2.06	0.67	0.76	19.57
HPB	154B	7.7	0.02	25	4	700	0.26	4.3	7	2.19	0.68	0.68	11.47
HPB	155B	21.3	0.4	25	4	750	0.13	4.3	8	2.06	0.67	0.76	33.35
HPB	156B	64.9	0.02	25	2	1680	0.26	4.3	11	1.77	0.81	0.81	93.05
HPB	158B	33.8	0.2	25	4	1000	0.03	4.3	14	1.58	0.59	0.64	34.18
HPB	160B	33.8	0.36	25	4	1185	0.09	4.3	12	1.7	0.61	0.71	40.8
HPB	162A	11.5	0.02	25	4	1220	0.15	4.3	12	1.7	0.61	0.62	12.12
HPB	165A	21.9	0.42	25	4	1170	0.06	4.3	12	1.7	0.61	0.73	27.18

Portuguese Bend: Tc Calculator (50-year Post-development)

Project	Subarea	Area (acres)	%imp	Frequency	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Intensity (in./hr)	Cu	Cd	Flowrate (cfs)
HPB	108A	8.1	0.21	50	2	1360	0.02	4.9	13	1.87	0.83	0.84	12.72
HPB	110A	46.7	0.02	50	2	2500	0.05	4.9	18	1.6	0.8	0.8	59.78
HPB	112B	16.2	0.21	50	4	1860	0.04	4.9	18	1.6	0.6	0.66	17.11
HPB	114B	23.8	0.42	50	4	2220	0.05	4.9	18	1.6	0.6	0.73	27.8
HPB	116A	27.9	0.21	50	4	1880	0.02	4.9	21	1.49	0.58	0.65	27.02
HPB	117B	8.8	0.42	50	4	2000	0.01	4.9	22	1.46	0.57	0.71	9.12
HPB	119A	7	0.21	50	4	540	0.11	4.9	6	2.68	0.71	0.75	14.07
HPB	121B	3.5	0.21	50	4	425	0.08	4.9	6	2.68	0.71	0.75	7.04
HPB	125A	60	0.01	50	4	1260	0.40	4.9	9	2.22	0.68	0.68	90.58
HPB	127B	14.5	0.42	50	4	780	0.04	4.9	9	2.22	0.68	0.77	24.79
HPB	129C	53.3	0.42	50	4	1570	0.07	4.9	13	1.87	0.64	0.75	74.75
HPB	132B	68.7	0.01	50	2	1580	0.33	4.9	9	2.22	0.85	0.85	129.64
HPB	135B	15.8	0.42	50	4	2120	0.05	4.9	17	1.64	0.6	0.73	18.92
HPB	137C	1.3	0.21	50	4	290	0.05	4.9	5	2.92	0.73	0.77	2.92
HPB	139B	59.1	0.02	50	4	1922	0.32	4.9	12	1.94	0.66	0.66	75.67
HPB	140B	16.5	0.4	50	2	1350	0.16	4.9	9	2.22	0.85	0.87	31.87
HPB	141C	61.2	0.01	50	2	2170	0.19	4.9	12	1.94	0.83	0.83	98.54
HPB	142C	23.3	0.01	50	2	630	0.27	4.9	5	2.92	0.88	0.88	59.87
HPB	143C	48.3	0.05	50	2	2020	0.18	4.9	12	1.94	0.83	0.83	77.77
HPB	146A	31.6	0.23	50	2	920	0.30	4.9	7	2.5	0.86	0.86	67.94
HPB	148A	16.2	0.4	50	4	590	0.04	4.9	8	2.34	0.69	0.74	28.05
HPB	150B	13.9	0.4	50	4	760	0.20	4.9	7	2.5	0.7	0.78	27.11
HPB	151B	21.6	0.02	50	4	1140	0.20	4.9	10	2.11	0.67	0.67	30.54
HPB	152A	12.5	0.4	50	4	750	0.14	4.9	7	2.5	0.7	0.78	24.38
HPB	154B	7.7	0.02	50	4	700	0.26	4.9	7	2.5	0.7	0.7	13.48
HPB	155B	21.3	0.4	50	4	750	0.13	4.9	7	2.5	0.7	0.78	41.54
HPB	156B	64.9	0.02	50	2	1680	0.26	4.9	10	2.11	0.84	0.84	115.03
HPB	158B	33.8	0.2	50	4	1000	0.03	4.9	12	1.94	0.66	0.7	45.9
HPB	160B	33.8	0.36	50	4	1185	0.09	4.9	11	2.02	0.67	0.75	51.21
HPB	162A	11.5	0.02	50	4	1220	0.15	4.9	11	2.02	0.67	0.67	15.56
HPB	165A	21.9	0.42	50	4	1170	0.06	4.9	11	2.02	0.67	0.77	34.06

9.A.2. SUSMP Calculations

- Pre-development
- Post-development

PROJECT NAME / TRACT NUMBER **Zone 2 Landslide**
Prepared By: ***Wai Lan***
Date: ***3/30/2011***

Standard Urban Stormwater Mitigration Peak Flowrate and Volume Calculations (Pre-development-Project Site)

Subarea No.	A_{Total} (ac)	Site Proportion Imp *	A_I (ac)	A_P (ac)	A_u (ac)	Overall Trib, Area Prportion Imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Ix - Intensity (in./hr)	Cu	Cd	Cd * Ix*1.008333	Qpm (cfs)	V_M (ft3)	V_M (Ac-ft)
140B	16.5	0.38	5.9	9.6	1.0	0.357	2	1350	0.16	0.75	30	0.193	1.100	1.029	0.200	3.30	46,206	1.06
146A	31.6	0.13	4.1	27.5	0.0	0.130	2	920	0.30	0.75	30	0.193	0.100	0.204	0.040	1.25	17,550	0.40
148A	16.2	0.22	3.6	12.6	0.0	0.220	4	590	0.04	0.75	30	0.193	0.100	0.276	0.054	0.87	12,173	0.28
150B	13.9	0.26	3.6	10.3	0.0	0.260	4	760	0.20	0.75	30	0.193	0.100	0.308	0.060	0.83	11,656	0.27
152A	12.5	0.18	2.3	10.3	0.0	0.180	4	750	0.14	0.75	30	0.193	0.100	0.244	0.047	0.59	8,304	0.19
155B	21.3	0.13	2.8	18.5	0.0	0.130	4	750	0.13	0.75	30	0.193	0.100	0.204	0.040	0.85	11,830	0.27
158B	33.8	0.16	5.4	28.4	0.0	0.160	4	1000	0.03	0.75	30	0.193	0.100	0.228	0.044	1.50	20,981	0.48

∑A (ac)	145.8
∑Qpm (cfs)	9.2
∑VM (ft3)	128,699
∑VM (ac-ft)	3.0

Cu	Based upon Ix
Ix	Based upon TC
A_u	Undeveloped Upstraem Area that Flows directly into the BMP - Usually zero if included with subarea
TC	Ranges from 5 min to 30 min

PROJECT NAME / TRACT NUMBER **Zone 2 Landslide**
Prepared By: ***Wai Lan***
Date: ***3/30/2011***

Standard Urban Stormwater Mitigration Peak Flowrate and Volume Calculations (Pre-development)

Subarea No.	A_{Total} (ac)	Site Proportion Imp *	A_I (ac)	A_P (ac)	A_u (ac)	Overall Trib, Area Prportion Imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Ix - Intensity (in./hr)	Cu	Cd	Cd * Ix*1.008333	Qpm (cfs)	V_M (ft3)	V_M (Ac-ft)
108A	8.1	0.21	1.7	6.4	0.0	0.210	2	1360	0.02	0.75	30	0.193	0.100	0.268	0.052	0.42	5,910	0.14
110A	46.7	0.02	0.9	45.8	0.0	0.020	2	2500	0.05	0.75	30	0.193	0.100	0.116	0.023	1.05	14,748	0.34
112B	16.2	0.21	3.4	12.8	0.0	0.210	4	1860	0.04	0.75	30	0.193	0.100	0.268	0.052	0.84	11,820	0.27
114B	23.8	0.42	10.0	13.8	0.0	0.420	4	2220	0.05	0.75	30	0.193	0.100	0.436	0.085	2.02	28,251	0.65
116A	27.9	0.21	5.9	22.0	0.0	0.210	4	1880	0.02	0.75	30	0.193	0.100	0.268	0.052	1.46	20,357	0.47
117B	8.8	0.42	3.7	5.1	0.0	0.420	4	2000	0.01	0.75	30	0.193	0.100	0.436	0.085	0.75	10,446	0.24
119A	7	0.21	1.5	5.5	0.0	0.210	4	540	0.11	0.75	30	0.193	0.100	0.268	0.052	0.37	5,107	0.12
121B	3.5	0.21	0.7	2.8	0.0	0.210	4	425	0.08	0.75	30	0.193	0.100	0.268	0.052	0.18	2,554	0.06
125A	60	0.01	0.6	59.4	0.0	0.010	4	1260	0.40	0.75	30	0.193	0.100	0.108	0.021	1.26	17,642	0.41
127B	14.5	0.42	6.1	8.4	0.0	0.420	4	780	0.04	0.75	30	0.193	0.100	0.436	0.085	1.23	17,212	0.40
129C	53.3	0.42	22.4	30.9	0.0	0.420	4	1570	0.07	0.75	30	0.193	0.100	0.436	0.085	4.52	63,268	1.45
132B	68.7	0.01	0.7	68.0	0.0	0.010	2	1580	0.33	0.75	30	0.193	0.100	0.108	0.021	1.44	20,200	0.46
135B	15.8	0.42	6.6	9.2	0.0	0.420	4	2120	0.05	0.75	30	0.193	0.100	0.436	0.085	1.34	18,755	0.43
137C	1.3	0.21	0.3	1.0	0.0	0.210	4	290	0.05	0.75	30	0.193	0.100	0.268	0.052	0.07	949	0.02
139B	59.1	0.02	1.2	57.9	0.0	0.020	4	1922	0.32	0.75	30	0.193	0.100	0.116	0.023	1.33	18,664	0.43
140B	16.5	0.38	5.9	9.6	1.0	0.357	2	1350	0.16	0.75	30	0.193	1.100	1.029	0.200	3.30	46,206	1.06
141C	61.2	0.01	0.6	60.6	0.0	0.010	2	2170	0.19	0.75	30	0.193	0.100	0.108	0.021	1.29	17,995	0.41
142C	23.3	0.01	0.2	23.1	0.0	0.010	2	630	0.27	0.75	30	0.193	0.100	0.108	0.021	0.49	6,851	0.16
143C	48.3	0.05	2.4	45.9	0.0	0.050	2	2020	0.18	0.75	30	0.193	0.100	0.140	0.027	1.32	18,410	0.42
146A	31.6	0.13	4.1	27.5	0.0	0.130	2	920	0.30	0.75	30	0.193	0.100	0.204	0.040	1.25	17,550	0.40
148A	16.2	0.22	3.6	12.6	0.0	0.220	4	590	0.04	0.75	30	0.193	0.100	0.276	0.054	0.87	12,173	0.28
150B	13.9	0.26	3.6	10.3	0.0	0.260	4	760	0.20	0.75	30	0.193	0.100	0.308	0.060	0.83	11,656	0.27
151B	21.6	0.02	0.4	21.2	0.0	0.020	4	1140	0.20	0.75	30	0.193	0.100	0.116	0.023	0.49	6,821	0.16
152A	12.5	0.18	2.3	10.3	0.0	0.180	4	750	0.14	0.75	30	0.193	0.100	0.244	0.047	0.59	8,304	0.19
154B	7.7	0.02	0.2	7.5	0.0	0.020	4	700	0.26	0.75	30	0.193	0.100	0.116	0.023	0.17	2,432	0.06
155B	21.3	0.13	2.8	18.5	0.0	0.130	4	750	0.13	0.75	30	0.193	0.100	0.204	0.040	0.85	11,830	0.27
156B	64.9	0.02	1.3	63.6	0.0	0.020	2	1680	0.26	0.75	30	0.193	0.100	0.116	0.023	1.47	20,496	0.47
158B	33.8	0.16	5.4	28.4	0.0	0.160	4	1000	0.03	0.75	30	0.193	0.100	0.228	0.044	1.50	20,981	0.48
160B	33.8	0.36	12.2	21.6	0.0	0.360	4	1185	0.09	0.75	30	0.193	0.100	0.388	0.076	2.55	35,704	0.82
162A	11.5	0.02	0.23	11.27	0	0.02	4	1220	0.15	0.75	30	0.193	0.1	0.116	0.023	0.26	3,632	0.08
165A	21.9	0.42	9.198	12.702	0	0.42	4	1170	0.06	0.75	30	0.193	0.1	0.436	0.085	1.86	25,996	0.60

ΣA (ac)	854.7
ΣQpm (cfs)	37.4
ΣVM (ft3)	522,916
ΣVM (ac-ft)	12.0

Cu	Based upon Ix
Ix	Based upon TC
A_u	Undeveloped Upstraem Area that Flows directly into the BMP - Usually zero if included with subarea
TC	Ranges from 5 min to 30 min

PROJECT NAME / TRACT NUMBER **Zone 2 Landslide**
Prepared By: ***Wai Lan***
Date: ***3/30/2011***

Standard Urban Stormwater Mitigration Peak Flowrate and Volume Calculations (Post-Development-Project Site)

Subarea No.	A_{Total} (ac)	Site Proportion Imp *	A_I (ac)	A_P (ac)	A_u (ac)	Overall Trib, Area Prportion Imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Ix - Intensity (in./hr)	Cu	Cd	Cd * Ix*1.008333	Qpm (cfs)	V_M (ft3)	V_M (Ac-ft)
140B	16.5	0.400	6.2	9.3	1.0	0.376	2	1350	0.16	0.75	30	0.193	1.100	1.025	0.199	3.29	46,037	1.06
146A	31.6	0.230	7.3	24.3	0.0	0.230	2	920	0.30	0.75	30	0.193	0.100	0.284	0.055	1.75	24,433	0.56
148A	16.2	0.400	6.5	9.7	0.0	0.400	4	590	0.04	0.75	30	0.193	0.100	0.420	0.082	1.32	18,524	0.43
150B	13.9	0.400	5.6	8.3	0.0	0.400	4	760	0.20	0.75	30	0.193	0.100	0.420	0.082	1.14	15,894	0.36
152A	12.5	0.400	5.0	7.5	0.0	0.400	4	750	0.14	0.75	30	0.193	0.100	0.420	0.082	1.02	14,293	0.33
155B	21.3	0.400	8.5	12.8	0.0	0.400	4	750	0.13	0.75	30	0.193	0.100	0.420	0.082	1.74	24,355	0.56
158B	33.8	0.200	6.8	27.0	0.0	0.200	4	1000	0.03	0.75	30	0.193	0.100	0.260	0.051	1.71	23,925	0.55

∑A (ac)	145.8
∑Qpm (cfs)	12.0
∑VM (ft3)	167,462
∑VM (ac-ft)	3.8

Cu	Based upon Ix
Ix	Based upon TC
A_u	Undeveloped Upstraem Area that Flows directly into the BMP - Usually zero if included with subarea
TC	Ranges from 5 min to 30 min

PROJECT NAME / TRACT NUMBER **Zone 2 Landslide**
Prepared By: ***Wai Lan***
Date: ***3/30/2011***

Standard Urban Stormwater Mitigration Peak Flowrate and Volume Calculations (Post-Development)

Subarea No.	A_{Total} (ac)	Site Proportion Imp *	A_I (ac)	A_P (ac)	A_u (ac)	Overall Trib, Area Prportion Imp	Soil Type	Length (ft)	Slope (ft/ft)	Isohyet (in.)	Tc-calculated (min.)	Ix - Intensity (in./hr)	Cu	Cd	Cd * Ix*1.008333	Qpm (cfs)	V_M (ft3)	V_M (Ac-ft)
108A	8.1	0.210	1.7	6.4	0.0	0.210	2	1360	0.02	0.75	30	0.193	0.100	0.268	0.052	0.42	5,910	0.14
110A	46.7	0.020	0.9	45.8	0.0	0.020	2	2500	0.05	0.75	30	0.193	0.100	0.116	0.023	1.05	14,748	0.34
112B	16.2	0.210	3.4	12.8	0.0	0.210	4	1860	0.04	0.75	30	0.193	0.100	0.268	0.052	0.84	11,820	0.27
114B	23.8	0.420	10.0	13.8	0.0	0.420	4	2220	0.05	0.75	30	0.193	0.100	0.436	0.085	2.02	28,251	0.65
116A	27.9	0.210	5.9	22.0	0.0	0.210	4	1880	0.02	0.75	30	0.193	0.100	0.268	0.052	1.46	20,357	0.47
117B	8.8	0.420	3.7	5.1	0.0	0.420	4	2000	0.01	0.75	30	0.193	0.100	0.436	0.085	0.75	10,446	0.24
119A	7	0.210	1.5	5.5	0.0	0.210	4	540	0.11	0.75	30	0.193	0.100	0.268	0.052	0.37	5,107	0.12
121B	3.5	0.210	0.7	2.8	0.0	0.210	4	425	0.08	0.75	30	0.193	0.100	0.268	0.052	0.18	2,554	0.06
125A	60	0.010	0.6	59.4	0.0	0.010	4	1260	0.40	0.75	30	0.193	0.100	0.108	0.021	1.26	17,642	0.41
127B	14.5	0.420	6.1	8.4	0.0	0.420	4	780	0.04	0.75	30	0.193	0.100	0.436	0.085	1.23	17,212	0.40
129C	53.3	0.420	22.4	30.9	0.0	0.420	4	1570	0.07	0.75	30	0.193	0.100	0.436	0.085	4.52	63,268	1.45
132B	68.7	0.010	0.7	68.0	0.0	0.010	2	1580	0.33	0.75	30	0.193	0.100	0.108	0.021	1.44	20,200	0.46
135B	15.8	0.420	6.6	9.2	0.0	0.420	4	2120	0.05	0.75	30	0.193	0.100	0.436	0.085	1.34	18,755	0.43
137C	1.3	0.210	0.3	1.0	0.0	0.210	4	290	0.05	0.75	30	0.193	0.100	0.268	0.052	0.07	949	0.02
139B	59.1	0.020	1.2	57.9	0.0	0.020	4	1922	0.32	0.75	30	0.193	0.100	0.116	0.023	1.33	18,664	0.43
140B	16.5	0.400	6.2	9.3	1.0	0.376	2	1350	0.16	0.75	30	0.193	1.100	1.025	0.199	3.29	46,037	1.06
141C	61.2	0.010	0.6	60.6	0.0	0.010	2	2170	0.19	0.75	30	0.193	0.100	0.108	0.021	1.29	17,995	0.41
142C	23.3	0.010	0.2	23.1	0.0	0.010	2	630	0.27	0.75	30	0.193	0.100	0.108	0.021	0.49	6,851	0.16
143C	48.3	0.050	2.4	45.9	0.0	0.050	2	2020	0.18	0.75	30	0.193	0.100	0.140	0.027	1.32	18,410	0.42
146A	31.6	0.230	7.3	24.3	0.0	0.230	2	920	0.30	0.75	30	0.193	0.100	0.284	0.055	1.75	24,433	0.56
148A	16.2	0.400	6.5	9.7	0.0	0.400	4	590	0.04	0.75	30	0.193	0.100	0.420	0.082	1.32	18,524	0.43
150B	13.9	0.400	5.6	8.3	0.0	0.400	4	760	0.20	0.75	30	0.193	0.100	0.420	0.082	1.14	15,894	0.36
151B	21.6	0.020	0.4	21.2	0.0	0.020	4	1140	0.20	0.75	30	0.193	0.100	0.116	0.023	0.49	6,821	0.16
152A	12.5	0.400	5.0	7.5	0.0	0.400	4	750	0.14	0.75	30	0.193	0.100	0.420	0.082	1.02	14,293	0.33
154B	7.7	0.020	0.2	7.5	0.0	0.020	4	700	0.26	0.75	30	0.193	0.100	0.116	0.023	0.17	2,432	0.06
155B	21.3	0.400	8.5	12.8	0.0	0.400	4	750	0.13	0.75	30	0.193	0.100	0.420	0.082	1.74	24,355	0.56
156B	64.9	0.020	1.3	63.6	0.0	0.020	2	1680	0.26	0.75	30	0.193	0.100	0.116	0.023	1.47	20,496	0.47
158B	33.8	0.200	6.8	27.0	0.0	0.200	4	1000	0.03	0.75	30	0.193	0.100	0.260	0.051	1.71	23,925	0.55
160B	33.8	0.360	12.2	21.6	0.0	0.360	4	1185	0.09	0.75	30	0.193	0.100	0.388	0.076	2.55	35,704	0.82
162A	11.5	0.020	0.2	11.3	0.0	0.020	4	1220	0.15	0.75	30	0.193	0.100	0.116	0.023	0.26	3,632	0.08
165A	21.9	0.420	9.2	12.7	0.0	0.420	4	1170	0.06	0.75	30	0.193	0.100	0.436	0.085	1.86	25,996	0.60

ΣA (ac)	854.7
ΣQpm (cfs)	40.1
ΣVM (ft3)	561,679
ΣVM (ac-ft)	12.9

Cu	Based upon Ix
Ix	Based upon TC
A_u	Undeveloped Upstraem Area that Flows directly into the BMP - Usually zero if included with subarea
TC	Ranges from 5 min to 30 min

9.A.4. 2-year, 2-year (burn), 5-year, 10-year, 25-year, 50-year and 50-year (burn) Storm Modified Rational of Hydrology Result and Hydrograph

- Pre-development
- Post-development

Pre-development
(Watershed)

2-YEAR

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	4.01	8.1	4.01	0	0.	.00000	.00	.00	0.	2	30	A35	.21
159	109A	.0	.00	8.1	4.01	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	21.63	54.8	25.64	2	735.	.01400	.00	.00	0.	2	30	A35	.02
159	111A	.0	.00	54.8	25.36	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	5.41	16.2	5.41	4	270.	.01900	2.75	.00	0.	4	30	A35	.21
159	113AB	16.2	5.41	71.0	20.72	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	9.79	23.8	9.79	0	0.	.00000	.00	.00	0.	4	30	A35	.42
159	115AB	23.8	9.79	94.8	22.10	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	9.31	122.7	27.94	4	560.	.02300	3.50	.00	0.	4	30	A35	.21
159	117B	8.8	3.62	8.8	3.62	4	350.	.06600	2.00	.00	0.	4	30	A35	.42
159	118AB	8.8	3.62	131.5	31.32	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	3.69	138.5	33.83	1	210.	.54200	.00	.00	0.	4	16	A35	.21
159	120A	.0	.00	138.5	33.81	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	1.93	3.5	1.93	0	0.	.00000	.00	.00	0.	4	15	A35	.21
159	122B	.0	.00	3.5	1.93	1	510.	.43100	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  123A  TA 1164 QA    33.77 QAB    35.40 QB     1.63     159  123B  TB 1158 QB     1.89 QBA    34.08 QA    32.19   *
*                                159  123AB TAB 1164 QAB    35.40 QA    33.77 QB     1.63                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	1.89	142.0	35.40	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	35.40	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	15.60	202.0	48.95	0	0.	.00000	.00	.00	0.	4	30	A35	.01
159	126A	.0	.00	202.0	48.95	1	550.	.13600	.00	.00	0.	4	99	A35	.00
159	127B	14.5	7.28	14.5	7.28	4	570.	.07000	2.00	.00	0.	4	22	A35	.42
159	128B	.0	.00	14.5	7.28	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	21.91	53.3	21.91	4	1260.	.03000	3.25	.00	0.	4	30	A35	.42
159	130C	.0	.00	53.3	21.88	0	0.	.00000	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  131B  TB 1158 QB     7.28 QBC    28.81 QC    21.53     159  131C  TC 1161 QC    21.88 QCB    29.00 QB     7.12   *
*                                159  131BC TBC 1160 QBC    29.03 QB     7.19 QC    21.84                                 *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	21.88	67.8	29.03	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	37.14	136.5	60.05	0	0.	.00000	.00	.00	0.	2	23	A35	.01
159	133AB	136.5	60.05	338.5	108.52	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	134A	.0	.00	338.5	108.52	1	1955.	.08700	.00	.00	0.	2	99	A35	.00
159	135B	15.8	6.50	15.8	6.50	2	165.	.09100	2.00	.00	0.	4	30	A35	.42
159	136B	.0	.00	15.8	6.50	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	.83	1.3	.83	1	320.	.53100	.00	.00	0.	4	12	A35	.21

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              MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR =  2  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                          STORM DAY 4
                   SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
**************************************************************************************************************************
*                                                       CONFLUENCE Q'S                                                   *
*    159  138B  TB 1160 QB     6.49 QBC     7.25 QC      .76     159  138C  TC 1157 QC      .82 QCB     7.26 QB     6.44  *
*                            159  138BC TBC 1158 QBC     7.28 QB     6.47 QC      .81                                    *
**************************************************************************************************************************
                   SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  138BC    1.3        .82       17.1      7.28   1    1600.   .33800      .00   .00        0.    4   0   A35   .00
     159  139B    59.1      15.58       76.2     22.06   1    1880.   .09600      .00   .00        0.    4  30   A35   .02
     159  140B    16.5      10.77       92.7     28.13   0       0.   .00000      .00   .00        0.    2  20   A35   .38
     159  141C    61.2      28.24       61.2     28.24   0       0.   .00000      .00   .00        0.    2  30   A35   .01
     159  142C    23.3      18.56       84.5     46.44   0       0.   .00000      .00   .00        0.    2  12   A35   .01
     159  143C    48.3      23.10      132.8     69.38   0       0.   .00000      .00   .00        0.    2  29   A35   .05
**************************************************************************************************************************
*                                                       CONFLUENCE Q'S                                                   *
*    159  144B  TB 1168 QB    28.13 QBC    78.57 QC    50.43     159  144C  TC 1156 QC    69.38 QCB    86.26 QB    16.88  *
*                            159  144BC TBC 1160 QBC    89.41 QB    22.20 QC    67.21                                    *
**************************************************************************************************************************
                   SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  144BC  132.8      69.38      225.5     89.41   0       0.   .00000      .00   .00        0.    2   0   A35   .00
     159  145B      .0        .00      225.5     89.41   0       0.   .00000      .00   .00        0.    2  99   A35   .00
     159  146A    31.6      21.97      370.1    111.06   0       0.   .00000      .00   .00        0.    2  16   A35   .13
**************************************************************************************************************************
*                                                       CONFLUENCE Q'S                                                   *
*    159  147A  TA 1167 QA   111.06 QAB   190.41 QB    79.36     159  147B  TB 1160 QB    89.41 QBA   182.24 QA    92.84  *
*                            159  147AB TAB 1166 QAB   190.67 QA   110.42 QB    80.25                                    *
**************************************************************************************************************************
                   SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  147AB  225.5      89.41      595.6    190.67   1     590.   .08500      .00   .00        0.    2   0   A35   .00
     159  148A    16.2       6.90      611.8    196.07   0       0.   .00000      .00   .00        0.    4  22   A35   .22
     159  149A      .0        .00      611.8    196.07   1    1180.   .05100      .00   .00        0.    4  99   A35   .00
     159  150B    13.9       7.03       13.9      7.03   0       0.   .00000      .00   .00        0.    4  18   A35   .26
     159  151B    21.6       5.70       35.5     12.66   0       0.   .00000      .00   .00        0.    4  30   A35   .02
     159  152A    12.5       5.13      624.3    198.48   0       0.   .00000      .00   .00        0.    4  22   A35   .18
**************************************************************************************************************************
*                                                       CONFLUENCE Q'S                                                   *
*    159  153A  TA 1170 QA   198.48 QAB   204.96 QB     6.47     159  153B  TB 1157 QB    12.66 QBA   152.42 QA   139.76  *
*                            159  153AB TAB 1168 QAB   205.87 QA   197.39 QB     8.48                                    *
**************************************************************************************************************************
                   SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  153AB   35.5      12.66      659.8    205.87   1     990.   .06100      .00   .00        0.    4   0   A35   .00
     159  154B     7.7       2.41        7.7      2.41   0       0.   .00000      .00   .00        0.    4  25   A35   .02
     159  155B    21.3       7.55       29.0      9.96   4    1470.   .03400     3.00   .00        0.    4  25   A35   .13
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	33.57	93.9	43.05	4	520.	.05800	3.00	.00	0.	2	25	A35	.02
159	157B	.0	.00	93.9	43.02	4	1760.	.04100	2.00	.00	0.	2	99	A35	.00
159	158B	33.8	10.66	127.7	53.07	0	0.	.00000	.00	.00	0.	4	30	A35	.16
159	159B	.0	.00	127.7	53.07	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	13.83	161.5	66.19	0	0.	.00000	.00	.00	0.	4	28	A35	.36
159	161B	.0	.00	161.5	66.19	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	3.03	671.3	207.49	0	0.	.00000	.00	.00	0.	4	30	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1171 QA   207.49 QAB   267.83 QB    60.34     159  163B  TB 1164 QB    66.19 QBA   252.17 QA   185.98   *
*                                159  163AB TAB 1169 QAB   268.82 QA   205.96 QB    62.86                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	66.19	832.8	268.82	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	268.81	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	9.45	854.7	276.73	4	180.	.16700	9.50	.00	0.	4	28	A35	.42
159	166A	.0	.00	854.7	276.70	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	11.02	200	11.32	300	11.88	400	12.53
500	13.30	600	14.25	700	15.48	800	17.12	900	19.47
1000	25.46	1050	33.91	1100	48.88	1110	53.04	1120	59.60
1130	69.98	1131	71.18	1132	72.40	1133	73.67	1134	74.97
1135	76.34	1136	77.73	1137	79.19	1138	80.71	1139	82.27
1140	83.89	1141	85.60	1142	87.39	1143	89.27	1144	91.23
1145	93.36	1146	95.67	1147	98.32	1148	101.45	1149	105.88
1150	111.58	1151	118.24	1152	126.22	1153	135.51	1154	145.21
1155	155.23	1156	166.07	1157	177.87	1158	190.41	1159	203.84
1160	216.80	1161	228.45	1162	238.82	1163	247.68	1164	255.40
1165	261.63	1166	266.98	1167	271.04	1168	274.19	1169	275.99
1170	276.70	1171	276.33	1172	275.08	1173	272.82	1174	269.75
1175	265.96	1176	261.48	1177	255.55	1178	248.15	1179	240.63
1180	232.48	1181	223.96	1182	215.23	1183	206.83	1184	198.62
1185	190.70	1186	182.87	1187	174.88	1188	166.81	1189	159.09
1190	151.60	1191	144.53	1192	137.89	1193	131.80	1194	126.27
1195	121.24	1196	116.36	1197	111.89	1198	107.56	1199	103.66
1200	99.87	1201	96.38	1202	93.04	1203	89.91	1204	86.87
1205	84.01	1206	81.28	1207	78.71	1208	76.28	1209	74.01
1210	71.92	1211	69.96	1212	68.18	1213	66.51	1214	64.88
1215	63.40	1216	62.01	1217	60.73	1218	59.52	1219	58.43
1220	57.42	1221	56.45	1222	55.55	1223	54.71	1224	53.92
1225	53.17	1226	52.46	1227	51.79	1228	51.14	1229	50.52
1230	49.92	1231	49.32	1232	48.72	1233	48.14	1234	47.54
1235	46.95	1236	46.37	1237	45.78	1238	45.21	1239	44.62
1240	44.04	1241	43.46	1242	42.89	1243	42.33	1244	41.78
1245	41.23	1246	40.67	1247	40.13	1248	39.58	1249	39.03
1250	38.49	1251	37.96	1252	37.44	1253	36.93	1254	36.43
1255	35.94	1256	35.45	1257	34.97	1258	34.49	1259	34.04
1260	33.62	1261	33.18	1262	32.77	1263	32.35	1264	31.95
1265	31.56	1266	31.18	1267	30.82	1268	30.47	1269	30.13
1270	29.80	1271	29.48	1272	29.15	1273	28.83	1274	28.52
1275	28.21	1276	27.90	1277	27.60	1278	27.29	1279	26.99
1280	26.70	1281	26.42	1282	26.14	1283	25.86	1284	25.59
1285	25.35	1286	25.10	1287	24.85	1288	24.61	1289	24.37
1290	24.14	1291	23.92	1292	23.70	1293	23.49	1294	23.29
1295	23.10	1296	22.92	1297	22.74	1298	22.57	1299	22.39
1300	22.22	1310	20.57	1320	19.15	1330	17.99	1340	17.05
1350	16.22	1360	15.49	1370	14.92	1380	14.37	1390	13.91
1400	13.48	1420	12.79	1440	12.21	1460	11.02	1500	11.02

TOTAL VOLUME THIS HYDROGRAPH = 52.35(Ac.Ft)

2-YEAR

(BURN)

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	4.01	8.1	4.01	0	0.	.00000	.00	.00	0.	2	30	A35	.21
159	109A	.0	.00	8.1	4.01	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	21.63	54.8	25.64	2	735.	.01400	.00	.00	0.	2	30	A35	.02
159	111A	.0	.00	54.8	25.36	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	5.41	16.2	5.41	4	270.	.01900	2.75	.00	0.	4	30	A35	.21
159	113AB	16.2	5.41	71.0	20.72	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	9.79	23.8	9.79	0	0.	.00000	.00	.00	0.	4	30	A35	.42
159	115AB	23.8	9.79	94.8	22.10	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	9.31	122.7	27.94	4	560.	.02300	3.50	.00	0.	4	30	A35	.21
159	117B	8.8	3.62	8.8	3.62	4	350.	.06600	2.00	.00	0.	4	30	A35	.42
159	118AB	8.8	3.62	131.5	31.32	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	3.69	138.5	33.83	1	210.	.54200	.00	.00	0.	4	16	A35	.21
159	120A	.0	.00	138.5	33.81	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	1.93	3.5	1.93	0	0.	.00000	.00	.00	0.	4	15	A35	.21
159	122B	.0	.00	3.5	1.93	1	510.	.43100	.00	.00	0.	4	99	A35	.00

```
*                                        CONFLUENCE Q'S                                                    *
*    159  123A  TA 1164 QA    33.77 QAB    35.40 QB     1.63     159  123B  TB 1158 QB     1.89 QBA    34.08 QA    32.19   *
*                                159  123AB TAB 1164 QAB    35.40 QA    33.77 QB     1.63                                  *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	1.89	142.0	35.40	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	35.40	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	22.01	202.0	55.21	0	0.	.00000	.00	.00	0.	204	30	A35	.01
159	126A	.0	.00	202.0	55.21	1	550.	.13600	.00	.00	0.	204	99	A35	.00
159	127B	14.5	7.28	14.5	7.28	4	570.	.07000	2.00	.00	0.	4	22	A35	.42
159	128B	.0	.00	14.5	7.28	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	21.91	53.3	21.91	4	1260.	.03000	3.25	.00	0.	4	30	A35	.42
159	130C	.0	.00	53.3	21.88	0	0.	.00000	.00	.00	0.	4	99	A35	.00

```
*                                        CONFLUENCE Q'S                                                    *
*    159  131B  TB 1158 QB     7.28 QBC    28.81 QC    21.53     159  131C  TC 1161 QC    21.88 QCB    29.00 QB     7.12   *
*                                159  131BC TBC 1160 QBC    29.03 QB     7.19 QC    21.84                                 *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	21.88	67.8	29.03	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	41.44	136.5	64.16	0	0.	.00000	.00	.00	0.	202	23	A35	.01
159	133AB	136.5	64.16	338.5	118.86	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	134A	.0	.00	338.5	118.86	1	1955.	.08700	.00	.00	0.	2	99	A35	.00
159	135B	15.8	6.50	15.8	6.50	2	165.	.09100	2.00	.00	0.	4	30	A35	.42
159	136B	.0	.00	15.8	6.50	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	.83	1.3	.83	1	320.	.53100	.00	.00	0.	4	12	A35	.21

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              MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR =  2  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                           STORM DAY 4
                      SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
*****************************************************************************************************************************
*                                                     CONFLUENCE Q'S                                                        *
*    159  138B  TB 1160 QB     6.49 QBC     7.25 QC      .76     159  138C  TC 1157 QC      .82 QCB     7.26 QB      6.44   *
*                                  159  138BC TBC 1158 QBC     7.28 QB     6.47 QC     .81                                  *
*****************************************************************************************************************************
                      SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  138BC    1.3         .82       17.1      7.28   1     1600.   .33800      .00   .00         0.    4   0   A35   .00
     159  139B    59.1       21.84       76.2     28.28   1     1880.   .09600      .00   .00         0.  204  30   A35   .02
     159  140B    16.5       10.77       92.7     34.96   0        0.   .00000      .00   .00         0.    2  20   A35   .38
     159  141C    61.2       31.75       61.2     31.75   0        0.   .00000      .00   .00         0.  202  30   A35   .01
     159  142C    23.3       20.25       84.5     51.62   0        0.   .00000      .00   .00         0.  202  12   A35   .01
     159  143C    48.3       25.78      132.8     77.23   0        0.   .00000      .00   .00         0.  202  29   A35   .05
*****************************************************************************************************************************
*                                                     CONFLUENCE Q'S                                                        *
*    159  144B  TB 1168 QB    34.96 QBC    92.03 QC    57.08     159  144C  TC 1156 QC    77.23 QCB   100.31 QB    23.08   *
*                                  159  144BC TBC 1160 QBC   104.49 QB    29.50 QC    74.98                                 *
*****************************************************************************************************************************
                      SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  144BC  132.8       77.23      225.5    104.49   0        0.   .00000      .00   .00         0.    2   0   A35   .00
     159  145B      .0         .00      225.5    104.49   0        0.   .00000      .00   .00         0.    2  99   A35   .00
     159  146A    31.6       21.97      370.1    122.39   0        0.   .00000      .00   .00         0.    2  16   A35   .13
*****************************************************************************************************************************
*                                                     CONFLUENCE Q'S                                                        *
*    159  147A  TA 1167 QA   122.39 QAB   215.42 QB    93.03     159  147B  TB 1160 QB   104.49 QBA   208.90 QA   104.41   *
*                                  159  147AB TAB 1164 QAB   216.75 QA   119.17 QB    97.58                                 *
*****************************************************************************************************************************
                      SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  147AB  225.5      104.49      595.6    216.75   1      590.   .08500      .00   .00         0.    2   0   A35   .00
     159  148A    16.2        6.90      611.8    222.03   0        0.   .00000      .00   .00         0.    4  22   A35   .22
     159  149A      .0         .00      611.8    222.03   1     1180.   .05100      .00   .00         0.    4  99   A35   .00
     159  150B    13.9        7.03       13.9      7.03   0        0.   .00000      .00   .00         0.    4  18   A35   .26
     159  151B    21.6        7.98       35.5     14.94   0        0.   .00000      .00   .00         0.  204  30   A35   .02
     159  152A    12.5        5.13      624.3    224.43   0        0.   .00000      .00   .00         0.    4  22   A35   .18
*****************************************************************************************************************************
*                                                     CONFLUENCE Q'S                                                        *
*    159  153A  TA 1169 QA   224.43 QAB   234.06 QB     9.64     159  153B  TB 1157 QB    14.94 QBA   177.09 QA   162.15   *
*                                  159  153AB TAB 1168 QAB   234.67 QA   223.99 QB    10.68                                 *
*****************************************************************************************************************************
                      SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  153AB   35.5       14.94      659.8    234.67   1      990.   .06100      .00   .00         0.    4   0   A35   .00
     159  154B     7.7        3.27        7.7      3.27   0        0.   .00000      .00   .00         0.  204  25   A35   .02
     159  155B    21.3        7.55       29.0     10.82   4     1470.   .03400     3.00   .00         0.    4  25   A35   .13
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	37.48	93.9	47.82	4	520.	.05800	3.00	.00	0.	202	25	A35	.02
159	157B	.0	.00	93.9	47.80	4	1760.	.04100	2.00	.00	0.	2	99	A35	.00
159	158B	33.8	10.66	127.7	57.69	0	0.	.00000	.00	.00	0.	4	30	A35	.16
159	159B	.0	.00	127.7	57.69	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	13.83	161.5	70.81	0	0.	.00000	.00	.00	0.	4	28	A35	.36
159	161B	.0	.00	161.5	70.81	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	4.25	671.3	237.37	0	0.	.00000	.00	.00	0.	204	30	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1170 QA   237.37 QAB   303.82 QB    66.46     159  163B  TB 1164 QB    70.81 QBA   286.95 QA   216.14   *
*                                159  163AB TAB 1169 QAB   304.23 QA   236.56 QB    67.67                                 *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	70.81	832.8	304.23	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	304.01	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	9.45	854.7	312.02	4	180.	.16700	9.50	.00	0.	4	28	A35	.42
159	166A	.0	.00	854.7	312.00	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	14.60	200	15.03	300	15.81	400	16.69
500	17.75	600	19.04	700	20.72	800	22.94	900	26.18
1000	33.55	1050	43.63	1100	61.23	1110	66.11	1120	73.92
1130	86.01	1131	87.40	1132	88.77	1133	90.20	1134	91.68
1135	93.20	1136	94.81	1137	96.50	1138	98.26	1139	100.07
1140	101.95	1141	103.93	1142	106.03	1143	108.24	1144	110.56
1145	113.06	1146	115.76	1147	118.80	1148	122.35	1149	127.48
1150	133.86	1151	141.53	1152	150.07	1153	159.93	1154	170.36
1155	181.44	1156	193.43	1157	206.78	1158	220.71	1159	234.64
1160	248.26	1161	260.95	1162	271.79	1163	281.50	1164	289.60
1165	296.63	1166	302.24	1167	306.74	1168	309.84	1169	311.64
1170	312.00	1171	311.28	1172	309.47	1173	306.68	1174	302.96
1175	298.51	1176	293.31	1177	286.63	1178	278.40	1179	269.94
1180	261.03	1181	251.38	1182	241.80	1183	232.25	1184	222.97
1185	213.67	1186	204.57	1187	195.58	1188	186.84	1189	178.23
1190	169.99	1191	162.23	1192	155.06	1193	148.36	1194	142.12
1195	136.32	1196	130.95	1197	126.02	1198	121.60	1199	117.26
1200	112.90	1201	108.99	1202	105.14	1203	101.60	1204	98.18
1205	95.03	1206	92.05	1207	89.26	1208	86.61	1209	84.14
1210	81.86	1211	79.73	1212	77.75	1213	75.91	1214	74.19
1215	72.61	1216	71.13	1217	69.73	1218	68.45	1219	67.26
1220	66.16	1221	65.18	1222	64.30	1223	63.40	1224	62.54
1225	61.73	1226	60.94	1227	60.20	1228	59.49	1229	58.79
1230	58.13	1231	57.46	1232	56.80	1233	56.13	1234	55.46
1235	54.81	1236	54.17	1237	53.53	1238	52.88	1239	52.22
1240	51.57	1241	50.91	1242	50.25	1243	49.59	1244	48.95
1245	48.30	1246	47.67	1247	47.05	1248	46.44	1249	45.83
1250	45.23	1251	44.65	1252	44.09	1253	43.54	1254	43.00
1255	42.46	1256	41.94	1257	41.43	1258	40.93	1259	40.46
1260	39.99	1261	39.56	1262	39.14	1263	38.73	1264	38.31
1265	37.90	1266	37.49	1267	37.08	1268	36.68	1269	36.28
1270	35.88	1271	35.49	1272	35.11	1273	34.74	1274	34.39
1275	34.03	1276	33.69	1277	33.37	1278	33.03	1279	32.71
1280	32.40	1281	32.10	1282	31.80	1283	31.50	1284	31.23
1285	30.97	1286	30.73	1287	30.48	1288	30.24	1289	29.99
1290	29.74	1291	29.51	1292	29.27	1293	29.04	1294	28.80
1295	28.57	1296	28.35	1297	28.13	1298	27.92	1299	27.71
1300	27.51	1310	25.67	1320	24.15	1330	22.84	1340	21.75
1350	20.80	1360	19.95	1370	19.21	1380	18.57	1390	18.00
1400	17.47	1420	16.63	1440	15.92	1460	14.60	1500	14.60

TOTAL VOLUME THIS HYDROGRAPH = 65.18(Ac.Ft)

5-YEAR

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 5 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	7.45	8.1	7.45	0	0.	.00000	.00	.00	0.	2	24	A35	.21
159	109A	.0	.00	8.1	7.45	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	36.48	54.8	43.93	2	735.	.01400	.00	.00	0.	2	30	A35	.02
159	111A	.0	.00	54.8	43.59	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	10.05	16.2	10.05	4	270.	.01900	2.75	.00	0.	4	30	A35	.21
159	113AB	16.2	10.05	71.0	38.51	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	16.80	23.8	16.80	0	0.	.00000	.00	.00	0.	4	30	A35	.42
159	115AB	23.8	16.80	94.8	42.84	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	17.30	122.7	54.58	4	560.	.02300	3.50	.00	0.	4	30	A35	.21
159	117B	8.8	6.21	8.8	6.21	4	350.	.06600	2.00	.00	0.	4	30	A35	.42
159	118AB	8.8	6.21	131.5	60.43	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	7.65	138.5	64.45	1	210.	.54200	.00	.00	0.	4	12	A35	.21
159	120A	.0	.00	138.5	64.36	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	4.04	3.5	4.04	0	0.	.00000	.00	.00	0.	4	11	A35	.21
159	122B	.0	.00	3.5	4.04	1	510.	.43100	.00	.00	0.	4	99	A35	.00

```
*                                        CONFLUENCE Q'S                                                    *
*    159  123A  TA 1161 QA    64.34 QAB    67.75 QB     3.41     159  123B  TB 1157 QB     3.98 QBA    65.93 QA    61.95   *
*                                159  123AB TAB 1161 QAB    67.75 QA    64.34 QB     3.41                                  *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	3.98	142.0	67.75	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	67.75	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	43.28	202.0	105.69	0	0.	.00000	.00	.00	0.	4	20	A35	.01
159	126A	.0	.00	202.0	105.69	1	550.	.13600	.00	.00	0.	4	99	A35	.00
159	127B	14.5	14.73	14.5	14.73	4	570.	.07000	2.00	.00	0.	4	16	A35	.42
159	128B	.0	.00	14.5	14.71	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	42.97	53.3	42.97	4	1260.	.03000	3.25	.00	0.	4	24	A35	.42
159	130C	.0	.00	53.3	42.89	0	0.	.00000	.00	.00	0.	4	99	A35	.00

