Flow –based BMPs shall be designed to infiltrate or treat either:

1. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour; or
2. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or
3. The maximum flow rate of runoff, as determined from the local historical rainfall record that achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied be a factor of two.

The following are the minimum required mitigation from the *Water Quality Management Plan (WQMP) for Urban Runoff.*

Control of Impervious Runoff – Surface runoff shall be directed to landscape areas or pervious areas.

Common area Efficient Irrigation – Physical implementation of landscape plan consistent with County Administrative Design Guidelines or city equivalent, which may include provision of water sensors, programmable irrigation times, etc.

Common Area Runoff-Minimizing Landscape Design – Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration.

Catch Basin Stenciling – Put "No Dumping – Flows to Lake" or equivalent effective phrase, to be stenciled on catch basins to alert the public as to the destination of pollutant discharging into storm drain.

Debris Posts – Are necessary to prevent large floatable debris from entering the storm drains. They are place upstream of the cross culverts.

Inlet Trash Racks – Where appropriate to reduce intake and transport through the storm drain system of large floatable debris, trash racks shall be provided where drainage from open areas entering storm drain or cross culverts.

Since no treatment BMPs are currently proposed on site, the mitigation for storm water treatment under the NPDES Permit and the future TMDL requirements will require the construction of treatment BMPs. The Treatment BMPs appropriate for onsite use are infiltration trenches and basins, swales, inlet filtration, and/or water quality basins. The mitigation requires that all storm water runoff be treated before leaving the site to reduce pollutants in Big Bear Lake. It is possible that by the time the project is developed that the site will be subject to TMDL requirements.

Infiltration Trenches and Basins

Infiltration Trenches and/or Basins may be used on site to meet potential future TMDLs for noxious aquatic plants and nutrients. Infiltration trenches and basins treat storm water runoff through filtration. A typical infiltration trench is essentially an excavated trench, which is lined with filter fabric and backfilled with stones. Depth of the infiltration trench ranges from 3 to 8 feet and functions best in areas with permeable soils, and water table and bedrock depth situated well below the bottom of the trench. Trenches should not be used to trap coarse sediments, because large sediment will likely clog the trench. Grass buffers can be installed to capture sediment before it enters the trench to minimize clogging. Infiltration basins are generally used for drainage areas between 5 to 50 acres. Infiltration basins can be either in-line or off-line, and may treat different volumes such as the water quality volume or the 2-year or 10-year storm.

Swales

One appropriate treatment is either vegetative swales, enhanced vegetated swales utilizing check dams and wide depressions, a series of small detention facilities designed similarly to a dry detention basin, or a combination of these treatment methods into a treatment train (A series of Structural BMPs). It is essential that the Water Quality Management Plan address treatment for Moon Camp to assure that the runoff from the site be treated to the “maximum extent practicable”.

In order for the vegetation swales to be effective in the removal of potential pollutants, the swales must be treated as water quality features and must be maintained differently than grass areas. Specifically, pesticides, herbicide, and fertilizers, which may be used on the grass areas, must <u>not</u> be used in the vegetation swales.

Filtration

Another appropriate treatment is filtration, which could be accomplished using drop-in infiltration devices or inline devices.

Drop-infiltration devices at all curb inlets within the internal parking lots could provide potential pollutant removal. Existing examples of these filtration devices include the Drain Pac Storm Drain Inserts and Fossil Filters. These types of devices are efficient at removing oil and grease, debris, and suspended solids from treated waters. Some of these devices have also exhibited high efficiencies at removing heavy metals and other pollutants.

Inline devices suggested for use onsite include the Continuous Deflection Separator (CDS® unit). Once the runoff has entered the storm drain, an in-line diversion will direct the treatment flow to a CDS® unit. The CDS® unit is a non-blocking, non-mechanical screening system, which will provide a second line of defense for solids removal. Adsorption materials can be added within the CDS® unit to aid in the removal of oil and grease. The treated flow will exit the CDS® unit and continue downstream.