```
*                                        CONFLUENCE Q'S                                                    *
*    159  131B  TB 1156 QB    14.71 QBC    56.38 QC    41.68     159  131C  TC 1159 QC    42.89 QCB    57.20 QB    14.31   *
*                                159  131BC TBC 1158 QBC    57.31 QB    14.51 QC    42.80                                 *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	42.89	67.8	57.31	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	74.00	136.5	119.28	0	0.	.00000	.00	.00	0.	2	17	A35	.01
159	133AB	136.5	119.28	338.5	224.03	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	134A	.0	.00	338.5	224.03	1	1955.	.08700	.00	.00	0.	2	99	A35	.00
159	135B	15.8	11.16	15.8	11.16	2	165.	.09100	2.00	.00	0.	4	30	A35	.42
159	136B	.0	.00	15.8	11.15	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	1.68	1.3	1.68	1	320.	.53100	.00	.00	0.	4	9	A35	.21

```
 Program Package Serial Number:  2061
03/30/11   FILE: HPBE     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     2
                                                     LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                        PROG F0601M

                  MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR =  5  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                STORM DAY 4
                          SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
      LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
**************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                    *
*    159  138B  TB 1160 QB    11.15 QBC    12.37 QC     1.22     159  138C  TC 1156 QC     1.65 QCB    12.65 QB    11.00  *
*                                 159  138BC TBC 1157 QBC    12.70 QB    11.08 QC     1.62                               *
**************************************************************************************************************************
                          SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
      LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
       159  138BC    1.3       1.65       17.1     12.70   1     1600.  .33800       .00   .00        0.     4   0   A35   .00
       159  139B    59.1      32.07       76.2     43.97   1     1880.  .09600       .00   .00        0.     4  30   A35   .02
       159  140B    16.5      19.37       92.7     55.73   0        0.  .00000       .00   .00        0.     2  16   A35   .38
       159  141C    61.2      54.31       61.2     54.31   0        0.  .00000       .00   .00        0.     2  24   A35   .01
       159  142C    23.3      35.52       84.5     89.01   0        0.  .00000       .00   .00        0.     2   9   A35   .01
       159  143C    48.3      44.21      132.8    133.06   0        0.  .00000       .00   .00        0.     2  23   A35   .05
**************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                    *
*    159  144B  TB 1164 QB    55.73 QBC   155.25 QC    99.53     159  144C  TC 1155 QC   133.06 QCB   172.21 QB    39.15  *
*                                 159  144BC TBC 1157 QBC   175.75 QB    44.39 QC   131.36                               *
**************************************************************************************************************************
                          SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
      LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
       159  144BC  132.8     133.06      225.5    175.75   0        0.  .00000       .00   .00        0.     2   0   A35   .00
       159  145B      .0        .00      225.5    175.75   0        0.  .00000       .00   .00        0.     2  99   A35   .00
       159  146A    31.6      41.82      370.1    231.55   0        0.  .00000       .00   .00        0.     2  12   A35   .13
**************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                    *
*    159  147A  TA 1164 QA   231.55 QAB   386.81 QB   155.25     159  147B  TB 1157 QB   175.75 QBA   369.09 QA   193.35  *
*                                 159  147AB TAB 1160 QAB   389.02 QA   221.42 QB   167.60                               *
**************************************************************************************************************************
                          SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
      LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
       159  147AB  225.5     175.75      595.6    389.02   1      590.  .08500       .00   .00        0.     2   0   A35   .00
       159  148A    16.2      15.65      611.8    401.89   0        0.  .00000       .00   .00        0.     4  15   A35   .22
       159  149A      .0        .00      611.8    401.89   1     1180.  .05100       .00   .00        0.     4  99   A35   .00
       159  150B    13.9      15.51       13.9     15.51   0        0.  .00000       .00   .00        0.     4  12   A35   .26
       159  151B    21.6      15.16       35.5     30.61   0        0.  .00000       .00   .00        0.     4  21   A35   .02
       159  152A    12.5      12.32      624.3    405.25   0        0.  .00000       .00   .00        0.     4  14   A35   .18
**************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                    *
*    159  153A  TA 1164 QA   405.25 QAB   424.31 QB    19.06     159  153B  TB 1155 QB    30.61 QBA   306.46 QA   275.85  *
*                                 159  153AB TAB 1163 QAB   424.53 QA   403.20 QB    21.33                               *
**************************************************************************************************************************
                          SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
      LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
       159  153AB   35.5      30.61      659.8    424.53   1      990.  .06100       .00   .00        0.     4   0   A35   .00
       159  154B     7.7       7.37        7.7      7.37   0        0.  .00000       .00   .00        0.     4  13   A35   .02
       159  155B    21.3      19.74       29.0     27.11   4     1470.  .03400      3.00   .00        0.     4  15   A35   .13
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 5 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	65.77	93.9	91.86	4	520.	.05800	3.00	.00	0.	2	19	A35	.02
159	157B	.0	.00	93.9	91.77	4	1760.	.04100	2.75	.00	0.	2	99	A35	.00
159	158B	33.8	22.38	127.7	113.18	0	0.	.00000	.00	.00	0.	4	26	A35	.16
159	159B	.0	.00	127.7	113.18	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	30.28	161.5	141.41	0	0.	.00000	.00	.00	0.	4	19	A35	.36
159	161B	.0	.00	161.5	141.41	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	7.57	671.3	429.39	0	0.	.00000	.00	.00	0.	4	23	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1166 QA   429.39 QAB   560.14 QB   130.75     159  163B  TB 1161 QB   141.41 QBA   535.43 QA   394.02   *
*                                159  163AB TAB 1165 QAB   563.31 QA   429.13 QB   134.18                                 *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	141.41	832.8	563.31	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	563.26	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	19.62	854.7	579.77	4	180.	.16700	9.50	.00	0.	4	20	A35	.42
159	166A	.0	.00	854.7	579.62	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 5 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	16.63	200	17.12	300	17.98	400	19.01
500	20.25	600	22.03	700	25.49	800	30.72	900	38.08
1000	50.31	1050	64.59	1100	89.75	1110	97.70	1120	111.64
1130	136.04	1131	139.18	1132	142.21	1133	145.38	1134	148.70
1135	152.16	1136	155.80	1137	159.64	1138	163.76	1139	168.13
1140	172.77	1141	177.74	1142	183.06	1143	188.73	1144	194.83
1145	201.78	1146	209.42	1147	217.69	1148	226.74	1149	238.33
1150	252.91	1151	269.91	1152	289.80	1153	313.15	1154	338.75
1155	366.79	1156	397.49	1157	429.29	1158	462.03	1159	491.91
1160	518.36	1161	539.73	1162	556.83	1163	569.18	1164	576.94
1165	579.62	1166	578.49	1167	573.96	1168	566.21	1169	554.08
1170	539.73	1171	523.59	1172	504.96	1173	484.52	1174	464.55
1175	444.96	1176	424.77	1177	404.59	1178	384.25	1179	364.44
1180	344.75	1181	325.18	1182	307.12	1183	290.46	1184	275.48
1185	262.02	1186	250.32	1187	239.80	1188	230.59	1189	222.19
1190	214.62	1191	207.41	1192	200.67	1193	194.15	1194	187.95
1195	181.76	1196	175.62	1197	169.59	1198	163.77	1199	158.16
1200	152.75	1201	147.55	1202	142.63	1203	137.98	1204	133.82
1205	129.96	1206	126.25	1207	122.81	1208	119.67	1209	116.73
1210	114.03	1211	111.52	1212	109.28	1213	107.12	1214	105.16
1215	103.33	1216	101.68	1217	100.09	1218	98.61	1219	97.20
1220	95.87	1221	94.57	1222	93.34	1223	92.10	1224	90.85
1225	89.60	1226	88.38	1227	87.19	1228	86.00	1229	84.83
1230	83.65	1231	82.45	1232	81.24	1233	80.05	1234	78.88
1235	77.70	1236	76.54	1237	75.36	1238	74.20	1239	73.02
1240	71.86	1241	70.69	1242	69.55	1243	68.44	1244	67.38
1245	66.32	1246	65.25	1247	64.23	1248	63.33	1249	62.39
1250	61.43	1251	60.54	1252	59.66	1253	58.82	1254	58.03
1255	57.26	1256	56.46	1257	55.69	1258	54.91	1259	54.16
1260	53.41	1261	52.69	1262	51.98	1263	51.28	1264	50.59
1265	49.92	1266	49.27	1267	48.61	1268	48.00	1269	47.41
1270	46.82	1271	46.27	1272	45.77	1273	45.29	1274	44.79
1275	44.31	1276	43.84	1277	43.38	1278	42.90	1279	42.42
1280	41.96	1281	41.47	1282	41.00	1283	40.54	1284	40.10
1285	39.68	1286	39.26	1287	38.85	1288	38.46	1289	38.06
1290	37.69	1291	37.32	1292	36.94	1293	36.59	1294	36.23
1295	35.90	1296	35.58	1297	35.27	1298	35.00	1299	34.70
1300	34.40	1310	31.56	1320	29.17	1330	27.24	1340	25.68
1350	24.43	1360	23.41	1370	22.53	1380	21.76	1390	21.02
1400	20.36	1420	19.27	1440	18.28	1460	16.63	1500	16.63

TOTAL VOLUME THIS HYDROGRAPH = 91.44(Ac.Ft)

10-YEAR

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	10.98	8.1	10.98	0	0.	.00000	.00	.00	0.	2	18	A35	.21
159	109A	.0	.00	8.1	10.98	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	52.86	54.8	63.83	2	735.	.01400	.00	.00	0.	2	24	A35	.02
159	111A	.0	.00	54.8	63.12	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	15.16	16.2	15.16	4	270.	.01900	2.75	.00	0.	4	24	A35	.21
159	113AB	16.2	15.16	71.0	52.75	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	24.46	23.8	24.46	0	0.	.00000	.00	.00	0.	4	24	A35	.42
159	115AB	23.8	24.46	94.8	58.25	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	23.27	122.7	78.26	4	560.	.02300	3.50	.00	0.	4	29	A35	.21
159	117B	8.8	7.97	8.8	7.97	4	350.	.06600	2.00	.00	0.	4	30	A35	.42
159	118AB	8.8	7.97	131.5	85.93	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	12.24	138.5	89.37	1	210.	.54200	.00	.00	0.	4	8	A35	.21
159	120A	.0	.00	138.5	89.22	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	6.12	3.5	6.12	0	0.	.00000	.00	.00	0.	4	8	A35	.21
159	122B	.0	.00	3.5	6.12	1	510.	.43100	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  123A  TA 1157 QA    89.19 QAB    95.08 QB     5.89     159  123B  TB 1156 QB     6.02 QBA    94.50 QA    88.48   *
*                                159  123AB TAB 1157 QAB    95.08 QA    89.19 QB     5.89                                  *
*****************************************************************************************************************
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	6.02	142.0	95.08	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	95.08	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	74.92	202.0	158.90	0	0.	.00000	.00	.00	0.	4	13	A35	.01
159	126A	.0	.00	202.0	158.90	1	550.	.13600	.00	.00	0.	4	99	A35	.00
159	127B	14.5	21.76	14.5	21.76	4	570.	.07000	2.00	.00	0.	4	12	A35	.42
159	128B	.0	.00	14.5	21.75	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	64.30	53.3	64.30	4	1260.	.03000	3.25	.00	0.	4	18	A35	.42
159	130C	.0	.00	53.3	64.02	0	0.	.00000	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  131B  TB 1155 QB    21.75 QBC    83.13 QC    61.39     159  131C  TC 1158 QC    64.02 QCB    84.89 QB    20.87   *
*                                159  131BC TBC 1157 QBC    85.35 QB    21.41 QC    63.94                                 *
*****************************************************************************************************************
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	64.02	67.8	85.35	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	113.21	136.5	174.42	0	0.	.00000	.00	.00	0.	2	12	A35	.01
159	133AB	136.5	174.42	338.5	332.93	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	134A	.0	.00	338.5	332.93	1	1955.	.08700	.00	.00	0.	2	99	A35	.00
159	135B	15.8	16.62	15.8	16.62	2	165.	.09100	2.00	.00	0.	4	23	A35	.42
159	136B	.0	.00	15.8	16.62	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	2.67	1.3	2.67	1	320.	.53100	.00	.00	0.	4	6	A35	.21

```
 Program Package Serial Number:  2061
03/30/11   FILE: HPBE     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     2
                                    LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                    PROG F0601M

               MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                          STORM DAY 4
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV      CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
*******************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                             *
*    159  138B  TB 1157 QB    16.62 QBC    18.65 QC     2.03     159  138C  TC 1155 QC     2.59 QCB    19.01 QB    16.42  *
*                                159  138BC TBC 1155 QBC    19.01 QB    16.42 QC     2.59                                     *
*******************************************************************************************************************************
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV      CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  138BC    1.3       2.59       17.1      19.01   1    1600.   .33800      .00   .00        0.    4   0   A35   .00
    159  139B    59.1      60.67       76.2      77.06   1    1880.   .09600      .00   .00        0.    4  18   A35   .02
    159  140B    16.5      27.94       92.7      91.66   0       0.   .00000      .00   .00        0.    2  12   A35   .38
    159  141C    61.2      83.70       61.2      83.70   0       0.   .00000      .00   .00        0.    2  17   A35   .01
    159  142C    23.3      50.67       84.5     133.93   0       0.   .00000      .00   .00        0.    2   7   A35   .01
    159  143C    48.3      68.67      132.8     202.11   0       0.   .00000      .00   .00        0.    2  16   A35   .05
*******************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                             *
*    159  144B  TB 1160 QB    91.66 QBC   250.04 QC   158.38     159  144C  TC 1154 QC   202.11 QCB   267.17 QB    65.06  *
*                                159  144BC TBC 1155 QBC   272.32 QB    70.24 QC   202.08                                     *
*******************************************************************************************************************************
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV      CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  144BC  132.8     202.11      225.5     272.32   0       0.   .00000      .00   .00        0.    2   0   A35   .00
    159  145B      .0        .00      225.5     272.32   0       0.   .00000      .00   .00        0.    2  99   A35   .00
    159  146A    31.6      61.04      370.1     340.00   0       0.   .00000      .00   .00        0.    2   9   A35   .13
*******************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                             *
*    159  147A  TA 1161 QA   340.00 QAB   583.62 QB   243.61     159  147B  TB 1155 QB   272.32 QBA   545.78 QA   273.46  *
*                                159  147AB TAB 1159 QAB   588.85 QA   331.82 QB   257.03                                     *
*******************************************************************************************************************************
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV      CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  147AB  225.5     272.32      595.6     588.85   1     590.   .08500      .00   .00        0.    2   0   A35   .00
    159  148A    16.2      24.02      611.8     607.51   0       0.   .00000      .00   .00        0.    4  11   A35   .22
    159  149A      .0        .00      611.8     607.51   1    1180.   .05100      .00   .00        0.    4  99   A35   .00
    159  150B    13.9      23.24       13.9      23.24   0       0.   .00000      .00   .00        0.    4   9   A35   .26
    159  151B    21.6      25.92       35.5      49.17   0       0.   .00000      .00   .00        0.    4  14   A35   .02
    159  152A    12.5      19.42      624.3     609.51   0       0.   .00000      .00   .00        0.    4  10   A35   .18
*******************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                             *
*    159  153A  TA 1162 QA   609.51 QAB   636.60 QB    27.08     159  153B  TB 1154 QB    49.17 QBA   459.21 QA   410.04  *
*                                159  153AB TAB 1161 QAB   640.01 QA   608.82 QB    31.19                                     *
*******************************************************************************************************************************
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV      CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  153AB   35.5      49.17      659.8     640.01   1     990.   .06100      .00   .00        0.    4   0   A35   .00
    159  154B     7.7      12.00        7.7      12.00   0       0.   .00000      .00   .00        0.    4   9   A35   .02
    159  155B    21.3      30.68       29.0      42.68   4    1470.   .03400     3.00   .00        0.    4  11   A35   .13
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	102.56	93.9	143.04	4	520.	.05800	3.00	.00	0.	2	13	A35	.02
159	157B	.0	.00	93.9	142.67	4	1760.	.04100	3.00	.00	0.	2	99	A35	.00
159	158B	33.8	36.82	127.7	175.73	0	0.	.00000	.00	.00	0.	4	18	A35	.16
159	159B	.0	.00	127.7	175.73	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	45.84	161.5	216.55	0	0.	.00000	.00	.00	0.	4	14	A35	.36
159	161B	.0	.00	161.5	216.55	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	13.27	671.3	647.29	0	0.	.00000	.00	.00	0.	4	15	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1163 QA   647.29 QAB   847.93 QB   200.65     159  163B  TB 1160 QB   216.55 QBA   834.81 QA   618.25   *
*                                159  163AB TAB 1162 QAB   855.59 QA   645.20 QB   210.39                                 *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	216.55	832.8	855.59	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	852.63	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	29.27	854.7	877.16	4	180.	.16700	9.50	.00	0.	4	15	A35	.42
159	166A	.0	.00	854.7	876.86	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	20.44	200	21.05	300	22.60	400	25.02
500	27.98	600	31.73	700	36.51	800	42.92	900	52.11
1000	67.54	1050	86.17	1100	117.41	1110	132.55	1120	163.03
1130	204.50	1131	209.25	1132	213.92	1133	218.86	1134	224.10
1135	229.60	1136	235.30	1137	241.33	1138	247.82	1139	254.79
1140	261.95	1141	269.95	1142	278.58	1143	288.04	1144	298.14
1145	309.49	1146	321.88	1147	335.69	1148	350.59	1149	369.90
1150	394.97	1151	424.23	1152	460.36	1153	502.34	1154	549.20
1155	600.40	1156	654.26	1157	705.87	1158	760.43	1159	812.62
1160	846.51	1161	866.97	1162	876.86	1163	875.75	1164	860.84
1165	836.55	1166	807.01	1167	772.58	1168	737.72	1169	701.45
1170	664.25	1171	623.17	1172	583.39	1173	544.62	1174	507.82
1175	474.10	1176	443.54	1177	417.14	1178	393.81	1179	373.12
1180	354.60	1181	337.78	1182	322.53	1183	308.68	1184	295.63
1185	283.48	1186	272.29	1187	261.91	1188	252.26	1189	243.33
1190	234.79	1191	226.82	1192	219.30	1193	212.19	1194	205.48
1195	199.27	1196	193.34	1197	187.59	1198	182.19	1199	177.08
1200	172.23	1201	167.59	1202	163.15	1203	158.99	1204	155.16
1205	151.60	1206	148.41	1207	145.43	1208	142.74	1209	140.22
1210	137.90	1211	135.70	1212	133.58	1213	131.53	1214	129.58
1215	127.64	1216	125.67	1217	123.77	1218	121.83	1219	119.90
1220	117.99	1221	116.20	1222	114.37	1223	112.51	1224	110.58
1225	108.67	1226	106.81	1227	105.02	1228	103.32	1229	101.68
1230	99.99	1231	98.30	1232	96.64	1233	95.00	1234	93.37
1235	91.79	1236	90.24	1237	88.74	1238	87.32	1239	85.95
1240	84.59	1241	83.24	1242	81.95	1243	80.72	1244	79.57
1245	78.50	1246	77.46	1247	76.43	1248	75.36	1249	74.33
1250	73.32	1251	72.31	1252	71.36	1253	70.40	1254	69.49
1255	68.59	1256	67.70	1257	66.86	1258	66.09	1259	65.27
1260	64.48	1261	63.78	1262	63.06	1263	62.40	1264	61.77
1265	61.11	1266	60.47	1267	59.85	1268	59.24	1269	58.60
1270	57.98	1271	57.40	1272	56.85	1273	56.31	1274	55.79
1275	55.26	1276	54.71	1277	54.18	1278	53.66	1279	53.14
1280	52.63	1281	52.12	1282	51.59	1283	51.09	1284	50.63
1285	50.23	1286	49.81	1287	49.39	1288	48.99	1289	48.58
1290	48.20	1291	47.82	1292	47.44	1293	47.09	1294	46.71
1295	46.32	1296	45.96	1297	45.61	1298	45.27	1299	44.90
1300	44.56	1310	41.46	1320	38.86	1330	36.68	1340	34.74
1350	32.99	1360	31.20	1370	29.66	1380	28.29	1390	27.01
1400	25.77	1420	23.97	1440	22.70	1460	20.44	1500	20.44

TOTAL VOLUME THIS HYDROGRAPH = 121.62(Ac.Ft)

25-YEAR

Program Package Serial Number: 2061

03/30/11 FILE: HPBE INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	15.26	8.1	15.26	0	0.	.00000	.00	.00	0.	2	15	A35	.21
159	109A	.0	.00	8.1	15.26	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	74.46	54.8	89.64	2	735.	.01400	.00	.00	0.	2	20	A35	.02
159	111A	.0	.00	54.8	88.40	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	21.93	16.2	21.93	4	270.	.01900	2.75	.00	0.	4	20	A35	.21
159	113AB	16.2	21.90	71.0	73.77	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	34.53	23.8	34.53	0	0.	.00000	.00	.00	0.	4	20	A35	.42
159	115AB	23.8	34.53	94.8	79.89	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	34.80	122.7	112.07	4	560.	.02300	3.50	.00	0.	4	23	A35	.21
159	117B	8.8	11.30	8.8	11.30	4	350.	.06600	2.00	.00	0.	4	25	A35	.42
159	118AB	8.8	11.30	131.5	122.94	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	16.75	138.5	128.49	1	210.	.54200	.00	.00	0.	4	7	A35	.21
159	120A	.0	.00	138.5	128.47	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	9.13	3.5	9.13	0	0.	.00000	.00	.00	0.	4	6	A35	.21
159	122B	.0	.00	3.5	9.13	1	510.	.43100	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  123A  TA 1157 QA   128.33 QAB   135.59 QB     7.26     159  123B  TB 1155 QB     8.87 QBA   135.11 QA   126.24   *
*                                159  123AB TAB 1156 QAB   136.60 QA   128.26 QB     8.34                                   *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	8.87	142.0	136.60	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	136.60	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	114.49	202.0	232.11	0	0.	.00000	.00	.00	0.	4	10	A35	.01
159	126A	.0	.00	202.0	232.11	1	550.	.13600	.00	.00	0.	4	99	A35	.00
159	127B	14.5	30.53	14.5	30.53	4	570.	.07000	2.00	.00	0.	4	10	A35	.42
159	128B	.0	.00	14.5	30.35	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	90.39	53.3	90.39	4	1260.	.03000	3.25	.00	0.	4	15	A35	.42
159	130C	.0	.00	53.3	89.75	0	0.	.00000	.00	.00	0.	4	99	A35	.00

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*                                                CONFLUENCE Q'S                                                 *
*    159  131B  TB 1155 QB    30.35 QBC   117.22 QC    86.87     159  131C  TC 1157 QC    89.75 QCB   118.83 QB    29.07   *
*                                159  131BC TBC 1156 QBC   119.06 QB    29.85 QC    89.21                                  *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	89.75	67.8	119.06	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	158.81	136.5	241.55	0	0.	.00000	.00	.00	0.	2	10	A35	.01
159	133AB	136.5	241.55	338.5	471.43	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	134A	.0	.00	338.5	471.43	1	1955.	.08700	.00	.00	0.	2	99	A35	.00
159	135B	15.8	23.54	15.8	23.54	2	165.	.09100	2.00	.00	0.	4	19	A35	.42
159	136B	.0	.00	15.8	23.54	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	3.79	1.3	3.79	1	320.	.53100	.00	.00	0.	4	5	A35	.21

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
CONFLUENCE Q'S														
159 138B TB 1156 QB	23.51 QBC	26.38 QC	2.87	159 138C TC 1154 QC	3.52 QCB	26.33 QB	22.81							
159 138BC TBC 1155 QBC	26.74 QB	23.38 QC	3.36											
159 138BC	1.3	3.52	17.1	26.74	1	1600.	.33800	.00	.00	0.	4	0	A35	.00
159 139B	59.1	92.49	76.2	114.45	1	1880.	.09600	.00	.00	0.	4	14	A35	.02
159 140B	16.5	38.59	92.7	132.35	0	0.	.00000	.00	.00	0.	2	10	A35	.38
159 141C	61.2	117.89	61.2	117.89	0	0.	.00000	.00	.00	0.	2	14	A35	.01
159 142C	23.3	69.28	84.5	187.17	0	0.	.00000	.00	.00	0.	2	6	A35	.01
159 143C	48.3	96.81	132.8	283.98	0	0.	.00000	.00	.00	0.	2	13	A35	.05
CONFLUENCE Q'S														
159 144B TB 1159 QB	132.35 QBC	351.29 QC	218.94	159 144C TC 1154 QC	283.98 QCB	384.01 QB	100.03							
159 144BC TBC 1154 QBC	384.01 QB	100.03 QC	283.98											
159 144BC	132.8	283.98	225.5	384.01	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159 145B	.0	.00	225.5	384.01	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 146A	31.6	86.62	370.1	475.09	0	0.	.00000	.00	.00	0.	2	7	A35	.13
CONFLUENCE Q'S														
159 147A TA 1161 QA	475.09 QAB	804.67 QB	329.59	159 147B TB 1154 QB	384.01 QBA	760.99 QA	376.98							
159 147AB TAB 1158 QAB	832.53 QA	465.11 QB	367.43											
159 147AB	225.5	384.01	595.6	832.53	1	590.	.08500	.00	.00	0.	2	0	A35	.00
159 148A	16.2	34.18	611.8	854.71	0	0.	.00000	.00	.00	0.	4	9	A35	.22
159 149A	.0	.00	611.8	854.71	1	1180.	.05100	.00	.00	0.	4	99	A35	.00
159 150B	13.9	31.35	13.9	31.35	0	0.	.00000	.00	.00	0.	4	8	A35	.26
159 151B	21.6	38.90	35.5	70.25	0	0.	.00000	.00	.00	0.	4	11	A35	.02
159 152A	12.5	27.71	624.3	857.40	0	0.	.00000	.00	.00	0.	4	8	A35	.18
CONFLUENCE Q'S														
159 153A TA 1160 QA	857.40 QAB	899.37 QB	41.97	159 153B TB 1154 QB	70.25 QBA	685.85 QA	615.60							
159 153AB TAB 1159 QAB	901.21 QA	850.04 QB	51.17											
159 153AB	35.5	70.25	659.8	901.21	1	990.	.06100	.00	.00	0.	4	0	A35	.00
159 154B	7.7	17.72	7.7	17.72	0	0.	.00000	.00	.00	0.	4	7	A35	.02
159 155B	21.3	44.02	29.0	61.74	4	1470.	.03400	3.00	.00	0.	4	9	A35	.13

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	142.12	93.9	200.60	4	520.	.05800	3.00	.00	0.	2	11	A35	.02
159	157B	.0	.00	93.9	199.49	4	1760.	.04100	3.50	.00	0.	2	99	A35	.00
159	158B	33.8	55.13	127.7	249.37	0	0.	.00000	.00	.00	0.	4	14	A35	.16
159	159B	.0	.00	127.7	249.37	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	63.25	161.5	305.02	0	0.	.00000	.00	.00	0.	4	12	A35	.36
159	161B	.0	.00	161.5	305.02	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	19.65	671.3	910.47	0	0.	.00000	.00	.00	0.	4	12	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1161 QA   910.47 QAB  1197.74 QB   287.28     159  163B  TB 1159 QB   305.02 QBA  1185.26 QA   880.24   *
*                                159  163AB TAB 1160 QAB  1204.69 QA   903.89 QB   300.80                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	305.02	832.8	1204.69	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	1202.31	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	41.61	854.7	1231.21	4	180.	.16700	9.50	.00	0.	4	12	A35	.42
159	166A	.0	.00	854.7	1230.66	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	28.76	200	30.36	300	33.11	400	36.19
500	39.96	600	44.54	700	50.50	800	58.38	900	70.27
1000	90.29	1050	113.69	1100	166.73	1110	195.71	1120	242.49
1130	300.17	1131	306.79	1132	313.47	1133	320.23	1134	327.34
1135	334.75	1136	342.59	1137	350.83	1138	359.91	1139	369.55
1140	380.14	1141	391.54	1142	404.30	1143	417.69	1144	432.29
1145	448.39	1146	466.40	1147	486.11	1148	507.66	1149	536.07
1150	572.95	1151	617.98	1152	672.23	1153	734.66	1154	820.92
1155	912.37	1156	998.82	1157	1083.27	1158	1153.53	1159	1203.38
1160	1229.95	1161	1230.66	1162	1212.34	1163	1174.36	1164	1125.73
1165	1065.95	1166	1006.36	1167	946.25	1168	884.67	1169	824.78
1170	768.12	1171	720.22	1172	672.13	1173	622.07	1174	583.72
1175	548.24	1176	518.67	1177	491.25	1178	466.81	1179	444.38
1180	423.89	1181	405.09	1182	387.37	1183	370.64	1184	355.38
1185	340.66	1186	327.30	1187	314.63	1188	302.76	1189	291.17
1190	280.52	1191	270.30	1192	260.97	1193	252.19	1194	244.17
1195	236.73	1196	229.75	1197	223.49	1198	217.84	1199	212.79
1200	208.19	1201	204.01	1202	199.95	1203	196.13	1204	192.52
1205	189.18	1206	185.78	1207	182.45	1208	179.20	1209	175.94
1210	172.73	1211	169.62	1212	166.61	1213	163.64	1214	160.65
1215	157.68	1216	154.71	1217	151.82	1218	149.03	1219	146.42
1220	143.80	1221	141.22	1222	138.64	1223	136.10	1224	133.55
1225	131.07	1226	128.70	1227	126.34	1228	124.11	1229	121.98
1230	119.95	1231	117.90	1232	115.91	1233	113.95	1234	112.15
1235	110.37	1236	108.78	1237	107.17	1238	105.64	1239	104.14
1240	102.73	1241	101.32	1242	99.94	1243	98.60	1244	97.28
1245	95.94	1246	94.63	1247	93.39	1248	92.15	1249	90.97
1250	89.84	1251	88.76	1252	87.67	1253	86.62	1254	85.64
1255	84.71	1256	83.80	1257	82.91	1258	82.07	1259	81.17
1260	80.30	1261	79.51	1262	78.70	1263	77.91	1264	77.16
1265	76.41	1266	75.64	1267	74.87	1268	74.17	1269	73.51
1270	72.85	1271	72.22	1272	71.62	1273	71.00	1274	70.40
1275	69.86	1276	69.36	1277	68.81	1278	68.19	1279	67.57
1280	66.98	1281	66.43	1282	65.91	1283	65.42	1284	64.94
1285	64.47	1286	63.96	1287	63.48	1288	63.03	1289	62.55
1290	62.13	1291	61.71	1292	61.24	1293	60.79	1294	60.36
1295	59.98	1296	59.60	1297	59.19	1298	58.83	1299	58.45
1300	58.07	1310	54.53	1320	51.54	1330	49.10	1340	46.90
1350	44.78	1360	42.65	1370	40.86	1380	39.24	1390	37.70
1400	36.20	1420	34.06	1440	32.08	1460	28.76	1500	28.76

TOTAL VOLUME THIS HYDROGRAPH = 164.78(Ac.Ft)

50-YEAR

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   Program Package Serial Number:  2061
03/30/11   FILE: HPBE     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     1
                                        LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                   PROG F0601M

                 MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                   STORM DAY 4
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  108A     8.1      18.88       8.1     18.88   0       0.   .00000      .00   .00        0.    2  13   A35   .21
      159  109A      .0        .00       8.1     18.88   4     135.  2.00000     2.00   .00        0.    2  99   A35   .00
      159  110A    46.7      91.34      54.8    110.21   2     735.   .01400      .00   .00        0.    2  18   A35   .02
      159  111A      .0        .00      54.8    108.67   2    1660.   .00200      .00   .00        0.    2  99   A35   .00
      159  112B    16.2      27.23      16.2     27.23   4     270.   .01900     2.75   .00        0.    4  18   A35   .21
      159  113AB   16.2      27.19      71.0     90.05   1     735.   .01400      .00   .00        0.    4   0   A35   .00
      159  114B    23.8      42.37      23.8     42.37   0       0.   .00000      .00   .00        0.    4  18   A35   .42
      159  115AB   23.8      42.37      94.8     97.47   0       0.   .00000      .00   .00        0.    4   0   A35   .00
      159  116A    27.9      43.03     122.7    138.10   4     560.   .02300     3.50   .00        0.    4  21   A35   .21
      159  117B     8.8      14.07       8.8     14.07   4     350.   .06600     2.00   .00        0.    4  22   A35   .42
      159  118AB    8.8      14.07     131.5    151.59   4     220.   .16800     3.50   .00        0.    4   0   A35   .00
      159  119A     7.0      21.17     138.5    157.54   1     210.   .54200      .00   .00        0.    4   6   A35   .21
      159  120A      .0        .00     138.5    157.48   1     215.   .27900      .00   .00        0.    4  99   A35   .00
      159  121B     3.5      10.59       3.5     10.59   0       0.   .00000      .00   .00        0.    4   6   A35   .21
      159  122B      .0        .00       3.5     10.59   1     510.   .43100      .00   .00        0.    4  99   A35   .00
*****************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                   *
*    159  123A  TA 1156 QA   157.44 QAB   167.07 QB     9.63     159  123B  TB 1155 QB    10.29 QBA   166.72 QA   156.43   *
*                                  159  123AB TAB 1156 QAB   167.07 QA   157.44 QB     9.63                                 *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  123AB    3.5      10.29     142.0    167.07   0       0.   .00000      .00   .00        0.    4   0   A35   .00
      159  124A      .0        .00     142.0    167.07   1    1675.   .17900      .00   .00        0.    4  99   A35   .00
      159  125A    60.0     141.02     202.0    286.64   0       0.   .00000      .00   .00        0.    4   9   A35   .01
      159  126A      .0        .00     202.0    286.64   1     550.   .13600      .00   .00        0.    4  99   A35   .00
      159  127B    14.5      36.97      14.5     36.97   4     570.   .07000     2.00   .00        0.    4   9   A35   .42
      159  128B      .0        .00      14.5     36.81   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  129C    53.3     112.42      53.3    112.42   4    1260.   .03000     3.25   .00        0.    4  13   A35   .42
      159  130C      .0        .00      53.3    111.74   0       0.   .00000      .00   .00        0.    4  99   A35   .00
*****************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                   *
*    159  131B  TB 1155 QB    36.81 QBC   145.84 QC   109.02     159  131C  TC 1157 QC   111.74 QCB   146.85 QB    35.11   *
*                                  159  131BC TBC 1156 QBC   147.51 QB    36.08 QC   111.43                                 *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  131BC   53.3     111.74      67.8    147.51   1    2640.   .21200      .00   .00        0.    4   0   A35   .00
      159  132B    68.7     192.09     136.5    293.77   0       0.   .00000      .00   .00        0.    2   9   A35   .01
      159  133AB  136.5     293.77     338.5    575.64   0       0.   .00000      .00   .00        0.    2   0   A35   .00
      159  134A      .0        .00     338.5    575.64   1    1955.   .08700      .00   .00        0.    2  99   A35   .00
      159  135B    15.8      28.97      15.8     28.97   2     165.   .09100     2.00   .00        0.    4  17   A35   .42
      159  136B      .0        .00      15.8     28.97   4     300.   .11700     3.00   .00        0.    4  99   A35   .00
      159  137C     1.3       4.39       1.3      4.39   1     320.   .53100      .00   .00        0.    4   5   A35   .21
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              MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                          STORM DAY 4
                 SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac) Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
*****************************************************************************************************************************
*                                                       CONFLUENCE Q'S                                                      *
*    159  138B  TB 1156 QB    28.94 QBC    32.23 QC     3.30     159  138C  TC 1154 QC     4.09 QCB    32.37 QB    28.28   *
*                                  159  138BC TBC 1155 QBC    32.72 QB    28.85 QC     3.87                                 *
*****************************************************************************************************************************
                 SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac) Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  138BC    1.3       4.09      17.1     32.72   1     1600.  .33800      .00   .00        0.    4   0   A35   .00
    159  139B    59.1     118.59      76.2    145.31   1     1880.  .09600      .00   .00        0.    4  12   A35   .02
    159  140B    16.5      46.36      92.7    165.18   0        0.  .00000      .00   .00        0.    2   9   A35   .38
    159  141C    61.2     147.74      61.2    147.74   0        0.  .00000      .00   .00        0.    2  12   A35   .01
    159  142C    23.3      88.65      84.5    234.31   0        0.  .00000      .00   .00        0.    2   5   A35   .01
    159  143C    48.3     116.73     132.8    349.39   0        0.  .00000      .00   .00        0.    2  12   A35   .05
*****************************************************************************************************************************
*                                                       CONFLUENCE Q'S                                                      *
*    159  144B  TB 1159 QB   165.18 QBC   424.51 QC   259.34     159  144C  TC 1153 QC   349.39 QCB   467.00 QB   117.61   *
*                                  159  144BC TBC 1154 QBC   471.06 QB   128.37 QC   342.69                                 *
*****************************************************************************************************************************
                 SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac) Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  144BC  132.8     349.39     225.5    471.06   0        0.  .00000      .00   .00        0.    2   0   A35   .00
    159  145B      .0        .00     225.5    471.06   0        0.  .00000      .00   .00        0.    2  99   A35   .00
    159  146A    31.6      99.76     370.1    588.89   0        0.  .00000      .00   .00        0.    2   7   A35   .13
*****************************************************************************************************************************
*                                                       CONFLUENCE Q'S                                                      *
*    159  147A  TA 1159 QA   588.89 QAB  1013.41 QB   424.51     159  147B  TB 1154 QB   471.06 QBA   940.50 QA   469.43   *
*                                  159  147AB TAB 1157 QAB  1022.04 QA   566.67 QB   455.37                                 *
*****************************************************************************************************************************
                 SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac) Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  147AB  225.5     471.06     595.6   1022.04   1      590.  .08500      .00   .00        0.    2   0   A35   .00
    159  148A    16.2      42.06     611.8   1048.64   0        0.  .00000      .00   .00        0.    4   8   A35   .22
    159  149A      .0        .00     611.8   1048.64   1     1180.  .05100      .00   .00        0.    4  99   A35   .00
    159  150B    13.9      38.92      13.9     38.92   0        0.  .00000      .00   .00        0.    4   7   A35   .26
    159  151B    21.6      48.40      35.5     87.32   0        0.  .00000      .00   .00        0.    4  10   A35   .02
    159  152A    12.5      34.51     624.3   1050.71   0        0.  .00000      .00   .00        0.    4   7   A35   .18
*****************************************************************************************************************************
*                                                       CONFLUENCE Q'S                                                      *
*    159  153A  TA 1160 QA  1050.71 QAB  1092.19 QB    41.47     159  153B  TB 1154 QB    87.32 QBA   866.93 QA   779.60   *
*                                  159  153AB TAB 1159 QAB  1102.70 QA  1049.42 QB    53.27                                 *
*****************************************************************************************************************************
                 SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac) Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  153AB   35.5      87.32     659.8   1102.70   1      990.  .06100      .00   .00        0.    4   0   A35   .00
    159  154B     7.7      20.66       7.7     20.66   0        0.  .00000      .00   .00        0.    4   7   A35   .02
    159  155B    21.3      54.36      29.0     75.02   4     1470.  .03400     3.00   .00        0.    4   8   A35   .13
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	173.32	93.9	242.34	4	520.	.05800	3.00	.00	0.	2	10	A35	.02
159	157B	.0	.00	93.9	241.52	4	1760.	.04100	3.75	.00	0.	2	99	A35	.00
159	158B	33.8	70.11	127.7	303.81	0	0.	.00000	.00	.00	0.	4	12	A35	.16
159	159B	.0	.00	127.7	303.81	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	76.98	161.5	371.07	0	0.	.00000	.00	.00	0.	4	11	A35	.36
159	161B	.0	.00	161.5	371.07	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	24.30	671.3	1112.77	0	0.	.00000	.00	.00	0.	4	11	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1160 QA  1112.77 QAB  1469.48 QB   356.71     159  163B  TB 1158 QB   371.07 QBA  1428.52 QA  1057.45   *
*                                159  163AB TAB 1160 QAB  1469.48 QA  1112.77 QB   356.71                                 *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	371.07	832.8	1469.48	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	1469.22	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	50.51	854.7	1505.69	4	180.	.16700	9.50	.00	0.	4	11	A35	.42
159	166A	.0	.00	854.7	1505.43	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	36.01	200	37.88	300	41.03	400	44.55
500	48.86	600	54.08	700	60.86	800	70.39	900	84.46
1000	107.32	1050	135.20	1100	208.15	1110	246.67	1120	303.81
1130	373.13	1131	381.18	1132	388.68	1133	396.82	1134	405.01
1135	413.88	1136	423.09	1137	433.54	1138	444.74	1139	456.90
1140	469.74	1141	484.09	1142	499.47	1143	516.03	1144	533.52
1145	553.14	1146	575.37	1147	599.78	1148	626.27	1149	661.63
1150	706.50	1151	764.99	1152	847.08	1153	941.62	1154	1044.52
1155	1157.75	1156	1269.17	1157	1368.93	1158	1445.64	1159	1494.85
1160	1505.43	1161	1488.79	1162	1443.38	1163	1380.06	1164	1302.03
1165	1220.82	1166	1138.95	1167	1056.27	1168	978.57	1169	904.39
1170	838.72	1171	781.16	1172	734.82	1173	690.56	1174	648.63
1175	612.63	1176	580.29	1177	551.57	1178	525.66	1179	501.15
1180	478.68	1181	457.54	1182	437.69	1183	418.86	1184	401.63
1185	384.88	1186	369.14	1187	354.62	1188	340.79	1189	328.24
1190	316.62	1191	306.02	1192	296.29	1193	287.55	1194	279.42
1195	272.16	1196	265.53	1197	259.56	1198	254.04	1199	248.75
1200	243.67	1201	238.62	1202	233.72	1203	228.93	1204	224.31
1205	219.81	1206	215.46	1207	211.18	1208	206.85	1209	202.53
1210	198.18	1211	193.91	1212	189.83	1213	185.94	1214	182.20
1215	178.58	1216	174.98	1217	171.40	1218	167.95	1219	164.55
1220	161.26	1221	158.12	1222	155.12	1223	152.19	1224	149.31
1225	146.56	1226	143.88	1227	141.36	1228	139.01	1229	136.78
1230	134.65	1231	132.60	1232	130.41	1233	128.36	1234	126.43
1235	124.72	1236	123.12	1237	121.44	1238	119.80	1239	118.15
1240	116.57	1241	115.00	1242	113.54	1243	112.08	1244	110.63
1245	109.28	1246	107.89	1247	106.59	1248	105.34	1249	104.09
1250	102.95	1251	101.84	1252	100.77	1253	99.71	1254	98.71
1255	97.71	1256	96.69	1257	95.74	1258	94.73	1259	93.76
1260	92.83	1261	91.94	1262	91.08	1263	90.26	1264	89.45
1265	88.58	1266	87.73	1267	86.94	1268	86.21	1269	85.53
1270	84.82	1271	84.14	1272	83.45	1273	82.79	1274	82.17
1275	81.56	1276	80.95	1277	80.31	1278	79.60	1279	78.88
1280	78.20	1281	77.61	1282	76.99	1283	76.37	1284	75.81
1285	75.26	1286	74.71	1287	74.16	1288	73.66	1289	73.16
1290	72.67	1291	72.18	1292	71.67	1293	71.24	1294	70.80
1295	70.34	1296	69.94	1297	69.54	1298	69.14	1299	68.68
1300	68.31	1310	64.42	1320	61.02	1330	58.42	1340	56.01
1350	53.65	1360	51.25	1370	49.27	1380	47.48	1390	45.73
1400	44.04	1420	41.74	1440	39.50	1460	36.01	1500	36.01

TOTAL VOLUME THIS HYDROGRAPH = 197.98(Ac.Ft)

50-YEAR

(BURN)

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	18.88	8.1	18.88	0	0.	.00000	.00	.00	0.	2	13	A35	.21
159	109A	.0	.00	8.1	18.88	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	91.34	54.8	110.21	2	735.	.01400	.00	.00	0.	2	18	A35	.02
159	111A	.0	.00	54.8	108.67	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	27.23	16.2	27.23	4	270.	.01900	2.75	.00	0.	4	18	A35	.21
159	113AB	16.2	27.19	71.0	90.05	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	42.37	23.8	42.37	0	0.	.00000	.00	.00	0.	4	18	A35	.42
159	115AB	23.8	42.37	94.8	97.47	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	43.03	122.7	138.10	4	560.	.02300	3.50	.00	0.	4	21	A35	.21
159	117B	8.8	14.07	8.8	14.07	4	350.	.06600	2.00	.00	0.	4	22	A35	.42
159	118AB	8.8	14.07	131.5	151.59	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	21.17	138.5	157.54	1	210.	.54200	.00	.00	0.	4	6	A35	.21
159	120A	.0	.00	138.5	157.48	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	10.59	3.5	10.59	0	0.	.00000	.00	.00	0.	4	6	A35	.21
159	122B	.0	.00	3.5	10.59	1	510.	.43100	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  123A  TA 1156 QA   157.44 QAB   167.07 QB     9.63     159  123B  TB 1155 QB    10.29 QBA   166.72 QA   156.43   *
*                                159  123AB TAB 1156 QAB   167.07 QA   157.44 QB     9.63                                *
*****************************************************************************************************************
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	10.29	142.0	167.07	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	167.07	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	156.79	202.0	301.78	0	0.	.00000	.00	.00	0.	204	9	A35	.01
159	126A	.0	.00	202.0	301.78	1	550.	.13600	.00	.00	0.	204	99	A35	.00
159	127B	14.5	36.97	14.5	36.97	4	570.	.07000	2.00	.00	0.	4	9	A35	.42
159	128B	.0	.00	14.5	36.81	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	112.42	53.3	112.42	4	1260.	.03000	3.25	.00	0.	4	13	A35	.42
159	130C	.0	.00	53.3	111.74	0	0.	.00000	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  131B  TB 1155 QB    36.81 QBC   145.84 QC   109.02     159  131C  TC 1157 QC   111.74 QCB   146.85 QB    35.11   *
*                                159  131BC TBC 1156 QBC   147.51 QB    36.08 QC   111.43                                *
*****************************************************************************************************************
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	111.74	67.8	147.51	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	199.95	136.5	301.46	0	0.	.00000	.00	.00	0.	202	9	A35	.01
159	133AB	136.5	301.46	338.5	598.81	0	0.	.00000	.00	.00	0.	202	0	A35	.00
159	134A	.0	.00	338.5	598.81	1	1955.	.08700	.00	.00	0.	202	99	A35	.00
159	135B	15.8	28.97	15.8	28.97	2	165.	.09100	2.00	.00	0.	4	17	A35	.42
159	136B	.0	.00	15.8	28.97	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	4.39	1.3	4.39	1	320.	.53100	.00	.00	0.	4	5	A35	.21

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\cst_soilx_83.dat
STORM DAY 4

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*                                        CONFLUENCE Q'S                                                   *
*  159  138B  TB 1156 QB    28.94 QBC    32.23 QC     3.30    159  138C  TC 1154 QC    4.09 QCB    32.37 QB    28.28  *
*                     159  138BC TBC 1155 QBC    32.72 QB    28.85 QC     3.87                               *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	138BC	1.3	4.09	17.1	32.72	1	1600.	.33800	.00	.00	0.	4	0	A35	.00
159	139B	30.8	76.76	47.9	101.40	1	1880.	.09600	.00	.00	0.	204	10	A35	.01
159	140B	44.8	118.33	92.7	195.38	0	0.	.00000	.00	.00	0.	202	11	A35	.01
159	141C	61.2	154.41	61.2	154.41	0	0.	.00000	.00	.00	0.	202	12	A35	.01
159	142C	23.3	91.55	84.5	243.84	0	0.	.00000	.00	.00	0.	202	5	A35	.01
159	143C	48.3	121.78	132.8	363.96	0	0.	.00000	.00	.00	0.	202	12	A35	.05

```
*                                        CONFLUENCE Q'S                                                   *
*  159  144B  TB 1159 QB   195.38 QBC   467.78 QC   272.40    159  144C  TC 1153 QC   363.96 QCB   528.51 QB   164.55  *
*                     159  144BC TBC 1154 QBC   529.86 QB   172.64 QC   357.21                               *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	144BC	132.8	363.96	225.5	529.86	0	0.	.00000	.00	.00	0.	202	0	A35	.00
159	145B	.0	.00	225.5	529.86	0	0.	.00000	.00	.00	0.	202	99	A35	.00
159	146A	31.6	103.32	370.1	615.48	0	0.	.00000	.00	.00	0.	202	7	A35	.05

```
*                                        CONFLUENCE Q'S                                                   *
*  159  147A  TA 1159 QA   615.48 QAB  1083.27 QB   467.78    159  147B  TB 1154 QB   529.86 QBA  1025.27 QA   495.42  *
*                     159  147AB TAB 1157 QAB  1093.13 QA   594.62 QB   498.52                               *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	147AB	225.5	529.86	595.6	1093.13	1	590.	.08500	.00	.00	0.	202	0	A35	.00
159	148A	16.2	45.51	611.8	1124.42	0	0.	.00000	.00	.00	0.	204	8	A35	.22
159	149A	.0	.00	611.8	1124.42	1	1180.	.05100	.00	.00	0.	204	99	A35	.00
159	150B	13.9	38.92	13.9	38.92	0	0.	.00000	.00	.00	0.	4	7	A35	.26
159	151B	21.6	53.88	35.5	92.80	0	0.	.00000	.00	.00	0.	204	10	A35	.02
159	152A	12.5	34.51	624.3	1129.57	0	0.	.00000	.00	.00	0.	4	7	A35	.18

```
*                                        CONFLUENCE Q'S                                                   *
*  159  153A  TA 1159 QA  1129.57 QAB  1187.67 QB    58.10    159  153B  TB 1154 QB    92.80 QBA   957.52 QA   864.71  *
*                     159  153AB TAB 1158 QAB  1189.06 QA  1118.69 QB    70.37                               *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	153AB	35.5	92.80	659.8	1189.06	1	990.	.06100	.00	.00	0.	204	0	A35	.00
159	154B	7.7	22.80	7.7	22.80	0	0.	.00000	.00	.00	0.	204	7	A35	.02
159	155B	21.3	54.36	29.0	77.16	4	1470.	.03400	3.00	.00	0.	4	8	A35	.13

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	180.58	93.9	251.71	4	520.	.05800	3.00	.00	0.	202	10	A35	.02
159	157B	.0	.00	93.9	250.91	4	1760.	.04100	3.75	.00	0.	202	99	A35	.00
159	158B	33.8	70.11	127.7	312.70	0	0.	.00000	.00	.00	0.	4	12	A35	.16
159	159B	.0	.00	127.7	312.70	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	76.98	161.5	378.42	0	0.	.00000	.00	.00	0.	4	11	A35	.36
159	161B	.0	.00	161.5	378.42	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	27.14	671.3	1203.88	0	0.	.00000	.00	.00	0.	204	11	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1160 QA  1203.88 QAB  1570.59 QB   366.71     159  163B  TB 1158 QB   378.42 QBA  1537.75 QA  1159.33   *
*                                159  163AB TAB 1159 QAB  1572.49 QA  1194.47 QB   378.02                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	378.42	832.8	1572.49	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	1570.77	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	50.51	854.7	1608.47	4	180.	.16700	9.50	.00	0.	4	11	A35	.42
159	166A	.0	.00	854.7	1608.33	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	46.07	200	48.40	300	52.24	400	56.49
500	61.69	600	68.00	700	76.22	800	87.56	900	104.31
1000	131.45	1050	164.87	1100	243.13	1110	284.55	1120	346.38
1130	419.73	1131	427.92	1132	436.07	1133	444.35	1134	453.17
1135	462.34	1136	472.24	1137	483.02	1138	494.89	1139	507.54
1140	521.09	1141	536.02	1142	552.23	1143	569.76	1144	588.48
1145	609.25	1146	632.68	1147	658.33	1148	686.17	1149	721.20
1150	773.64	1151	845.32	1152	923.94	1153	1022.21	1154	1135.04
1155	1255.77	1156	1375.77	1157	1479.40	1158	1556.38	1159	1601.87
1160	1608.33	1161	1587.73	1162	1535.83	1163	1465.25	1164	1378.20
1165	1287.80	1166	1194.54	1167	1101.34	1168	1012.84	1169	931.31
1170	858.68	1171	797.37	1172	749.11	1173	708.80	1174	669.26
1175	632.57	1176	602.62	1177	574.80	1178	549.89	1179	526.74
1180	504.57	1181	484.13	1182	464.33	1183	445.85	1184	428.19
1185	411.89	1186	396.22	1187	381.53	1188	367.88	1189	355.29
1190	343.45	1191	332.89	1192	322.83	1193	313.98	1194	306.03
1195	299.02	1196	292.50	1197	286.36	1198	280.57	1199	275.05
1200	269.67	1201	264.48	1202	259.41	1203	254.53	1204	249.90
1205	245.35	1206	240.85	1207	236.27	1208	231.57	1209	226.83
1210	222.27	1211	217.99	1212	213.91	1213	209.90	1214	205.82
1215	201.85	1216	197.93	1217	194.08	1218	190.38	1219	186.76
1220	183.28	1221	180.00	1222	176.87	1223	173.82	1224	170.79
1225	167.88	1226	165.06	1227	162.45	1228	160.04	1229	157.71
1230	155.52	1231	153.32	1232	151.13	1233	149.00	1234	146.92
1235	144.97	1236	143.12	1237	141.23	1238	139.42	1239	137.62
1240	135.89	1241	134.16	1242	132.56	1243	131.00	1244	129.58
1245	128.14	1246	126.71	1247	125.37	1248	124.10	1249	122.83
1250	121.63	1251	120.41	1252	119.19	1253	117.96	1254	116.81
1255	115.67	1256	114.53	1257	113.46	1258	112.34	1259	111.28
1260	110.26	1261	109.30	1262	108.37	1263	107.48	1264	106.59
1265	105.65	1266	104.73	1267	103.89	1268	103.11	1269	102.39
1270	101.64	1271	100.94	1272	100.23	1273	99.53	1274	98.86
1275	98.16	1276	97.45	1277	96.69	1278	95.85	1279	95.02
1280	94.24	1281	93.56	1282	92.86	1283	92.17	1284	91.55
1285	90.95	1286	90.33	1287	89.71	1288	89.14	1289	88.57
1290	88.03	1291	87.49	1292	86.94	1293	86.47	1294	85.99
1295	85.48	1296	85.01	1297	84.55	1298	84.11	1299	83.60
1300	83.17	1310	78.61	1320	74.74	1330	71.83	1340	69.04
1350	66.27	1360	63.45	1370	61.10	1380	59.10	1390	56.98
1400	54.99	1420	52.39	1440	49.78	1460	46.07	1500	46.07

TOTAL VOLUME THIS HYDROGRAPH = 232.77(Ac.Ft)

Post-development
(Watershed)

2-YEAR

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     Program Package Serial Number:  2061
03/30/11   FILE: HPBP     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     1
                                          LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                  PROG F0601M

                 MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR =  2  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                   STORM DAY 4
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  108A     8.1       4.01       8.1      4.01   0       0.   .00000      .00   .00        0.    2  30   A35   .21
      159  109A      .0        .00       8.1      4.01   4     135.  2.00000     2.00   .00        0.    2  99   A35   .00
      159  110A    46.7      21.63      54.8     25.64   2     735.   .01400      .00   .00        0.    2  30   A35   .02
      159  111A      .0        .00      54.8     25.36   2    1660.   .00200      .00   .00        0.    2  99   A35   .00
      159  112B    16.2       5.41      16.2      5.41   4     270.   .01900     2.75   .00        0.    4  30   A35   .21
      159  113AB   16.2       5.41      71.0     20.72   1     735.   .01400      .00   .00        0.    4   0   A35   .00
      159  114B    23.8       9.79      23.8      9.79   0       0.   .00000      .00   .00        0.    4  30   A35   .42
      159  115AB   23.8       9.79      94.8     22.10   0       0.   .00000      .00   .00        0.    4   0   A35   .00
      159  116A    27.9       9.31     122.7     27.94   4     560.   .02300     3.50   .00        0.    4  30   A35   .21
      159  117B     8.8       3.62       8.8      3.62   4     350.   .06600     2.00   .00        0.    4  30   A35   .42
      159  118AB    8.8       3.62     131.5     31.32   4     220.   .16800     3.50   .00        0.    4   0   A35   .00
      159  119A     7.0       3.69     138.5     33.83   1     210.   .54200      .00   .00        0.    4  16   A35   .21
      159  120A      .0        .00     138.5     33.81   1     215.   .27900      .00   .00        0.    4  99   A35   .00
      159  121B     3.5       1.93       3.5      1.93   0       0.   .00000      .00   .00        0.    4  15   A35   .21
      159  122B      .0        .00       3.5      1.93   1     510.   .43100      .00   .00        0.    4  99   A35   .00
 ************************************************************************************************************************
 *                                                   CONFLUENCE Q'S                                                     *
 *    159  123A  TA 1164 QA    33.77 QAB    35.40 QB     1.63     159  123B  TB 1158 QB     1.89 QBA    34.08 QA    32.19   *
 *                                159  123AB TAB 1164 QAB    35.40 QA    33.77 QB     1.63                                 *
 ************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  123AB    3.5       1.89     142.0     35.40   0       0.   .00000      .00   .00        0.    4   0   A35   .00
      159  124A      .0        .00     142.0     35.40   1    1675.   .17900      .00   .00        0.    4  99   A35   .00
      159  125A    60.0      15.60     202.0     48.95   0       0.   .00000      .00   .00        0.    4  30   A35   .01
      159  126A      .0        .00     202.0     48.95   1     550.   .13600      .00   .00        0.    4  99   A35   .00
      159  127B    14.5       7.28      14.5      7.28   4     570.   .07000     2.00   .00        0.    4  22   A35   .42
      159  128B      .0        .00      14.5      7.28   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  129C    53.3      21.91      53.3     21.91   4    1260.   .03000     3.25   .00        0.    4  30   A35   .42
      159  130C      .0        .00      53.3     21.88   0       0.   .00000      .00   .00        0.    4  99   A35   .00
 ************************************************************************************************************************
 *                                                   CONFLUENCE Q'S                                                     *
 *    159  131B  TB 1158 QB     7.28 QBC    28.81 QC    21.53     159  131C  TC 1161 QC    21.88 QCB    29.00 QB     7.12   *
 *                                159  131BC TBC 1160 QBC    29.03 QB     7.19 QC    21.84                                 *
 ************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  131BC   53.3      21.88      67.8     29.03   1    2640.   .21200      .00   .00        0.    4   0   A35   .00
      159  132B    68.7      37.14     136.5     60.05   0       0.   .00000      .00   .00        0.    2  23   A35   .01
      159  133AB  136.5      60.05     338.5    108.52   0       0.   .00000      .00   .00        0.    2   0   A35   .00
      159  134A      .0        .00     338.5    108.52   1    1955.   .08700      .00   .00        0.    2  99   A35   .00
      159  135B    15.8       6.50      15.8      6.50   2     165.   .09100     2.00   .00        0.    4  30   A35   .42
      159  136B      .0        .00      15.8      6.50   4     300.   .11700     3.00   .00        0.    4  99   A35   .00
      159  137C     1.3        .83       1.3       .83   1     320.   .53100      .00   .00        0.    4  12   A35   .21
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              MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR =  2  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                        STORM DAY 4
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL     RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)  Z      Q(CFS) NAME  TC  ZONE  IMPV
*******************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                *
*    159  138B  TB 1160 QB     6.49 QBC     7.25 QC      .76     159  138C  TC 1157 QC      .82 QCB     7.26 QB     6.44  *
*                               159  138BC TBC 1158 QBC     7.28 QB     6.47 QC      .81                           *
*******************************************************************************************************************
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL     RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)  Z      Q(CFS) NAME  TC  ZONE  IMPV
    159  138BC    1.3        .82       17.1      7.28   1     1600.  .33800      .00   .00        0.    4   0   A35   .00
    159  139B    59.1      15.58       76.2     22.06   1     1880.  .09600      .00   .00        0.    4  30   A35   .02
    159  140B    16.5      10.82       92.7     28.19   0        0.  .00000      .00   .00        0.    2  20   A35   .40
    159  141C    61.2      28.24       61.2     28.24   0        0.  .00000      .00   .00        0.    2  30   A35   .01
    159  142C    23.3      18.56       84.5     46.44   0        0.  .00000      .00   .00        0.    2  12   A35   .01
    159  143C    48.3      23.10      132.8     69.38   0        0.  .00000      .00   .00        0.    2  29   A35   .05
*******************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                *
*    159  144B  TB 1168 QB    28.19 QBC    78.62 QC    50.43     159  144C  TC 1156 QC    69.38 QCB    86.32 QB    16.93  *
*                               159  144BC TBC 1160 QBC    89.46 QB    22.26 QC    67.21                           *
*******************************************************************************************************************
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL     RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)  Z      Q(CFS) NAME  TC  ZONE  IMPV
    159  144BC  132.8      69.38      225.5     89.46   0        0.  .00000      .00   .00        0.    2   0   A35   .00
    159  145B      .0        .00      225.5     89.46   0        0.  .00000      .00   .00        0.    2  99   A35   .00
    159  146A    31.6      22.50      370.1    111.55   0        0.  .00000      .00   .00        0.    2  16   A35   .23
*******************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                *
*    159  147A  TA 1167 QA   111.55 QAB   190.96 QB    79.41     159  147B  TB 1160 QB    89.46 QBA   182.83 QA    93.37  *
*                               159  147AB TAB 1166 QAB   191.23 QA   110.93 QB    80.30                           *
*******************************************************************************************************************
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL     RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)  Z      Q(CFS) NAME  TC  ZONE  IMPV
    159  147AB  225.5      89.46      595.6    191.23   1      590.  .08500      .00   .00        0.    2   0   A35   .00
    159  148A    16.2       8.01      611.8    197.74   0        0.  .00000      .00   .00        0.    4  22   A35   .40
    159  149A      .0        .00      611.8    197.74   1     1180.  .05100      .00   .00        0.    4  99   A35   .00
    159  150B    13.9       8.72       13.9      8.72   0        0.  .00000      .00   .00        0.    4  15   A35   .40
    159  151B    21.6       5.70       35.5     14.29   0        0.  .00000      .00   .00        0.    4  30   A35   .02
    159  152A    12.5       7.25      624.3    198.53   0        0.  .00000      .00   .00        0.    4  17   A35   .40
*******************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                *
*    159  153A  TA 1170 QA   198.53 QAB   205.00 QB     6.47     159  153B  TB 1155 QB    14.29 QBA   136.95 QA   122.66  *
*                               159  153AB TAB 1168 QAB   205.45 QA   198.36 QB     7.09                           *
*******************************************************************************************************************
                  SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL     RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)  Z      Q(CFS) NAME  TC  ZONE  IMPV
    159  153AB   35.5      14.29      659.8    205.45   1      990.  .06100      .00   .00        0.    4   0   A35   .00
    159  154B     7.7       2.41        7.7      2.41   0        0.  .00000      .00   .00        0.    4  25   A35   .02
    159  155B    21.3      12.35       29.0     14.75   4     1470.  .03400     3.00   .00        0.    4  17   A35   .40
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	33.57	93.9	47.90	4	520.	.05800	3.00	.00	0.	2	25	A35	.02
159	157B	.0	.00	93.9	47.88	4	1760.	.04100	2.00	.00	0.	2	99	A35	.00
159	158B	33.8	11.16	127.7	58.20	0	0.	.00000	.00	.00	0.	4	30	A35	.20
159	159B	.0	.00	127.7	58.20	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	13.83	161.5	71.33	0	0.	.00000	.00	.00	0.	4	28	A35	.36
159	161B	.0	.00	161.5	71.33	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	3.03	671.3	207.43	0	0.	.00000	.00	.00	0.	4	30	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1171 QA   207.43 QAB   271.78 QB    64.35     159  163B  TB 1164 QB    71.33 QBA   262.12 QA   190.78   *
*                                159  163AB TAB 1168 QAB   274.47 QA   205.67 QB    68.79                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	71.33	832.8	274.47	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	274.33	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	9.45	854.7	282.51	4	180.	.16700	9.50	.00	0.	4	28	A35	.42
159	166A	.0	.00	854.7	282.48	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	11.91	200	12.25	300	12.86	400	13.56
500	14.39	600	15.43	700	16.76	800	18.52	900	21.10
1000	27.37	1050	36.23	1100	51.77	1110	56.15	1120	63.09
1130	74.26	1131	75.44	1132	76.71	1133	78.05	1134	79.38
1135	80.79	1136	82.23	1137	83.75	1138	85.33	1139	86.97
1140	88.66	1141	90.46	1142	92.34	1143	94.32	1144	96.42
1145	98.74	1146	101.25	1147	104.11	1148	107.48	1149	112.12
1150	118.01	1151	125.02	1152	133.53	1153	143.19	1154	153.46
1155	164.04	1156	175.62	1157	187.82	1158	201.20	1159	214.66
1160	227.54	1161	239.29	1162	249.59	1163	258.37	1164	265.52
1165	271.60	1166	276.28	1167	279.77	1168	281.80	1169	282.48
1170	282.08	1171	280.86	1172	278.99	1173	276.40	1174	273.03
1175	268.94	1176	264.08	1177	257.70	1178	249.84	1179	241.95
1180	233.61	1181	224.98	1182	216.25	1183	207.91	1184	199.81
1185	192.08	1186	184.24	1187	176.51	1188	168.58	1189	160.85
1190	153.47	1191	146.44	1192	139.92	1193	133.84	1194	128.32
1195	123.25	1196	118.54	1197	114.03	1198	109.71	1199	105.76
1200	101.97	1201	98.45	1202	95.09	1203	91.94	1204	88.92
1205	86.04	1206	83.30	1207	80.71	1208	78.27	1209	75.98
1210	73.87	1211	71.94	1212	70.09	1213	68.34	1214	66.73
1215	65.24	1216	63.85	1217	62.54	1218	61.46	1219	60.36
1220	59.26	1221	58.31	1222	57.38	1223	56.54	1224	55.73
1225	54.99	1226	54.27	1227	53.59	1228	52.93	1229	52.29
1230	51.67	1231	51.06	1232	50.44	1233	49.84	1234	49.23
1235	48.64	1236	48.06	1237	47.46	1238	46.87	1239	46.27
1240	45.68	1241	45.09	1242	44.53	1243	43.96	1244	43.39
1245	42.83	1246	42.26	1247	41.70	1248	41.14	1249	40.58
1250	40.03	1251	39.49	1252	38.96	1253	38.44	1254	37.93
1255	37.43	1256	36.93	1257	36.45	1258	35.97	1259	35.51
1260	35.06	1261	34.61	1262	34.19	1263	33.77	1264	33.35
1265	32.96	1266	32.59	1267	32.23	1268	31.89	1269	31.55
1270	31.21	1271	30.87	1272	30.53	1273	30.20	1274	29.88
1275	29.55	1276	29.24	1277	28.93	1278	28.62	1279	28.31
1280	28.02	1281	27.73	1282	27.44	1283	27.20	1284	26.91
1285	26.65	1286	26.39	1287	26.14	1288	25.90	1289	25.65
1290	25.42	1291	25.20	1292	24.98	1293	24.79	1294	24.59
1295	24.39	1296	24.20	1297	24.01	1298	23.82	1299	23.64
1300	23.46	1310	21.76	1320	20.31	1330	19.14	1340	18.16
1350	17.31	1360	16.55	1370	15.90	1380	15.34	1390	14.89
1400	14.41	1420	13.73	1440	13.09	1460	11.91	1500	11.91

TOTAL VOLUME THIS HYDROGRAPH = 55.35(Ac.Ft))

2-YEAR

(BURN)

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	4.01	8.1	4.01	0	0.	.00000	.00	.00	0.	2	30	A35	.21
159	109A	.0	.00	8.1	4.01	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	21.63	54.8	25.64	2	735.	.01400	.00	.00	0.	2	30	A35	.02
159	111A	.0	.00	54.8	25.36	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	5.41	16.2	5.41	4	270.	.01900	2.75	.00	0.	4	30	A35	.21
159	113AB	16.2	5.41	71.0	20.72	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	9.79	23.8	9.79	0	0.	.00000	.00	.00	0.	4	30	A35	.42
159	115AB	23.8	9.79	94.8	22.10	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	9.31	122.7	27.94	4	560.	.02300	3.50	.00	0.	4	30	A35	.21
159	117B	8.8	3.62	8.8	3.62	4	350.	.06600	2.00	.00	0.	4	30	A35	.42
159	118AB	8.8	3.62	131.5	31.32	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	3.69	138.5	33.83	1	210.	.54200	.00	.00	0.	4	16	A35	.21
159	120A	.0	.00	138.5	33.81	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	1.93	3.5	1.93	0	0.	.00000	.00	.00	0.	4	15	A35	.21
159	122B	.0	.00	3.5	1.93	1	510.	.43100	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  123A  TA 1164 QA    33.77 QAB    35.40 QB     1.63     159  123B  TB 1158 QB     1.89 QBA    34.08 QA    32.19   *
*                                159  123AB TAB 1164 QAB    35.40 QA    33.77 QB     1.63                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	1.89	142.0	35.40	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	35.40	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	22.01	202.0	55.21	0	0.	.00000	.00	.00	0.	204	30	A35	.01
159	126A	.0	.00	202.0	55.21	1	550.	.13600	.00	.00	0.	204	99	A35	.00
159	127B	14.5	7.28	14.5	7.28	4	570.	.07000	2.00	.00	0.	4	22	A35	.42
159	128B	.0	.00	14.5	7.28	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	21.91	53.3	21.91	4	1260.	.03000	3.25	.00	0.	4	30	A35	.42
159	130C	.0	.00	53.3	21.88	0	0.	.00000	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  131B  TB 1158 QB     7.28 QBC    28.81 QC    21.53     159  131C  TC 1161 QC    21.88 QCB    29.00 QB     7.12   *
*                                159  131BC TBC 1160 QBC    29.03 QB     7.19 QC    21.84                                 *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	21.88	67.8	29.03	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	41.44	136.5	64.16	0	0.	.00000	.00	.00	0.	202	23	A35	.01
159	133AB	136.5	64.16	338.5	118.86	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	134A	.0	.00	338.5	118.86	1	1955.	.08700	.00	.00	0.	2	99	A35	.00
159	135B	15.8	6.50	15.8	6.50	2	165.	.09100	2.00	.00	0.	4	30	A35	.42
159	136B	.0	.00	15.8	6.50	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	.83	1.3	.83	1	320.	.53100	.00	.00	0.	4	12	A35	.21

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

CONFLUENCE Q'S

159 138B TB 1160 QB 6.49 QBC 7.25 QC .76 159 138C TC 1157 QC .82 QCB 7.26 QB 6.44
159 138BC TBC 1158 QBC 7.28 QB 6.47 QC .81

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	138BC	1.3	.82	17.1	7.28	1	1600.	.33800	.00	.00	0.	4	0	A35	.00
159	139B	59.1	21.84	76.2	28.28	1	1880.	.09600	.00	.00	0.	204	30	A35	.02
159	140B	16.5	10.82	92.7	35.01	0	0.	.00000	.00	.00	0.	2	20	A35	.40
159	141C	61.2	31.75	61.2	31.75	0	0.	.00000	.00	.00	0.	202	30	A35	.01
159	142C	23.3	20.25	84.5	51.62	0	0.	.00000	.00	.00	0.	202	12	A35	.01
159	143C	48.3	25.78	132.8	77.23	0	0.	.00000	.00	.00	0.	202	29	A35	.05

CONFLUENCE Q'S

159 144B TB 1168 QB 35.01 QBC 92.09 QC 57.08 159 144C TC 1156 QC 77.23 QCB 100.37 QB 23.14
159 144BC TBC 1160 QBC 104.54 QB 29.56 QC 74.98

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	144BC	132.8	77.23	225.5	104.54	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	145B	.0	.00	225.5	104.54	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	146A	31.6	22.50	370.1	122.89	0	0.	.00000	.00	.00	0.	2	16	A35	.23

CONFLUENCE Q'S

159 147A TA 1167 QA 122.89 QAB 215.97 QB 93.08 159 147B TB 1160 QB 104.54 QBA 209.49 QA 104.94
159 147AB TAB 1164 QAB 217.34 QA 119.71 QB 97.64

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	147AB	225.5	104.54	595.6	217.34	1	590.	.08500	.00	.00	0.	2	0	A35	.00
159	148A	16.2	8.01	611.8	223.70	0	0.	.00000	.00	.00	0.	4	22	A35	.40
159	149A	.0	.00	611.8	223.70	1	1180.	.05100	.00	.00	0.	4	99	A35	.00
159	150B	13.9	8.72	13.9	8.72	0	0.	.00000	.00	.00	0.	4	15	A35	.40
159	151B	21.6	7.98	35.5	16.56	0	0.	.00000	.00	.00	0.	204	30	A35	.02
159	152A	12.5	7.25	624.3	224.95	0	0.	.00000	.00	.00	0.	4	17	A35	.40

CONFLUENCE Q'S

159 153A TA 1168 QA 224.95 QAB 234.24 QB 9.28 159 153B TB 1155 QB 16.56 QBA 160.01 QA 143.44
159 153AB TAB 1167 QAB 234.39 QA 224.33 QB 10.06

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	153AB	35.5	16.56	659.8	234.39	1	990.	.06100	.00	.00	0.	4	0	A35	.00
159	154B	7.7	3.27	7.7	3.27	0	0.	.00000	.00	.00	0.	204	25	A35	.02
159	155B	21.3	12.35	29.0	15.61	4	1470.	.03400	3.00	.00	0.	4	17	A35	.40

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	37.48	93.9	52.68	4	520.	.05800	3.00	.00	0.	202	25	A35	.02
159	157B	.0	.00	93.9	52.66	4	1760.	.04100	2.25	.00	0.	2	99	A35	.00
159	158B	33.8	11.16	127.7	63.29	0	0.	.00000	.00	.00	0.	4	30	A35	.20
159	159B	.0	.00	127.7	63.29	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	13.83	161.5	76.53	0	0.	.00000	.00	.00	0.	4	28	A35	.36
159	161B	.0	.00	161.5	76.53	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	4.25	671.3	237.47	0	0.	.00000	.00	.00	0.	204	30	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1170 QA   237.47 QAB   307.40 QB    69.93     159  163B  TB 1163 QB    76.53 QBA   290.52 QA   213.99   *
*                                159  163AB TAB 1168 QAB   309.33 QA   236.39 QB    72.94                                 *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	76.53	832.8	309.33	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	309.11	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	9.45	854.7	317.26	4	180.	.16700	9.50	.00	0.	4	28	A35	.42
159	166A	.0	.00	854.7	317.25	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	15.49	200	15.96	300	16.78	400	17.72
500	18.84	600	20.22	700	21.99	800	24.36	900	27.79
1000	35.49	1050	45.94	1100	64.10	1110	69.31	1120	77.48
1130	90.16	1131	91.57	1132	92.99	1133	94.51	1134	96.05
1135	97.66	1136	99.33	1137	101.09	1138	102.93	1139	104.86
1140	106.84	1141	108.93	1142	111.11	1143	113.39	1144	115.80
1145	118.41	1146	121.27	1147	124.62	1148	128.52	1149	133.94
1150	140.64	1151	148.26	1152	157.23	1153	167.65	1154	178.85
1155	190.56	1156	203.80	1157	217.75	1158	232.10	1159	246.57
1160	260.60	1161	272.74	1162	283.63	1163	292.64	1164	300.44
1165	306.68	1166	311.66	1167	315.01	1168	316.95	1169	317.25
1170	316.52	1171	314.78	1172	312.39	1173	309.20	1174	305.24
1175	300.54	1176	295.05	1177	288.00	1178	279.41	1179	270.66
1180	261.61	1181	251.98	1182	242.49	1183	233.19	1184	224.01
1185	215.01	1186	206.06	1187	197.24	1188	188.49	1189	180.26
1190	171.99	1191	164.22	1192	157.11	1193	150.41	1194	144.26
1195	138.44	1196	133.07	1197	128.08	1198	123.70	1199	119.39
1200	115.10	1201	111.12	1202	107.30	1203	103.71	1204	100.30
1205	97.10	1206	94.10	1207	91.30	1208	88.65	1209	86.16
1210	83.86	1211	81.71	1212	79.71	1213	77.85	1214	76.09
1215	74.48	1216	72.97	1217	71.57	1218	70.27	1219	69.09
1220	68.00	1221	66.99	1222	66.03	1223	65.11	1224	64.25
1225	63.44	1226	62.74	1227	61.99	1228	61.27	1229	60.58
1230	59.89	1231	59.22	1232	58.53	1233	57.86	1234	57.18
1235	56.53	1236	55.88	1237	55.23	1238	54.56	1239	53.89
1240	53.22	1241	52.54	1242	51.88	1243	51.21	1244	50.55
1245	49.90	1246	49.25	1247	48.63	1248	48.00	1249	47.38
1250	46.78	1251	46.19	1252	45.62	1253	45.05	1254	44.50
1255	43.97	1256	43.43	1257	42.92	1258	42.41	1259	41.94
1260	41.48	1261	41.05	1262	40.62	1263	40.19	1264	39.76
1265	39.34	1266	38.92	1267	38.51	1268	38.09	1269	37.69
1270	37.28	1271	36.89	1272	36.50	1273	36.12	1274	35.76
1275	35.40	1276	35.05	1277	34.71	1278	34.37	1279	34.04
1280	33.73	1281	33.43	1282	33.12	1283	32.83	1284	32.56
1285	32.30	1286	32.05	1287	31.79	1288	31.54	1289	31.29
1290	31.04	1291	30.79	1292	30.55	1293	30.31	1294	30.07
1295	29.83	1296	29.61	1297	29.38	1298	29.17	1299	28.95
1300	28.75	1310	26.88	1320	25.31	1330	23.98	1340	22.85
1350	21.89	1360	20.99	1370	20.24	1380	19.57	1390	18.99
1400	18.43	1420	17.57	1440	16.82	1460	15.49	1500	15.49

TOTAL VOLUME THIS HYDROGRAPH = 68.18(Ac.Ft)

5-YEAR

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     Program Package Serial Number:  2061
03/30/11   FILE: HPBP     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     1
                                        LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                   PROG F0601M

                 MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR =  5  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                   STORM DAY 4
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  108A      8.1       7.45       8.1      7.45   0       0.   .00000      .00   .00        0.    2  24   A35   .21
     159  109A       .0        .00       8.1      7.45   4     135.  2.00000     2.00   .00        0.    2  99   A35   .00
     159  110A     46.7      36.48      54.8     43.93   2     735.   .01400      .00   .00        0.    2  30   A35   .02
     159  111A       .0        .00      54.8     43.59   2    1660.   .00200      .00   .00        0.    2  99   A35   .00
     159  112B     16.2      10.05      16.2     10.05   4     270.   .01900     2.75   .00        0.    4  30   A35   .21
     159  113AB    16.2      10.05      71.0     38.51   1     735.   .01400      .00   .00        0.    4   0   A35   .00
     159  114B     23.8      16.80      23.8     16.80   0       0.   .00000      .00   .00        0.    4  30   A35   .42
     159  115AB    23.8      16.80      94.8     42.84   0       0.   .00000      .00   .00        0.    4   0   A35   .00
     159  116A     27.9      17.30     122.7     54.58   4     560.   .02300     3.50   .00        0.    4  30   A35   .21
     159  117B      8.8       6.21       8.8      6.21   4     350.   .06600     2.00   .00        0.    4  30   A35   .42
     159  118AB     8.8       6.21     131.5     60.43   4     220.   .16800     3.50   .00        0.    4   0   A35   .00
     159  119A      7.0       7.65     138.5     64.45   1     210.   .54200      .00   .00        0.    4  12   A35   .21
     159  120A       .0        .00     138.5     64.36   1     215.   .27900      .00   .00        0.    4  99   A35   .00
     159  121B      3.5       4.04       3.5      4.04   0       0.   .00000      .00   .00        0.    4  11   A35   .21
     159  122B       .0        .00       3.5      4.04   1     510.   .43100      .00   .00        0.    4  99   A35   .00
*****************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                   *
*    159  123A  TA 1161 QA    64.34 QAB    67.75 QB     3.41     159  123B  TB 1157 QB     3.98 QBA    65.93 QA    61.95   *
*                                159  123AB TAB 1161 QAB    67.75 QA    64.34 QB     3.41                                   *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  123AB     3.5       3.98     142.0     67.75   0       0.   .00000      .00   .00        0.    4   0   A35   .00
     159  124A       .0        .00     142.0     67.75   1    1675.   .17900      .00   .00        0.    4  99   A35   .00
     159  125A     60.0      43.28     202.0    105.69   0       0.   .00000      .00   .00        0.    4  20   A35   .01
     159  126A       .0        .00     202.0    105.69   1     550.   .13600      .00   .00        0.    4  99   A35   .00
     159  127B     14.5      14.73      14.5     14.73   4     570.   .07000     2.00   .00        0.    4  16   A35   .42
     159  128B       .0        .00      14.5     14.71   0       0.   .00000      .00   .00        0.    4  99   A35   .00
     159  129C     53.3      42.97      53.3     42.97   4    1260.   .03000     3.25   .00        0.    4  24   A35   .42
     159  130C       .0        .00      53.3     42.89   0       0.   .00000      .00   .00        0.    4  99   A35   .00
*****************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                   *
*    159  131B  TB 1156 QB    14.71 QBC    56.38 QC    41.68     159  131C  TC 1159 QC    42.89 QCB    57.20 QB    14.31   *
*                                159  131BC TBC 1158 QBC    57.31 QB    14.51 QC    42.80                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  131BC    53.3      42.89      67.8     57.31   1    2640.   .21200      .00   .00        0.    4   0   A35   .00
     159  132B     68.7      74.00     136.5    119.28   0       0.   .00000      .00   .00        0.    2  17   A35   .01
     159  133AB   136.5     119.28     338.5    224.03   0       0.   .00000      .00   .00        0.    2   0   A35   .00
     159  134A       .0        .00     338.5    224.03   1    1955.   .08700      .00   .00        0.    2  99   A35   .00
     159  135B     15.8      11.16      15.8     11.16   2     165.   .09100     2.00   .00        0.    4  30   A35   .42
     159  136B       .0        .00      15.8     11.15   4     300.   .11700     3.00   .00        0.    4  99   A35   .00
     159  137C      1.3       1.68       1.3      1.68   1     320.   .53100      .00   .00        0.    4   9   A35   .21
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              MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR =  5  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                               STORM DAY 4
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
*************************************************************************************************************************
*                                                        CONFLUENCE Q'S                                                  *
*    159  138B  TB 1160 QB    11.15 QBC    12.37 QC     1.22     159  138C  TC 1156 QC     1.65 QCB    12.65 QB    11.00   *
*                                 159  138BC TBC 1157 QBC    12.70 QB    11.08 QC     1.62                               *
*************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  138BC    1.3       1.65       17.1     12.70   1    1600.  .33800      .00   .00        0.    4   0   A35   .00
    159  139B    59.1      32.07       76.2     43.97   1    1880.  .09600      .00   .00        0.    4  30   A35   .02
    159  140B    16.5      19.42       92.7     55.78   0       0.  .00000      .00   .00        0.    2  16   A35   .40
    159  141C    61.2      54.31       61.2     54.31   0       0.  .00000      .00   .00        0.    2  24   A35   .01
    159  142C    23.3      35.52       84.5     89.01   0       0.  .00000      .00   .00        0.    2   9   A35   .01
    159  143C    48.3      44.21      132.8    133.06   0       0.  .00000      .00   .00        0.    2  23   A35   .05
*************************************************************************************************************************
*                                                        CONFLUENCE Q'S                                                  *
*    159  144B  TB 1164 QB    55.78 QBC   155.31 QC    99.53     159  144C  TC 1155 QC   133.06 QCB   172.26 QB    39.20   *
*                                 159  144BC TBC 1157 QBC   175.80 QB    44.44 QC   131.36                               *
*************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  144BC  132.8     133.06      225.5    175.80   0       0.  .00000      .00   .00        0.    2   0   A35   .00
    159  145B      .0        .00      225.5    175.80   0       0.  .00000      .00   .00        0.    2  99   A35   .00
    159  146A    31.6      42.27      370.1    232.09   0       0.  .00000      .00   .00        0.    2  12   A35   .23
*************************************************************************************************************************
*                                                        CONFLUENCE Q'S                                                  *
*    159  147A  TA 1164 QA   232.09 QAB   387.39 QB   155.31     159  147B  TB 1157 QB   175.80 QBA   369.61 QA   193.81   *
*                                 159  147AB TAB 1161 QAB   389.57 QA   226.29 QB   163.28                               *
*************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  147AB  225.5     175.80      595.6    389.57   1     590.  .08500      .00   .00        0.    2   0   A35   .00
    159  148A    16.2      16.94      611.8    403.69   0       0.  .00000      .00   .00        0.    4  15   A35   .40
    159  149A      .0        .00      611.8    403.69   1    1180.  .05100      .00   .00        0.    4  99   A35   .00
    159  150B    13.9      16.38       13.9     16.38   0       0.  .00000      .00   .00        0.    4  12   A35   .40
    159  151B    21.6      15.16       35.5     31.49   0       0.  .00000      .00   .00        0.    4  21   A35   .02
    159  152A    12.5      14.73      624.3    405.69   0       0.  .00000      .00   .00        0.    4  12   A35   .40
*************************************************************************************************************************
*                                                        CONFLUENCE Q'S                                                  *
*    159  153A  TA 1164 QA   405.69 QAB   425.49 QB    19.79     159  153B  TB 1155 QB    31.49 QBA   311.77 QA   280.28   *
*                                 159  153AB TAB 1163 QAB   426.00 QA   403.89 QB    22.10                               *
*************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  153AB   35.5      31.49      659.8    426.00   1     990.  .06100      .00   .00        0.    4   0   A35   .00
    159  154B     7.7       7.37        7.7      7.37   0       0.  .00000      .00   .00        0.    4  13   A35   .02
    159  155B    21.3      24.01       29.0     31.38   4    1470.  .03400     3.00   .00        0.    4  13   A35   .40
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 5 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	65.77	93.9	96.24	4	520.	.05800	3.00	.00	0.	2	19	A35	.02
159	157B	.0	.00	93.9	96.13	4	1760.	.04100	2.75	.00	0.	2	99	A35	.00
159	158B	33.8	24.34	127.7	119.45	0	0.	.00000	.00	.00	0.	4	26	A35	.30
159	159B	.0	.00	127.7	119.45	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	30.28	161.5	147.69	0	0.	.00000	.00	.00	0.	4	19	A35	.36
159	161B	.0	.00	161.5	147.69	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	7.57	671.3	430.80	0	0.	.00000	.00	.00	0.	4	23	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1165 QA   430.80 QAB   570.51 QB   139.71     159  163B  TB 1161 QB   147.69 QBA   546.49 QA   398.81   *
*                                159  163AB TAB 1164 QAB   571.06 QA   428.13 QB   142.93                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	147.69	832.8	571.06	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	570.60	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	19.62	854.7	587.42	4	180.	.16700	9.50	.00	0.	4	20	A35	.42
159	166A	.0	.00	854.7	587.37	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 5 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	18.22	200	18.77	300	19.72	400	20.85
500	22.21	600	24.13	700	27.77	800	33.21	900	40.90
1000	53.68	1050	68.62	1100	94.87	1110	103.29	1120	118.12
1130	143.32	1131	146.33	1132	149.42	1133	152.61	1134	155.98
1135	159.45	1136	163.16	1137	167.08	1138	171.27	1139	175.66
1140	180.31	1141	185.26	1142	190.59	1143	196.42	1144	202.75
1145	209.72	1146	217.38	1147	225.70	1148	234.84	1149	246.59
1150	261.55	1151	278.53	1152	298.98	1153	322.49	1154	349.07
1155	377.50	1156	408.47	1157	440.95	1158	473.61	1159	503.51
1160	529.76	1161	550.95	1162	567.78	1163	579.33	1164	585.86
1165	587.37	1166	585.45	1167	580.17	1168	571.77	1169	559.34
1170	544.55	1171	528.06	1172	509.08	1173	488.49	1174	468.57
1175	449.10	1176	429.16	1177	408.98	1178	388.93	1179	369.18
1180	349.25	1181	330.06	1182	311.83	1183	295.52	1184	280.26
1185	266.80	1186	254.92	1187	244.43	1188	235.20	1189	226.70
1190	219.10	1191	211.81	1192	204.97	1193	198.34	1194	192.01
1195	185.81	1196	179.70	1197	173.59	1198	167.71	1199	162.02
1200	156.58	1201	151.36	1202	146.39	1203	141.75	1204	137.54
1205	133.50	1206	129.78	1207	126.35	1208	123.17	1209	120.21
1210	117.50	1211	115.09	1212	112.72	1213	110.58	1214	108.55
1215	106.73	1216	105.04	1217	103.46	1218	101.94	1219	100.50
1220	99.12	1221	97.79	1222	96.51	1223	95.24	1224	93.96
1225	92.71	1226	91.47	1227	90.26	1228	89.05	1229	87.85
1230	86.64	1231	85.41	1232	84.19	1233	83.00	1234	81.82
1235	80.60	1236	79.40	1237	78.20	1238	77.01	1239	75.82
1240	74.64	1241	73.46	1242	72.30	1243	71.18	1244	70.09
1245	69.02	1246	67.95	1247	67.02	1248	66.01	1249	65.00
1250	64.06	1251	63.16	1252	62.29	1253	61.44	1254	60.66
1255	59.85	1256	59.04	1257	58.24	1258	57.45	1259	56.68
1260	55.92	1261	55.19	1262	54.46	1263	53.75	1264	53.05
1265	52.38	1266	51.73	1267	51.07	1268	50.45	1269	49.86
1270	49.27	1271	48.72	1272	48.22	1273	47.72	1274	47.21
1275	46.71	1276	46.23	1277	45.76	1278	45.27	1279	44.78
1280	44.30	1281	43.81	1282	43.33	1283	42.86	1284	42.42
1285	41.99	1286	41.56	1287	41.14	1288	40.74	1289	40.33
1290	39.95	1291	39.58	1292	39.19	1293	38.83	1294	38.47
1295	38.14	1296	37.83	1297	37.51	1298	37.23	1299	36.92
1300	36.61	1310	33.66	1320	31.20	1330	29.26	1340	27.66
1350	26.40	1360	25.29	1370	24.38	1380	23.55	1390	22.79
1400	22.06	1420	20.94	1440	19.89	1460	18.22	1500	18.22

TOTAL VOLUME THIS HYDROGRAPH = 96.56(Ac.Ft)

10-YEAR

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	10.98	8.1	10.98	0	0.	.00000	.00	.00	0.	2	18	A35	.21
159	109A	.0	.00	8.1	10.98	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	52.86	54.8	63.83	2	735.	.01400	.00	.00	0.	2	24	A35	.02
159	111A	.0	.00	54.8	63.12	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	15.16	16.2	15.16	4	270.	.01900	2.75	.00	0.	4	24	A35	.21
159	113AB	16.2	15.16	71.0	52.75	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	24.46	23.8	24.46	0	0.	.00000	.00	.00	0.	4	24	A35	.42
159	115AB	23.8	24.46	94.8	58.25	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	23.27	122.7	78.26	4	560.	.02300	3.50	.00	0.	4	29	A35	.21
159	117B	8.8	7.97	8.8	7.97	4	350.	.06600	2.00	.00	0.	4	30	A35	.42
159	118AB	8.8	7.97	131.5	85.93	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	12.24	138.5	89.37	1	210.	.54200	.00	.00	0.	4	8	A35	.21
159	120A	.0	.00	138.5	89.22	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	6.12	3.5	6.12	0	0.	.00000	.00	.00	0.	4	8	A35	.21
159	122B	.0	.00	3.5	6.12	1	510.	.43100	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  123A  TA 1157 QA    89.19 QAB    95.08 QB     5.89     159  123B  TB 1156 QB     6.02 QBA    94.50 QA    88.48   *
*                                159  123AB TAB 1157 QAB    95.08 QA    89.19 QB     5.89                                  *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	6.02	142.0	95.08	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	95.08	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	74.92	202.0	158.90	0	0.	.00000	.00	.00	0.	4	13	A35	.01
159	126A	.0	.00	202.0	158.90	1	550.	.13600	.00	.00	0.	4	99	A35	.00
159	127B	14.5	21.76	14.5	21.76	4	570.	.07000	2.00	.00	0.	4	12	A35	.42
159	128B	.0	.00	14.5	21.75	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	64.30	53.3	64.30	4	1260.	.03000	3.25	.00	0.	4	18	A35	.42
159	130C	.0	.00	53.3	64.02	0	0.	.00000	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  131B  TB 1155 QB    21.75 QBC    83.13 QC    61.39     159  131C  TC 1158 QC    64.02 QCB    84.89 QB    20.87   *
*                                159  131BC TBC 1157 QBC    85.35 QB    21.41 QC    63.94                                 *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	64.02	67.8	85.35	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	113.21	136.5	174.42	0	0.	.00000	.00	.00	0.	2	12	A35	.01
159	133AB	136.5	174.42	338.5	332.93	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	134A	.0	.00	338.5	332.93	1	1955.	.08700	.00	.00	0.	2	99	A35	.00
159	135B	15.8	16.62	15.8	16.62	2	165.	.09100	2.00	.00	0.	4	23	A35	.42
159	136B	.0	.00	15.8	16.62	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	2.67	1.3	2.67	1	320.	.53100	.00	.00	0.	4	6	A35	.21

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              MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                  STORM DAY 4
                    SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION     AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
*****************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                    *
*     159  138B  TB 1157 QB    16.62 QBC    18.65 QC     2.03     159  138C  TC 1155 QC     2.59 QCB    19.01 QB    16.42   *
*                                  159  138BC TBC 1155 QBC    19.01 QB    16.42 QC     2.59                                  *
*****************************************************************************************************************************
                    SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION     AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  138BC    1.3       2.59      17.1     19.01   1    1600.  .33800      .00   .00        0.    4   0   A35   .00
     159  139B    59.1      60.67      76.2     77.06   1    1880.  .09600      .00   .00        0.    4  18   A35   .02
     159  140B    16.5      27.99      92.7     91.70   0       0.  .00000      .00   .00        0.    2  12   A35   .40
     159  141C    61.2      83.70      61.2     83.70   0       0.  .00000      .00   .00        0.    2  17   A35   .01
     159  142C    23.3      50.67      84.5    133.93   0       0.  .00000      .00   .00        0.    2   7   A35   .01
     159  143C    48.3      68.67     132.8    202.11   0       0.  .00000      .00   .00        0.    2  16   A35   .05
*****************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                    *
*     159  144B  TB 1160 QB    91.70 QBC   250.08 QC   158.38     159  144C  TC 1154 QC   202.11 QCB   267.21 QB    65.10   *
*                                  159  144BC TBC 1155 QBC   272.36 QB    70.29 QC   202.08                                  *
*****************************************************************************************************************************
                    SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION     AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  144BC  132.8     202.11     225.5    272.36   0       0.  .00000      .00   .00        0.    2   0   A35   .00
     159  145B      .0        .00     225.5    272.36   0       0.  .00000      .00   .00        0.    2  99   A35   .00
     159  146A    31.6      61.37     370.1    340.53   0       0.  .00000      .00   .00        0.    2   9   A35   .23
*****************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                    *
*     159  147A  TA 1161 QA   340.53 QAB   584.19 QB   243.66     159  147B  TB 1155 QB   272.36 QBA   546.16 QA   273.80   *
*                                  159  147AB TAB 1159 QAB   589.34 QA   332.27 QB   257.07                                  *
*****************************************************************************************************************************
                    SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION     AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  147AB  225.5     272.36     595.6    589.34   1     590.  .08500      .00   .00        0.    2   0   A35   .00
     159  148A    16.2      25.38     611.8    609.30   0       0.  .00000      .00   .00        0.    4  11   A35   .40
     159  149A      .0        .00     611.8    609.30   1    1180.  .05100      .00   .00        0.    4  99   A35   .00
     159  150B    13.9      24.16      13.9     24.16   0       0.  .00000      .00   .00        0.    4   9   A35   .40
     159  151B    21.6      25.92      35.5     50.09   0       0.  .00000      .00   .00        0.    4  14   A35   .02
     159  152A    12.5      20.71     624.3    612.43   0       0.  .00000      .00   .00        0.    4  10   A35   .40
*****************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                    *
*     159  153A  TA 1162 QA   612.43 QAB   640.26 QB    27.82     159  153B  TB 1154 QB    50.09 QBA   463.44 QA   413.35   *
*                                  159  153AB TAB 1161 QAB   643.79 QA   611.80 QB    31.99                                  *
*****************************************************************************************************************************
                    SUBAREA  SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION     AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  153AB   35.5      50.09     659.8    643.79   1     990.  .06100      .00   .00        0.    4   0   A35   .00
     159  154B     7.7      12.00       7.7     12.00   0       0.  .00000      .00   .00        0.    4   9   A35   .02
     159  155B    21.3      35.30      29.0     47.30   4    1470.  .03400     3.00   .00        0.    4  10   A35   .40
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	102.56	93.9	147.55	4	520.	.05800	3.00	.00	0.	2	13	A35	.02
159	157B	.0	.00	93.9	147.06	4	1760.	.04100	3.25	.00	0.	2	99	A35	.00
159	158B	33.8	37.43	127.7	181.88	0	0.	.00000	.00	.00	0.	4	18	A35	.20
159	159B	.0	.00	127.7	181.88	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	45.84	161.5	223.39	0	0.	.00000	.00	.00	0.	4	14	A35	.36
159	161B	.0	.00	161.5	223.39	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	13.27	671.3	651.05	0	0.	.00000	.00	.00	0.	4	15	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1163 QA   651.05 QAB   853.74 QB   202.70     159  163B  TB 1159 QB   223.39 QBA   819.57 QA   596.18   *
*                                159  163AB TAB 1162 QAB   862.90 QA   649.09 QB   213.82                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	223.39	832.8	862.90	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	862.13	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	29.27	854.7	885.64	4	180.	.16700	9.50	.00	0.	4	15	A35	.42
159	166A	.0	.00	854.7	885.38	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	22.08	200	22.75	300	24.39	400	26.90
500	29.97	600	33.85	700	38.80	800	45.44	900	54.94
1000	70.91	1050	90.23	1100	122.52	1110	138.16	1120	168.98
1130	210.83	1131	215.41	1132	220.15	1133	225.10	1134	230.38
1135	235.88	1136	241.58	1137	247.59	1138	254.23	1139	261.00
1140	268.35	1141	276.29	1142	285.12	1143	294.57	1144	304.77
1145	316.08	1146	328.69	1147	342.61	1148	357.59	1149	377.14
1150	402.18	1151	431.91	1152	468.14	1153	510.58	1154	557.93
1155	610.07	1156	664.79	1157	715.45	1158	774.61	1159	826.52
1160	856.88	1161	877.02	1162	885.38	1163	882.29	1164	866.02
1165	840.50	1166	809.26	1167	774.62	1168	738.62	1169	705.47
1170	668.91	1171	626.04	1172	587.52	1173	548.34	1174	512.33
1175	478.40	1176	448.08	1177	421.61	1178	398.33	1179	377.67
1180	359.09	1181	342.35	1182	326.99	1183	313.23	1184	300.21
1185	288.06	1186	276.80	1187	266.39	1188	256.67	1189	247.59
1190	239.16	1191	230.99	1192	223.52	1193	216.28	1194	209.59
1195	203.29	1196	197.26	1197	191.46	1198	186.05	1199	180.86
1200	175.98	1201	171.26	1202	166.81	1203	162.65	1204	158.75
1205	155.17	1206	151.96	1207	148.96	1208	146.26	1209	143.72
1210	141.37	1211	139.12	1212	136.97	1213	134.90	1214	132.83
1215	130.84	1216	128.87	1217	126.93	1218	124.98	1219	123.04
1220	121.23	1221	119.38	1222	117.55	1223	115.62	1224	113.69
1225	111.74	1226	109.89	1227	108.10	1228	106.38	1229	104.69
1230	102.98	1231	101.26	1232	99.57	1233	97.91	1234	96.26
1235	94.66	1236	93.09	1237	91.58	1238	90.15	1239	88.75
1240	87.38	1241	86.01	1242	84.71	1243	83.47	1244	82.34
1245	81.26	1246	80.20	1247	79.14	1248	78.05	1249	76.99
1250	75.96	1251	74.94	1252	73.97	1253	73.00	1254	72.08
1255	71.17	1256	70.29	1257	69.47	1258	68.62	1259	67.78
1260	66.99	1261	66.29	1262	65.58	1263	64.91	1264	64.26
1265	63.59	1266	62.94	1267	62.31	1268	61.68	1269	61.04
1270	60.40	1271	59.82	1272	59.26	1273	58.71	1274	58.17
1275	57.62	1276	57.06	1277	56.52	1278	55.99	1279	55.46
1280	54.94	1281	54.42	1282	53.90	1283	53.38	1284	52.92
1285	52.51	1286	52.09	1287	51.67	1288	51.27	1289	50.85
1290	50.46	1291	50.08	1292	49.69	1293	49.33	1294	48.94
1295	48.54	1296	48.17	1297	47.82	1298	47.48	1299	47.10
1300	46.76	1310	43.59	1320	40.93	1330	38.71	1340	36.74
1350	34.94	1360	33.09	1370	31.51	1380	30.11	1390	28.79
1400	27.51	1420	25.69	1440	24.37	1460	22.08	1500	22.08

TOTAL VOLUME THIS HYDROGRAPH = 126.68(Ac.Ft)

25-YEAR

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	15.26	8.1	15.26	0	0.	.00000	.00	.00	0.	2	15	A35	.21
159	109A	.0	.00	8.1	15.26	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	74.46	54.8	89.64	2	735.	.01400	.00	.00	0.	2	20	A35	.02
159	111A	.0	.00	54.8	88.40	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	21.93	16.2	21.93	4	270.	.01900	2.75	.00	0.	4	20	A35	.21
159	113AB	16.2	21.90	71.0	73.77	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	34.53	23.8	34.53	0	0.	.00000	.00	.00	0.	4	20	A35	.42
159	115AB	23.8	34.53	94.8	79.89	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	34.80	122.7	112.07	4	560.	.02300	3.50	.00	0.	4	23	A35	.21
159	117B	8.8	11.30	8.8	11.30	4	350.	.06600	2.00	.00	0.	4	25	A35	.42
159	118AB	8.8	11.30	131.5	122.94	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	16.75	138.5	128.49	1	210.	.54200	.00	.00	0.	4	7	A35	.21
159	120A	.0	.00	138.5	128.47	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	9.13	3.5	9.13	0	0.	.00000	.00	.00	0.	4	6	A35	.21
159	122B	.0	.00	3.5	9.13	1	510.	.43100	.00	.00	0.	4	99	A35	.00

```
*                                                CONFLUENCE Q'S                                                          *
*    159  123A  TA 1157 QA   128.33 QAB   135.59 QB     7.26     159  123B  TB 1155 QB     8.87 QBA   135.11 QA   126.24   *
*                                159  123AB TAB 1156 QAB   136.60 QA   128.26 QB     8.34                                  *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	8.87	142.0	136.60	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	136.60	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	114.49	202.0	232.11	0	0.	.00000	.00	.00	0.	4	10	A35	.01
159	126A	.0	.00	202.0	232.11	1	550.	.13600	.00	.00	0.	4	99	A35	.00
159	127B	14.5	30.53	14.5	30.53	4	570.	.07000	2.00	.00	0.	4	10	A35	.42
159	128B	.0	.00	14.5	30.35	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	90.39	53.3	90.39	4	1260.	.03000	3.25	.00	0.	4	15	A35	.42
159	130C	.0	.00	53.3	89.75	0	0.	.00000	.00	.00	0.	4	99	A35	.00

```
*                                                CONFLUENCE Q'S                                                          *
*    159  131B  TB 1155 QB    30.35 QBC   117.22 QC    86.87     159  131C  TC 1157 QC    89.75 QCB   118.83 QB    29.07   *
*                                159  131BC TBC 1156 QBC   119.06 QB    29.85 QC    89.21                                  *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	89.75	67.8	119.06	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	158.81	136.5	241.55	0	0.	.00000	.00	.00	0.	2	10	A35	.01
159	133AB	136.5	241.55	338.5	471.43	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	134A	.0	.00	338.5	471.43	1	1955.	.08700	.00	.00	0.	2	99	A35	.00
159	135B	15.8	23.54	15.8	23.54	2	165.	.09100	2.00	.00	0.	4	19	A35	.42
159	136B	.0	.00	15.8	23.54	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	3.79	1.3	3.79	1	320.	.53100	.00	.00	0.	4	5	A35	.21

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 Program Package Serial Number:  2061
03/30/11   FILE: HPBP     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     2
                                         LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                PROG F0601M

               MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                         STORM DAY 4
                    SUBAREA  SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
*****************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                        *
*    159  138B  TB 1156 QB    23.51 QBC    26.38 QC     2.87     159  138C  TC 1154 QC     3.52 QCB    26.33 QB    22.81   *
*                                   159  138BC TBC 1155 QBC    26.74 QB    23.38 QC     3.36                                 *
*****************************************************************************************************************************
                    SUBAREA  SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  138BC    1.3       3.52       17.1     26.74   1     1600.  .33800       .00   .00         0.    4   0   A35   .00
     159  139B    59.1      92.49       76.2    114.45   1     1880.  .09600       .00   .00         0.    4  14   A35   .02
     159  140B    16.5      38.62       92.7    132.38   0        0.  .00000       .00   .00         0.    2  10   A35   .40
     159  141C    61.2     117.89       61.2    117.89   0        0.  .00000       .00   .00         0.    2  14   A35   .01
     159  142C    23.3      69.28       84.5    187.17   0        0.  .00000       .00   .00         0.    2   6   A35   .01
     159  143C    48.3      96.81      132.8    283.98   0        0.  .00000       .00   .00         0.    2  13   A35   .05
*****************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                        *
*    159  144B  TB 1159 QB   132.38 QBC   351.32 QC   218.94     159  144C  TC 1154 QC   283.98 QCB   384.04 QB   100.05   *
*                                   159  144BC TBC 1154 QBC   384.04 QB   100.05 QC   283.98                                 *
*****************************************************************************************************************************
                    SUBAREA  SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  144BC  132.8     283.98      225.5    384.04   0        0.  .00000       .00   .00         0.    2   0   A35   .00
     159  145B      .0        .00      225.5    384.04   0        0.  .00000       .00   .00         0.    2  99   A35   .00
     159  146A    31.6      86.75      370.1    475.62   0        0.  .00000       .00   .00         0.    2   7   A35   .23
*****************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                        *
*    159  147A  TA 1161 QA   475.62 QAB   805.25 QB   329.64     159  147B  TB 1154 QB   384.04 QBA   761.15 QA   377.11   *
*                                   159  147AB TAB 1158 QAB   832.97 QA   465.51 QB   367.46                                 *
*****************************************************************************************************************************
                    SUBAREA  SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  147AB  225.5     384.04      595.6    832.97   1      590.  .08500       .00   .00         0.    2   0   A35   .00
     159  148A    16.2      35.59      611.8    856.46   0        0.  .00000       .00   .00         0.    4   9   A35   .40
     159  149A      .0        .00      611.8    856.46   1     1180.  .05100       .00   .00         0.    4  99   A35   .00
     159  150B    13.9      34.55       13.9     34.55   0        0.  .00000       .00   .00         0.    4   7   A35   .40
     159  151B    21.6      38.90       35.5     73.45   0        0.  .00000       .00   .00         0.    4  11   A35   .02
     159  152A    12.5      29.04      624.3    860.35   0        0.  .00000       .00   .00         0.    4   8   A35   .40
*****************************************************************************************************************************
*                                                      CONFLUENCE Q'S                                                        *
*    159  153A  TA 1160 QA   860.35 QAB   899.26 QB    38.91     159  153B  TB 1154 QB    73.45 QBA   692.29 QA   618.84   *
*                                   159  153AB TAB 1159 QAB   901.70 QA   853.00 QB    48.69                                 *
*****************************************************************************************************************************
                    SUBAREA  SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV    CONTROL SOIL      RAIN  PCT
    LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z      Q(CFS) NAME  TC  ZONE  IMPV
     159  153AB   35.5      73.45      659.8    901.70   1      990.  .06100       .00   .00         0.    4   0   A35   .00
     159  154B     7.7      17.72        7.7     17.72   0        0.  .00000       .00   .00         0.    4   7   A35   .02
     159  155B    21.3      49.48       29.0     67.20   4     1470.  .03400      3.00   .00         0.    4   8   A35   .40
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MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	142.12	93.9	206.20	4	520.	.05800	3.00	.00	0.	2	11	A35	.02
159	157B	.0	.00	93.9	205.01	4	1760.	.04100	3.50	.00	0.	2	99	A35	.00
159	158B	33.8	55.77	127.7	255.43	0	0.	.00000	.00	.00	0.	4	14	A35	.20
159	159B	.0	.00	127.7	255.43	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	63.25	161.5	310.93	0	0.	.00000	.00	.00	0.	4	12	A35	.36
159	161B	.0	.00	161.5	310.93	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	19.65	671.3	911.00	0	0.	.00000	.00	.00	0.	4	12	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1161 QA   911.00 QAB  1203.12 QB   292.12     159  163B  TB 1159 QB   310.93 QBA  1192.96 QA   882.03   *
*                                159  163AB TAB 1160 QAB  1211.42 QA   904.90 QB   306.52                                 *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	310.93	832.8	1211.42	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	1209.17	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	41.61	854.7	1237.97	4	180.	.16700	9.50	.00	0.	4	12	A35	.42
159	166A	.0	.00	854.7	1237.29	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	30.74	200	32.41	300	35.26	400	38.45
500	42.36	600	47.09	700	53.25	800	61.41	900	73.70
1000	94.37	1050	118.62	1100	172.41	1110	201.64	1120	248.64
1130	306.45	1131	313.04	1132	319.75	1133	326.54	1134	333.83
1135	341.17	1136	349.03	1137	357.39	1138	366.53	1139	376.40
1140	386.94	1141	398.55	1142	411.27	1143	424.92	1144	439.56
1145	455.78	1146	473.83	1147	493.67	1148	515.32	1149	543.92
1150	581.03	1151	626.35	1152	681.06	1153	745.49	1154	832.95
1155	923.57	1156	1010.91	1157	1094.69	1158	1163.09	1159	1211.61
1160	1236.77	1161	1237.29	1162	1217.10	1163	1179.09	1164	1129.88
1165	1069.30	1166	1009.23	1167	949.08	1168	887.66	1169	828.19
1170	772.21	1171	724.03	1172	675.45	1173	626.58	1174	588.48
1175	552.90	1176	523.50	1177	496.04	1178	471.73	1179	449.27
1180	428.80	1181	409.92	1182	392.30	1183	375.60	1184	360.31
1185	345.73	1186	332.23	1187	319.47	1188	307.69	1189	296.10
1190	285.36	1191	275.19	1192	265.79	1193	257.03	1194	248.93
1195	241.51	1196	234.40	1197	228.18	1198	222.42	1199	217.38
1200	212.71	1201	208.51	1202	204.38	1203	200.54	1204	196.91
1205	193.44	1206	189.99	1207	186.64	1208	183.33	1209	180.05
1210	176.81	1211	173.68	1212	170.63	1213	167.64	1214	164.57
1215	161.55	1216	158.56	1217	155.64	1218	152.87	1219	150.23
1220	147.56	1221	144.93	1222	142.31	1223	139.73	1224	137.17
1225	134.66	1226	132.27	1227	129.89	1228	127.64	1229	125.49
1230	123.44	1231	121.36	1232	119.35	1233	117.46	1234	115.60
1235	113.82	1236	112.18	1237	110.59	1238	109.04	1239	107.54
1240	106.09	1241	104.66	1242	103.26	1243	101.91	1244	100.56
1245	99.20	1246	97.87	1247	96.62	1248	95.37	1249	94.17
1250	93.02	1251	91.94	1252	90.83	1253	89.77	1254	88.78
1255	87.86	1256	86.93	1257	86.03	1258	85.16	1259	84.25
1260	83.36	1261	82.55	1262	81.73	1263	80.92	1264	80.16
1265	79.40	1266	78.62	1267	77.84	1268	77.14	1269	76.47
1270	75.81	1271	75.16	1272	74.56	1273	73.91	1274	73.31
1275	72.77	1276	72.22	1277	71.65	1278	71.02	1279	70.39
1280	69.80	1281	69.24	1282	68.72	1283	68.21	1284	67.72
1285	67.23	1286	66.71	1287	66.22	1288	65.77	1289	65.28
1290	64.85	1291	64.43	1292	63.94	1293	63.48	1294	63.05
1295	62.66	1296	62.28	1297	61.85	1298	61.49	1299	61.11
1300	60.74	1310	57.09	1320	54.04	1330	51.53	1340	49.29
1350	47.09	1360	44.90	1370	43.07	1380	41.44	1390	39.85
1400	38.30	1420	36.13	1440	34.08	1460	30.74	1500	30.74

TOTAL VOLUME THIS HYDROGRAPH = 170.73(Ac.Ft)

50-YEAR

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	108A	8.1	18.88	8.1	18.88	0	0.	.00000	.00	.00	0.	2	13	A35	.21
159	109A	.0	.00	8.1	18.88	4	135.	2.00000	2.00	.00	0.	2	99	A35	.00
159	110A	46.7	91.34	54.8	110.21	2	735.	.01400	.00	.00	0.	2	18	A35	.02
159	111A	.0	.00	54.8	108.67	2	1660.	.00200	.00	.00	0.	2	99	A35	.00
159	112B	16.2	27.23	16.2	27.23	4	270.	.01900	2.75	.00	0.	4	18	A35	.21
159	113AB	16.2	27.19	71.0	90.05	1	735.	.01400	.00	.00	0.	4	0	A35	.00
159	114B	23.8	42.37	23.8	42.37	0	0.	.00000	.00	.00	0.	4	18	A35	.42
159	115AB	23.8	42.37	94.8	97.47	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	116A	27.9	43.03	122.7	138.10	4	560.	.02300	3.50	.00	0.	4	21	A35	.21
159	117B	8.8	14.07	8.8	14.07	4	350.	.06600	2.00	.00	0.	4	22	A35	.42
159	118AB	8.8	14.07	131.5	151.59	4	220.	.16800	3.50	.00	0.	4	0	A35	.00
159	119A	7.0	21.17	138.5	157.54	1	210.	.54200	.00	.00	0.	4	6	A35	.21
159	120A	.0	.00	138.5	157.48	1	215.	.27900	.00	.00	0.	4	99	A35	.00
159	121B	3.5	10.59	3.5	10.59	0	0.	.00000	.00	.00	0.	4	6	A35	.21
159	122B	.0	.00	3.5	10.59	1	510.	.43100	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  123A  TA 1156 QA   157.44 QAB   167.07 QB     9.63     159  123B  TB 1155 QB    10.29 QBA   166.72 QA   156.43   *
*                                159  123AB TAB 1156 QAB   167.07 QA   157.44 QB     9.63                                  *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	123AB	3.5	10.29	142.0	167.07	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	124A	.0	.00	142.0	167.07	1	1675.	.17900	.00	.00	0.	4	99	A35	.00
159	125A	60.0	141.02	202.0	286.64	0	0.	.00000	.00	.00	0.	4	9	A35	.01
159	126A	.0	.00	202.0	286.64	1	550.	.13600	.00	.00	0.	4	99	A35	.00
159	127B	14.5	36.97	14.5	36.97	4	570.	.07000	2.00	.00	0.	4	9	A35	.42
159	128B	.0	.00	14.5	36.81	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	129C	53.3	112.42	53.3	112.42	4	1260.	.03000	3.25	.00	0.	4	13	A35	.42
159	130C	.0	.00	53.3	111.74	0	0.	.00000	.00	.00	0.	4	99	A35	.00

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  131B  TB 1155 QB    36.81 QBC   145.84 QC   109.02     159  131C  TC 1157 QC   111.74 QCB   146.85 QB    35.11   *
*                                159  131BC TBC 1156 QBC   147.51 QB    36.08 QC   111.43                                  *
*****************************************************************************************************************
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	131BC	53.3	111.74	67.8	147.51	1	2640.	.21200	.00	.00	0.	4	0	A35	.00
159	132B	68.7	192.09	136.5	293.77	0	0.	.00000	.00	.00	0.	2	9	A35	.01
159	133AB	136.5	293.77	338.5	575.64	0	0.	.00000	.00	.00	0.	2	0	A35	.00
159	134A	.0	.00	338.5	575.64	1	1955.	.08700	.00	.00	0.	2	99	A35	.00
159	135B	15.8	28.97	15.8	28.97	2	165.	.09100	2.00	.00	0.	4	17	A35	.42
159	136B	.0	.00	15.8	28.97	4	300.	.11700	3.00	.00	0.	4	99	A35	.00
159	137C	1.3	4.39	1.3	4.39	1	320.	.53100	.00	.00	0.	4	5	A35	.21

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              MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                         STORM DAY 4
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
***************************************************************************************************************************
*                                                CONFLUENCE Q'S                                                           *
*    159  138B  TB 1156 QB    28.94 QBC    32.23 QC     3.30     159  138C  TC 1154 QC     4.09 QCB    32.37 QB    28.28  *
*                              159  138BC TBC 1155 QBC    32.72 QB    28.85 QC     3.87                                    *
***************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  138BC    1.3       4.09      17.1     32.72   1    1600.   .33800      .00   .00        0.    4   0   A35   .00
     159  139B    59.1     118.59      76.2    145.31   1    1880.   .09600      .00   .00        0.    4  12   A35   .02
     159  140B    16.5      46.37      92.7    165.21   0       0.   .00000      .00   .00        0.    2   9   A35   .40
     159  141C    61.2     147.74      61.2    147.74   0       0.   .00000      .00   .00        0.    2  12   A35   .01
     159  142C    23.3      88.65      84.5    234.31   0       0.   .00000      .00   .00        0.    2   5   A35   .01
     159  143C    48.3     116.73     132.8    349.39   0       0.   .00000      .00   .00        0.    2  12   A35   .05
***************************************************************************************************************************
*                                                CONFLUENCE Q'S                                                           *
*    159  144B  TB 1159 QB   165.21 QBC   424.55 QC   259.34     159  144C  TC 1153 QC   349.39 QCB   467.01 QB   117.62  *
*                              159  144BC TBC 1154 QBC   471.07 QB   128.38 QC   342.69                                    *
***************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  144BC  132.8     349.39     225.5    471.07   0       0.   .00000      .00   .00        0.    2   0   A35   .00
     159  145B      .0        .00     225.5    471.07   0       0.   .00000      .00   .00        0.    2  99   A35   .00
     159  146A    31.6      99.78     370.1    589.34   0       0.   .00000      .00   .00        0.    2   7   A35   .23
***************************************************************************************************************************
*                                                CONFLUENCE Q'S                                                           *
*    159  147A  TA 1159 QA   589.34 QAB  1013.88 QB   424.55     159  147B  TB 1154 QB   471.07 QBA   940.53 QA   469.45  *
*                              159  147AB TAB 1157 QAB  1022.30 QA   566.92 QB   455.39                                    *
***************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  147AB  225.5     471.07     595.6   1022.30   1     590.   .08500      .00   .00        0.    2   0   A35   .00
     159  148A    16.2      43.48     611.8   1050.32   0       0.   .00000      .00   .00        0.    4   8   A35   .40
     159  149A      .0        .00     611.8   1050.32   1    1180.   .05100      .00   .00        0.    4  99   A35   .00
     159  150B    13.9      39.88      13.9     39.88   0       0.   .00000      .00   .00        0.    4   7   A35   .40
     159  151B    21.6      48.40      35.5     88.28   0       0.   .00000      .00   .00        0.    4  10   A35   .02
     159  152A    12.5      35.86     624.3   1053.55   0       0.   .00000      .00   .00        0.    4   7   A35   .40
***************************************************************************************************************************
*                                                CONFLUENCE Q'S                                                           *
*    159  153A  TA 1160 QA  1053.55 QAB  1095.85 QB    42.29     159  153B  TB 1154 QB    88.28 QBA   871.03 QA   782.76  *
*                              159  153AB TAB 1159 QAB  1106.44 QA  1052.29 QB    54.15                                    *
***************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  153AB   35.5      88.28     659.8   1106.44   1     990.   .06100      .00   .00        0.    4   0   A35   .00
     159  154B     7.7      20.66       7.7     20.66   0       0.   .00000      .00   .00        0.    4   7   A35   .02
     159  155B    21.3      61.11      29.0     81.76   4    1470.   .03400     3.00   .00        0.    4   7   A35   .40
```

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	173.32	93.9	248.98	4	520.	.05800	3.00	.00	0.	2	10	A35	.02
159	157B	.0	.00	93.9	248.10	4	1760.	.04100	3.75	.00	0.	2	99	A35	.00
159	158B	33.8	70.76	127.7	310.57	0	0.	.00000	.00	.00	0.	4	12	A35	.20
159	159B	.0	.00	127.7	310.57	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	76.98	161.5	376.90	0	0.	.00000	.00	.00	0.	4	11	A35	.36
159	161B	.0	.00	161.5	376.90	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	24.30	671.3	1116.56	0	0.	.00000	.00	.00	0.	4	11	A35	.02

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*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1160 QA  1116.56 QAB  1479.48 QB   362.92     159  163B  TB 1158 QB   376.90 QBA  1438.34 QA  1061.44   *
*                                159  163AB TAB 1160 QAB  1479.48 QA  1116.56 QB   362.92                                 *
*****************************************************************************************************************
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	376.90	832.8	1479.48	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	1479.24	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	50.51	854.7	1515.79	4	180.	.16700	9.50	.00	0.	4	11	A35	.42
159	166A	.0	.00	854.7	1515.53	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	38.23	200	40.18	300	43.45	400	47.10
500	51.55	600	56.95	700	63.97	800	73.81	900	88.34
1000	111.91	1050	140.81	1100	214.01	1110	252.72	1120	310.11
1130	379.61	1131	387.61	1132	395.19	1133	403.35	1134	411.58
1135	420.45	1136	429.86	1137	440.26	1138	451.49	1139	463.71
1140	476.62	1141	491.09	1142	506.57	1143	523.24	1144	540.81
1145	560.49	1146	582.86	1147	607.25	1148	633.87	1149	669.14
1150	713.84	1151	774.06	1152	856.76	1153	950.30	1154	1054.28
1155	1167.57	1156	1279.23	1157	1378.83	1158	1455.60	1159	1504.81
1160	1515.53	1161	1498.11	1162	1450.76	1163	1385.07	1164	1305.50
1165	1223.24	1166	1141.37	1167	1059.02	1168	982.00	1169	908.15
1170	842.89	1171	785.54	1172	738.59	1173	695.32	1174	654.44
1175	617.34	1176	585.62	1177	556.47	1178	530.92	1179	506.26
1180	483.82	1181	462.68	1182	442.81	1183	424.01	1184	406.68
1185	390.11	1186	374.31	1187	359.72	1188	345.94	1189	333.36
1190	321.77	1191	311.15	1192	301.48	1193	292.70	1194	284.56
1195	277.29	1196	270.66	1197	264.68	1198	259.12	1199	253.78
1200	248.68	1201	243.57	1202	238.66	1203	233.80	1204	229.15
1205	224.59	1206	220.23	1207	215.88	1208	211.53	1209	207.16
1210	202.72	1211	198.43	1212	194.31	1213	190.40	1214	186.64
1215	182.98	1216	179.33	1217	175.73	1218	172.25	1219	168.82
1220	165.49	1221	162.31	1222	159.28	1223	156.33	1224	153.43
1225	150.66	1226	147.95	1227	145.40	1228	143.03	1229	140.78
1230	138.71	1231	136.50	1232	134.31	1233	132.25	1234	130.34
1235	128.63	1236	127.00	1237	125.27	1238	123.59	1239	121.91
1240	120.32	1241	118.72	1242	117.23	1243	115.74	1244	114.27
1245	112.88	1246	111.49	1247	110.20	1248	108.93	1249	107.67
1250	106.52	1251	105.40	1252	104.32	1253	103.24	1254	102.22
1255	101.20	1256	100.16	1257	99.20	1258	98.17	1259	97.18
1260	96.23	1261	95.33	1262	94.46	1263	93.62	1264	92.80
1265	91.92	1266	91.06	1267	90.28	1268	89.54	1269	88.86
1270	88.15	1271	87.46	1272	86.76	1273	86.08	1274	85.45
1275	84.82	1276	84.20	1277	83.55	1278	82.82	1279	82.08
1280	81.39	1281	80.79	1282	80.15	1283	79.52	1284	78.95
1285	78.39	1286	77.83	1287	77.27	1288	76.76	1289	76.26
1290	75.76	1291	75.26	1292	74.73	1293	74.29	1294	73.85
1295	73.38	1296	72.97	1297	72.53	1298	72.13	1299	71.66
1300	71.28	1310	67.28	1320	63.80	1330	61.22	1340	58.70
1350	56.28	1360	53.77	1370	51.77	1380	49.93	1390	48.12
1400	46.38	1420	44.07	1440	41.75	1460	38.23	1500	38.23

TOTAL VOLUME THIS HYDROGRAPH = 204.58(Ac.Ft)

50-YEAR

(BURN)

```
     Program Package Serial Number:  2061
03/30/11   FILE: HPBP     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     1
                                        LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                   PROG F0601M

                 MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                   STORM DAY 4
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  108A      8.1      18.88       8.1     18.88   0       0.   .00000      .00   .00        0.    2  13   A35   .21
     159  109A       .0        .00       8.1     18.88   4     135.  2.00000     2.00   .00        0.    2  99   A35   .00
     159  110A     46.7      91.34      54.8    110.21   2     735.   .01400      .00   .00        0.    2  18   A35   .02
     159  111A       .0        .00      54.8    108.67   2    1660.   .00200      .00   .00        0.    2  99   A35   .00
     159  112B     16.2      27.23      16.2     27.23   4     270.   .01900     2.75   .00        0.    4  18   A35   .21
     159  113AB    16.2      27.19      71.0     90.05   1     735.   .01400      .00   .00        0.    4   0   A35   .00
     159  114B     23.8      42.37      23.8     42.37   0       0.   .00000      .00   .00        0.    4  18   A35   .42
     159  115AB    23.8      42.37      94.8     97.47   0       0.   .00000      .00   .00        0.    4   0   A35   .00
     159  116A     27.9      43.03     122.7    138.10   4     560.   .02300     3.50   .00        0.    4  21   A35   .21
     159  117B      8.8      14.07       8.8     14.07   4     350.   .06600     2.00   .00        0.    4  22   A35   .42
     159  118AB     8.8      14.07     131.5    151.59   4     220.   .16800     3.50   .00        0.    4   0   A35   .00
     159  119A      7.0      21.17     138.5    157.54   1     210.   .54200      .00   .00        0.    4   6   A35   .21
     159  120A       .0        .00     138.5    157.48   1     215.   .27900      .00   .00        0.    4  99   A35   .00
     159  121B      3.5      10.59       3.5     10.59   0       0.   .00000      .00   .00        0.    4   6   A35   .21
     159  122B       .0        .00       3.5     10.59   1     510.   .43100      .00   .00        0.    4  99   A35   .00
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  123A  TA 1156 QA   157.44 QAB   167.07 QB     9.63     159  123B  TB 1155 QB    10.29 QBA   166.72 QA   156.43   *
*                                159  123AB TAB 1156 QAB   167.07 QA   157.44 QB     9.63                                   *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  123AB     3.5      10.29     142.0    167.07   0       0.   .00000      .00   .00        0.    4   0   A35   .00
     159  124A       .0        .00     142.0    167.07   1    1675.   .17900      .00   .00        0.    4  99   A35   .00
     159  125A     60.0     156.79     202.0    301.78   0       0.   .00000      .00   .00        0.  204   9   A35   .01
     159  126A       .0        .00     202.0    301.78   1     550.   .13600      .00   .00        0.  204  99   A35   .00
     159  127B     14.5      36.97      14.5     36.97   4     570.   .07000     2.00   .00        0.    4   9   A35   .42
     159  128B       .0        .00      14.5     36.81   0       0.   .00000      .00   .00        0.    4  99   A35   .00
     159  129C     53.3     112.42      53.3    112.42   4    1260.   .03000     3.25   .00        0.    4  13   A35   .42
     159  130C       .0        .00      53.3    111.74   0       0.   .00000      .00   .00        0.    4  99   A35   .00
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  131B  TB 1155 QB    36.81 QBC   145.84 QC   109.02     159  131C  TC 1157 QC   111.74 QCB   146.85 QB    35.11   *
*                                159  131BC TBC 1156 QBC   147.51 QB    36.08 QC   111.43                                   *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL    TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL       RAIN  PCT
    LOCATION       AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
     159  131BC    53.3     111.74      67.8    147.51   1    2640.   .21200      .00   .00        0.    4   0   A35   .00
     159  132B     68.7     199.95     136.5    301.46   0       0.   .00000      .00   .00        0.  202   9   A35   .01
     159  133AB   136.5     301.46     338.5    598.81   0       0.   .00000      .00   .00        0.    2   0   A35   .00
     159  134A       .0        .00     338.5    598.81   1    1955.   .08700      .00   .00        0.    2  99   A35   .00
     159  135B     15.8      28.97      15.8     28.97   2     165.   .09100     2.00   .00        0.    4  17   A35   .42
     159  136B       .0        .00      15.8     28.97   4     300.   .11700     3.00   .00        0.    4  99   A35   .00
     159  137C      1.3       4.39       1.3      4.39   1     320.   .53100      .00   .00        0.    4   5   A35   .21
```

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 Program Package Serial Number:  2061
03/30/11   FILE: HPBP     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     2
                                                   LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                           PROG F0601M

               MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                              STORM DAY 4
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION        AREA(Ac)  Q(CFS)   AREA(Ac)  Q(CFS) TYPE LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
******************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                    *
*    159  138B  TB 1156 QB    28.94 QBC    32.23 QC     3.30     159  138C  TC 1154 QC     4.09 QCB    32.37 QB    28.28  *
*                                 159  138BC TBC 1155 QBC    32.72 QB    28.85 QC     3.87                                *
******************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION        AREA(Ac)  Q(CFS)   AREA(Ac)  Q(CFS) TYPE LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  138BC    1.3      4.09      17.1     32.72   1    1600.  .33800      .00   .00        0.    4   0   A35   .00
    159  139B    59.1    132.81      76.2    159.47   1    1880.  .09600      .00   .00        0.  204  12   A35   .02
    159  140B    16.5     46.37      92.7    180.21   0       0.  .00000      .00   .00        0.    2   9   A35   .40
    159  141C    61.2    154.41      61.2    154.41   0       0.  .00000      .00   .00        0.  202  12   A35   .01
    159  142C    23.3     91.55      84.5    243.84   0       0.  .00000      .00   .00        0.  202   5   A35   .01
    159  143C    48.3    121.78     132.8    363.96   0       0.  .00000      .00   .00        0.  202  12   A35   .05
******************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                    *
*    159  144B  TB 1159 QB   180.21 QBC   452.61 QC   272.40     159  144C  TC 1153 QC   363.96 QCB   493.96 QB   130.01  *
*                                 159  144BC TBC 1155 QBC   499.21 QB   154.72 QC   344.49                                *
******************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION        AREA(Ac)  Q(CFS)   AREA(Ac)  Q(CFS) TYPE LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  144BC  132.8    363.96     225.5    499.21   0       0.  .00000      .00   .00        0.    2   0   A35   .00
    159  145B      .0       .00     225.5    499.21   0       0.  .00000      .00   .00        0.    2  99   A35   .00
    159  146A    31.6     99.78     370.1    613.56   0       0.  .00000      .00   .00        0.    2   7   A35   .23
******************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                    *
*    159  147A  TA 1159 QA   613.56 QAB  1066.17 QB   452.61     159  147B  TB 1155 QB   499.21 QBA  1036.56 QA   537.35  *
*                                 159  147AB TAB 1157 QAB  1076.27 QA   591.84 QB   484.43                                *
******************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION        AREA(Ac)  Q(CFS)   AREA(Ac)  Q(CFS) TYPE LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  147AB  225.5    499.21     595.6   1076.27   1     590.  .08500      .00   .00        0.    2   0   A35   .00
    159  148A    16.2     43.48     611.8   1104.14   0       0.  .00000      .00   .00        0.    4   8   A35   .40
    159  149A      .0       .00     611.8   1104.14   1    1180.  .05100      .00   .00        0.    4  99   A35   .00
    159  150B    13.9     39.88      13.9     39.88   0       0.  .00000      .00   .00        0.    4   7   A35   .40
    159  151B    21.6     53.88      35.5     93.76   0       0.  .00000      .00   .00        0.  204  10   A35   .02
    159  152A    12.5     35.86     624.3   1107.37   0       0.  .00000      .00   .00        0.    4   7   A35   .40
******************************************************************************************************************************
*                                                          CONFLUENCE Q'S                                                    *
*    159  153A  TA 1160 QA  1107.37 QAB  1154.09 QB    46.72     159  153B  TB 1154 QB    93.76 QBA   923.38 QA   829.62  *
*                                 159  153AB TAB 1159 QAB  1165.70 QA  1106.72 QB    58.98                                *
******************************************************************************************************************************
                   SUBAREA  SUBAREA    TOTAL   TOTAL  CONV   CONV     CONV    CONV   CONV   CONTROL SOIL      RAIN  PCT
   LOCATION        AREA(Ac)  Q(CFS)   AREA(Ac)  Q(CFS) TYPE LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
    159  153AB   35.5     93.76     659.8   1165.70   1     990.  .06100      .00   .00        0.    4   0   A35   .00
    159  154B     7.7     22.80       7.7     22.80   0       0.  .00000      .00   .00        0.  204   7   A35   .02
    159  155B    21.3     61.11      29.0     83.91   4    1470.  .03400     3.00   .00        0.    4   7   A35   .40
```

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

STORM DAY 4

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	156B	64.9	180.58	93.9	258.34	4	520.	.05800	3.00	.00	0.	202	10	A35	.02
159	157B	.0	.00	93.9	257.48	4	1760.	.04100	3.75	.00	0.	2	99	A35	.00
159	158B	33.8	70.76	127.7	319.28	0	0.	.00000	.00	.00	0.	4	12	A35	.20
159	159B	.0	.00	127.7	319.28	4	1400.	.08400	3.50	.00	0.	4	99	A35	.00
159	160B	33.8	76.98	161.5	383.05	0	0.	.00000	.00	.00	0.	4	11	A35	.36
159	161B	.0	.00	161.5	383.05	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	162A	11.5	27.14	671.3	1178.56	0	0.	.00000	.00	.00	0.	204	11	A35	.02

```
*****************************************************************************************************************
*                                                CONFLUENCE Q'S                                                 *
*    159  163A  TA 1160 QA  1178.56 QAB  1550.99 QB   372.42     159  163B  TB 1159 QB   383.05 QBA  1546.44 QA  1163.39   *
*                                159  163AB TAB 1160 QAB  1550.99 QA  1178.56 QB   372.42                                 *
*****************************************************************************************************************
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	163AB	161.5	383.05	832.8	1550.99	4	450.	.06700	5.00	.00	0.	4	0	A35	.00
159	164A	.0	.00	832.8	1548.02	4	460.	.04300	9.50	.00	0.	4	99	A35	.00
159	165A	21.9	50.51	854.7	1586.65	4	180.	.16700	9.50	.00	0.	4	11	A35	.42
159	166A	.0	.00	854.7	1586.33	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 159 166A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	47.78	200	50.09	300	53.87	400	58.08
500	63.21	600	69.45	700	77.56	800	88.77	900	105.20
1000	131.96	1050	164.65	1100	242.22	1110	283.01	1120	343.70
1130	416.42	1131	424.53	1132	432.70	1133	440.99	1134	449.73
1135	458.83	1136	468.57	1137	479.22	1138	490.96	1139	503.55
1140	517.01	1141	531.88	1142	547.99	1143	565.28	1144	583.77
1145	604.13	1146	626.97	1147	652.27	1148	679.45	1149	715.05
1150	763.97	1151	833.78	1152	913.08	1153	1007.91	1154	1116.53
1155	1231.53	1156	1345.86	1157	1445.65	1158	1523.19	1159	1573.52
1160	1586.33	1161	1571.67	1162	1524.17	1163	1453.30	1164	1367.71
1165	1281.17	1166	1194.98	1167	1108.76	1168	1027.58	1169	950.82
1170	881.87	1171	821.16	1172	771.45	1173	727.65	1174	689.06
1175	649.75	1176	616.20	1177	586.61	1178	559.01	1179	534.70
1180	511.04	1181	489.59	1182	468.94	1183	449.77	1184	431.59
1185	414.71	1186	398.79	1187	383.69	1188	369.84	1189	357.05
1190	345.17	1191	334.48	1192	324.49	1193	315.50	1194	307.35
1195	300.16	1196	293.61	1197	287.52	1198	281.70	1199	276.19
1200	270.77	1201	265.55	1202	260.40	1203	255.40	1204	250.63
1205	246.03	1206	241.49	1207	236.94	1208	232.23	1209	227.50
1210	222.87	1211	218.53	1212	214.41	1213	210.45	1214	206.40
1215	202.45	1216	198.55	1217	194.75	1218	191.09	1219	187.50
1220	184.03	1221	180.74	1222	177.62	1223	174.59	1224	171.59
1225	168.72	1226	165.90	1227	163.27	1228	160.87	1229	158.52
1230	156.25	1231	154.01	1232	151.84	1233	149.80	1234	147.78
1235	145.89	1236	144.05	1237	142.16	1238	140.35	1239	138.57
1240	136.88	1241	135.18	1242	133.60	1243	132.03	1244	130.61
1245	129.17	1246	127.74	1247	126.36	1248	125.10	1249	123.83
1250	122.66	1251	121.46	1252	120.26	1253	119.05	1254	117.92
1255	116.80	1256	115.66	1257	114.61	1258	113.50	1259	112.45
1260	111.43	1261	110.47	1262	109.55	1263	108.67	1264	107.79
1265	106.87	1266	105.96	1267	105.13	1268	104.35	1269	103.63
1270	102.87	1271	102.14	1272	101.40	1273	100.70	1274	100.03
1275	99.34	1276	98.63	1277	97.87	1278	97.03	1279	96.21
1280	95.45	1281	94.80	1282	94.12	1283	93.45	1284	92.85
1285	92.27	1286	91.66	1287	91.06	1288	90.51	1289	89.95
1290	89.40	1291	88.86	1292	88.30	1293	87.83	1294	87.36
1295	86.85	1296	86.38	1297	85.92	1298	85.49	1299	85.00
1300	84.57	1310	80.06	1320	76.20	1330	73.30	1340	70.54
1350	67.80	1360	65.02	1370	62.71	1380	60.72	1390	58.60
1400	56.65	1420	54.08	1440	51.44	1460	47.78	1500	47.78

TOTAL VOLUME THIS HYDROGRAPH = 234.91(Ac.Ft)

Pre-development

(Project Site)

2-YEAR

Program Package Serial Number: 2061

03/31/11 FILE: HPBE INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159 139A	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159 140B	16.5	10.77	16.5	10.77	0	0.	.00000	.00	.00	0.	2	20	A35	.38
159 141C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 142C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 143C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 144C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 145B	.0	.00	16.5	10.77	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 146A	31.6	21.97	31.6	21.97	0	0.	.00000	.00	.00	0.	2	16	A35	.13

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* CONFLUENCE Q'S *

* 159 147A TA 1155 QA 21.97 QAB 32.72 QB 10.75 159 147B TB 1156 QB 10.77 QBA 32.70 QA 21.93 *

* 159 147AB TAB 1155 QAB 32.72 QA 21.97 QB 10.75 *

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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159 147AB	16.5	10.77	48.1	32.72	1	590.	.08500	.00	.00	0.	2	0	A35	.00
159 148A	16.2	6.90	64.3	39.20	0	0.	.00000	.00	.00	0.	4	22	A35	.22
159 149A	.0	.00	64.3	39.20	1	1180.	.05100	.00	.00	0.	4	99	A35	.00
159 150B	13.9	7.03	13.9	7.03	0	0.	.00000	.00	.00	0.	4	18	A35	.26
159 151B	.0	.00	13.9	7.03	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159 152A	12.5	5.13	76.8	41.44	0	0.	.00000	.00	.00	0.	4	22	A35	.18

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* CONFLUENCE Q'S *

* 159 153A TA 1165 QA 41.44 QAB 46.94 QB 5.50 159 153B TB 1155 QB 7.03 QBA 29.85 QA 22.82 *

* 159 153AB TAB 1164 QAB 46.95 QA 41.16 QB 5.79 *

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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159 153AB	13.9	7.03	90.7	46.95	1	990.	.06100	.00	.00	0.	4	0	A35	.00
159 154B	.0	.00	.0	7.03	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159 155B	21.3	7.55	21.3	7.55	4	1470.	.03400	3.00	.00	0.	4	25	A35	.13
159 156B	.0	.00	21.3	7.43	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 157B	.0	.00	21.3	7.43	4	1760.	.04100	2.00	.00	0.	2	99	A35	.00
159 158B	33.8	10.66	55.1	17.39	0	0.	.00000	.00	.00	0.	4	30	A35	.16

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* CONFLUENCE Q'S *

* 159 159A TA 1169 QA 45.82 QAB 62.30 QB 16.48 159 159B TB 1164 QB 17.39 QBA 57.59 QA 40.20 *

* 159 159AB TAB 1168 QAB 62.40 QA 45.62 QB 16.77 *

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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159 159AB	55.1	17.39	145.8	62.40	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159 160A	.0	.00	145.8	62.40	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	2.26	200	2.33	300	2.45	400	2.59
500	2.75	600	2.95	700	3.21	800	3.56	900	4.05
1000	5.08	1050	6.50	1100	8.97	1110	9.68	1120	10.81
1130	12.66	1131	12.88	1132	13.10	1133	13.33	1134	13.57
1135	13.81	1136	14.07	1137	14.35	1138	14.63	1139	14.93
1140	15.23	1141	15.56	1142	15.89	1143	16.22	1144	16.57
1145	16.98	1146	17.40	1147	17.84	1148	18.70	1149	20.67
1150	22.47	1151	24.26	1152	26.29	1153	28.65	1154	30.54
1155	32.68	1156	35.12	1157	37.74	1158	40.45	1159	43.26
1160	46.24	1161	49.26	1162	52.29	1163	55.10	1164	57.59
1165	59.59	1166	61.05	1167	61.97	1168	62.40	1169	62.30
1170	61.66	1171	60.49	1172	58.96	1173	57.10	1174	55.03
1175	52.59	1176	50.00	1177	47.34	1178	44.63	1179	40.87
1180	37.35	1181	34.62	1182	31.92	1183	29.33	1184	27.13
1185	25.15	1186	23.36	1187	21.77	1188	20.33	1189	19.06
1190	17.92	1191	16.89	1192	15.96	1193	15.13	1194	14.38
1195	13.70	1196	13.09	1197	12.54	1198	12.04	1199	11.60
1200	11.18	1201	10.79	1202	10.43	1203	10.11	1204	9.82
1205	9.54	1206	9.28	1207	9.04	1208	8.82	1209	8.61
1210	8.42	1211	8.23	1212	8.06	1213	7.88	1214	7.72
1215	7.57	1216	7.42	1217	7.28	1218	7.14	1219	7.00
1220	6.87	1221	6.76	1222	6.64	1223	6.53	1224	6.42
1225	6.32	1226	6.22	1227	6.14	1228	6.05	1229	5.97
1230	5.89	1231	5.80	1232	5.73	1233	5.66	1234	5.58
1235	5.51	1236	5.44	1237	5.37	1238	5.30	1239	5.23
1240	5.17	1241	5.11	1242	5.05	1243	4.99	1244	4.94
1245	4.88	1246	4.82	1247	4.78	1248	4.73	1249	4.68
1250	4.64	1251	4.58	1252	4.54	1253	4.49	1254	4.46
1255	4.42	1256	4.38	1257	4.34	1258	4.30	1259	4.26
1260	4.23	1261	4.21	1262	4.17	1263	4.14	1264	4.11
1265	4.08	1266	4.05	1267	4.03	1268	4.00	1269	3.98
1270	3.95	1271	3.93	1272	3.90	1273	3.88	1274	3.86
1275	3.84	1276	3.83	1277	3.80	1278	3.78	1279	3.76
1280	3.74	1281	3.72	1282	3.70	1283	3.69	1284	3.67
1285	3.65	1286	3.63	1287	3.62	1288	3.60	1289	3.58
1290	3.57	1291	3.55	1292	3.53	1293	3.52	1294	3.50
1295	3.49	1296	3.47	1297	3.46	1298	3.45	1299	3.43
1300	3.42	1310	3.28	1320	3.17	1330	3.06	1340	2.98
1350	2.89	1360	2.81	1370	2.74	1380	2.67	1390	2.61
1400	2.54	1420	2.45	1440	2.36	1460	1.94	1500	1.79

TOTAL VOLUME THIS HYDROGRAPH = 9.70(Ac.Ft)

5-YEAR

Program Package Serial Number: 2061

03/31/11 FILE: HPBE INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 5 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159 139A	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159 140B	16.5	19.37	16.5	19.37	0	0.	.00000	.00	.00	0.	2	16	A35	.38
159 141C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 142C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 143C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 144C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 145B	.0	.00	16.5	19.37	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 146A	31.6	41.82	31.6	41.82	0	0.	.00000	.00	.00	0.	2	12	A35	.13

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* CONFLUENCE Q'S *

* 159 147A TA 1155 QA 41.82 QAB 61.19 QB 19.37 159 147B TB 1155 QB 19.37 QBA 61.19 QA 41.82 *

* 159 147AB TAB 1155 QAB 61.19 QA 41.82 QB 19.37 *

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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159 147AB	16.5	19.37	48.1	61.19	1	590.	.08500	.00	.00	0.	2	0	A35	.00
159 148A	16.2	15.65	64.3	75.99	0	0.	.00000	.00	.00	0.	4	15	A35	.22
159 149A	.0	.00	64.3	75.99	1	1180.	.05100	.00	.00	0.	4	99	A35	.00
159 150B	13.9	15.51	13.9	15.51	0	0.	.00000	.00	.00	0.	4	12	A35	.26
159 151B	.0	.00	13.9	15.51	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159 152A	12.5	12.32	76.8	81.66	0	0.	.00000	.00	.00	0.	4	14	A35	.18

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* CONFLUENCE Q'S *

* 159 153A TA 1162 QA 81.66 QAB 91.12 QB 9.46 159 153B TB 1155 QB 15.51 QBA 68.54 QA 53.03 *

* 159 153AB TAB 1160 QAB 92.38 QA 79.06 QB 13.32 *

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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159 153AB	13.9	15.51	90.7	92.38	1	990.	.06100	.00	.00	0.	4	0	A35	.00
159 154B	.0	.00	.0	15.51	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159 155B	21.3	19.74	21.3	19.74	4	1470.	.03400	3.00	.00	0.	4	15	A35	.13
159 156B	.0	.00	21.3	19.31	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 157B	.0	.00	21.3	19.31	4	1760.	.04100	2.00	.00	0.	2	99	A35	.00
159 158B	33.8	22.38	55.1	40.72	0	0.	.00000	.00	.00	0.	4	26	A35	.16

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* CONFLUENCE Q'S *

* 159 159A TA 1164 QA 89.61 QAB 129.30 QB 39.69 159 159B TB 1161 QB 40.72 QBA 121.60 QA 80.88 *

* 159 159AB TAB 1164 QAB 129.30 QA 89.61 QB 39.69 *

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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159 159AB	55.1	40.72	145.8	129.30	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159 160A	.0	.00	145.8	129.30	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 5 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	3.41	200	3.52	300	3.71	400	3.91
500	4.16	600	4.50	700	5.06	800	5.89	900	7.06
1000	9.00	1050	11.31	1100	15.30	1110	16.63	1120	18.96
1130	24.28	1131	25.07	1132	25.87	1133	26.72	1134	27.59
1135	28.46	1136	29.41	1137	30.39	1138	31.44	1139	32.48
1140	33.60	1141	34.87	1142	36.19	1143	37.56	1144	39.02
1145	40.82	1146	42.69	1147	44.61	1148	46.73	1149	50.41
1150	54.31	1151	58.62	1152	63.83	1153	70.05	1154	75.74
1155	82.15	1156	88.93	1157	95.68	1158	102.55	1159	109.38
1160	115.91	1161	121.60	1162	126.03	1163	128.63	1164	129.30
1165	128.18	1166	125.44	1167	121.29	1168	116.23	1169	110.40
1170	104.07	1171	97.16	1172	90.14	1173	83.12	1174	76.43
1175	68.75	1176	61.50	1177	54.79	1178	48.51	1179	42.21
1180	38.68	1181	35.72	1182	33.14	1183	30.88	1184	28.90
1185	27.16	1186	25.63	1187	24.29	1188	23.11	1189	22.06
1190	21.09	1191	20.21	1192	19.42	1193	18.70	1194	18.06
1195	17.49	1196	16.94	1197	16.45	1198	15.99	1199	15.59
1200	15.20	1201	14.83	1202	14.49	1203	14.19	1204	13.89
1205	13.61	1206	13.33	1207	13.05	1208	12.81	1209	12.56
1210	12.34	1211	12.12	1212	11.92	1213	11.71	1214	11.51
1215	11.34	1216	11.16	1217	10.99	1218	10.84	1219	10.69
1220	10.55	1221	10.42	1222	10.29	1223	10.15	1224	10.00
1225	9.88	1226	9.76	1227	9.65	1228	9.54	1229	9.43
1230	9.32	1231	9.21	1232	9.10	1233	9.01	1234	8.91
1235	8.83	1236	8.74	1237	8.65	1238	8.57	1239	8.49
1240	8.41	1241	8.32	1242	8.26	1243	8.18	1244	8.11
1245	8.03	1246	7.96	1247	7.88	1248	7.81	1249	7.74
1250	7.69	1251	7.62	1252	7.55	1253	7.48	1254	7.43
1255	7.36	1256	7.30	1257	7.25	1258	7.19	1259	7.13
1260	7.08	1261	7.03	1262	6.97	1263	6.92	1264	6.87
1265	6.83	1266	6.78	1267	6.74	1268	6.69	1269	6.65
1270	6.59	1271	6.55	1272	6.51	1273	6.46	1274	6.42
1275	6.38	1276	6.33	1277	6.29	1278	6.25	1279	6.21
1280	6.16	1281	6.13	1282	6.08	1283	6.05	1284	6.02
1285	5.98	1286	5.94	1287	5.90	1288	5.87	1289	5.83
1290	5.80	1291	5.77	1292	5.73	1293	5.70	1294	5.66
1295	5.63	1296	5.61	1297	5.57	1298	5.54	1299	5.50
1300	5.47	1310	5.17	1320	4.92	1330	4.69	1340	4.50
1350	4.33	1360	4.19	1370	4.08	1380	3.98	1390	3.88
1400	3.80	1420	3.66	1440	3.53	1460	2.86	1500	2.70

TOTAL VOLUME THIS HYDROGRAPH = 16.27(Ac.Ft)

10-YEAR

Program Package Serial Number: 2061

03/31/11 FILE: HPBE INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	139A	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	140B	16.5	27.94	16.5	27.94	0	0.	.00000	.00	.00	0.	2	12	A35	.38
159	141C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	142C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	143C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	144C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	145B	.0	.00	16.5	27.94	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	146A	31.6	61.04	31.6	61.04	0	0.	.00000	.00	.00	0.	2	9	A35	.13

CONFLUENCE Q'S

159 147A TA 1154 QA 61.04 QAB 88.99 QB 27.94 159 147B TB 1154 QB 27.94 QBA 88.99 QA 61.04

159 147AB TAB 1154 QAB 88.99 QA 61.04 QB 27.94

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	147AB	16.5	27.94	48.1	88.99	1	590.	.08500	.00	.00	0.	2	0	A35	.00
159	148A	16.2	24.02	64.3	111.11	0	0.	.00000	.00	.00	0.	4	11	A35	.22
159	149A	.0	.00	64.3	111.11	1	1180.	.05100	.00	.00	0.	4	99	A35	.00
159	150B	13.9	23.24	13.9	23.24	0	0.	.00000	.00	.00	0.	4	9	A35	.26
159	151B	.0	.00	13.9	23.24	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	152A	12.5	19.42	76.8	115.45	0	0.	.00000	.00	.00	0.	4	10	A35	.18

CONFLUENCE Q'S

159 153A TA 1160 QA 115.45 QAB 127.69 QB 12.24 159 153B TB 1154 QB 23.24 QBA 98.02 QA 74.78

159 153AB TAB 1159 QAB 130.03 QA 114.75 QB 15.28

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	153AB	13.9	23.24	90.7	130.03	1	990.	.06100	.00	.00	0.	4	0	A35	.00
159	154B	.0	.00	.0	23.24	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	155B	21.3	30.68	21.3	30.68	4	1470.	.03400	3.00	.00	0.	4	11	A35	.13
159	156B	.0	.00	21.3	29.94	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	157B	.0	.00	21.3	29.94	4	1760.	.04100	2.00	.00	0.	2	99	A35	.00
159	158B	33.8	36.82	55.1	64.04	0	0.	.00000	.00	.00	0.	4	18	A35	.16

CONFLUENCE Q'S

159 159A TA 1162 QA 125.76 QAB 187.88 QB 62.11 159 159B TB 1160 QB 64.04 QBA 183.73 QA 119.69

159 159AB TAB 1162 QAB 187.88 QA 125.76 QB 62.11

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	159AB	55.1	64.04	145.8	187.88	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	160A	.0	.00	145.8	187.88	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	4.16	200	4.31	300	4.59	400	4.97
500	5.44	600	6.03	700	6.78	800	7.79	900	9.23
1000	11.65	1050	14.61	1100	19.56	1110	22.66	1120	30.03
1130	39.12	1131	40.15	1132	41.19	1133	42.29	1134	43.41
1135	44.54	1136	45.79	1137	47.14	1138	48.59	1139	49.90
1140	51.36	1141	53.11	1142	54.96	1143	56.92	1144	59.01
1145	61.70	1146	64.53	1147	67.61	1148	71.01	1149	77.14
1150	83.61	1151	90.96	1152	100.13	1153	111.02	1154	120.93
1155	131.98	1156	143.44	1157	154.83	1158	166.04	1159	176.09
1160	183.73	1161	187.66	1162	187.88	1163	184.13	1164	177.27
1165	168.11	1166	157.66	1167	143.90	1168	129.72	1169	115.58
1170	101.87	1171	88.92	1172	79.46	1173	71.25	1174	64.22
1175	58.06	1176	52.55	1177	47.88	1178	43.96	1179	40.74
1180	37.92	1181	35.49	1182	33.37	1183	31.52	1184	29.84
1185	28.36	1186	27.03	1187	25.93	1188	24.90	1189	23.97
1190	23.11	1191	22.35	1192	21.66	1193	21.03	1194	20.47
1195	19.93	1196	19.43	1197	18.96	1198	18.56	1199	18.16
1200	17.80	1201	17.43	1202	17.08	1203	16.76	1204	16.45
1205	16.16	1206	15.87	1207	15.58	1208	15.32	1209	15.07
1210	14.84	1211	14.61	1212	14.39	1213	14.18	1214	13.99
1215	13.83	1216	13.63	1217	13.45	1218	13.27	1219	13.09
1220	12.94	1221	12.80	1222	12.64	1223	12.48	1224	12.30
1225	12.18	1226	12.03	1227	11.91	1228	11.77	1229	11.65
1230	11.52	1231	11.40	1232	11.30	1233	11.19	1234	11.07
1235	10.98	1236	10.88	1237	10.77	1238	10.69	1239	10.56
1240	10.48	1241	10.38	1242	10.31	1243	10.21	1244	10.13
1245	10.04	1246	9.94	1247	9.87	1248	9.78	1249	9.71
1250	9.64	1251	9.56	1252	9.49	1253	9.41	1254	9.35
1255	9.29	1256	9.21	1257	9.15	1258	9.07	1259	9.02
1260	8.95	1261	8.91	1262	8.84	1263	8.79	1264	8.73
1265	8.66	1266	8.62	1267	8.57	1268	8.50	1269	8.45
1270	8.39	1271	8.34	1272	8.28	1273	8.24	1274	8.20
1275	8.15	1276	8.09	1277	8.05	1278	7.99	1279	7.93
1280	7.89	1281	7.85	1282	7.79	1283	7.75	1284	7.72
1285	7.68	1286	7.63	1287	7.59	1288	7.57	1289	7.52
1290	7.48	1291	7.44	1292	7.38	1293	7.35	1294	7.29
1295	7.25	1296	7.24	1297	7.19	1298	7.15	1299	7.10
1300	7.08	1310	6.73	1320	6.42	1330	6.16	1340	5.92
1350	5.71	1360	5.50	1370	5.30	1380	5.11	1390	4.92
1400	4.77	1420	4.52	1440	4.31	1460	3.30	1500	3.30

TOTAL VOLUME THIS HYDROGRAPH = 21.17(Ac.Ft)

25-YEAR

Program Package Serial Number: 2061

03/31/11 FILE: HPBE INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	139A	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	140B	16.5	38.59	16.5	38.59	0	0.	.00000	.00	.00	0.	2	10	A35	.38
159	141C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	142C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	143C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	144C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	145B	.0	.00	16.5	38.59	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	146A	31.6	86.62	31.6	86.62	0	0.	.00000	.00	.00	0.	2	7	A35	.13

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*                                                CONFLUENCE Q'S                                                 *
*    159  147A  TA 1154 QA    86.62 QAB   125.21 QB    38.59     159  147B  TB 1154 QB    38.59 QBA   125.21 QA    86.62   *
*                                159  147AB TAB 1154 QAB   125.21 QA    86.62 QB    38.59                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	147AB	16.5	38.59	48.1	125.21	1	590.	.08500	.00	.00	0.	2	0	A35	.00
159	148A	16.2	34.18	64.3	155.97	0	0.	.00000	.00	.00	0.	4	9	A35	.22
159	149A	.0	.00	64.3	155.97	1	1180.	.05100	.00	.00	0.	4	99	A35	.00
159	150B	13.9	31.35	13.9	31.35	0	0.	.00000	.00	.00	0.	4	8	A35	.26
159	151B	.0	.00	13.9	31.35	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	152A	12.5	27.71	76.8	159.15	0	0.	.00000	.00	.00	0.	4	8	A35	.18

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*                                                CONFLUENCE Q'S                                                 *
*    159  153A  TA 1159 QA   159.15 QAB   176.30 QB    17.15     159  153B  TB 1153 QB    31.35 QBA   129.88 QA    98.53   *
*                                159  153AB TAB 1158 QAB   179.68 QA   158.23 QB    21.46                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	153AB	13.9	31.35	90.7	179.68	1	990.	.06100	.00	.00	0.	4	0	A35	.00
159	154B	.0	.00	.0	31.35	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	155B	21.3	44.02	21.3	44.02	4	1470.	.03400	3.00	.00	0.	4	9	A35	.13
159	156B	.0	.00	21.3	42.72	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	157B	.0	.00	21.3	42.72	4	1760.	.04100	2.00	.00	0.	2	99	A35	.00
159	158B	33.8	55.13	55.1	92.49	0	0.	.00000	.00	.00	0.	4	14	A35	.16

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*                                                CONFLUENCE Q'S                                                 *
*    159  159A  TA 1161 QA   173.32 QAB   261.34 QB    88.02     159  159B  TB 1158 QB    92.49 QBA   247.55 QA   155.06   *
*                                159  159AB TAB 1160 QAB   263.23 QA   172.27 QB    90.95                                 *
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LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	159AB	55.1	92.49	145.8	263.23	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	160A	.0	.00	145.8	263.23	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	5.51	200	5.78	300	6.22	400	6.70
500	7.29	600	8.01	700	8.94	800	10.18	900	12.02
1000	15.10	1050	18.81	1100	28.35	1110	34.93	1120	44.68
1130	56.48	1131	57.84	1132	59.21	1133	60.70	1134	62.21
1135	63.54	1136	65.03	1137	66.68	1138	68.52	1139	70.39
1140	72.53	1141	75.11	1142	77.79	1143	80.70	1144	83.86
1145	87.82	1146	91.99	1147	96.39	1148	101.26	1149	110.61
1150	120.66	1151	132.28	1152	146.71	1153	163.96	1154	179.55
1155	196.36	1156	213.82	1157	231.41	1158	247.55	1159	258.31
1160	263.23	1161	261.34	1162	252.62	1163	234.26	1164	213.05
1165	190.99	1166	168.51	1167	146.61	1168	130.05	1169	115.64
1170	103.36	1171	92.74	1172	83.71	1173	75.96	1174	69.32
1175	63.72	1176	58.73	1177	54.47	1178	50.68	1179	47.37
1180	44.35	1181	41.71	1182	39.04	1183	37.07	1184	35.20
1185	33.62	1186	32.16	1187	30.91	1188	29.78	1189	28.73
1190	27.78	1191	26.89	1192	26.11	1193	25.41	1194	24.78
1195	24.16	1196	23.60	1197	23.05	1198	22.58	1199	22.11
1200	21.65	1201	21.23	1202	20.80	1203	20.43	1204	20.07
1205	19.75	1206	19.42	1207	19.11	1208	18.81	1209	18.54
1210	18.30	1211	18.05	1212	17.81	1213	17.57	1214	17.35
1215	17.15	1216	16.96	1217	16.73	1218	16.52	1219	16.31
1220	16.11	1221	15.97	1222	15.77	1223	15.61	1224	15.40
1225	15.25	1226	15.09	1227	14.95	1228	14.81	1229	14.65
1230	14.53	1231	14.38	1232	14.26	1233	14.14	1234	14.00
1235	13.85	1236	13.74	1237	13.61	1238	13.54	1239	13.40
1240	13.30	1241	13.16	1242	13.06	1243	12.93	1244	12.84
1245	12.75	1246	12.63	1247	12.54	1248	12.45	1249	12.34
1250	12.25	1251	12.17	1252	12.06	1253	11.98	1254	11.90
1255	11.83	1256	11.73	1257	11.65	1258	11.56	1259	11.50
1260	11.43	1261	11.36	1262	11.29	1263	11.22	1264	11.12
1265	11.06	1266	11.00	1267	10.94	1268	10.85	1269	10.79
1270	10.71	1271	10.66	1272	10.61	1273	10.55	1274	10.49
1275	10.40	1276	10.34	1277	10.28	1278	10.21	1279	10.16
1280	10.12	1281	10.07	1282	10.00	1283	9.97	1284	9.95
1285	9.91	1286	9.83	1287	9.78	1288	9.72	1289	9.64
1290	9.59	1291	9.55	1292	9.50	1293	9.46	1294	9.39
1295	9.35	1296	9.34	1297	9.27	1298	9.23	1299	9.16
1300	9.15	1310	8.71	1320	8.36	1330	8.05	1340	7.78
1350	7.52	1360	7.25	1370	7.01	1380	6.78	1390	6.55
1400	6.37	1420	6.07	1440	5.79	1460	4.44	1500	4.44

TOTAL VOLUME THIS HYDROGRAPH = 27.99(Ac.Ft)

50-YEAR

Program Package Serial Number: 2061

03/31/11 FILE: hpbe INPUT DATA: English Units RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units PAGE 1

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT PROG F0601M

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159 139A	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159 140B	16.5	46.36	16.5	46.36	0	0.	.00000	.00	.00	0.	2	9	A35	.38
159 141C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 142C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 143C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 144C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 145B	.0	.00	16.5	46.36	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 146A	31.6	99.76	31.6	99.76	0	0.	.00000	.00	.00	0.	2	7	A35	.13

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* CONFLUENCE Q'S *

* 159 147A TA 1154 QA 99.76 QAB 146.11 QB 46.36 159 147B TB 1153 QB 46.36 QBA 146.11 QA 99.76 *

* 159 147AB TAB 1154 QAB 146.11 QA 99.76 QB 46.36 *

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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159 147AB	16.5	46.36	48.1	146.11	1	590.	.08500	.00	.00	0.	2	0	A35	.00
159 148A	16.2	42.06	64.3	184.92	0	0.	.00000	.00	.00	0.	4	8	A35	.22
159 149A	.0	.00	64.3	184.92	1	1180.	.05100	.00	.00	0.	4	99	A35	.00
159 150B	13.9	38.92	13.9	38.92	0	0.	.00000	.00	.00	0.	4	7	A35	.26
159 151B	.0	.00	13.9	38.92	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159 152A	12.5	34.51	76.8	187.36	0	0.	.00000	.00	.00	0.	4	7	A35	.18

****

* CONFLUENCE Q'S *

* 159 153A TA 1158 QA 187.36 QAB 209.34 QB 21.97 159 153B TB 1154 QB 38.92 QBA 175.71 QA 136.78 *

* 159 153AB TAB 1158 QAB 209.34 QA 187.36 QB 21.97 *

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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159 153AB	13.9	38.92	90.7	209.34	1	990.	.06100	.00	.00	0.	4	0	A35	.00
159 154B	.0	.00	.0	38.92	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159 155B	21.3	54.36	21.3	54.36	4	1470.	.03400	3.00	.00	0.	4	8	A35	.13
159 156B	.0	.00	21.3	52.98	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159 157B	.0	.00	21.3	52.98	4	1760.	.04100	2.25	.00	0.	2	99	A35	.00
159 158B	33.8	70.11	55.1	115.35	0	0.	.00000	.00	.00	0.	4	12	A35	.16

****

* CONFLUENCE Q'S *

* 159 159A TA 1160 QA 203.66 QAB 314.29 QB 110.62 159 159B TB 1158 QB 115.35 QBA 306.26 QA 190.91 *

* 159 159AB TAB 1160 QAB 314.29 QA 203.66 QB 110.62 *

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LOCATION	SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159 159AB	55.1	115.35	145.8	314.29	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159 160A	.0	.00	145.8	314.29	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	6.63	200	6.94	300	7.44	400	7.99
500	8.66	600	9.48	700	10.54	800	12.01	900	14.16
1000	17.68	1050	22.04	1100	36.00	1110	44.44	1120	55.61
1130	69.30	1131	70.95	1132	72.59	1133	74.12	1134	75.69
1135	77.33	1136	79.20	1137	81.29	1138	83.66	1139	86.09
1140	88.86	1141	92.18	1142	95.65	1143	99.12	1144	102.95
1145	107.89	1146	113.03	1147	118.59	1148	124.67	1149	136.73
1150	149.54	1151	165.01	1152	184.35	1153	206.88	1154	227.10
1155	249.19	1156	271.86	1157	291.52	1158	306.26	1159	314.18
1160	314.29	1161	299.66	1162	278.11	1163	252.90	1164	225.77
1165	197.90	1166	175.99	1167	156.22	1168	139.05	1169	123.95
1170	110.97	1171	100.03	1172	90.73	1173	82.81	1174	76.13
1175	70.49	1176	65.47	1177	61.24	1178	57.51	1179	54.26
1180	51.18	1181	48.66	1182	46.19	1183	44.14	1184	41.90
1185	40.10	1186	38.33	1187	36.70	1188	35.29	1189	33.94
1190	32.65	1191	31.60	1192	30.66	1193	29.74	1194	28.94
1195	28.12	1196	27.38	1197	26.70	1198	26.10	1199	25.50
1200	24.93	1201	24.41	1202	23.90	1203	23.48	1204	23.06
1205	22.68	1206	22.29	1207	21.93	1208	21.62	1209	21.31
1210	21.01	1211	20.72	1212	20.47	1213	20.20	1214	19.97
1215	19.74	1216	19.48	1217	19.22	1218	18.97	1219	18.78
1220	18.54	1221	18.39	1222	18.17	1223	17.99	1224	17.74
1225	17.59	1226	17.44	1227	17.25	1228	17.10	1229	16.96
1230	16.83	1231	16.65	1232	16.51	1233	16.33	1234	16.17
1235	16.05	1236	15.97	1237	15.81	1238	15.69	1239	15.53
1240	15.41	1241	15.26	1242	15.15	1243	15.04	1244	14.93
1245	14.79	1246	14.69	1247	14.60	1248	14.47	1249	14.37
1250	14.28	1251	14.19	1252	14.06	1253	13.97	1254	13.89
1255	13.81	1256	13.68	1257	13.61	1258	13.53	1259	13.42
1260	13.34	1261	13.30	1262	13.18	1263	13.10	1264	13.03
1265	12.96	1266	12.85	1267	12.78	1268	12.72	1269	12.66
1270	12.56	1271	12.50	1272	12.43	1273	12.32	1274	12.24
1275	12.17	1276	12.11	1277	12.05	1278	11.95	1279	11.90
1280	11.85	1281	11.81	1282	11.77	1283	11.71	1284	11.66
1285	11.60	1286	11.50	1287	11.42	1288	11.36	1289	11.26
1290	11.25	1291	11.19	1292	11.10	1293	11.05	1294	11.01
1295	10.96	1296	10.92	1297	10.83	1298	10.82	1299	10.73
1300	10.69	1310	10.23	1320	9.83	1330	9.48	1340	9.17
1350	8.88	1360	8.56	1370	8.30	1380	8.03	1390	7.78
1400	7.57	1420	7.24	1440	6.92	1460	5.41	1500	5.41

TOTAL VOLUME THIS HYDROGRAPH = 33.22(Ac.Ft)

Post-development
(Project Site)

2-YEAR

```
 Program Package Serial Number:  2061
03/31/11   FILE: HPBP     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     1
                                        LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                   PROG F0601M

                 MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR =  2  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                   STORM DAY 4
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  139A      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  140B    16.5      10.82      16.5     10.82   0       0.   .00000      .00   .00        0.    2  20   A35   .40
      159  141C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  142C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  143C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  144C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  145B      .0        .00      16.5     10.82   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  146A    31.6      22.50      31.6     22.50   0       0.   .00000      .00   .00        0.    2  16   A35   .23
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  147A  TA 1155 QA    22.50 QAB    33.31 QB    10.80     159  147B  TB 1156 QB    10.82 QBA    33.28 QA    22.46   *
*                                159  147AB TAB 1155 QAB    33.31 QA    22.50 QB    10.80                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  147AB    16.5      10.82      48.1     33.31   1     590.   .08500      .00   .00        0.    2   0   A35   .00
      159  148A     16.2       8.01      64.3     40.91   0       0.   .00000      .00   .00        0.    4  22   A35   .40
      159  149A      .0        .00      64.3     40.91   1    1180.   .05100      .00   .00        0.    4  99   A35   .00
      159  150B    13.9       8.72      13.9      8.72   0       0.   .00000      .00   .00        0.    4  15   A35   .40
      159  151B      .0        .00      13.9      8.72   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  152A    12.5       7.25      76.8     44.42   0       0.   .00000      .00   .00        0.    4  17   A35   .40
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  153A  TA 1165 QA    44.42 QAB    49.35 QB     4.93     159  153B  TB 1155 QB     8.72 QBA    35.57 QA    26.85   *
*                                159  153AB TAB 1163 QAB    50.87 QA    43.88 QB     6.99                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  153AB    13.9       8.72      90.7     50.87   1     990.   .06100      .00   .00        0.    4   0   A35   .00
      159  154B      .0        .00        .0      8.72   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  155B    21.3      12.35      21.3     12.35   4    1470.   .03400     3.00   .00        0.    4  17   A35   .40
      159  156B      .0        .00      21.3     12.12   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  157B      .0        .00      21.3     12.12   4    1760.   .04100     2.00   .00        0.    2  99   A35   .00
      159  158B    33.8      11.16      55.1     22.75   0       0.   .00000      .00   .00        0.    4  30   A35   .20
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  159A  TA 1167 QA    49.16 QAB    70.75 QB    21.59     159  159B  TB 1162 QB    22.75 QBA    64.01 QA    41.27   *
*                                159  159AB TAB 1167 QAB    70.75 QA    49.16 QB    21.59                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  159AB    55.1      22.75     145.8     70.75   0       0.   .00000      .00   .00        0.    4   0   A35   .00
      159  160A      .0        .00     145.8     70.75   0       0.   .00000      .00   .00        0.    4  99   A35   .00
```

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 2 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	3.15	200	3.25	300	3.43	400	3.62
500	3.84	600	4.13	700	4.49	800	4.97	900	5.67
1000	7.02	1050	8.80	1100	11.85	1110	12.79	1120	14.34
1130	16.76	1131	17.04	1132	17.33	1133	17.62	1134	17.91
1135	18.22	1136	18.55	1137	18.90	1138	19.27	1139	19.65
1140	20.05	1141	20.46	1142	20.89	1143	21.33	1144	21.78
1145	22.31	1146	22.88	1147	23.50	1148	24.59	1149	26.81
1150	28.90	1151	31.02	1152	33.48	1153	36.41	1154	39.06
1155	42.08	1156	45.40	1157	48.78	1158	52.04	1159	55.17
1160	58.25	1161	61.20	1162	64.01	1163	66.48	1164	68.49
1165	69.96	1166	70.74	1167	70.75	1168	70.07	1169	68.67
1170	66.73	1171	64.34	1172	61.79	1173	59.13	1174	56.48
1175	53.68	1176	50.88	1177	48.09	1178	45.33	1179	41.57
1180	38.11	1181	35.48	1182	32.94	1183	30.55	1184	28.55
1185	26.75	1186	25.10	1187	23.61	1188	22.26	1189	21.05
1190	19.94	1191	18.95	1192	18.06	1193	17.25	1194	16.52
1195	15.87	1196	15.26	1197	14.71	1198	14.20	1199	13.73
1200	13.30	1201	12.91	1202	12.53	1203	12.19	1204	11.88
1205	11.59	1206	11.32	1207	11.07	1208	10.83	1209	10.60
1210	10.39	1211	10.18	1212	9.99	1213	9.80	1214	9.62
1215	9.45	1216	9.29	1217	9.13	1218	8.98	1219	8.83
1220	8.69	1221	8.57	1222	8.44	1223	8.33	1224	8.21
1225	8.10	1226	8.00	1227	7.90	1228	7.79	1229	7.70
1230	7.60	1231	7.50	1232	7.42	1233	7.33	1234	7.24
1235	7.16	1236	7.08	1237	7.00	1238	6.92	1239	6.85
1240	6.77	1241	6.71	1242	6.64	1243	6.58	1244	6.52
1245	6.45	1246	6.39	1247	6.34	1248	6.28	1249	6.22
1250	6.17	1251	6.11	1252	6.06	1253	6.01	1254	5.97
1255	5.93	1256	5.88	1257	5.83	1258	5.79	1259	5.75
1260	5.71	1261	5.68	1262	5.64	1263	5.60	1264	5.57
1265	5.53	1266	5.50	1267	5.47	1268	5.44	1269	5.41
1270	5.38	1271	5.35	1272	5.32	1273	5.30	1274	5.27
1275	5.25	1276	5.22	1277	5.19	1278	5.16	1279	5.14
1280	5.11	1281	5.09	1282	5.07	1283	5.05	1284	5.02
1285	5.00	1286	4.97	1287	4.95	1288	4.93	1289	4.91
1290	4.89	1291	4.86	1292	4.84	1293	4.82	1294	4.80
1295	4.78	1296	4.77	1297	4.75	1298	4.73	1299	4.71
1300	4.70	1310	4.51	1320	4.36	1330	4.22	1340	4.11
1350	3.99	1360	3.88	1370	3.78	1380	3.69	1390	3.60
1400	3.52	1420	3.40	1440	3.28	1460	2.79	1500	2.61

TOTAL VOLUME THIS HYDROGRAPH = 12.69(Ac.Ft)

5-YEAR

```
        Program Package Serial Number:  2061
03/31/11   FILE: HPBP     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     1
                                        LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                   PROG F0601M

                 MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR =  5  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                  STORM DAY 4
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  139A      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  140B    16.5      19.42      16.5     19.42   0       0.   .00000      .00   .00        0.    2  16   A35   .40
      159  141C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  142C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  143C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  144C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  145B      .0        .00      16.5     19.42   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  146A    31.6      42.27      31.6     42.27   0       0.   .00000      .00   .00        0.    2  12   A35   .23
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  147A  TA 1155 QA    42.27 QAB    61.69 QB    19.42     159  147B  TB 1155 QB    19.42 QBA    61.69 QA    42.27   *
*                                159  147AB TAB 1155 QAB    61.69 QA    42.27 QB    19.42                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  147AB    16.5      19.42      48.1     61.69   1     590.   .08500      .00   .00        0.    2   0   A35   .00
      159  148A     16.2      16.94      64.3     77.78   0       0.   .00000      .00   .00        0.    4  15   A35   .40
      159  149A      .0        .00      64.3     77.78   1    1180.   .05100      .00   .00        0.    4  99   A35   .00
      159  150B    13.9      16.38      13.9     16.38   0       0.   .00000      .00   .00        0.    4  12   A35   .40
      159  151B      .0        .00      13.9     16.38   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  152A    12.5      14.73      76.8     83.37   0       0.   .00000      .00   .00        0.    4  12   A35   .40
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  153A  TA 1161 QA    83.37 QAB    95.60 QB    12.23     159  153B  TB 1155 QB    16.38 QBA    74.00 QA    57.62   *
*                                159  153AB TAB 1160 QAB    97.00 QA    82.83 QB    14.17                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  153AB    13.9      16.38      90.7     97.00   1     990.   .06100      .00   .00        0.    4   0   A35   .00
      159  154B      .0        .00        .0     16.38   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  155B    21.3      24.01      21.3     24.01   4    1470.   .03400     3.00   .00        0.    4  13   A35   .40
      159  156B      .0        .00      21.3     23.60   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  157B      .0        .00      21.3     23.60   4    1760.   .04100     2.00   .00        0.    2  99   A35   .00
      159  158B    33.8      24.34      55.1     46.97   0       0.   .00000      .00   .00        0.    4  26   A35   .30
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  159A  TA 1164 QA    93.14 QAB   138.34 QB    45.20     159  159B  TB 1161 QB    46.97 QBA   133.33 QA    86.35   *
*                                159  159AB TAB 1163 QAB   138.91 QA    92.83 QB    46.09                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  159AB    55.1      46.97     145.8    138.91   0       0.   .00000      .00   .00        0.    4   0   A35   .00
      159  160A      .0        .00     145.8    138.91   0       0.   .00000      .00   .00        0.    4  99   A35   .00
```

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 5 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	5.00	200	5.18	300	5.45	400	5.75
500	6.12	600	6.60	700	7.34	800	8.39	900	9.88
1000	12.35	1050	15.36	1100	20.40	1110	22.23	1120	25.45
1130	31.50	1131	32.33	1132	33.16	1133	34.05	1134	34.95
1135	35.88	1136	36.88	1137	37.89	1138	38.96	1139	40.02
1140	41.15	1141	42.46	1142	43.82	1143	45.27	1144	46.83
1145	48.75	1146	50.75	1147	52.79	1148	55.02	1149	58.88
1150	62.98	1151	67.56	1152	73.14	1153	79.85	1154	86.14
1155	93.23	1156	100.62	1157	107.82	1158	114.92	1159	121.73
1160	128.01	1161	133.33	1162	137.21	1163	138.91	1164	138.34
1165	135.93	1166	131.89	1167	126.39	1168	120.34	1169	114.02
1170	107.49	1171	100.50	1172	93.59	1173	86.84	1174	80.44
1175	72.95	1176	65.88	1177	59.27	1178	53.08	1179	46.97
1180	43.44	1181	40.45	1182	37.82	1183	35.52	1184	33.48
1185	31.71	1186	30.14	1187	28.77	1188	27.52	1189	26.40
1190	25.38	1191	24.45	1192	23.64	1193	22.90	1194	22.22
1195	21.59	1196	21.00	1197	20.47	1198	19.98	1199	19.53
1200	19.10	1201	18.70	1202	18.31	1203	17.96	1204	17.63
1205	17.30	1206	16.98	1207	16.67	1208	16.39	1209	16.10
1210	15.85	1211	15.59	1212	15.36	1213	15.13	1214	14.90
1215	14.71	1216	14.51	1217	14.33	1218	14.13	1219	13.97
1220	13.78	1221	13.63	1222	13.47	1223	13.32	1224	13.14
1225	12.99	1226	12.85	1227	12.71	1228	12.59	1229	12.46
1230	12.33	1231	12.19	1232	12.06	1233	11.96	1234	11.84
1235	11.75	1236	11.65	1237	11.54	1238	11.44	1239	11.33
1240	11.25	1241	11.14	1242	11.06	1243	10.96	1244	10.88
1245	10.79	1246	10.69	1247	10.60	1248	10.52	1249	10.43
1250	10.37	1251	10.29	1252	10.20	1253	10.12	1254	10.05
1255	9.98	1256	9.90	1257	9.84	1258	9.76	1259	9.69
1260	9.63	1261	9.58	1262	9.51	1263	9.46	1264	9.39
1265	9.33	1266	9.27	1267	9.22	1268	9.16	1269	9.11
1270	9.04	1271	8.99	1272	8.94	1273	8.88	1274	8.84
1275	8.79	1276	8.73	1277	8.68	1278	8.62	1279	8.57
1280	8.51	1281	8.47	1282	8.42	1283	8.37	1284	8.33
1285	8.29	1286	8.24	1287	8.19	1288	8.15	1289	8.10
1290	8.07	1291	8.03	1292	7.98	1293	7.95	1294	7.89
1295	7.86	1296	7.84	1297	7.79	1298	7.75	1299	7.70
1300	7.67	1310	7.29	1320	6.98	1330	6.71	1340	6.48
1350	6.27	1360	6.08	1370	5.92	1380	5.79	1390	5.65
1400	5.52	1420	5.34	1440	5.15	1460	4.18	1500	3.94

TOTAL VOLUME THIS HYDROGRAPH = 21.36(Ac.Ft)

10-YEAR

```
  Program Package Serial Number:  2061
03/31/11   FILE: HPBP     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     1
                                        LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                   PROG F0601M

                 MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                  STORM DAY 4
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  139A      .0       .00        .0       .00   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  140B    16.5      27.99      16.5     27.99   0       0.   .00000      .00   .00        0.    2  12   A35   .40
      159  141C      .0       .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  142C      .0       .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  143C      .0       .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  144C      .0       .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  145B      .0       .00      16.5     27.99   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  146A    31.6     61.37      31.6     61.37   0       0.   .00000      .00   .00        0.    2   9   A35   .23
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  147A  TA 1154 QA    61.37 QAB    89.36 QB    27.99     159  147B  TB 1154 QB    27.99 QBA    89.36 QA    61.37   *
*                                159  147AB TAB 1154 QAB    89.36 QA    61.37 QB    27.99                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  147AB    16.5      27.99      48.1     89.36   1     590.   .08500      .00   .00        0.    2   0   A35   .00
      159  148A     16.2      25.38      64.3    112.85   0       0.   .00000      .00   .00        0.    4  11   A35   .40
      159  149A      .0       .00       64.3    112.85   1    1180.   .05100      .00   .00        0.    4  99   A35   .00
      159  150B    13.9      24.16      13.9     24.16   0       0.   .00000      .00   .00        0.    4   9   A35   .40
      159  151B      .0       .00       13.9     24.16   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  152A    12.5      20.71      76.8    118.60   0       0.   .00000      .00   .00        0.    4  10   A35   .40
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  153A  TA 1160 QA   118.60 QAB   131.68 QB    13.08     159  153B  TB 1154 QB    24.16 QBA   102.45 QA    78.29   *
*                                159  153AB TAB 1159 QAB   134.18 QA   118.03 QB    16.15                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  153AB    13.9      24.16      90.7    134.18   1     990.   .06100      .00   .00        0.    4   0   A35   .00
      159  154B      .0       .00        .0      24.16   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  155B    21.3      35.30      21.3     35.30   4    1470.   .03400     3.00   .00        0.    4  10   A35   .40
      159  156B      .0       .00       21.3     34.20   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  157B      .0       .00       21.3     34.20   4    1760.   .04100     2.00   .00        0.    2  99   A35   .00
      159  158B    33.8      37.43      55.1     68.96   0       0.   .00000      .00   .00        0.    4  18   A35   .20
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  159A  TA 1162 QA   129.99 QAB   196.12 QB    66.13     159  159B  TB 1159 QB    68.96 QBA   185.92 QA   116.96   *
*                                159  159AB TAB 1161 QAB   196.69 QA   128.79 QB    67.90                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  159AB    55.1      68.96     145.8    196.69   0       0.   .00000      .00   .00        0.    4   0   A35   .00
      159  160A      .0       .00      145.8    196.69   0       0.   .00000      .00   .00        0.    4  99   A35   .00
```

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 10 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	5.81	200	6.01	300	6.38	400	6.85
500	7.43	600	8.14	700	9.06	800	10.29	900	12.06
1000	15.02	1050	18.65	1100	24.67	1110	28.25	1120	36.10
1130	45.39	1131	46.43	1132	47.47	1133	48.59	1134	49.72
1135	50.87	1136	52.12	1137	53.46	1138	54.93	1139	56.27
1140	57.77	1141	59.60	1142	61.53	1143	63.57	1144	65.75
1145	68.52	1146	71.42	1147	74.56	1148	78.05	1149	84.28
1150	90.89	1151	98.48	1152	108.01	1153	119.37	1154	129.78
1155	141.28	1156	153.11	1157	164.76	1158	176.04	1159	185.92
1160	193.25	1161	196.69	1162	196.12	1163	191.28	1164	183.26
1165	173.12	1166	161.90	1167	147.59	1168	133.20	1169	119.08
1170	105.52	1171	92.70	1172	83.34	1173	75.26	1174	68.32
1175	62.23	1176	56.76	1177	52.09	1178	48.23	1179	45.05
1180	42.26	1181	39.87	1182	37.75	1183	35.90	1184	34.21
1185	32.71	1186	31.40	1187	30.26	1188	29.17	1189	28.21
1190	27.31	1191	26.53	1192	25.81	1193	25.12	1194	24.51
1195	23.93	1196	23.40	1197	22.91	1198	22.47	1199	22.02
1200	21.61	1201	21.20	1202	20.81	1203	20.46	1204	20.12
1205	19.79	1206	19.47	1207	19.14	1208	18.85	1209	18.58
1210	18.31	1211	18.06	1212	17.83	1213	17.60	1214	17.37
1215	17.17	1216	16.94	1217	16.73	1218	16.53	1219	16.33
1220	16.16	1221	15.99	1222	15.80	1223	15.62	1224	15.42
1225	15.27	1226	15.11	1227	14.97	1228	14.81	1229	14.67
1230	14.53	1231	14.39	1232	14.27	1233	14.14	1234	14.01
1235	13.89	1236	13.78	1237	13.65	1238	13.55	1239	13.40
1240	13.31	1241	13.19	1242	13.11	1243	12.99	1244	12.90
1245	12.79	1246	12.68	1247	12.59	1248	12.49	1249	12.41
1250	12.33	1251	12.23	1252	12.15	1253	12.05	1254	11.98
1255	11.91	1256	11.82	1257	11.75	1258	11.66	1259	11.60
1260	11.51	1261	11.47	1262	11.38	1263	11.32	1264	11.25
1265	11.17	1266	11.12	1267	11.06	1268	10.98	1269	10.92
1270	10.85	1271	10.80	1272	10.73	1273	10.68	1274	10.62
1275	10.56	1276	10.50	1277	10.44	1278	10.37	1279	10.29
1280	10.24	1281	10.20	1282	10.13	1283	10.08	1284	10.05
1285	10.01	1286	9.94	1287	9.90	1288	9.87	1289	9.81
1290	9.76	1291	9.71	1292	9.64	1293	9.60	1294	9.53
1295	9.49	1296	9.47	1297	9.41	1298	9.37	1299	9.31
1300	9.29	1310	8.87	1320	8.49	1330	8.19	1340	7.92
1350	7.65	1360	7.38	1370	7.14	1380	6.93	1390	6.70
1400	6.51	1420	6.23	1440	5.97	1460	4.82	1500	4.82

TOTAL VOLUME THIS HYDROGRAPH = 26.22(Ac.Ft)

25-YEAR

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE: C:\civild\cst_soilx_83.dat

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	STORM DAY 4 RAIN ZONE	PCT IMPV
159	139A	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	140B	16.5	38.62	16.5	38.62	0	0.	.00000	.00	.00	0.	2	10	A35	.40
159	141C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	142C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	143C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	144C	.0	.00	.0	.00	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	145B	.0	.00	16.5	38.62	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	146A	31.6	86.75	31.6	86.75	0	0.	.00000	.00	.00	0.	2	7	A35	.23

```
*                                          CONFLUENCE Q'S                                                          *
*    159  147A  TA 1154 QA    86.75 QAB   125.37 QB    38.62     159  147B  TB 1154 QB    38.62 QBA   125.37 QA    86.75   *
*                                159  147AB TAB 1154 QAB   125.37 QA    86.75 QB    38.62                                 *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	147AB	16.5	38.62	48.1	125.37	1	590.	.08500	.00	.00	0.	2	0	A35	.00
159	148A	16.2	35.59	64.3	157.56	0	0.	.00000	.00	.00	0.	4	9	A35	.40
159	149A	.0	.00	64.3	157.56	1	1180.	.05100	.00	.00	0.	4	99	A35	.00
159	150B	13.9	34.55	13.9	34.55	0	0.	.00000	.00	.00	0.	4	7	A35	.40
159	151B	.0	.00	13.9	34.55	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	152A	12.5	29.04	76.8	162.16	0	0.	.00000	.00	.00	0.	4	8	A35	.40

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*                                          CONFLUENCE Q'S                                                          *
*    159  153A  TA 1159 QA   162.16 QAB   176.84 QB    14.68     159  153B  TB 1154 QB    34.55 QBA   148.25 QA   113.70   *
*                                159  153AB TAB 1158 QAB   181.10 QA   161.40 QB    19.69                                 *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	153AB	13.9	34.55	90.7	181.10	1	990.	.06100	.00	.00	0.	4	0	A35	.00
159	154B	.0	.00	.0	34.55	0	0.	.00000	.00	.00	0.	4	99	A35	.00
159	155B	21.3	49.48	21.3	49.48	4	1470.	.03400	3.00	.00	0.	4	8	A35	.40
159	156B	.0	.00	21.3	48.17	0	0.	.00000	.00	.00	0.	2	99	A35	.00
159	157B	.0	.00	21.3	48.17	4	1760.	.04100	2.00	.00	0.	2	99	A35	.00
159	158B	33.8	55.77	55.1	98.09	0	0.	.00000	.00	.00	0.	4	14	A35	.20

```
*                                          CONFLUENCE Q'S                                                          *
*    159  159A  TA 1161 QA   174.80 QAB   267.21 QB    92.41     159  159B  TB 1158 QB    98.09 QBA   258.45 QA   160.36   *
*                                159  159AB TAB 1160 QAB   271.05 QA   174.79 QB    96.25                                 *
```

LOCATION		SUBAREA AREA(Ac)	SUBAREA Q(CFS)	TOTAL AREA(Ac)	TOTAL Q(CFS)	CONV TYPE	CONV LNGTH(Ft)	CONV SLOPE	CONV SIZE(Ft)	CONV Z	CONTROL Q(CFS)	SOIL NAME	TC	RAIN ZONE	PCT IMPV
159	159AB	55.1	98.09	145.8	271.05	0	0.	.00000	.00	.00	0.	4	0	A35	.00
159	160A	.0	.00	145.8	271.05	0	0.	.00000	.00	.00	0.	4	99	A35	.00

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 25 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	7.49	200	7.83	300	8.37	400	8.96
500	9.68	600	10.55	700	11.69	800	13.21	900	15.44
1000	19.17	1050	23.74	1100	34.03	1110	40.86	1120	50.91
1130	62.83	1131	64.21	1132	65.60	1133	67.11	1134	68.65
1135	70.03	1136	71.57	1137	73.29	1138	75.20	1139	77.17
1140	79.41	1141	82.08	1142	84.86	1143	87.86	1144	91.16
1145	95.26	1146	99.54	1147	104.06	1148	109.12	1149	118.68
1150	128.96	1151	141.00	1152	156.16	1153	174.33	1154	190.88
1155	208.48	1156	226.41	1157	243.65	1158	258.45	1159	267.63
1160	271.05	1161	267.21	1162	256.53	1163	237.16	1164	215.48
1165	193.14	1166	170.78	1167	149.27	1168	133.17	1169	119.14
1170	107.19	1171	96.72	1172	87.87	1173	80.19	1174	73.62
1175	68.10	1176	63.19	1177	58.99	1178	55.24	1179	51.97
1180	48.98	1181	46.37	1182	43.77	1183	41.83	1184	39.98
1185	38.42	1186	36.97	1187	35.76	1188	34.61	1189	33.55
1190	32.60	1191	31.70	1192	30.93	1193	30.20	1194	29.54
1195	28.87	1196	28.28	1197	27.69	1198	27.18	1199	26.66
1200	26.16	1201	25.70	1202	25.23	1203	24.82	1204	24.42
1205	24.07	1206	23.70	1207	23.35	1208	23.03	1209	22.73
1210	22.46	1211	22.17	1212	21.89	1213	21.62	1214	21.35
1215	21.12	1216	20.90	1217	20.65	1218	20.40	1219	20.17
1220	19.94	1221	19.78	1222	19.55	1223	19.36	1224	19.12
1225	18.96	1226	18.77	1227	18.62	1228	18.46	1229	18.28
1230	18.14	1231	17.96	1232	17.81	1233	17.67	1234	17.50
1235	17.34	1236	17.21	1237	17.06	1238	16.97	1239	16.81
1240	16.69	1241	16.53	1242	16.41	1243	16.27	1244	16.16
1245	16.05	1246	15.91	1247	15.81	1248	15.71	1249	15.58
1250	15.48	1251	15.38	1252	15.25	1253	15.16	1254	15.07
1255	14.99	1256	14.87	1257	14.78	1258	14.67	1259	14.59
1260	14.51	1261	14.43	1262	14.34	1263	14.26	1264	14.15
1265	14.07	1266	14.00	1267	13.93	1268	13.83	1269	13.77
1270	13.68	1271	13.62	1272	13.56	1273	13.49	1274	13.41
1275	13.30	1276	13.23	1277	13.16	1278	13.06	1279	13.00
1280	12.95	1281	12.91	1282	12.83	1283	12.78	1284	12.76
1285	12.71	1286	12.61	1287	12.54	1288	12.48	1289	12.38
1290	12.33	1291	12.27	1292	12.22	1293	12.17	1294	12.09
1295	12.05	1296	12.04	1297	11.95	1298	11.91	1299	11.82
1300	11.81	1310	11.29	1320	10.87	1330	10.50	1340	10.19
1350	9.87	1360	9.53	1370	9.24	1380	8.97	1390	8.70
1400	8.47	1420	8.13	1440	7.79	1460	6.27	1500	6.28

TOTAL VOLUME THIS HYDROGRAPH = 33.93(Ac.Ft)

50-YEAR

```
        Program Package Serial Number:  2061
03/31/11   FILE: HPBP     INPUT DATA: English Units  RAINFALL SOIL FILE: English (In) OUTPUT DATA: English Units     PAGE     1
                                        LOS ANGELES COUNTY FLOOD CONTROL DISTRICT                                   PROG F0601M

                 MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50  SOIL DATA FILE: C:\civild\cst_soilx_83.dat
                                                                                                                  STORM DAY 4
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  139A      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  140B    16.5      46.37      16.5     46.37   0       0.   .00000      .00   .00        0.    2   9   A35   .40
      159  141C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  142C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  143C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  144C      .0        .00        .0       .00   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  145B      .0        .00      16.5     46.37   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  146A    31.6      99.78      31.6     99.78   0       0.   .00000      .00   .00        0.    2   7   A35   .23
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  147A  TA 1154 QA    99.78 QAB   146.15 QB    46.37     159  147B  TB 1153 QB    46.37 QBA   146.15 QA    99.78   *
*                                 159  147AB TAB 1154 QAB   146.15 QA    99.78 QB    46.37                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  147AB    16.5      46.37      48.1    146.15   1     590.   .08500      .00   .00        0.    2   0   A35   .00
      159  148A     16.2      43.48      64.3    186.39   0       0.   .00000      .00   .00        0.    4   8   A35   .40
      159  149A      .0        .00      64.3    186.39   1    1180.   .05100      .00   .00        0.    4  99   A35   .00
      159  150B    13.9      39.88      13.9     39.88   0       0.   .00000      .00   .00        0.    4   7   A35   .40
      159  151B      .0        .00      13.9     39.88   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  152A    12.5      35.86      76.8    190.39   0       0.   .00000      .00   .00        0.    4   7   A35   .40
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  153A  TA 1158 QA   190.39 QAB   213.28 QB    22.89     159  153B  TB 1154 QB    39.88 QBA   180.22 QA   140.34   *
*                                 159  153AB TAB 1157 QAB   213.43 QA   185.06 QB    28.37                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  153AB    13.9      39.88      90.7    213.43   1     990.   .06100      .00   .00        0.    4   0   A35   .00
      159  154B      .0        .00        .0     39.88   0       0.   .00000      .00   .00        0.    4  99   A35   .00
      159  155B    21.3      61.11      21.3     61.11   4    1470.   .03400     3.00   .00        0.    4   7   A35   .40
      159  156B      .0        .00      21.3     59.68   0       0.   .00000      .00   .00        0.    2  99   A35   .00
      159  157B      .0        .00      21.3     59.68   4    1760.   .04100     2.25   .00        0.    2  99   A35   .00
      159  158B    33.8      70.76      55.1    122.06   0       0.   .00000      .00   .00        0.    4  12   A35   .20
*****************************************************************************************************************************
*                                                   CONFLUENCE Q'S                                                          *
*    159  159A  TA 1160 QA   207.81 QAB   322.52 QB   114.70     159  159B  TB 1158 QB   122.06 QBA   317.66 QA   195.60   *
*                                 159  159AB TAB 1159 QAB   324.45 QA   204.56 QB   119.89                                  *
*****************************************************************************************************************************
                   SUBAREA   SUBAREA     TOTAL   TOTAL  CONV   CONV     CONV     CONV   CONV   CONTROL SOIL      RAIN  PCT
     LOCATION      AREA(Ac)  Q(CFS)    AREA(Ac)  Q(CFS) TYPE  LNGTH(Ft) SLOPE  SIZE(Ft)   Z     Q(CFS) NAME  TC  ZONE  IMPV
      159  159AB    55.1     122.06     145.8    324.45   0       0.   .00000      .00   .00        0.    4   0   A35   .00
      159  160A      .0        .00     145.8    324.45   0       0.   .00000      .00   .00        0.    4  99   A35   .00
```

MODIFIED RATIONAL METHOD HYDROLOGY - STORM YEAR = 50 SOIL DATA FILE:

HYDROGRAPH AT 159 160A STORM DAY 4 REDUCTION FACTOR = 1.000

TIME	Q	TIME	Q	TIME	Q	TIME	Q	TIME	Q
0	.00	100	8.85	200	9.25	300	9.86	400	10.53
500	11.35	600	12.35	700	13.64	800	15.42	900	18.02
1000	22.29	1050	27.59	1100	41.93	1110	50.51	1120	62.00
1130	75.80	1131	77.45	1132	79.11	1133	80.66	1134	82.26
1135	83.94	1136	85.85	1137	88.01	1138	90.48	1139	93.03
1140	95.93	1141	99.38	1142	102.94	1143	106.48	1144	110.39
1145	115.41	1146	120.65	1147	126.32	1148	132.50	1149	144.71
1150	157.76	1151	173.57	1152	193.38	1153	216.59	1154	237.60
1155	260.33	1156	283.35	1157	303.16	1158	317.66	1159	324.45
1160	322.52	1161	305.69	1162	282.28	1163	255.78	1164	228.05
1165	200.19	1166	178.75	1167	159.50	1168	142.74	1169	127.94
1170	115.22	1171	104.42	1172	95.29	1173	87.44	1174	80.82
1175	75.24	1176	70.25	1177	66.05	1178	62.34	1179	59.11
1180	56.07	1181	53.61	1182	51.15	1183	49.11	1184	46.88
1185	45.12	1186	43.38	1187	41.72	1188	40.30	1189	38.94
1190	37.69	1191	36.63	1192	35.68	1193	34.75	1194	33.96
1195	33.14	1196	32.41	1197	31.72	1198	31.12	1199	30.51
1200	29.92	1201	29.38	1202	28.83	1203	28.39	1204	27.93
1205	27.52	1206	27.10	1207	26.72	1208	26.39	1209	26.03
1210	25.68	1211	25.34	1212	25.06	1213	24.74	1214	24.48
1215	24.22	1216	23.92	1217	23.62	1218	23.34	1219	23.11
1220	22.84	1221	22.67	1222	22.41	1223	22.20	1224	21.92
1225	21.75	1226	21.58	1227	21.36	1228	21.19	1229	21.02
1230	20.86	1231	20.65	1232	20.48	1233	20.28	1234	20.09
1235	19.95	1236	19.86	1237	19.67	1238	19.53	1239	19.35
1240	19.21	1241	19.04	1242	18.91	1243	18.78	1244	18.66
1245	18.50	1246	18.39	1247	18.28	1248	18.12	1249	18.01
1250	17.90	1251	17.80	1252	17.65	1253	17.55	1254	17.45
1255	17.35	1256	17.21	1257	17.11	1258	17.02	1259	16.89
1260	16.80	1261	16.75	1262	16.61	1263	16.52	1264	16.43
1265	16.34	1266	16.22	1267	16.14	1268	16.07	1269	16.00
1270	15.89	1271	15.82	1272	15.74	1273	15.61	1274	15.52
1275	15.43	1276	15.35	1277	15.27	1278	15.16	1279	15.10
1280	15.04	1281	14.99	1282	14.94	1283	14.88	1284	14.81
1285	14.74	1286	14.62	1287	14.53	1288	14.45	1289	14.34
1290	14.32	1291	14.26	1292	14.16	1293	14.11	1294	14.06
1295	14.00	1296	13.94	1297	13.85	1298	13.83	1299	13.73
1300	13.68	1310	13.12	1320	12.64	1330	12.24	1340	11.88
1350	11.51	1360	11.12	1370	10.80	1380	10.50	1390	10.19
1400	9.93	1420	9.56	1440	9.17	1460	7.46	1500	7.47

TOTAL VOLUME THIS HYDROGRAPH = 39.81(Ac.Ft)

9.B. Hydrologic Reference Graphs & Table

1. 50-Year, 24-Hour Isohyet (LACDPW)
2. Runoff Coefficient Curves for Soil Types 2 and 4
3. Los Angeles County Proportion Impervious Data Table
4. Los Angeles County Debris Production Rates for Los Angeles Basin
5. Los Angeles County Peak Bulking Factors for Los Angeles Basin

016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

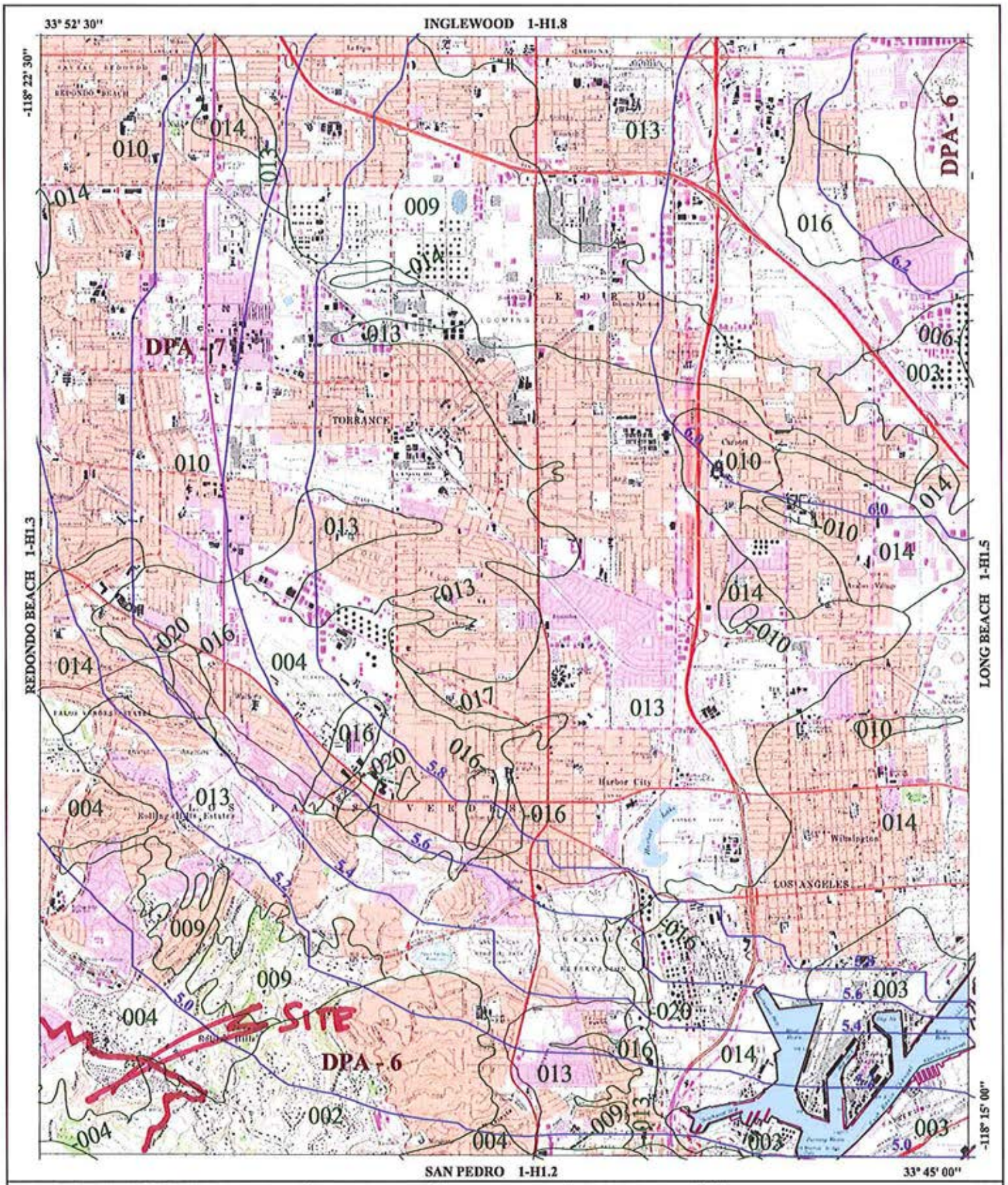
1 0 1 2 Miles

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

REDONDO BEACH
50-YEAR 24-HOUR ISOHYET

1-H1.3

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

1 0 1 2 Miles

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

TORRANCE 1-H1.4
50-YEAR 24-HOUR ISOHYET

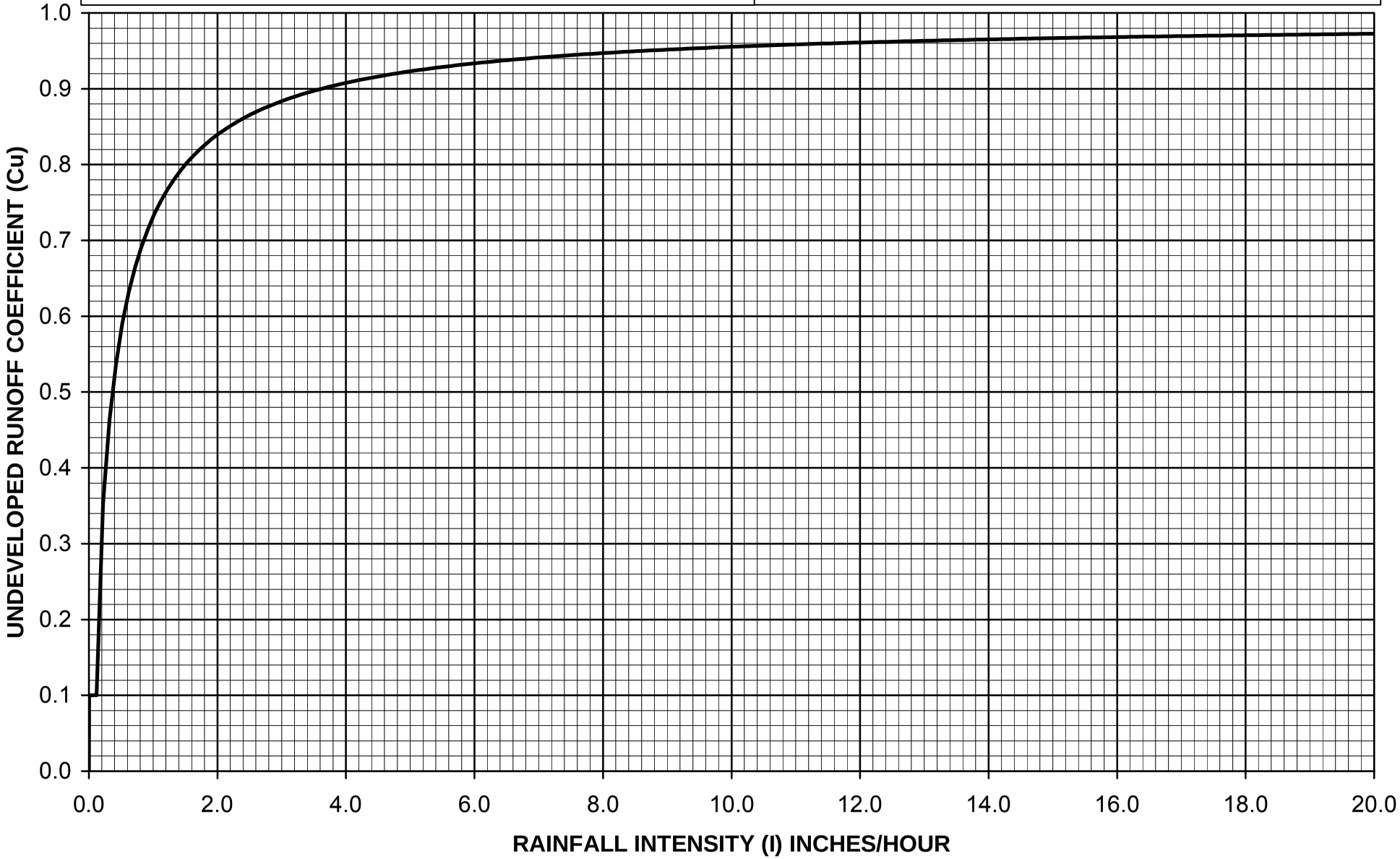
LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

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

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

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 002



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

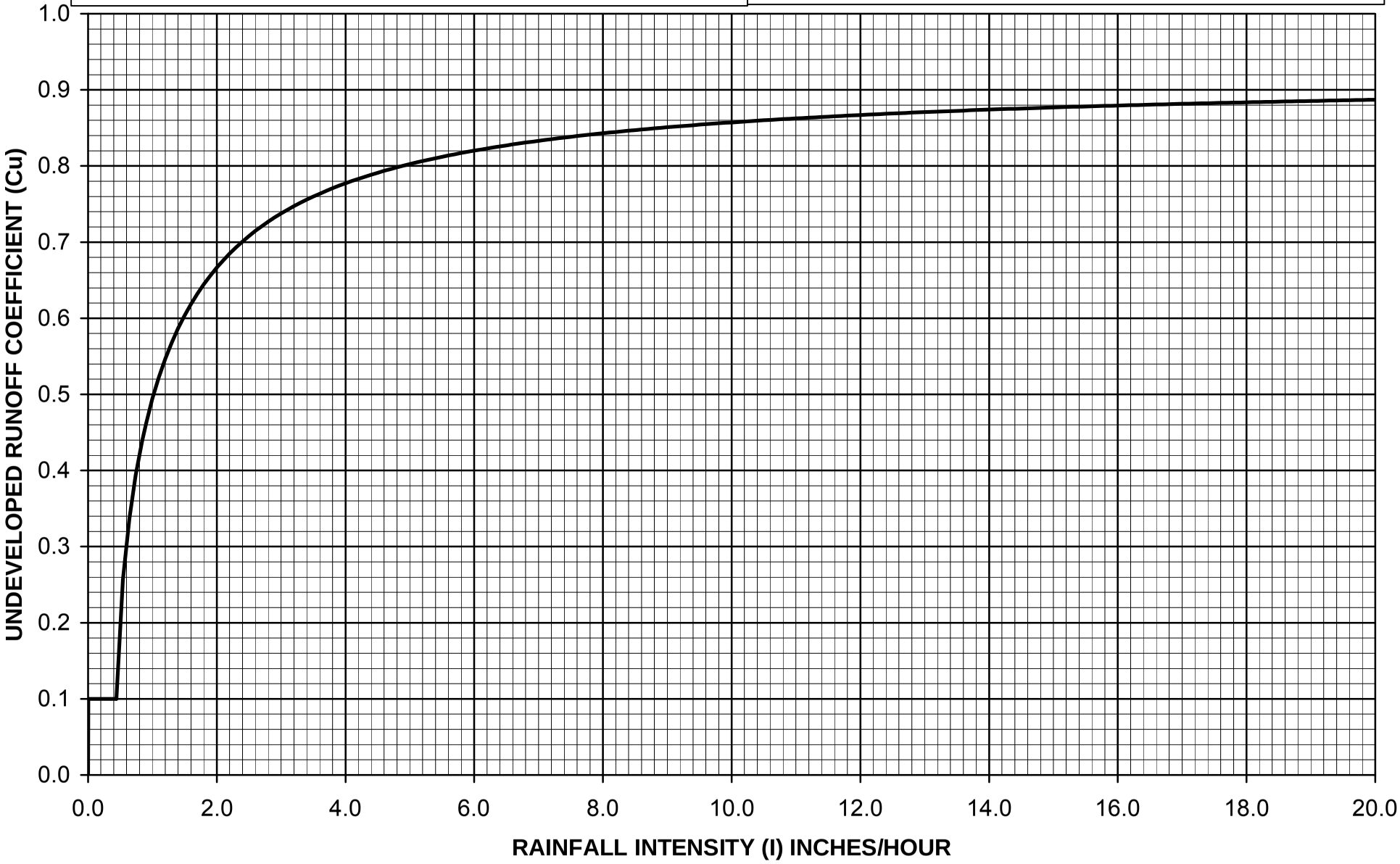
Where: C_D = Developed Runoff Coefficient

IMP = Proportion Impervious

C_U = Undeveloped runoff coefficient

Los Angeles County Department of Public Works

RUNOFF COEFFICIENT CURVE
SOIL TYPE NO. 004



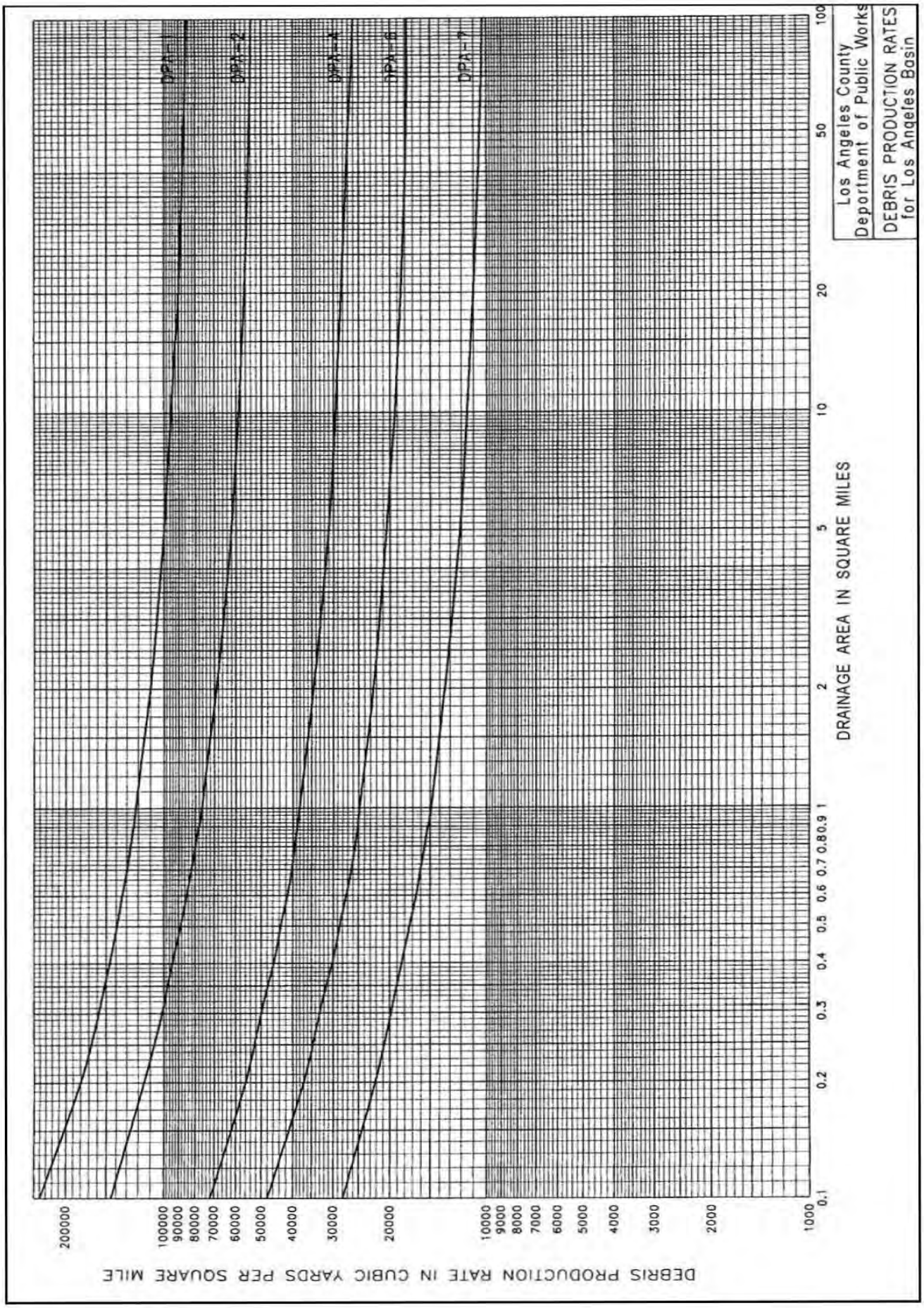
Proportion Impervious Data

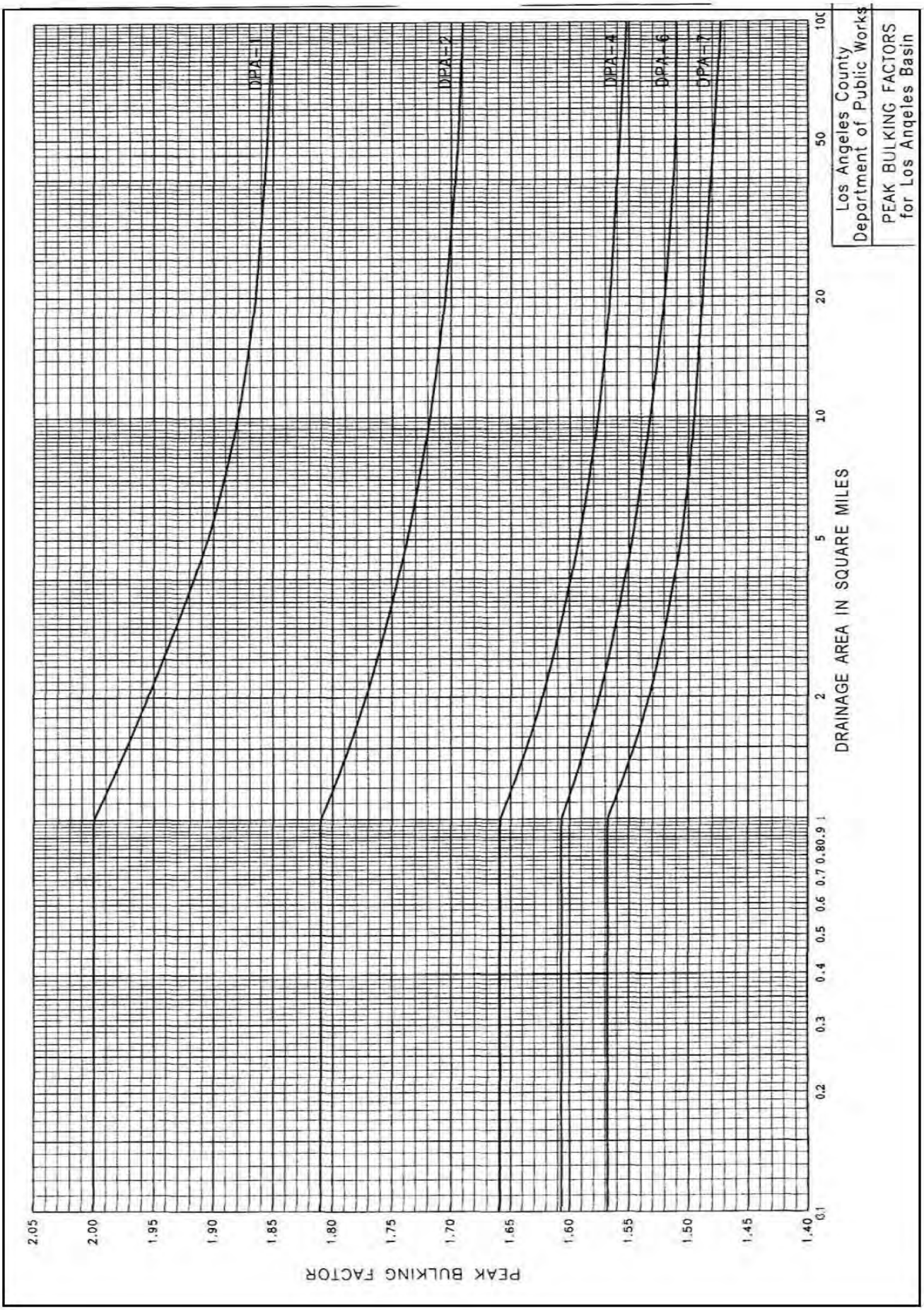
Code	Land Use Description	% Impervious
1111	High-Density Single Family Residential	42
1112	Low-Density Single Family Residential	21
1121	Mixed Multi-Family Residential	74
1122	Duplexes, Triplexes and 2-or 3-Unit Condominiums and Townhouses	55
1123	Low-Rise Apartments, Condominiums, and Townhouses	86
1124	Medium-Rise Apartments and Condominiums	86
1125	High-Rise Apartments and Condominiums	90
1131	Trailer Parks and Mobile Home Courts, High-Density	91
1132	Mobile Home Courts and Subdivisions, Low-Density	42
1140	Mixed Residential	59
1151	Rural Residential, High-Density	15
1152	Rural Residential, Low-Density	10
1211	Low- and Medium-Rise Major Office Use	91
1212	High-Rise Major Office Use	91
1213	Skyscrapers	91
1221	Regional Shopping Center	95
1222	Retail Centers (Non-Strip With Contiguous Interconnected Off-Street	96
1223	Modern Strip Development	96
1224	Older Strip Development	97
1231	Commercial Storage	90
1232	Commercial Recreation	90
1233	Hotels and Motels	96
1234	Attended Pay Public Parking Facilities	91
1241	Government Offices	91
1242	Police and Sheriff Stations	91
1243	Fire Stations	91
1244	Major Medical Health Care Facilities	74
1245	Religious Facilities	82
1246	Other Public Facilities	91
1247	Non-Attended Public Parking Facilities	91
1251	Correctional Facilities	91
1252	Special Care Facilities	74
1253	Other Special Use Facilities	86
1261	Pre-Schools/Day Care Centers	68
1262	Elementary Schools	82
1263	Junior or Intermediate High Schools	82
1264	Senior High Schools	82
1265	Colleges and Universities	47
1266	Trade Schools and Professional Training Facilities	91
1271	Base (Built-up Area)	65
1271.01	Base High-Density Single Family Residential	42
1271.02	Base Duplexes, Triplexes and 2-or 3-Unit Condominiums and T	55

Code	Land Use Description	% Impervious
1271.03	Base Government Offices	91
1271.04	Base Fire Stations	91
1271.05	Base Non-Attended Public Parking Facilities	91
1271.06	Base Air Field	45
1271.07	Base Petroleum Refining and Processing	91
1271.08	Base Mineral Extraction - Oil and Gas	10
1271.09	Base Harbor Facilities	91
1271.10	Base Navigation Aids	47
1271.11	Base Developed Local Parks and Recreation	10
1271.12	Base Vacant Undifferentiated	1
1272	Vacant Area	2
1273	Air Field	45
1274	Former Base (Built-up Area)	65
1275	Former Base Vacant Area	2
1276	Former Base Air Field	91
1311	Manufacturing, Assembly, and Industrial Services	91
1312	Motion Picture and Television Studio Lots	82
1313	Packing Houses and Grain Elevators	96
1314	Research and Development	91
1321	Manufacturing	91
1322	Petroleum Refining and Processing	91
1323	Open Storage	66
1324	Major Metal Processing	91
1325	Chemical Processing	91
1331	Mineral Extraction - Other Than Oil and Gas	10
1332	Mineral Extraction - Oil and Gas	10
1340	Wholesaling and Warehousing	91
1411	Airports	91
1411.01	Airstrip	10
1412	Railroads	15
1412.01	Railroads-Attended Pay Public Parking Facilities	91
1412.02	Railroads-Non-Attended Public Parking Facilities	91
1412.03	Railroads-Manufacturing, Assembly, and Industrial Services	91
1412.04	Railroads-Petroleum Refining and Processing	91
1412.05	Railroads-Open Storage	66
1412.06	Railroads-Truck Terminals	91
1413	Freeways and Major Roads	91
1414	Park-and-Ride Lots	91
1415	Bus Terminals and Yards	91
1416	Truck Terminals	91
1417	Harbor Facilities	91
1418	Navigation Aids	47
1420	Communication Facilities	82
1420.01	Communication Facilities-Antenna	2

Code	Land Use Description	% Impervious
1431	Electrical Power Facilities	47
1431.01	Electrical Power Facilities-Powerlines (Urban)	2
1431.02	Electrical Power Facilities-Powerlines (Rural)	1
1432	Solid Waste Disposal Facilities	15
1433	Liquid Waste Disposal Facilities	96
1434	Water Storage Facilities	91
1435	Natural Gas and Petroleum Facilities	91
1435.01	Natural Gas and Petroleum Facilities-Manufacturing, Assembly, and In	91
1435.02	Natural Gas and Petroleum Facilities-Petroleum Refining and Processing	91
1435.03	Natural Gas and Petroleum Facilities-Mineral Extraction – Oil and Gas	10
1435.04	Natural Gas and Petroleum Facilities-Vacant Undifferentiated	1
1436	Water Transfer Facilities	96
1437	Improved Flood Waterways and Structures	100
1440	Maintenance Yards	91
1450	Mixed Transportation	90
1460	Mixed Transportation and Utility	91
1460.01	Mixed Utility and Transportation-Improved Flood Waterways and Structures	100
1460.02	Mixed Utility and Transportation-Railroads	15
1460.03	Mixed Utility and Transportation-Freeways and Major Roads	91
1500	Mixed Commercial and Industrial	91
1600	Mixed Urban	89
1700	Under Construction (Use appropriate value)	91
1810	Golf Courses	3
1821	Developed Local Parks and Recreation	10
1822	Undeveloped Local Parks and Recreation	2
1831	Developed Regional Parks and Recreation	2
1832	Undeveloped Regional Parks and Recreation	1
1840	Cemeteries	10
1850	Wildlife Preserves and Sanctuaries	2
1850.01	Wildlife-Commercial Recreation	90
1850.02	Wildlife-Other Special Use Facilities	86
1850.03	Wildlife-Developed Local Parks and Recreation	10
1860	Specimen Gardens and Arboreta	15
1870	Beach Parks	10
1880	Other Open Space and Recreation	10
2110	Irrigated Cropland and Improved Pasture Land	2
2120	Non-Irrigated Cropland and Improved Pasture Land	2
2200	Orchards and Vineyards	2
2300	Nurseries	15
2400	Dairy, Intensive Livestock, and Associated Facilities	42
2500	Poultry Operations	62
2600	Other Agriculture	42
2700	Horse Ranches	42

Code	Land Use Description	% Impervious
3100	Vacant Undifferentiated	1
3200	Abandoned Orchards and Vineyards	2
3300	Vacant With Limited Improvements (Use appropriate value)	42
3400	Beaches (Vacant)	1
4100	Water, Undifferentiated	100
4200	Harbor Water Facilities	100
4300	Marina Water Facilities	100
4400	Water Within a Military Installation	100


DPA-2
DPA-4
DPA-6
DPA-7
DEBRIS PRODUCTION RATE IN CUBIC YARDS PER SQUARE MILE
200000
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
2
5
10
20
50
100
DRAINAGE AREA IN SQUARE MILES
Los Angeles County
Department of Public Works
DEBRIS PRODUCTION RATES
for Los Angeles Basin


DPA-1
DPA-2
DPA-4
DPA-6
DPA-7
PEAK BULKING FACTOR
2.05
2.00
1.95
1.90
1.85
1.80
1.75
1.70
1.65
1.60
1.55
1.50
1.45
1.40
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
2
5
10
20
50
100
DRAINAGE AREA IN SQUARE MILES
Los Angeles County
Department of Public Works
PEAK BULKING FACTORS
for Los Angeles Basin

9.C. Reference Plans:

1. FEMA FIRM Panel 06037C2025F, Effective September 26, 2008
2. FEMA FIRM Panel 06037C2026F, Effective September 26, 2008
3. PD 407
4. PD 1382
5. PD 1403
6. PD 1703
7. State RWQCB Clarification Letter to LACDPW

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

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Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242,** or visit its website at http://www.ngs.noaa.gov/.

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This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

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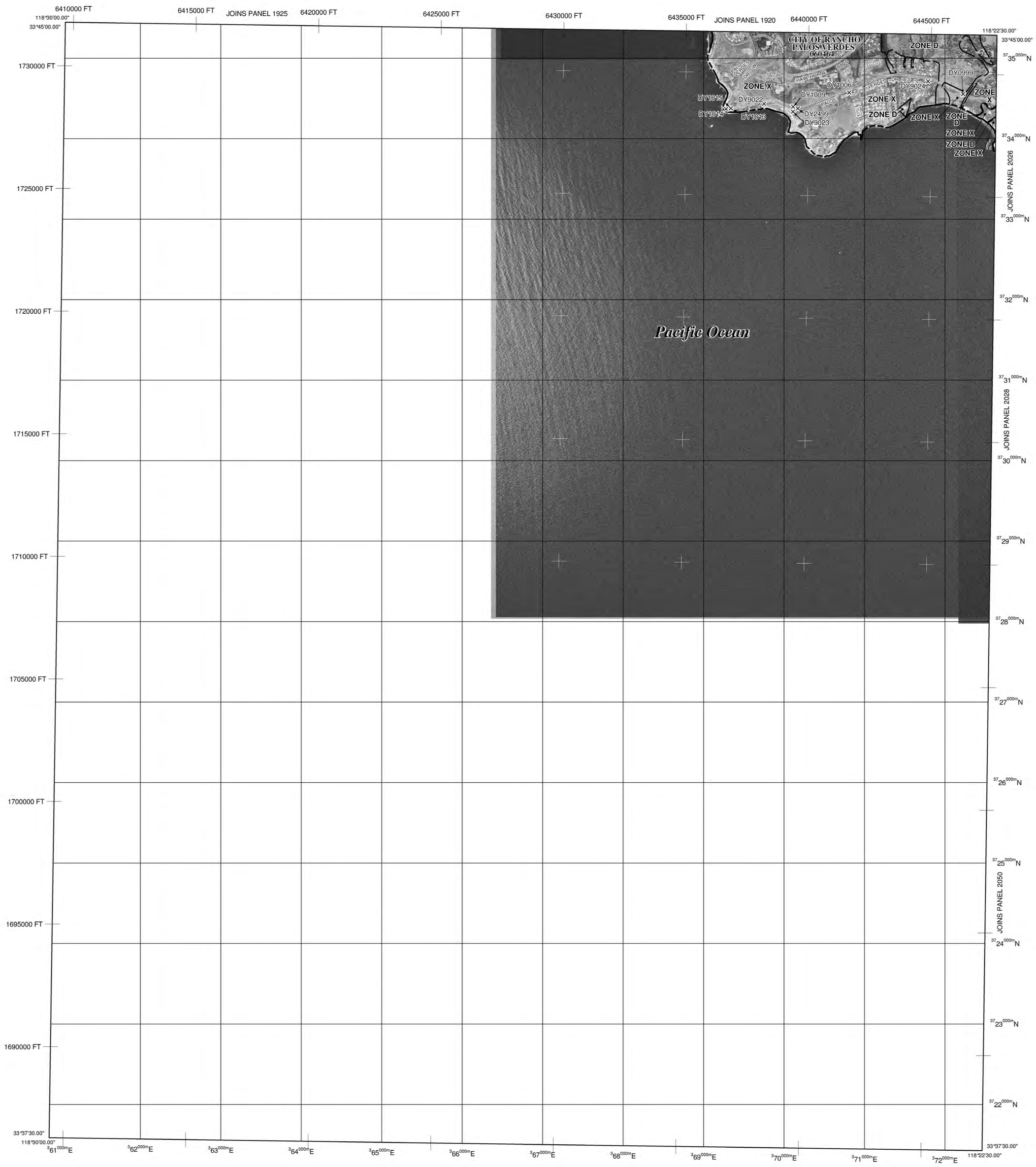
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study report,* and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - - - - 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid values, zone 11
6000000 FT	5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 26, 2008
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET
600 0 600 1200 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2025F

FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 2025 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RANCHO PALOS VERDES, CITY OF	060464	2025	F

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

MAP NUMBER
06037C2025F

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

ATTACHMENT 1-336

NOTES TO USERS

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LEGEND

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0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

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23 - - - - 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid values, zone 11
6000000 FT	5000-foot grid ticks: California State Plane coordinate system, V zone (FIPSZONE 0405), Lambert Conformal Conic
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

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September 26, 2008
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N

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2026F

FIRM
FLOOD INSURANCE RATE MAP
LOS ANGELES COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 2026 OF 2350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RANCHO PALOS VERDES, CITY OF	060464	2026	F
ROLLING HILLS, CITY OF	060151	2026	F

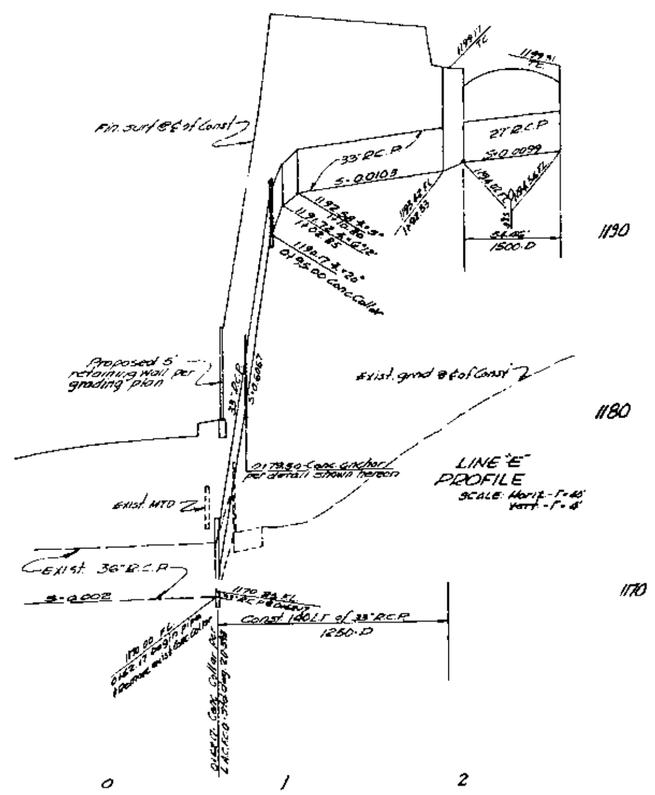
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

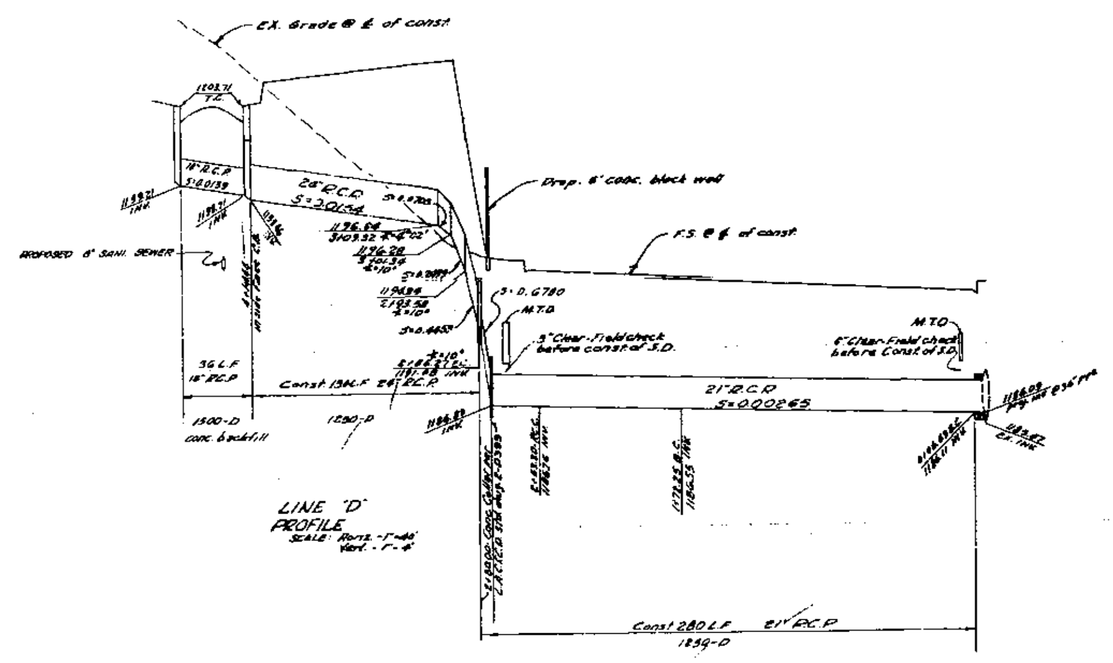
MAP NUMBER
06037C2026F

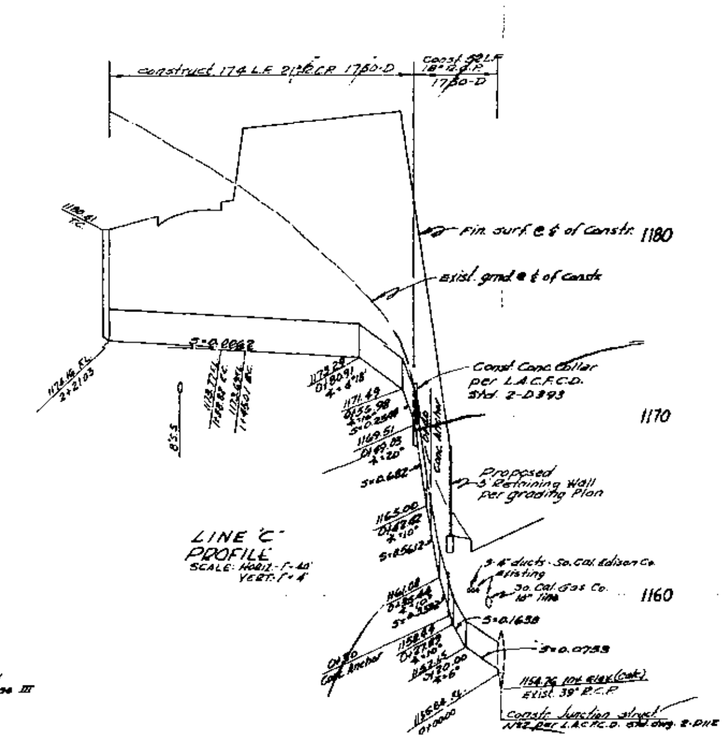
EFFECTIVE DATE
SEPTEMBER 26, 2008

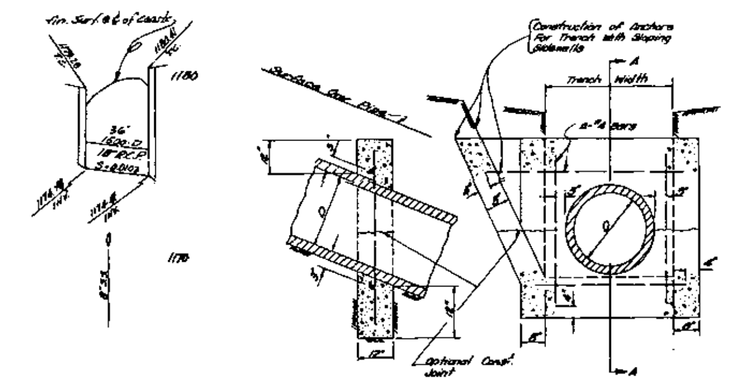
Federal Emergency Management Agency

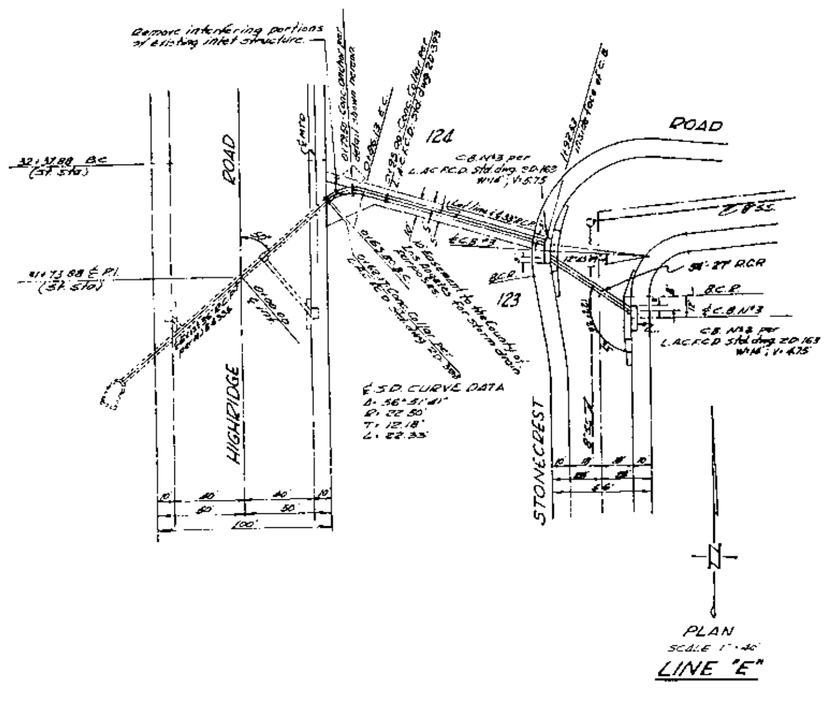
ATTACHMENT 1-337

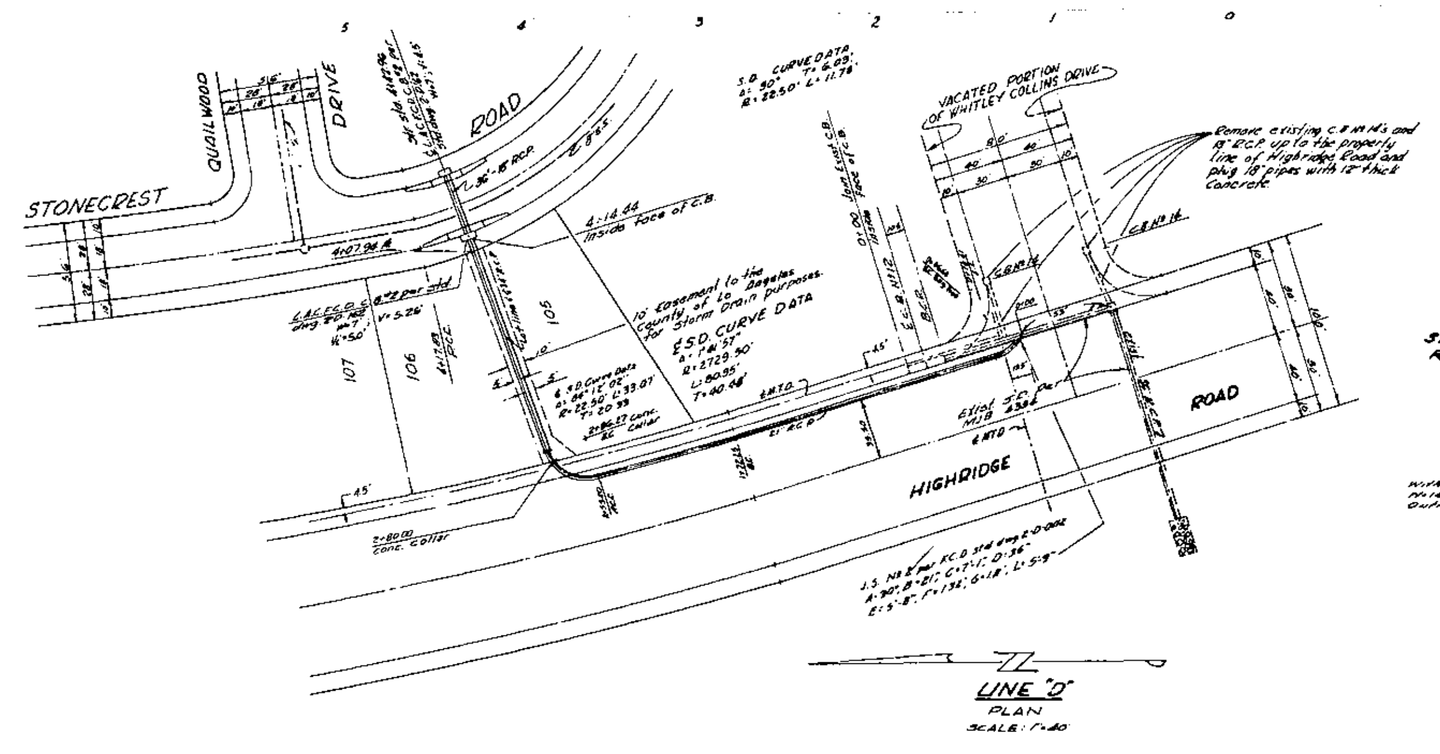


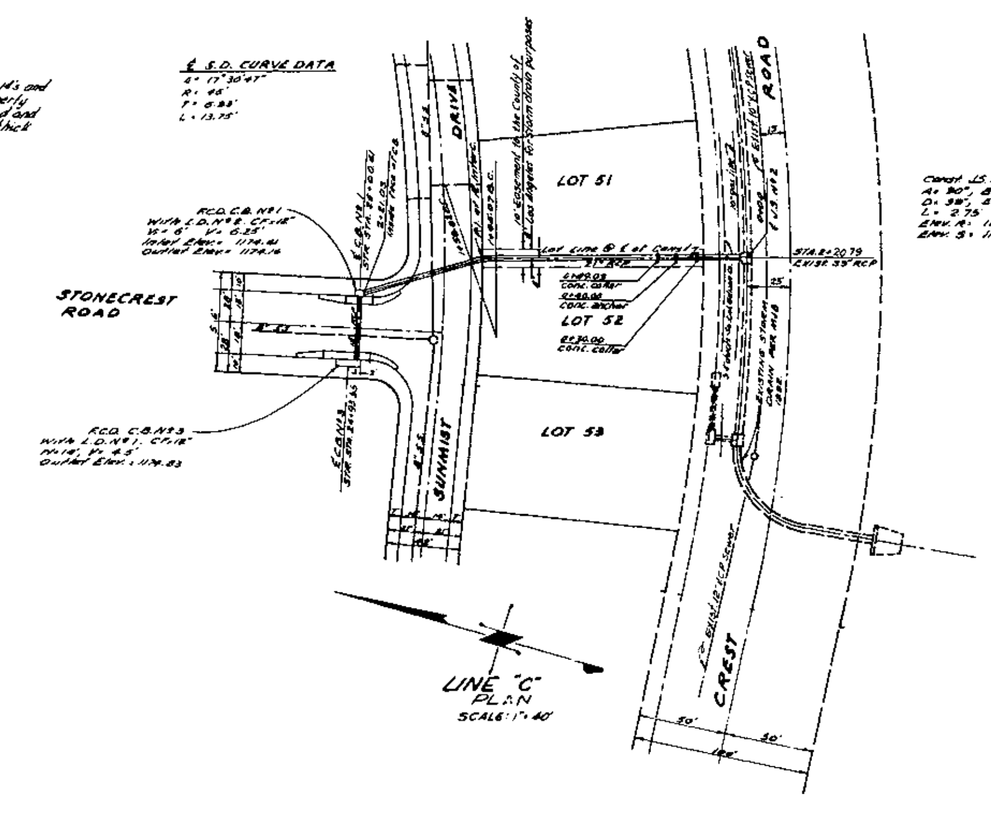












P.D. No. 407
TRACT 27789
SHEET 2 OF 2 SHEETS

HYDRAULIC ELEMENTS							
LINE	BEGIN STA.	BEGIN STA.	Q	I	n	Dia. WIDTH	V
"C"	0+07.58	11+21.03	0.4 cfs	0.015	0.0499	12"	2.6
"D"	0+00.00	5+00.00	0.4 cfs	0.013	0.0375	12"	1.5
"E"	0+42.77	11+75.50	0.4 cfs	0.013	0.0345	12"	1.6
				0.013	0.0420	12"	1.01

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

APPROVED BY: C. N. Green DATE: 5-9-63
DESIGN DIVISION ENGINEER

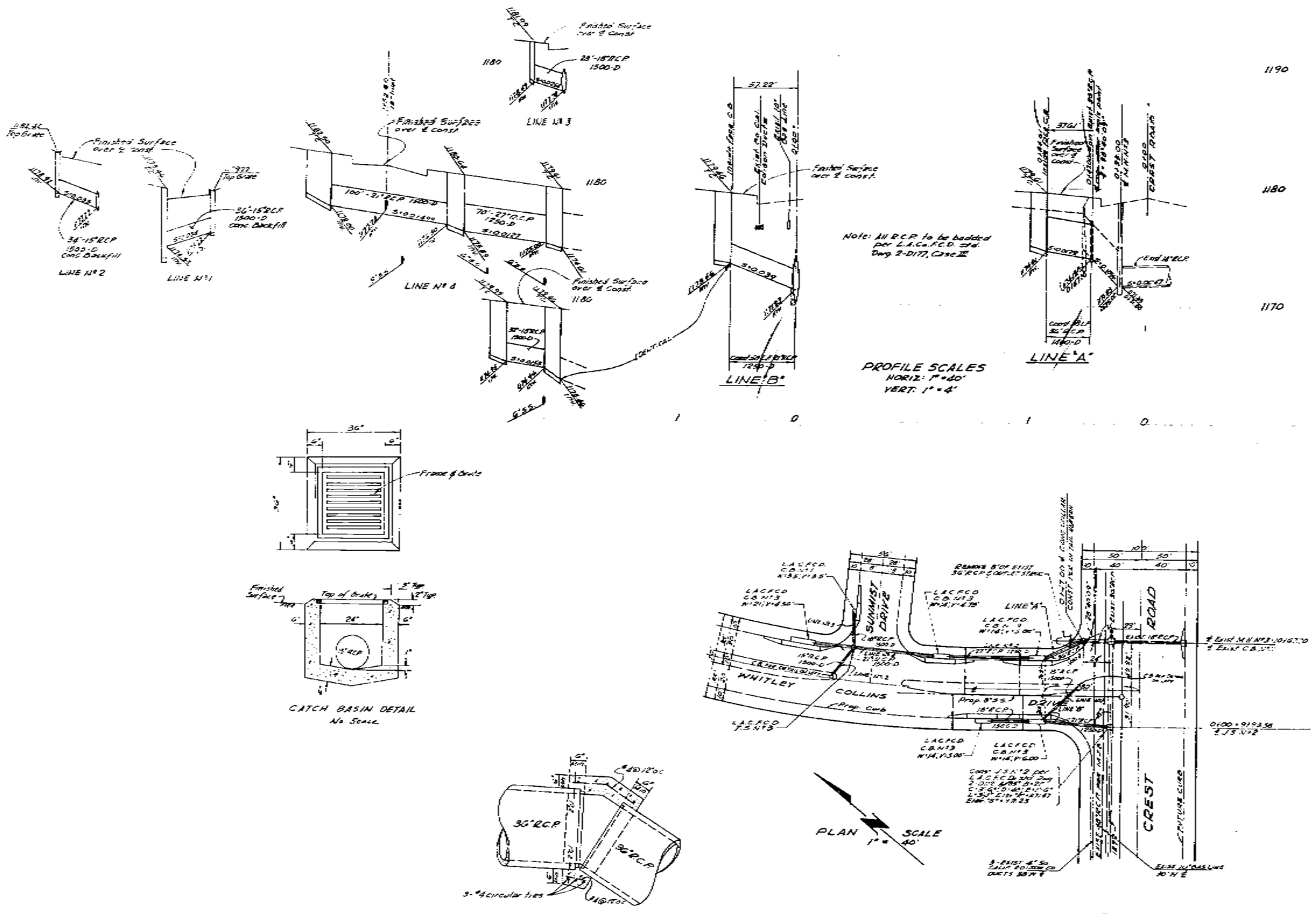
CHECKED BY: [illegible] DATE: 5-9-63
OFFICE OF THE COUNTY ENGINEER RCE No. [illegible]

DEVIEWED BY THE LOS ANGELES COUNTY ROAD DEPARTMENT
BY: [illegible] DATE: 5-7-63

A 1 OF A 2

A 2 OF A 2

ATTACHMENT 1-338



GENERAL NOTES

1. All concrete shall be Portland Cement Concrete with an ultimate 28 day compressive strength of 3000 p.s.i.
2. All exposed edges shall be finished with a ¾" chamfer.
3. All steel shall have 3" clearance unless otherwise specified.
4. Reinforcement shall be deformed bars of intermediate grade steel as per A.S.T.M. A-305-56T.
5. All bars, bends and hooks shall conform to the American Concrete Institute "Manual of Standard Practice".
6. Dimensions from face of concrete to steel are to centerline of steel unless otherwise noted.
7. All backfill and fills to be placed as indicated shall be compacted to a relative density of 90% unless otherwise specified.
8. All steel to be continuous around corners with a minimum lap of 30 diameters or 18" whichever is greater.
9. [illegible] shall be adhered to in the Div. Stat. and shall be submitted to the inspector prior to commencing construction when the rights of way.
10. All [illegible] and backfill rings between [illegible] to be inspected by County Road Dept.
11. All standard Drawings are L.A. County Engineer's standards (Co.) unless otherwise noted.
12. All backfill and fill around closed conduits in street right of way shall be brought up to the subgrade of the road in the 2 foot above the top of the conduit whichever is first. The Road Dept. shall inspect at least 1 foot before placing the second lift. Application for an engineer or inspector in connection with the work shall be made by the contractor at least 24 hours before the service is required. Call Capitol 5-1212, Extension 75204.
13. All State and local trench safety orders will be strictly enforced.

LIST OF STANDARD PLANS

Los Angeles County Flood Control District

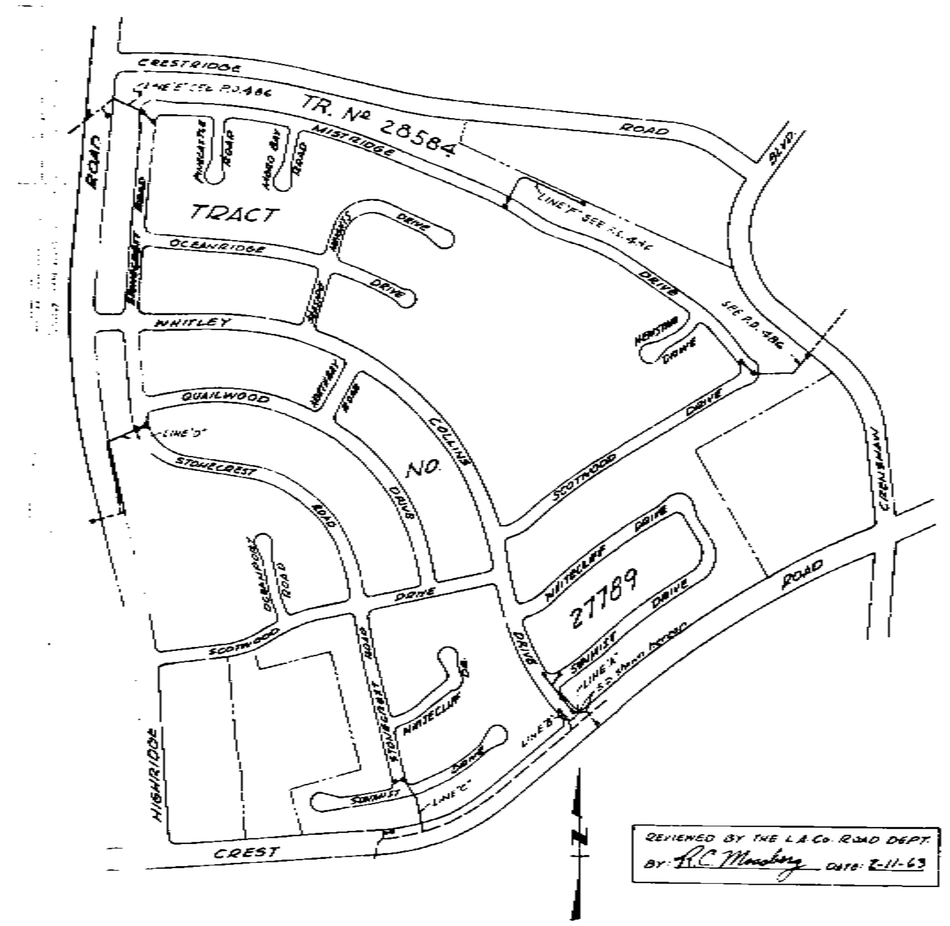
Junction Structure Nº 2	2-D112
C.B. Nº 4	2-D161
Pipe Bedding	2-D177
C.B. Nº 1	2-D160
T.S. Nº 3	2-D188

BENCH MARK

BM-6402

Los Angeles County Sanitation Mad
Bld 30-11936 as 1965 in 12 conc. Post w/
Brass grommet & N.R. cap. CARST ROAD &
CRENSHAW BLVD. 922.6 feet Ely from
ctr. item # 80 feet N.W. from Ctr. road
23.3 feet East of P.P. 10 & 18.8 under
sig. cable.

Elev. 120.998



DESIGNED BY THE L.A. Co. R.D.D. DEPT.
BY R.C. Moseley DATE: 2-11-63

STORM DRAIN DETAILS

Prepared in the offices of
McINTIRE & QUIROS, INC.
By [signature] RCE 12161

NOTE: Elevations are in feet above u.s.g.s. mean sea level of 1929.

All work shall be in accordance with the standards and specifications of storm drain construction of the County Engineer and shall be inspected only to the satisfaction of the County Engineer. Approval of this plan by the County of Los Angeles does not constitute a representation as to the accuracy of the location or the existence or non-existence of any underground utility pipe or structure within the limits of this project. This note applies to all sheets.

The contractor shall notify the Construction Division, by telephone, 213-6262 Cut Block, at least 24 hours before starting any work under this contract. The contractor shall submit a Request for Construction Inspection to the County Engineer. On jobs, 100 or more, at least 24 hours before starting any work under this contract.

PRIVATE ENGINEER'S NOTICE TO CONTRACTOR

The existence and location of any underground utility pipes or structures shown on these plans are based on the records of the various owners. To the best of our knowledge there are no existing utilities except as shown on this map.

The contractor is required to take any precautionary measures to protect the utility lines shown, plus any other lines not of record or not shown on this drawing.

[signature] RCE 12161

P.D. Nº 407
TRACT Nº 27789
SHEET 1 OF ~~1~~ 2 SHEETS

STORM FREQUENCY 10 YR

HYDRAULIC ELEMENTS

REACH STA	REACH TO STA	Q cfs	n	H/B	V feet	V f.p.s.
0+00.00 (Line "A")	0+37.22	23	0.013	0.075	21'9	9.54
0+23.00 (Line "B")	0+85.98	43	0.013	0.0242	30'9	5.08

COUNTY OF LOS ANGELES, CALIFORNIA
JOHN A. LAMBIE COUNTY ENGINEER

APPROVED BY: [signature] DESIGN DIVISION ENGINEER DATE: 2-18-63

CHECKED BY: [signature] OFFICE OF THE COUNTY ENGINEER R.C.E. DATE: 2-18-63

A 2 OF A 2

LIST OF STANDARD DRAWING OF LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

DESCRIPTION	DWG NO.
JUNCTION STRUCTURE Nº 2	2-D112
MANHOLE NO. 2	2-D164
CATCH BASIN NO. 2	2-D142
CATCH BASIN NO. 8	2-D163
MANHOLE FRAME AND COVER	2-D172
PROTECTION BARS FOR CATCH BASIN	2-D173
CATCH BASIN REINFORCEMENT	2-D172
CONNECTION TO C.B. FOR PIPE	2-D224
CATCH BASIN OPENING	2-D252
MANHOLE FRAME & COVER FOR CATCH BASIN	2-D156
CATCH BASIN REINFORCEMENT FOR ROUND C.B.	2-D157
STANDARD DROP STEP	2-D34
SPECIAL MANHOLE FRAME AND COVER	2-D427
TRANSITION STRUCTURE Nº 5	2-D185
CATCH BASIN Nº 1	2-D100
FENCE	2-D180

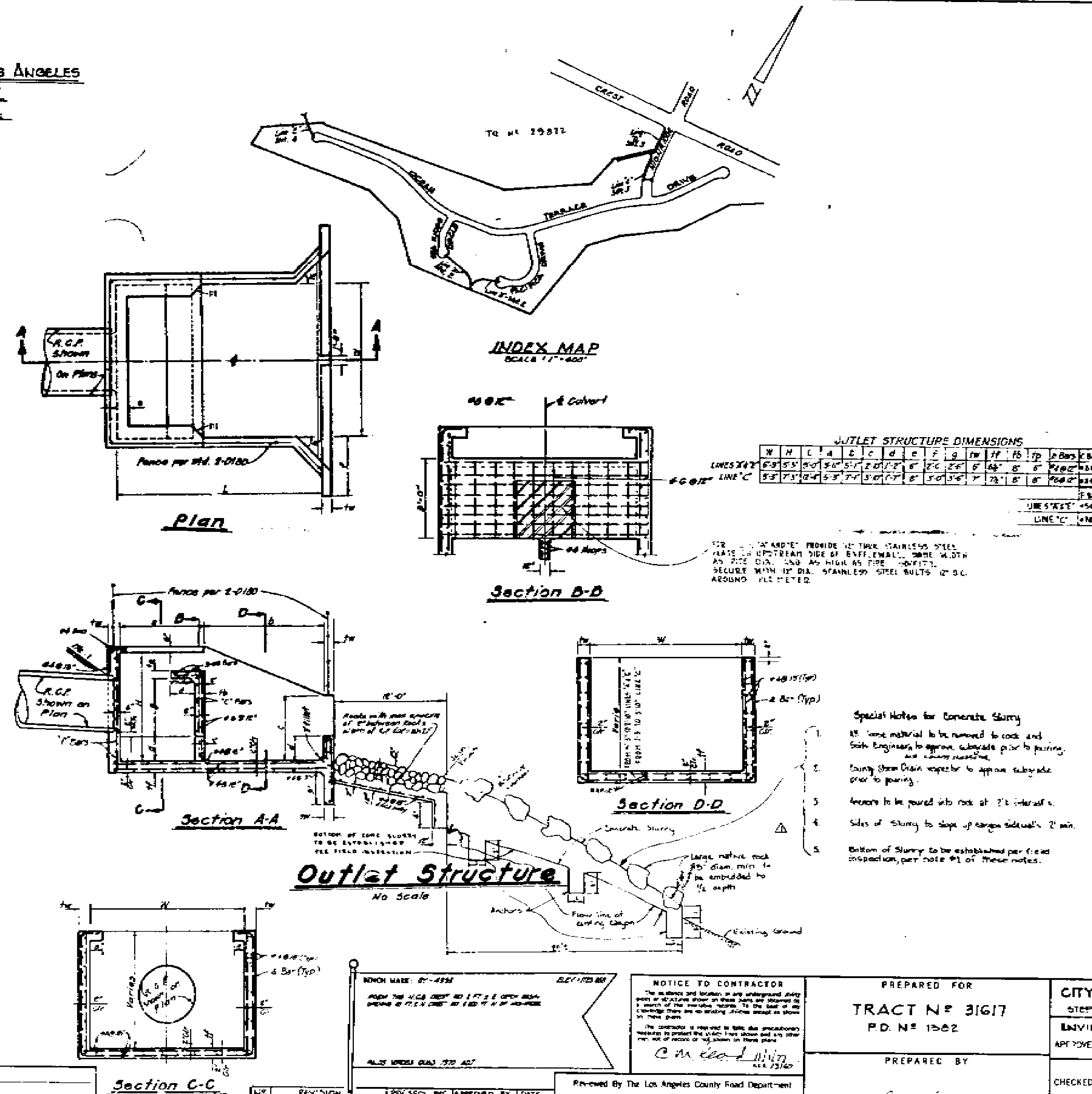
LOS ANGELES COUNTY ENGINEER

PIPE BEDDING	D-54
CONCRETE ANCHORS	D-72

HYDRAULIC ELEMENT TABLE

Station From	Station To	Qcs	Ø	SF	V
Line "A"					
1+00	1+16	58.9	30" R.C.P.	NOT FULL	27.6
1+16	1+45	38.9	24" R.C.P.	" "	39.7
1+58	2+11	38.9	24" "	" "	38.1
2+20	2+86	38.9	24" "	" "	24.4
2+86	3+97.30	38.9	24" "	" "	5.4
Line "B"					
1+80.50	2+20	31.1	27" R.C.P.	NOT FULL	27.3
2+20	2+28	31.1	" "	" "	26.1
2+28	2+36	31.1	" "	" "	23.2
2+36	2+44	31.1	" "	" "	19.7
2+44	2+52	31.1	" "	" "	15.0
2+52	3+42.67	31.1	" "	0.0101	7.8
Line "C"					
0+35	1+80	73.5	36" R.C.P.	NOT FULL	24.0
1+80	2+52.50	73.5	36" R.C.P.	NOT FULL	13.8
2+52.60	3+58.23	55.0	" "	" "	14.5
3+58.89	5+48.96	55.0	" "	" "	20.2
Line "D"					
2+58.30	4+32.43	14.8	24" R.C.P.	NOT FULL	5.8
4+37.45	4+99.43	12.0	21" R.C.P.	" "	6.9
Line "E"					
0+80	0+96	23.3	24" R.C.P.	NOT FULL	23.2
0+96	1+48	23.3	24" R.C.P.	NOT FULL	35.8
1+48	1+80	23.3	" "	" "	38.0
1+80	1+96	23.3	" "	" "	26.8
1+96	2+[illegible]	23.3	" "	" "	14.5

WHERE VELOCITY EXCEEDS 20'/SEC. PROVIDE AN EXTRA 1" OF CONCRETE OVER THE INVERT OF THE R.C.P.



OUTLET STRUCTURE DIMENSIONS

	W	H	L	a	b	c	d	e	f	g	tw	tf	ts	tp	"a" Bars	"c" Bars
LINES "A" & "E"	6'-3"	5'-5"	5'-0"	3'-6"	5'-1"	2'-0"	1'-2"	6"	2'-0"	2'-6"	6"	6½"	8"	6"	#4 @ 12"	#5 @ 12"
LINE "C"	5'-3"	7'-3"	12'-4"	5'-3"	7'-4"	3'-0"	1'-7"	8"	3'-0"	3'-6"	7"	7½"	8"	8"	#6 @ 12"	#5 @ 12"

	"F" Bars
LINES "A" & "E"	#5 @ 12"
LINE "C"	#4 @ 12"

FOR LINES "A" AND "E" PROVIDE 1/2" THICK STAINLESS STEEL PLATE ON UPSTREAM SIDE OF BAFFLEWALL, SAME WIDTH AS PIPE DIA. AND AS HIGH AS PIPE SOFFIT. SECURE WITH 1/2" DIA. STAINLESS STEEL BOLTS 12" O.C. AROUND PERIMETER.

Special Notes for Concrete Slurry

1. All loose material to be removed to rock and Soils Engineer to approve subgrade prior to pouring.
2. County Storm Drain inspector to approve subgrade prior to pouring.
3. Anchors to be poured into rock at 7½' intervals.
4. Sides of slurry to slope up canyon sidewalls 2' min.
5. Bottom of slurry to be established per field inspection, per note #1 of these notes.

PLANS FOR STORM DRAIN
TRACT NO. 31617
PRIVATE DRAIN NO. 1582

PREPARED IN THE OFFICES OF

LANCO ENGINEERING

BY C. M. Leonard R.C.E. 13167

GENERAL NOTES

1. ELEVATIONS ARE IN FEET ABOVE U.S.G.S. MEAN SEA LEVEL DATUM OF 1929.
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1976 EDITION, INCLUDING ALL SUPPLEMENTS AND SHALL BE PROSECUTED ONLY IN THE PRESENCE OF THE CITY ENGINEER.
3. APPROVAL OF THIS PLAN BY THE COUNTY OF LOS ANGELES DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OF THE LOCATION OR EXISTENCE OR NONEXISTENCE OF ANY UNDERGROUND UTILITY, PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT.
4. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION SECTION BY TELEPHONE [illegible] AT LEAST 24 HOURS BEFORE STARTING ANY WORK UNDER THIS CONTRACT.
5. THIS STORM DRAIN WILL NOT BE ACCEPTED FOR MAINTENANCE UNTIL THE STREETS HAVE BEEN PAVED, MANHOLES BROUGHT UP TO GRADE, AND THE SYSTEM IS CLEANED TO THE SATISFACTION OF THE CITY ENGINEER.
6. ALL REINFORCED CONC. PIPE SHALL BE BEDDED IN ACCORDANCE WITH CASE [illegible] BEDDING PER D-54 UNLESS OTHERWISE SPECIFIED.
7. PERMITS SHALL BE OBTAINED FROM THE ROAD DEPARTMENT AND L.A.C.F.C.D. AND SHALL BE SUBMITTED TO THE INSPECTOR PRIOR TO COMMENCING CONSTRUCTION WITHIN THEIR RIGHT OF WAY.
8. ALL BACKFILL AND FILL AROUND CLOSED CONDUITS IN STREET RIGHTS OF WAY SHALL BE BROUGHT UP TO THE SUBGRADE OF THE ROAD OR TO 2 FEET ABOVE THE TOP OF CONDUIT, WHICHEVER IS LESS. THE ROAD DEPARTMENT SHALL INSPECT ALL BACKFILL AND FILL ABOVE THE AFOREMENTIONED LIMITS. APPLICATION FOR AN ENGINEER OR INSPECTOR IN CONNECTION WITH THE WORK SHALL BE MADE BY THE CONTRACTOR AT LEAST 24 HOURS BEFORE HIS SERVICE IS REQUIRED. CALL [illegible].
9. ALL STATE AND LOCAL TRENCH SAFETY ORDERS WILL BE RIGIDLY ENFORCED.
10. ALL CATCH BASINS & CONNECTION PIPES BETWEEN BATHS TO BE [illegible] BY THE COUNTY ROAD DEPARTMENT.
11. ALL MANHOLE COVERS NOT IN STREET PAVING SHALL BE PROVIDED WITH ALLEN SOCKET SET SCREW LOCKING DEVICES. THE CONTRACTOR SHALL DRILL AND TAP TWO HOLES TO A DEPTH OF 1 INCH AT 90 DEGREES TO PICK HOLE AND INSTALL 3/4 INCH BY 3/4 ALLEN SOCKET SET SCREWS.
12. A SOIL ENGINEER SHALL CERTIFY THAT ALL FILLS AND BACKFILLS OVER UNDERGROUND STORM DRAINS OUTSIDE OF STREET R/W HAVE BEEN COMPACTED OR CONSOLIDATED TO A 90% DENSITY. THIS CERTIFICATION SHALL BE SUBMITTED TO THE CITY ENGINEER PRIOR TO ACCEPTANCE OF THE WORK BY THE CITY.

CONCRETE NOTES

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]
9. [illegible]

RIP-RAP NOTES

1. ROCKS FOR GROUTED RIP-RAP SHALL BE OF GOOD QUALITY BROKEN CONCRETE AND OR RIVER RUN ROCK. THE SMALLEST DIMENSION SHALL EXCEED [illegible] AND THE LARGEST DIMENSION SHALL NOT EXCEED [illegible]. THE LARGEST DIMENSION SHALL NOT EXCEED 4 TIMES THE SMALLEST DIMENSION.
2. THERE SHALL BE A GROUT BED OF AT LEAST [illegible] BENEATH THE FIRST LAYER OF ROCK. ALL THE VOIDS BETWEEN THE ROCKS SHALL BE FILLED WITH GROUT. MAXIMUM SPACING BETWEEN ROCKS SHALL BE [illegible].
3. SURFACE ROCKS SHALL BE IMBEDDED AT LEAST ONE-HALF TO TWO-THIRDS THEIR MAXIMUM DIMENSION.

12. A SOILS ENGINEER SHALL CERTIFY THAT ALL FILLS AND BACKFILLS OVER UNDERGROUND STORM DRAINS OUTSIDE OF STREET R/W HAVE BEEN COMPACTED OR CONSOLIDATED TO A 90% DENSITY. THIS CERTIFICATION SHALL BE SUBMITTED TO THE CITY ENGINEER PRIOR TO ACCEPTANCE OF THE WORK BY THE COUNTY.
13. LONGITUDINAL STEEL SHALL BE CONTINUOUS AND EXTEND THROUGH ALL CONSTRUCTION JOINTS EXCEPT TRANSVERSE JOINTS IN RECTANGULAR CHANNELS AND AROUND ALL CORNERS UNLESS OTHERWISE SHOWN.
14. TRANSVERSE REINFORCEMENT AND TRANSVERSE JOINTS SHALL BE PLACED AT RIGHT ANGLES OR RADIAL TO CONDUIT CENTER LINE UNLESS OTHERWISE SHOWN.
15. UNLESS OTHERWISE SHOWN, TRANSVERSE JOINT KEYWAYS IN BOTH SLABS AND WALLS SHALL BE PLACED AT THE END OF EACH POUR BUT THE SPACING THEREOF SHALL NOT EXCEED 50 FEET NO BE LESS THAN 10 FEET.
16. TRANSVERSE CONSTRUCTION JOINTS SHALL NOT BE PLACED WITHIN 30 INCHES OF MANHOLE OR JUNCTION STRUCTURE OPENINGS.

BENCH MARK: [illegible]

NOTICE TO CONTRACTOR

Reviewed By The Los Angeles County Road Department
By [signature] Date 11-29-77

No.	REVISION	REVISED BY	APPROVED BY	DATE
△	[illegible]	[illegible]	P.M. Spardau	[illegible]

APPROVED: ____

CITY OF RANCHO PALOS VERDES

PREPARED FOR

TRACT Nº 31617
P.D. Nº 1582

PREPARED BY

C. M. Leonard
CLARK M. LEONARD R.C.E. 13167

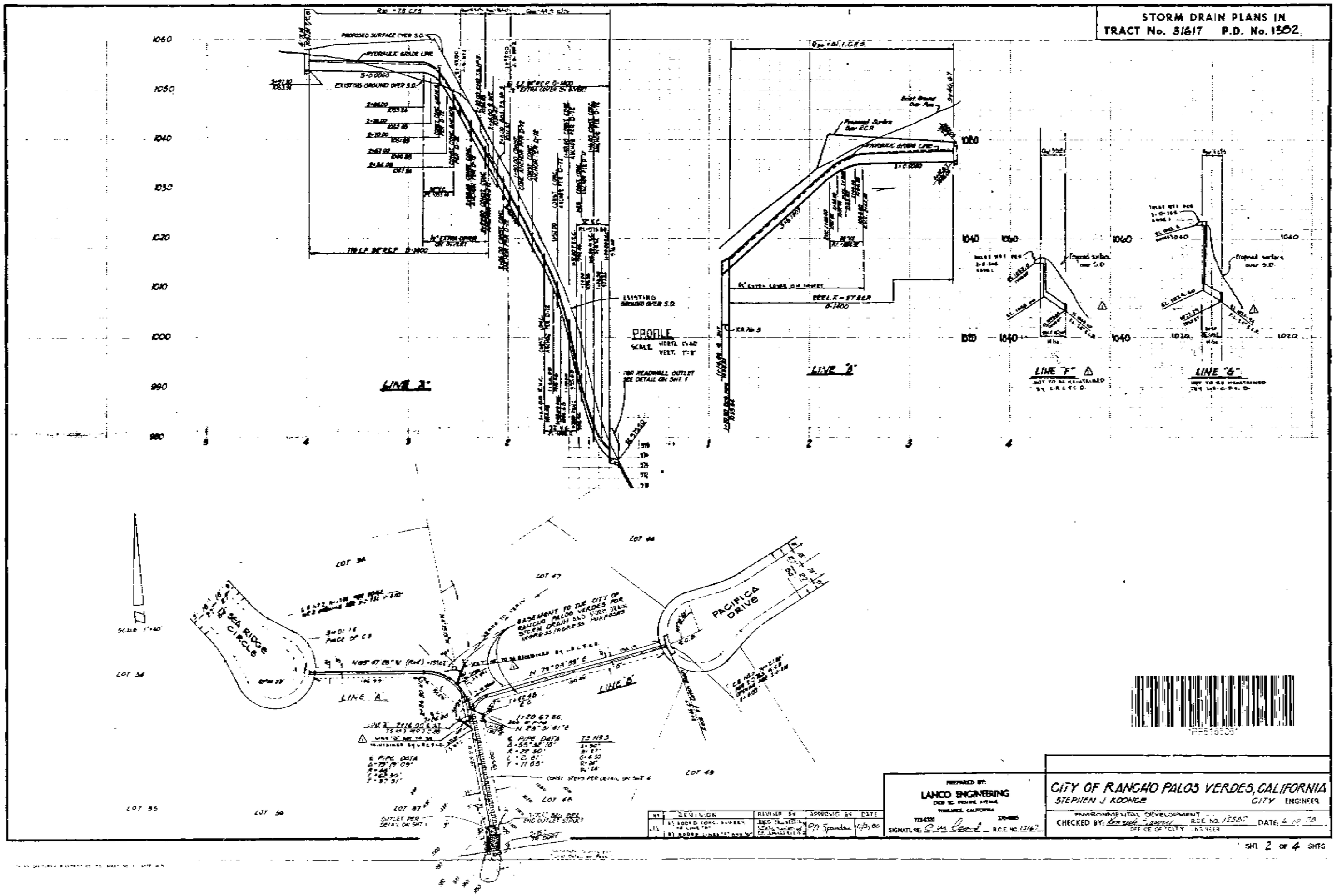
CITY OF RANCHO PALOS VERDES, CALIFORNIA
STEPHEN J. KOONCE CITY ENGINEER

ENVIRONMENTAL DEVELOPMENT DIVISION
APPROVED BY [signature] DIVISION ENGINEER DATE [illegible]

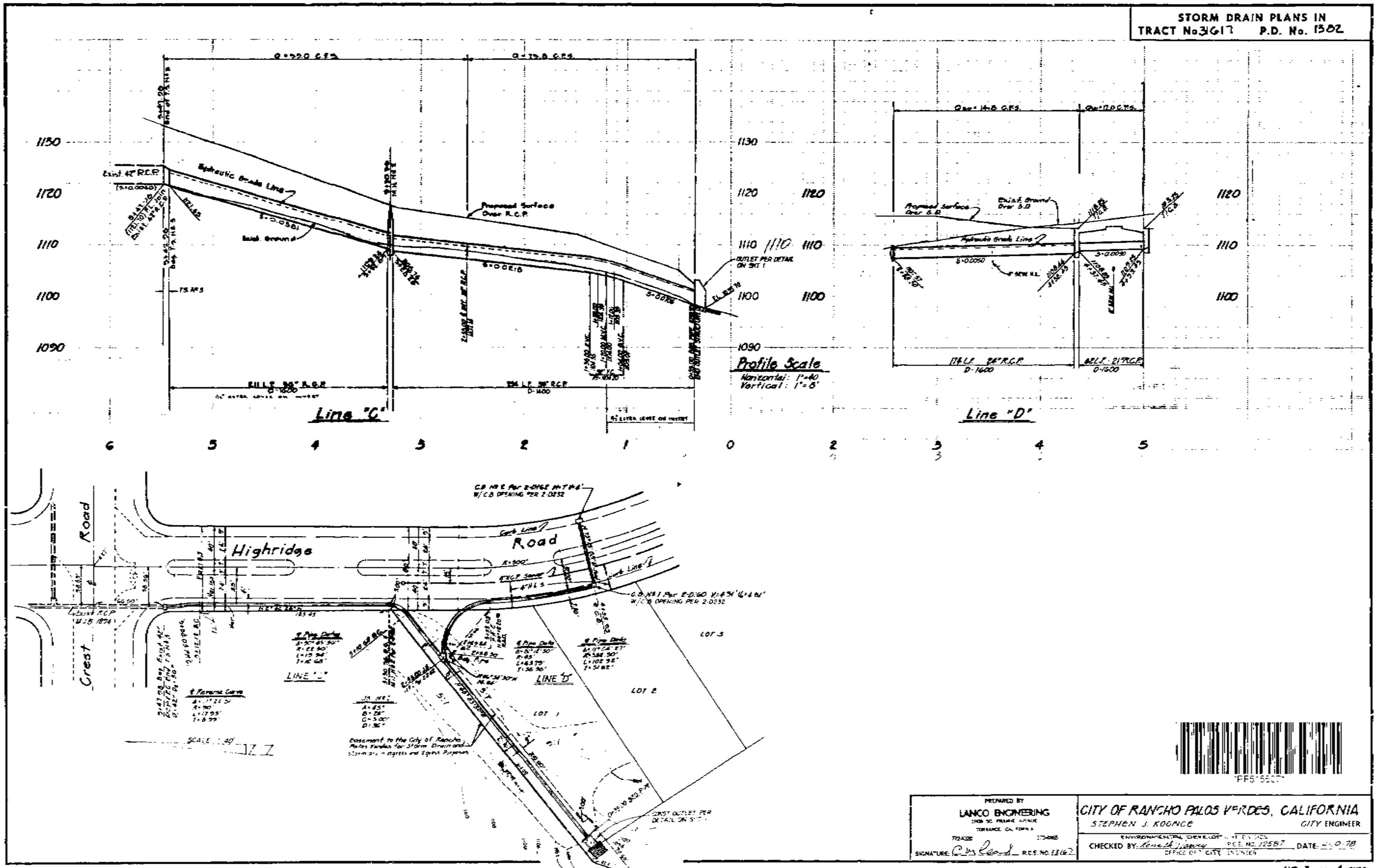
CHECKED BY [signature] R.C.E. 12557 DATE [illegible]
OFFICE OF THE CITY ENGINEER

DRAWN / DATE / TRACED / CHECKED

SHEET 1 OF 4 SHEETS


STORM DRAIN PLANS IN
TRACT No. 31617 P.D. No. 1502
PROFILE
LINE "A"
LINE "B"
LINE "F"
LINE "G"
SEA RIDGE CIRCLE
PACIFICA DRIVE
LOT 44
LOT 45
LOT 46
LOT 47
LOT 48
LOT 49
LOT 54
LOT 55
LOT 56
LOT 57
PREPARED BY:
LANCO ENGINEERING
CITY OF RANCHO PALOS VERDES, CALIFORNIA
STEPHEN J KOONCE
CITY ENGINEER
ENVIRONMENTAL DEVELOPMENT
CHECKED BY:
OFFICE OF CITY ENGINEER
SHT 2 OF 4 SHTS

STORM DRAIN PLANS IN
TRACT No 31617 P.D. No. 1502

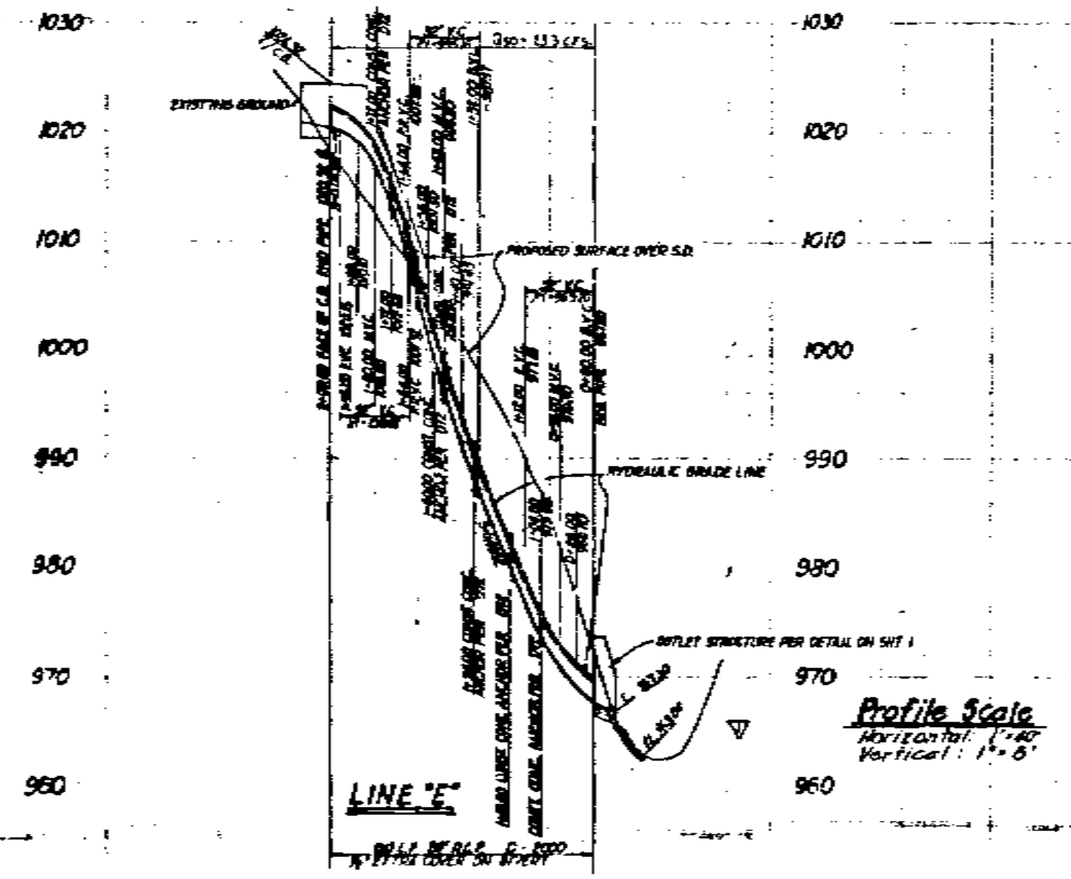


PREPARED BY
LANCO ENGINEERING
3108 SO. PRAIRIE AVENUE
TORRANCE, CALIFORNIA
772-4320 373-4085
SIGNATURE: R.C.E. NO. 13162

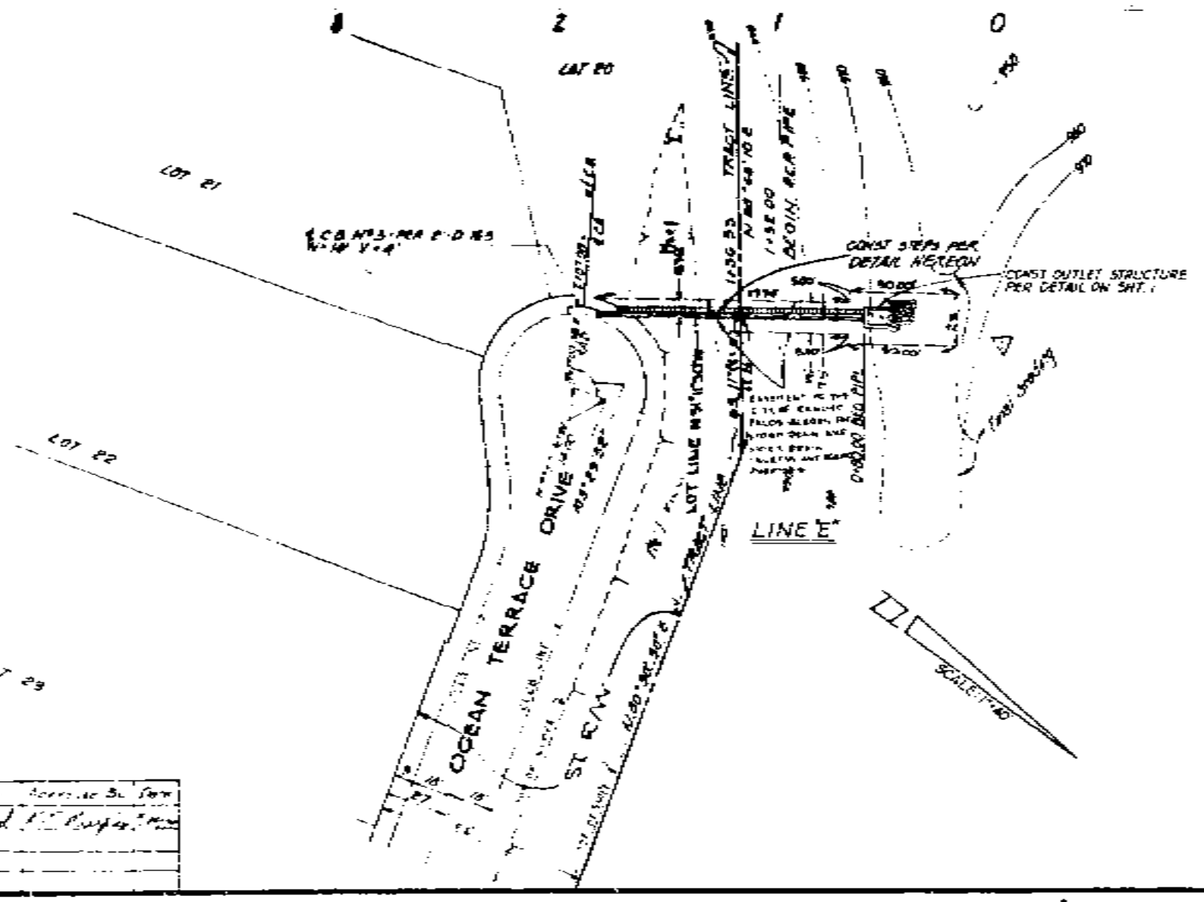
CITY OF RANCHO PALOS VERDES, CALIFORNIA
STEPHEN J. KOONCE — CITY ENGINEER
ENVIRONMENTAL DEVELOPMENT
CHECKED BY: Kenneth Chaney R.C.E. NO. 12587 DATE: 11-9-78
OFFICE OF THE CITY ENGINEER

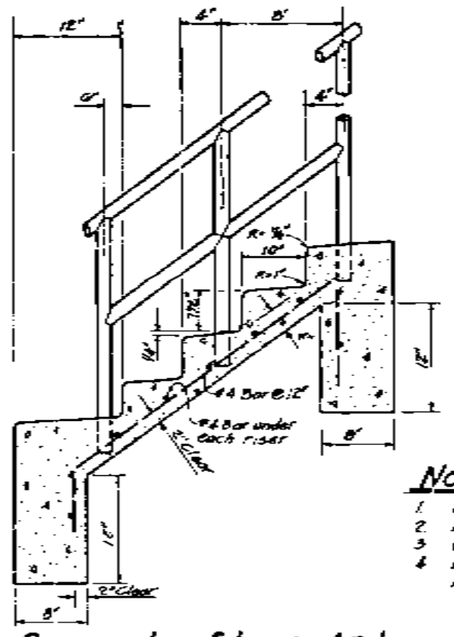
SHT 3 OF 4 SHTS

STORM DRAIN PLANS IN
TRACT No. 31617 P.D. No. 1562



Profile Scale
Horizontal: 1" = 40'
Vertical: 1" = 8'





Notes:

1. The Width of Stairway = 42"
2. Riser = 7¾" Tread = 10"
3. Use handrails per L.A.C.Rd Dept. Std Plan 18-02
4. Handrail shall not reduce stairway width by more than 3-½"

Concrete Steps And Handrail Detail
No Scale

PREPARED BY:
LANCO ENGINEERING
1208 SO. PALOS VERDES
TORRANCE, CALIFORNIA
SIGNATURE: R.C.E. NO. 17962

CITY OF RANCHO PALOS VERDES, CALIFORNIA
STEPHEN J. KOONTZ — CITY ENGINEER
ENVIRONMENTAL DEVELOPMENT
CHECKED BY: R.C.E. 7527 DATE: 4-10-78
OFFICE OF CITY ENGINEER

SHT 4 OF 4 SHTS

STORM DRAIN PLANS IN TRACT No. 31714 P.D. No. 1403

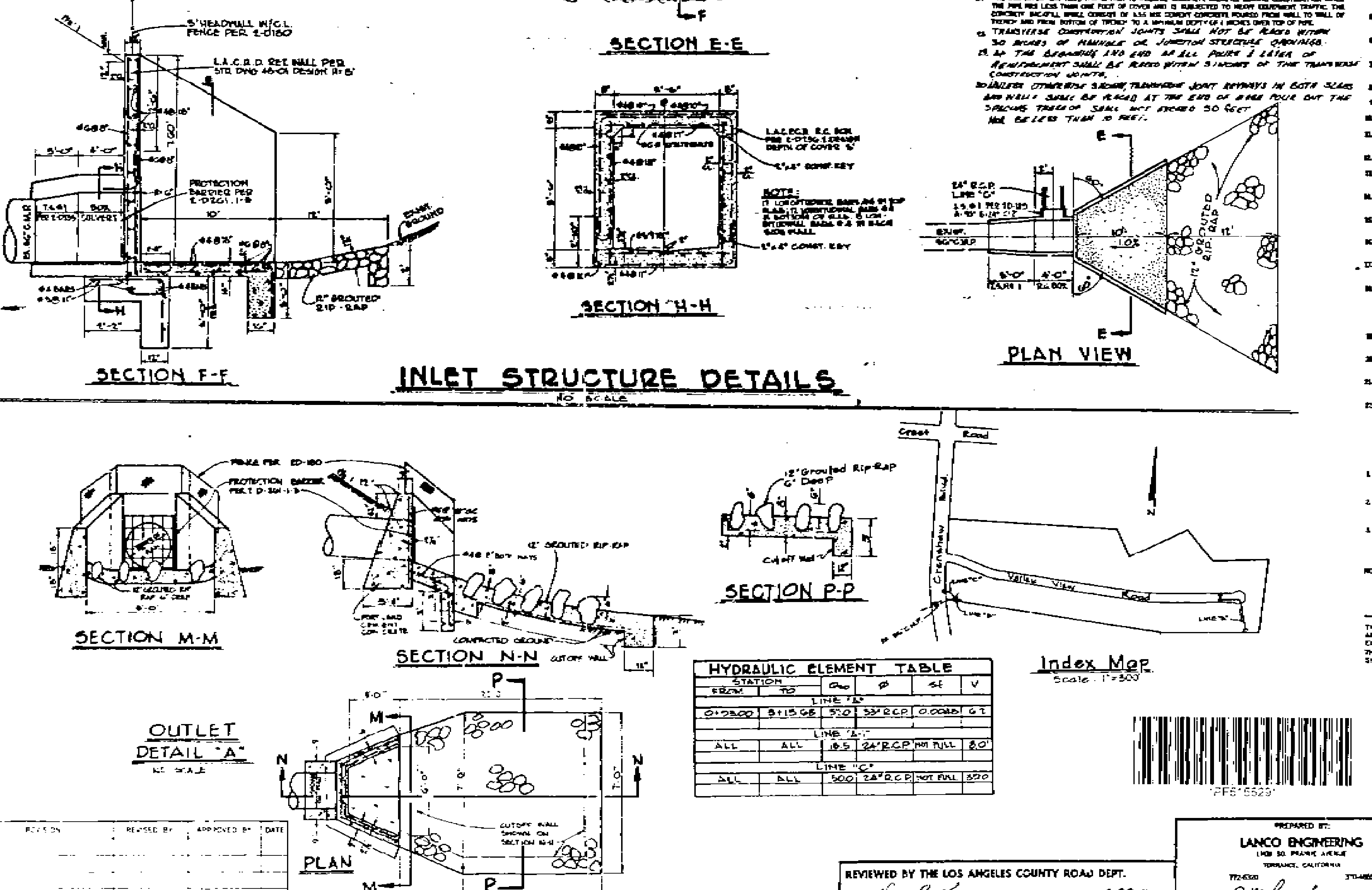
BENCH MARK: BY 4402

C.S. Mon. in 12 in. conc. post 4 in. above ground at N.E. cor. Crest Rd. & Crenshaw Blvd. 95 Ft.± & 40 Ft.± N. ℄ int. mkd.

Palos Verdes Quad. 1970 Elev. 1201.455

List of Standard Drawings of Los Angeles County Flood Control District

Description	Dwg. No.
Catch Basin No. 3	2-D165
Protection Bars for Catch Basin	2-D175
Catch Basin Reinforcement	2-D172
Catch Basin Opening	2-D232
Manhole Frame & Cover for Catch Basin	2-D156
Standard Drop Step	2-D 96
Connection to Catch Basin	2-D224
Headwall Fence	2-D180
Protection Barrier	2-D241 to 3
Transition Structure No. 1	2-D255
Catch Basin Reinforcement for Round M.H.	2-D151
Junction Structure No. 1	2-D165



GENERAL NOTES:

1. ELEVATIONS ARE IN FEET ABOVE U.S.C. & G.S. MEAN SEA LEVEL DATUM OF 1929. ALL WORK SHALL BE IN ACCORDANCE WITH THE "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION" [illegible] EDITION AND SHALL BE PROSECUTED ONLY IN THE PRESENCE OF THE CITY ENGINEER.
2. APPROVAL OF THIS PLAN BY THE CITY OF [illegible] DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OF THE LOCATION, OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY, PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THIS NOTE APPLIES TO ALL SHEETS.
3. THE CONTRACTOR SHALL NOTIFY THE ENVIRONMENTAL DEVELOPMENT DIV. BY TELEPHONE [illegible] AT LEAST 24 HOURS BEFORE STARTING ANY WORK UNDER THIS CONTRACT. THE CONTRACTOR SHALL SUBMIT A DEPOSIT FOR CONSTRUCTION INSPECTION TO THE COUNTY ENGINEER [illegible] LOS ANGELES, AT LEAST 24 HOURS BEFORE STARTING ANY WORK UNDER THIS CONTRACT.
4. ALL CONSTRUCTION JOINTS IN THE FOOTING OF SLABS AND WALLS SHALL BE IN THE SAME PLANE. NO STAGGERING OF JOINTS WILL BE PERMITTED.
5. NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAS BEEN PLACED, INSPECTED AND APPROVED.
6. TRANSVERSE REINFORCEMENT AND TRANSVERSE JOINTS SHALL BE PLACED AT RIGHT ANGLES [illegible] TO CONDUIT CENTERLINE EXCEPT AS OTHERWISE SHOWN ON THE DRAWINGS.
7. ALL CONCRETE SHALL BE PORTLAND CEMENT CONCRETE WITH AN ULTIMATE 28 DAYS COMPRESSIVE STRENGTH OF [illegible] psi.
8. ALL EXPOSED EDGES SHALL BE FINISHED WITH A 3/4" CHAMFER.
9. ALL STEEL ADJACENT TO FACE OF CONCRETE SHALL HAVE 2½" CLEARANCE UNLESS OTHERWISE SPECIFIED.
10. REINFORCEMENT SHALL BE DEFORMED BARS OF INTERMEDIATE GRADE STEEL AS PER A.S.T.M. A-15.
11. ALL BAR BENDS AND HOOKS SHALL CONFORM TO THE AMERICAN CONCRETE INSTITUTE "MANUAL OF STANDARD PRACTICE".
12. DIMENSIONS FROM FACE OF CONCRETE TO STEEL ARE TO CENTERLINE OF STEEL UNLESS OTHERWISE NOTED.
13. ALL BACKFILLS AND FILLS TO BE USED AS SUBGRADE SHALL BE COMPACTED TO A RELATIVE DENSITY OF 90% UNLESS OTHERWISE SPECIFIED.
14. ALL STEEL THAT IS TO BE CONTINUOUS SHALL HAVE A MINIMUM LAP OF 30 BAR DIAMETERS OR [illegible], WHICHEVER IS GREATER.

[illegible]

GENERAL NOTES (Cont'd)

[illegible]

RIPRAP NOTES

[illegible]

NOTE: CONCRETE MAY BE SUBSTITUTED FOR THE GROUT.

PRIVATE ENGINEERS NOTICE TO CONTRACTORS

[illegible]

REGISTERED CIVIL ENGINEER No. — DATE

HYDRAULIC ELEMENT TABLE					
STATION FROM	STATION TO	Q	Ø	Sf	V
LINE "A"					
0+73.00	3+15.66	52.0	33" R.C.P.	0.0046	6.2
LINE "A-1"					
ALL	ALL	18.5	24" R.C.P.	NOT FULL	8.0'
LINE "C"					
ALL	ALL	5.00	24" R.C.P.	NOT FULL	3.20

REVIEWED BY THE LOS ANGELES COUNTY ROAD DEPT.
BY: [signature] DATE: 5-28-72

PREPARED BY:
LANCO ENGINEERING
TORRANCE, CALIFORNIA
SIGNATURE: [signature] R.C.E. NO. 13142

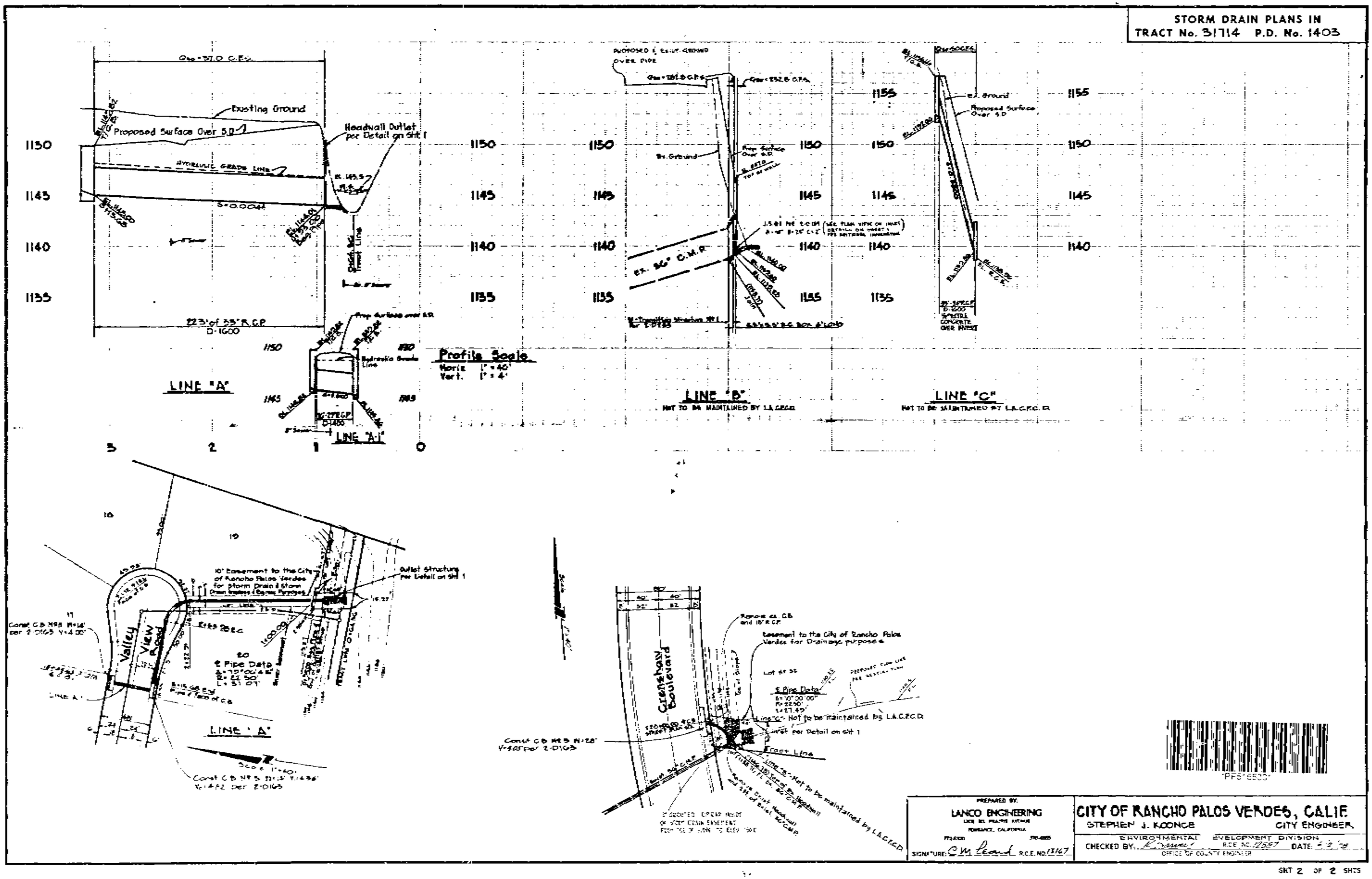
CITY OF RANCHO PALOS VERDES, CALIF.
STEPHEN J. KOONCE, CITY ENGINEER

ENVIRONMENTAL DEVELOPMENT DIVISION
APPROVED BY: [signature] DATE: [illegible]
CHECKED BY: [signature] R.C.E. NO. 11587 DATE: [illegible]
OFFICE OF COUNTY ENGINEER

REVISION	REVISED BY	APPROVED BY	DATE

SHT 1 OF 2 SHTS

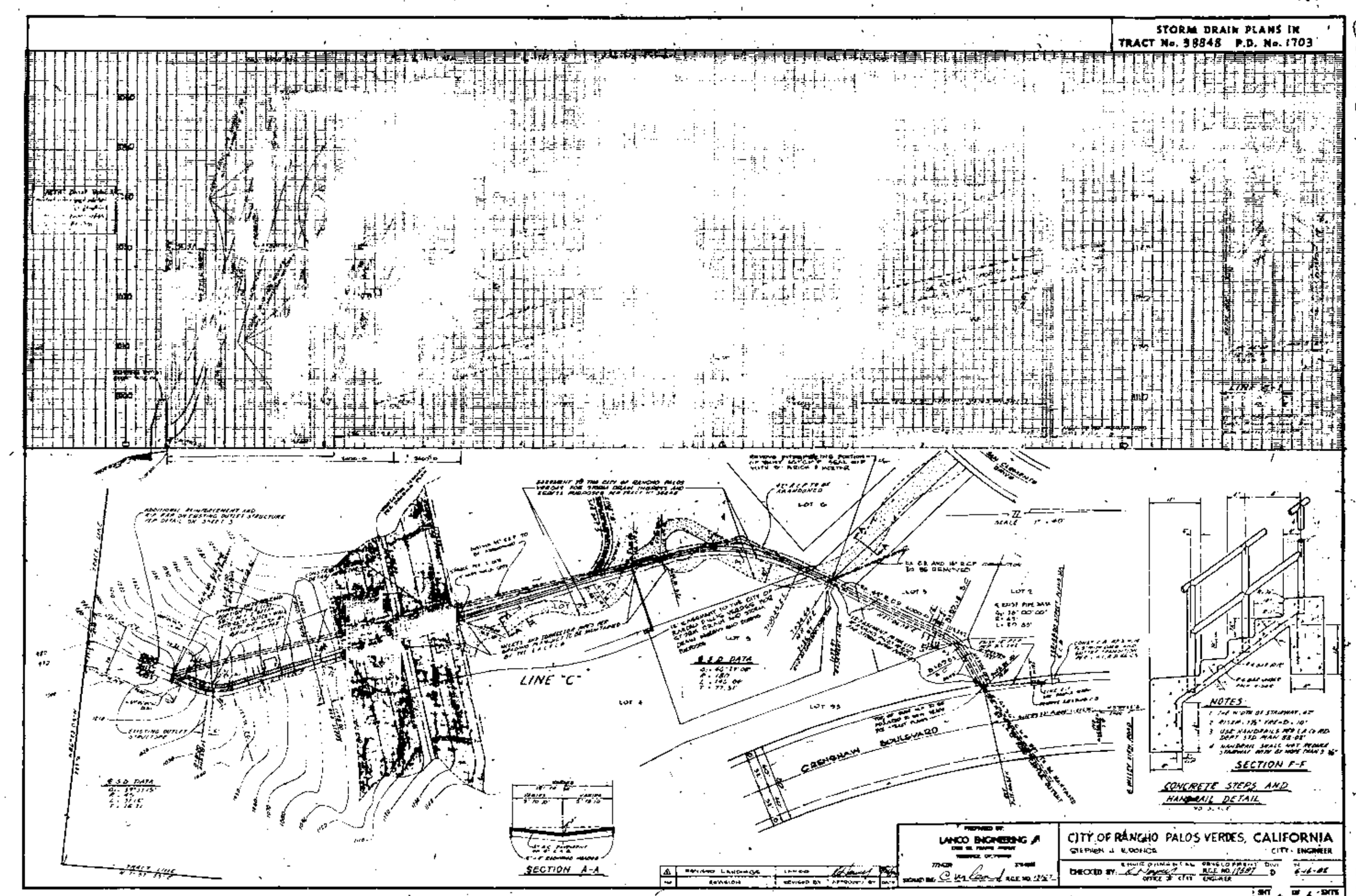
STORM DRAIN PLANS IN
TRACT No. 31714 P.D. No. 1403



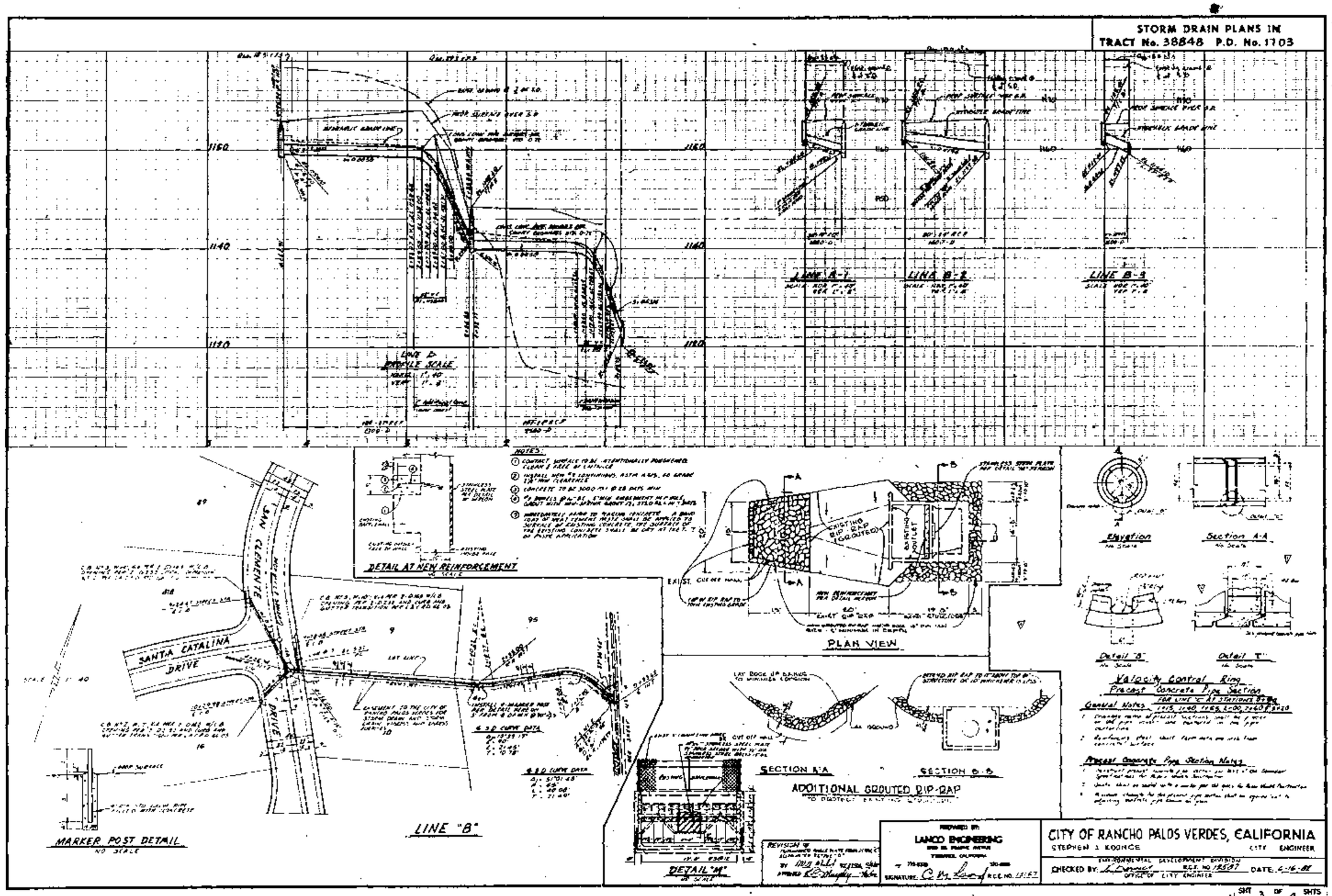
PREPARED BY:
LANCO ENGINEERING
LICE 101 PRAIRIE AVENUE
TORRANCE, CALIFORNIA
SIGNATURE: C M Leonard R.C.E. NO. 13167

CITY OF RANCHO PALOS VERDES, CALIF.
STEPHEN J. KOONCE CITY ENGINEER
ENVIRONMENTAL DEVELOPMENT DIVISION
CHECKED BY: Engineer R.C.E. NO. 17597 DATE: 2-3-78
OFFICE OF COUNTY ENGINEER

SHT 2 OF 2 SHTS

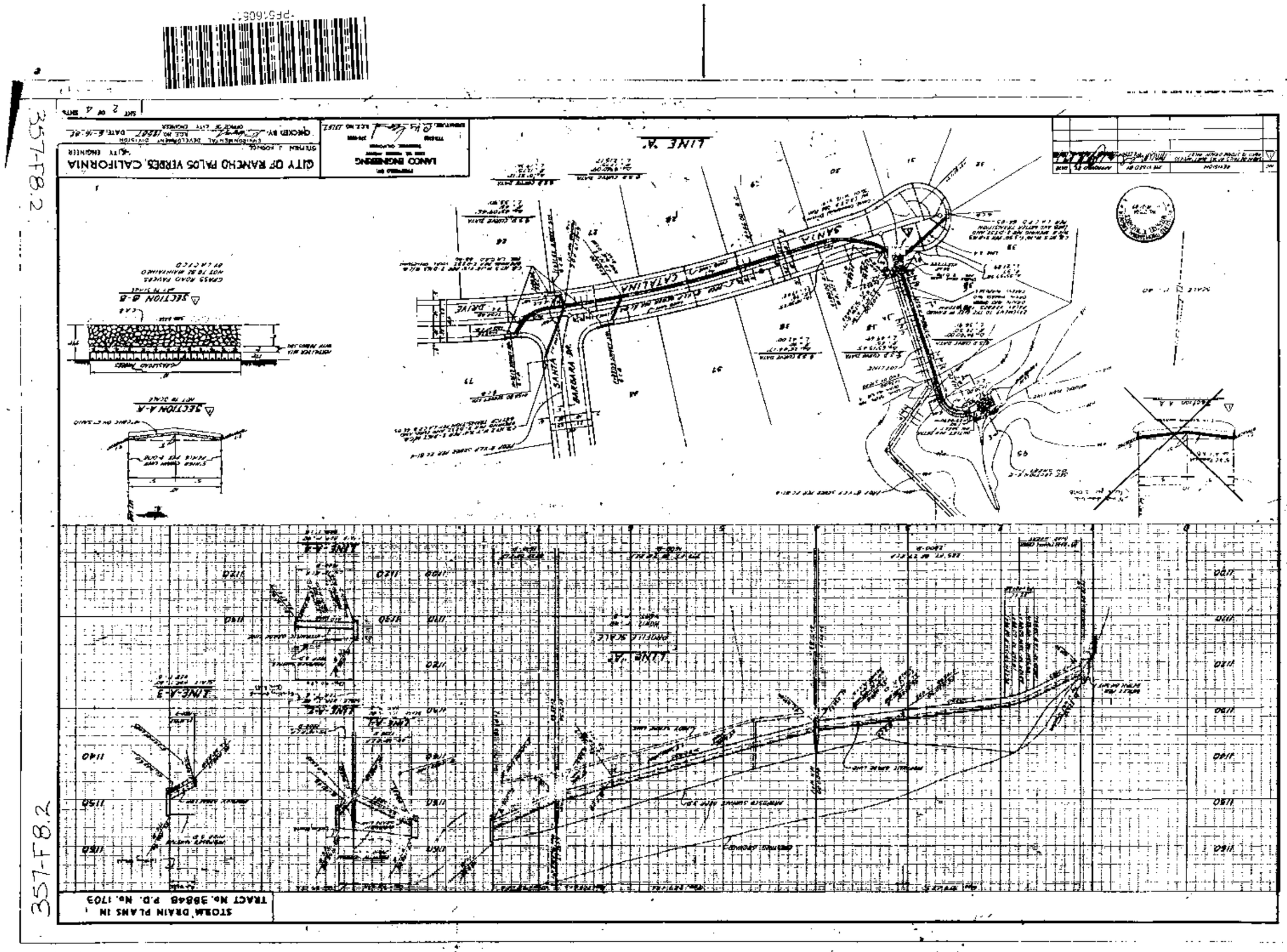


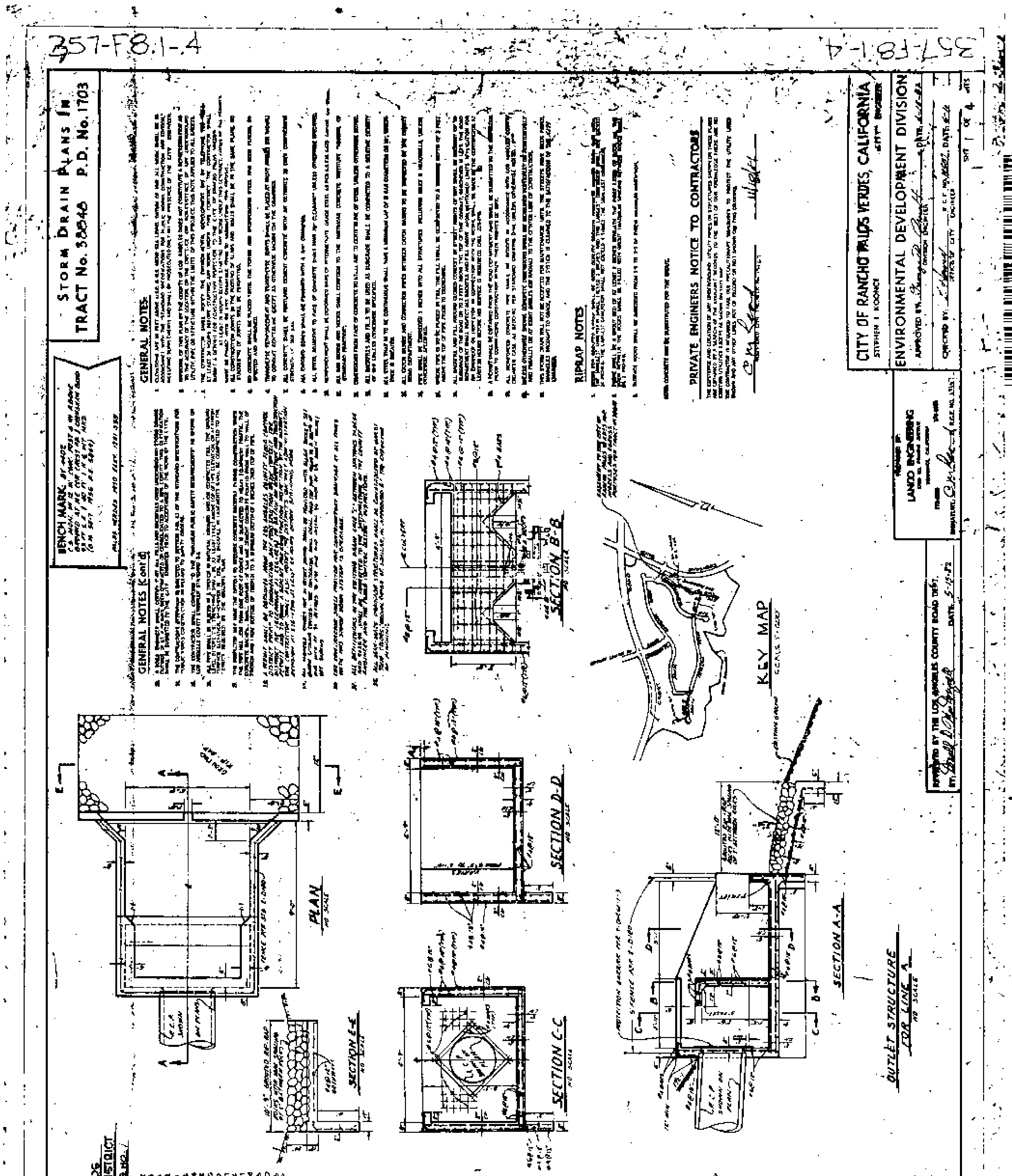
ATTACHMENT 1-346



357-F8.3

357-F8.3


STORM DRAIN PLANS IN
TRACT No. 35848 P.D. No. 1703
LINE A
LINE A-1
LINE A-2
LINE A-3
SECTION A-A
SECTION B-B
CATALINA
SANTA
SANTA BARBARA DR
CITY OF RANCHO PALOS VERDES, CALIFORNIA
LANDS ENGINEERING
357-F8.2
357-F8.2


357-F8.1-4
STORM DRAIN PLANS IN TRACT No. 38848 P.D. No. 1703
BENCH MARK
GENERAL NOTES
GENERAL NOTES (Cont'd)
RIPRAP NOTES
PRIVATE ENGINEERS NOTICE TO CONTRACTORS
LIST OF STANDARD DRAWINGS FOR LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
LOS ANGELES COUNTY ENGINEER
HYDRAULIC ELEMENT TABLE
LINE "A"
LINE "B"
LINE "C"
PLAN
SECTION E-E
SECTION C-C
SECTION D-D
SECTION B-B
SECTION A-A
OUTLET STRUCTURE FOR LINE A
KEY MAP
CITY OF RANCHO PALOS VERDES, CALIFORNIA
ENVIRONMENTAL DEVELOPMENT DIVISION
LANCO ENGINEERING
REVIEWED BY THE LOS ANGELES COUNTY ROAD DEPT.

California Regional Water Quality Control Board

Los Angeles Region

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

Linda S. Adams
Agency Secretary

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

Arnold Schwarzenegger
Governor

December 15, 2006

Mark Pestrella, Assistant Deputy Director
Department of Public Works
County of Los Angeles
700 South Fremont Ave.
Alhambra, CA 91803

Directors, Department of Public Works and
Directors, Department of Planning
Municipal Permittees within County of Los Angeles

CLARIFICATION TO PART 4.D. DEVELOPMENT PLANNING PROGRAM, THE LOS ANGELES COUNTY MUNICIPAL STORM WATER PERMIT, ORDER No. 01-182, NPDES PERMIT No. CAS004001

Dear Mr. Pestrella and Municipal Directors:

Thank you for requesting clarification on the Development Planning requirements of the Los Angeles County Municipal Storm Water Permit (L.A. County MS4 Permit).

This letter restates the compliance expectation of the California Regional Water Quality Control Board, Los Angeles Region (L.A. Water Board), when it adopted the requirements in 'Part 4 §D, Development Planning' of the L.A. County MS4 Permit. Part 4.D contains specific provisions that are fully enforceable, and which were also contained in the Development Planning Model Program submitted by the L.A. County Permitees, and which was approved in 2000.

Our evaluation of the implementation of the Development Planning and Standard Urban Stormwater Mitigation Plan (SUSMP) requirements on land development projects in Los Angeles County has revealed that many Permittees' planning and public works departments and their associated staff, including architects, planners and engineers have failed to integrate SUSMP implementation adequately with other storm water quality management strategies required in the L.A. County MS4 permit. The L.A. Water Board has identified several instances of inadequate or uncoordinated implementation by Permitttes for 'Part 4.D Development Planning'.

U.S. EPA Guidance

In areas undergoing new development or redevelopment, the most effective method of controlling impacts from storm water discharges is to limit the amount of rainfall that is converted to runoff. By utilizing design techniques that incorporate on-site storage and infiltration, and minimizing the amount of directly connected impervious surfaces, the amount of runoff generated from the site can be significantly reduced (***Preliminary Data Summary of Urban Storm Water Best Management Practices***, EPA 821-R-99-012, August 1999).

The three provisions in Part 4.D are consistent with guidance in Chapter 5 of ***Preliminary Data Summary of Urban Storm Water Best Management Practices***. The U.S. EPA guidance states that in order to meet the goals of post-development peak discharge rate, volume and pollutant loading to receiving waters being the same as pre-development values, BMPs should be implemented to achieve three main objectives: flow control, pollutant removal and pollutant source reduction.

California BMP Manual

Similarly, Section 2.4 of the California Stormwater Quality Association (CASQA) BMP Handbook for Development and Redevelopment (2003), in its discussion on planning and design principles, reiterates the provisions in Part 4.D. These principles promote three basic strategies in the following order of preference based on effectiveness and costs: (1) reduce or eliminate post-project runoff; (2) control sources of pollutants; and (3) treat contaminated storm water runoff before discharging it to natural water bodies.

Groundwater Quality Protection Concern

Some Permittees have expressed a concern that infiltration of storm water may present risks to groundwater aquifers. Generally, the common pollutants in storm water are filtered or adsorbed by soil, and unlike hydrophobic solvents and salts, do not cause groundwater contamination. In any case, infiltration of 1-2 inches of rainfall in semi-arid areas like Southern California where there is a high rate of evapo-transpiration, presents minimal risks.

The Water Augmentation Study conducted by the Los Angeles and San Gabriel Rivers Watershed Council, in partnership with several agencies including water districts, municipalities, and the U.S. Bureau of Reclamation, indicates that the infiltration of storm water, with appropriate pretreatment, does not adversely impact groundwater quality (***Los Angeles Basin Water Augmentation Study, August 2005***). You may view the study at www.lasgrwc.org/WAS.htm

Infiltration of storm water discharges from heavy industrial areas is seldom appropriate. Where there is a real concern on the risk of groundwater contamination from preexisting soil contamination or heavy vehicular traffic when installing infiltration systems such as extended detention basins, the L.A. Water Board and the California Department of Transportation (Caltrans) developed guidance to ensure an adequate analysis for proper

siting. See, ***Infiltration Basin -Site Selection Study, Volumes I, II, and III*** June 2003, CTSW-RT-03-025**,** http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/index.htm

Caltrans research indicates that infiltration basins and biofiltration BMPs are technically feasible if site site-specific considerations are taken into account (Caltrans CTSW-RT-01-050, ***BMP Retrofit Pilot Program, January 2004***).

Background of MS4 Development Planning Requirements

Standard Urban Storm Water Mitigation Plan

On March 8, 2000, the L.A. Water Board adopted the SUSMP, and required that municipalities incorporate into the planning and design phases post-construction storm water mitigation controls for specified development and redevelopment projects. Although the SUSMP action was petitioned by some municipalities to the State Water Resources Control Board (State Water Board), the State Water Board directed in Water Quality Order 2000-11 that, ***"the Permittees shall amend codes, if necessary, not later than January 15, 2001, to give legal effect to the SUSMP requirements. The SUSMP requirements shall take effect not later than February 15, 2001."***

On November 7, 2003, the L.A. Water Board transmitted the Development Planning Program Review Report after auditing four Permittee Programs (the Planning Review Report). The Planning Review Report presented and described discernible permit violations, deficiencies, and notable elements observed during the audit. Notably, the MS4 Development Planning program contained in Board Order No. 01-182 is built upon programs already established in previous Board Orders (90-079 and 96-054), after undergoing a very long process of public hearings and meetings before permit adoption.

Nearly six years later after the SUSMP was adopted, most Permittees' implementation of SUSMPs is deficient, because Permittees have not focused nor emphasized water quality pollution mitigation to protect the beneficial uses of receiving waters.

Consequently, the L.A. Water Board provides the following clarification consistent with the L.A. Water Board's mission of protecting water quality and preserving water resources:

A. Essential Post Construction Control Requirements

1. The three provisions in Part 4.D are the essential requirements for compliance with the Development Planning requirements of the L.A. County MS4 Permit. The three provisions are to: (1) maximize the percentage of pervious surfaces to allow percolation of storm water into the ground; (2) minimize the quantity of storm water directed to impervious surfaces and the MS4; and (3) minimize pollution emanating from parking lots through the use of appropriate treatment control BMPs and good housekeeping practices.

The basic site design planning considerations for post-construction storm water BMP implementation are to:

a. Preserve the natural drainage system, protect slopes and provide controls for stream protection. These controls are achieved through the basic control measures that include infiltration, retention/detention, bioretention and biofilters;

b. Integrate fully the opportunities to maximize the percentage of pervious surfaces and minimize the volume of storm water runoff;

c. Utilize a BMP treatment-train that (i) captures and infiltrates using infiltration basins, infiltration trenches, retention and/or detention BMPs; and/or (ii) provide flow through treatment in the order of preference for the prescribed storm water quality runoff volume **(Q_{wv})** based on the numerical mitigation criteria in Part 4.D;

d. Identify the combination of BMP treatment trains that are to be sized, designed and constructed based on $\mathbf{Q_{wv}}$ required for water quality. Using $\mathbf{Q_P}$ from 10, 20, or 50-year return-period for flood management is inappropriate for water quality purposes and not cost effective. Capturing and treating a larger percentage of the annual storm water runoff volume greater than $\mathbf{Q_{wv}}$ provides only a small increase in additional removal of pollutants and considerably increases the sizing and cost of the structural and treatment storm water controls; and

e. Establish in addition, for downstream channel protection, instead of $\mathbf{Q_P}$ a flow control criteria (Q_{HMC}) which takes into consideration flow volume, duration, and frequency to maintain the predevelopment distribution of in-stream flows above the critical flow for streambed erosion, thus preserving the pre-development capacity to transport sediment, while not accelerating down stream erosion. An appropriate hydromodification flow duration control criteria might be to set the Q_{HMC} such that the post-construction discharge rates and duration match the ranges from 10 percent of the pre-development 2-year 24 hour peak flow up to the pre-development 10 year 24 hour peak flow, unless an alternative criterion can be demonstrated as equally protective using hydrodynamic modeling.

2. <u>Measures and Approaches for Minimizing Impervious Surface Area</u>

a. Permittees must minimize the percentage of impervious surfaces to support the percolation and infiltration of storm water into the ground and/or minimize pollutants emanating from impervious surfaces by reducing the percentage of effective impervious area to a generally accepted standard of 5 percent or less of total project area.

The U.S. EPA storm water technology fact sheet for bioretention recommends that sizing criterion should be 5 to 7 percent of the drainage area multiplied by the rational method runoff coefficient "C" determined for the site (***Storm Water Technology Fact Sheet, Bioretention***, U.S. EPA Document No. EPA 832-F-99-012, September 1999). However, a lower sizing criterion may be more appropriate for

Southern California. A recent study determined that physical degradation of stream channels in semi-arid climates such as in Southern California may be detectable with watershed impervious cover between 3 and 5 percent (***Effects of Increases in Peak Flows and Imperviousness on the Morphology of Southern California Stream,*** SCCWRP, April 2005).

b. Permittees must also control pollution emanating from impervious surfaces such as roof-tops, parking lots, and roadways through the use of appropriate source controls such as the use of low impact development (LID) and integrated water resources management strategies that:

1. Emphasize conservation and the use of on-site natural features;
2. Integrate engineered small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. Small-scale hydrologic controls are BMPs that create green infrastructure and spaces such as park-like open space, rainwater collection barrels, planter boxes, and garden-like areas that promote community awareness and improve storm water quality; and
3. Implement primarily a source control and minimize the need for large sub-regional and regional treatment control BMPs.

B. Plan Preparation/ Review Procedures and Guidelines

1. Permittees must possess clear and adequate legal authority in municipal storm water ordinances to address post-construction requirements in the L.A. County MS4 Permit. The legal authority must direct land developers to review and mitigate the adverse storm water quality impacts in the Environmental Impact Report (EIR), and to ensure that adequate post-construction control measures are incorporated during the development project's site planning and design phases. In addition, clear instructions should be provided on how to illustrate on plans the BMPs selected, adequate sizing, and BMP siting;

2. The selection of the treatment train of BMPs must be conducted through a methodical selection process that matches the type of BMP with the type and nature of pollutants that are expected to be generated from the site. For example, vortex separation devices installed in high commerce areas for removing trash and gross solids are not suitable for removing pollutants in dissolved state or smaller size/lighter weight fractions from vehicular traffic areas;

3. Permittees should also prescribe guidelines for the submittal of standard final SUSMP plans so that relevant storm water BMP locations and specifications in design sheets are clearly identified. Separate SUSMP detail plan sheets will facilitate technical review.

   Delineation of drainage area and/or sub-areas, natural drainage systems, storm drains, and other relevant parameters at pre-development and post-development water flow paths, outfall (drainage) locations, BMP detail plans, and other relevant information should be presented. Simply inserting post-development plans within the grading plans, storm drain plans, or civil plans with unrelated detail drawings, numbers, and

construction notes makes it difficult to review and evaluate. Small-scale controls may be combined with the landscaping plans;

4. Plan view and sectional plans for small-scale hydrologic controls for a lot size and sub-drainage area of the sites should be prescribed; and

5. BMP design specifications must be incorporated in the SUSMP report together with hydrologic calculations for sizing BMPs. This report should support and show how criteria were adequately utilized in sizing BMPs (e.g., infiltration, retention/detention BMPs, bioretention facilities, etc.);

If you have any questions, please call Dr. Xavier Swamikannu at (213) 620-2094 or Carlos D. Santos at (213) 620-2093.

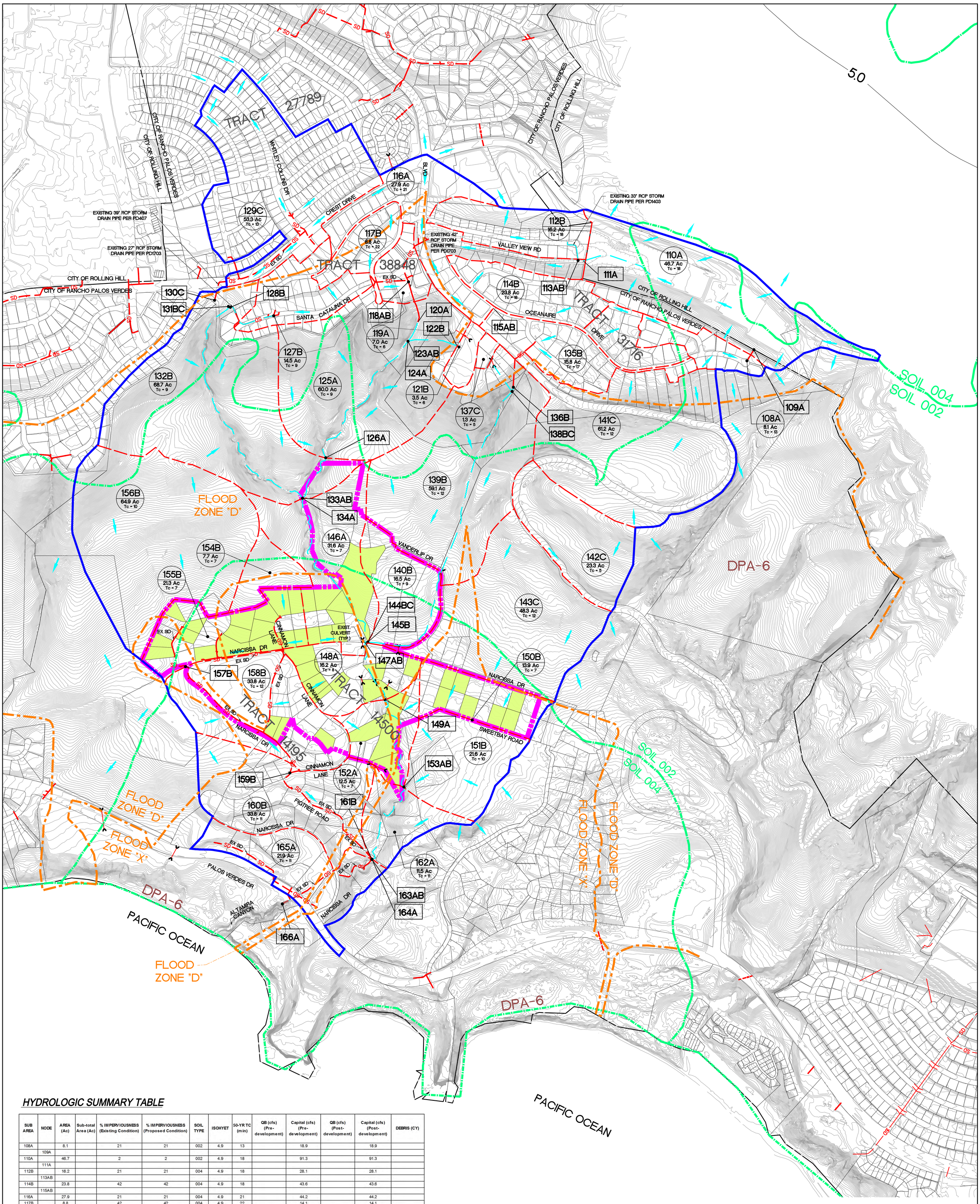
Sincerely,

Original Signed

Jonathan Bishop, P.E.
Executive Officer

cc: Michael Levy, Office of the Chief Counsel, State Water Board
Darrin Polhemus, Division of Water Quality, State Water Board
Bruce Fujimoto, Division of Water Quality, State Water Board

Conceptual Drainage and SUSMP (Water Quality) Map



HYDROLOGIC SUMMARY TABLE

SUB AREA	NODE	AREA (Ac)	Sub-total Area (Ac)	% IMPERVIOUSNESS (Existing Condition)	% IMPERVIOUSNESS (Proposed Condition)	SOIL TYPE	ISOHYET	50-YR TC (min)	QB (cfs) (Pre-development)	Capital (cfs) (Pre-development)	QB (cfs) (Post-development)	Capital (cfs) (Post-development)	DEBRIS (CY)
108A		8.1		21	21	002	4.9	13		18.9		18.9	
	109A												
110A		46.7		2	2	002	4.9	18		91.3		91.3	
	111A												
112B		16.2		21	21	004	4.9	18		28.1		28.1	
	113AB												
114B		23.8		42	42	004	4.9	18		43.6		43.6	
	115AB												
116A		27.9		21	21	004	4.9	21		44.2		44.2	
117B		8.8		42	42	004	4.9	22		14.1		14.1	
	118AB												
119A		7.0		21	21	004	4.9	6		21.2		21.2	
	120A												
121B		3.5		21	21	004	4.9	6		10.6		10.6	
	122B												
	123AB		**142.0**							**170.0**		**170.0**	
	124A												
125A		60.0		1	1	004	4.9	9	156.8	252.4	156.8	252.4	4500.0
	126A												
127B		14.5		42	42	004	4.9	9		37.0		37.0	
	128B												
129C		53.3		42	42	004	4.9	13		112.4		112.4	
	130C												
	131BC		**67.8**							**147.5**		**147.5**	
132B		68.7		1	1	002	4.9	9	200.0	321.9	200.0	321.9	5152.5
	133AB		**338.5**						**598.8**	**737.7**	**598.8**	**737.7**	
	134A												
135B		15.8		42	42	004	4.9	17		29.0		29.0	
	136B												
137C		1.3		21	21	004	4.9	5		4.4		4.4	
	138BC		**17.1**							**32.7**		**32.7**	
139B		59.1		2	2	004	4.9	12	132.8	213.8	132.8	213.8	4432.5
140B		16.5		38	40	002	4.9	9					
141C		61.2		1	1	002	4.9	12	154.4	248.6	154.4	248.6	4590.0
142C		23.3		1	1	002	4.9	5	91.6	147.4	91.6	147.4	1747.5
143C		48.3		5	5	002	4.9	12	121.8	196.1	121.8	196.1	3622.5
	144BC		**225.5**						**499.2**	**723.9**	**499.2**	**723.9**	
	145B												
146A		31.6		13	23	002	4.9	7					
	147AB		**595.6**						**1076.0**	**1464.0**	**1076.3**	**1464.4**	
148A		16.2		22	40	004	4.9	8					
	149A												
150B		13.9		26	40	004	4.9	7					
151B		21.6		2	2	005	4.9	10	53.9	84.5	53.9	84.5	1587.6
152A		12.5		18	40	004	4.9	7					
	153AB		**659.8**						**1102.7**	**1483.7**	**1165.7**	**1568.4**	
154B		7.7		2	2	004	4.9	7	22.8	36.7	51.9	47.9	566.0
155B		21.3		13	40	005	4.9	7					
156B		64.9		2	2	002	4.9	10	180.6	283.2	180.6	283.2	4770.2
	157B												
158B		33.8		16	20	004	4.9	12					
	159B												
160B		33.8		36	36	004	4.9	11					
	161B												
162A		11.5		2	2	004	4.9	11	27.1	43.7	27.1	43.7	862.5
	163AB		932.8						1541.5	**2025.2**	1585.9	**2083.5**	
	164A												
165A		21.9		42	42	004	4.9	11					
	166A		854.6						1577.2	**2092.5**	1586.3	**2128.4**	

LEGEND:

- 150B / 35.5 Ac / Tc = 16 — SUBAREA NODE; ACREAGE; TIME OF CONCENTRATION
- 153A — CONFLUENCE NODE
- VACANT OR DEVELOPED WITH STRUCTURES OTHER THAN RESIDENCES, POTENTIALLY DEVELOPMENT UNDER PROPOSED ORDINANCE REVISIONS
- DPA-6 — DEBRIS POTENTIAL AREA (DPA)
- SOIL 004 / SOIL 002 — SOIL CLASSIFICATION BOUNDARY
- FLOOD ZONE AREA
- 5.0 — ISOHYET
- CITY BOUNDARY
- PROJECT BOUNDARY
- WATERSHED BOUNDARY
- FLOW PATH
- EXISTING CULVERT
- SD — EXISTING STORM DRAIN
- SUBAREA BOUNDARY
- MAIN CHANNEL

DRAINAGE DESIGN CRITERIA:

1. 50-YR, 24-HR ISOHYET: 4.9
2. SOIL TYPES: 2 & 4
3. DESIGN STORMS: 50-YR, 24-HR
4. PERCENT IMPERVIOUS VALUES:
   EXISTING RESIDENTIAL – 42%
   ONSITE UNDEVELOPED LOTS – 2%
   OFFSITE VACANT AREA – 1%
   PROPOSED RESIDENTIAL – 40%
5. DPA = 6, 48,000 CY PER SQ MI
6. BULK FACTOR = 1.61

300' 0 150' 300' 600' 1200'
1" ½" 0" 1" 2" 4"

REGISTERED PROFESSIONAL ENGINEER JASON H. FUKUMITSU No. 40695 Exp. 3-31-13 CIVIL STATE OF CALIFORNIA

PLANS PREPARED BY:
HUNSAKER & ASSOCIATES LOS ANGELES, INC.
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26074 Avenue Hall, Ste 22 ▪ Valencia, CA 91355
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PREPARED UNDER THE SUPERVISION OF:
JASON H. FUKUMITSU, DATE

CITY OF RANCHO PALOS VERDES

ZONE 2 LANDSLIDE MORATORIUM ORDINANCE REVISION EIR
CONCEPTUAL DRAINAGE AND SUSMP (WATER QUALITY) MAP

IN THE CITY OF RANCHO PALOS VERDES,
COUNTY OF LOS ANGELES, STATE OF CALIFORNIA

DATE 03/09/2011
SCALE 1"=300'
PROJECT NO. 0159-001-001
SHEET 1 OF 1 SHEET

G:\Portuguese Bend EIR 0159-001-001\Storm\Hydrology\HP802-01.dwg Plotted on Dec 01, 2011-10:20am by wallonl