To assure the efficiency of these filtration devices, monitoring is necessary. The use of street sweeps on the parking lots and streets will help reduce the amounts of sediment and debris that flow through the devices. This will extend the effectiveness of the devices during a storm and will lower the frequency of required maintenance. Even so, the devices should be checked and cleaned, if necessary, once a month during the rainy season, following any precipitation and at the end of the dry season prior to the first precipitation event of the rainy season.

These filtration units could potentially be used in other areas besides the parking lot inlets. Another potential locations is at the downstream end of the tributary pipes that feed the discharge point. Sitting these units a downstream point will allow for the treatment of more runoff.

Water Quality / Extended Detention Basin

Another effective mitigation measure for impacts to water quality is the construction of a water quality basin. The purpose of the extended detention basin is to aid in the removal mechanism: settling or sedimentation; adsorption to sediments, vegetation, or detritus: filtration by plants; microbial uptake and/or transformation; and uptake by wetland plants or algae. The removal of the urban runoff pollutants occurs during the slow draining of the basin (minimum 24-hours).

Water Quality Basins are expected to reduce the following pollutants: total suspended solids, total phosphorous, total nitrogen, chemical oxygen demand (COD), total lead, total zinc, total copper, and bacteria. This will help reduce the pollutants entering Big Bear Lake.

4.4.3 Construction Erosion Controls Mitigation

Construction controls are separated from the rest of the water quality management because the measures are temporary and specific to the type of construction. Construction of a project such as Moon Camp development typically produces potential pollutants such as nutrients, heavy metals, pesticides and herbicides, toxic chemicals related to construction and cleaning, waste materials including wash water, paints, wood, paper, concrete, food containers, and sanitary wastes, fuel, and lubricants.

As part of its compliance the NPDES requirements, a Notice of Intent (NOI) will need to be prepared and submitted to the Santa Ana Regional Water Quality Control Board providing notification and intent to comply with the State of California general permit. Prior to construction, a Storm Water Pollution Prevention Plan (SWPPP) must be completed for the construction activities onsite. A copy of the SWPPP must be available and implemented at the construction site at all times. The SWPPP outlines the source control and/or treatment control BMPs that will avoid or mitigate runoff pollutants at the construction site to the “maximum extent practicable”.

From the *California Storm Water Best Management Practice Handbook - Construction Activity:*

CA 1 Dewatering Operations – This operation requires the use of sediment controls to prevent or reduce the discharge of pollutant to storm water from dewatering operations.

CA 2 Paving Operations – Prevent or reduce the runoff of pollutant from paving operations by proper storage of materials, protecting storm drain facilities during construction and training employees.

CA 3 Structural Construction and Painting – Keep site and area clean and orderly, use erosion control, use proper storage facilities, use safe products and train employees to prevent and reduce pollutant discharge to storm water facilities from construction and painting.

CA 10 Material Delivery and Storage – Minimize the storage of hazardous materials onsite. If stored onsite keep in designated areas, install secondary containment, conduct regular inspections and train employees.

CA 11 Material Use – Prevent and reduce the discharge of pesticides, herbicides, fertilizers, detergents, plaster, petroleum products and other hazardous materials from entering the storm water.

CA 20 Solid Waste Management - This BMP describes the requirements to properly design and maintain trash storage areas. The primary design feature requires the storage of trash in covered areas.

CA 21 Hazardous Waste Management - This BMP describes the requirements to properly design and maintain waste areas.

CA 23 Concrete Waste Management – Prevent and reduce pollutant discharge to storm water from concrete waste by performing on and off-site washouts in designated areas and training employees and consultants.

CA 24 Sanitary Septic Water Management – Provide convenient, well-maintained facilities, and arrange regular service and disposal of sanitary waste.

CA 30 Vehicle and Equipment Cleaning – Use off-site facilities, or wash in designated areas to reduce pollutant discharge into the storm drain facilities.

CA 31 Vehicle and Equipment Fueling – Use off-site facilities, or designated areas with enclosing or coverings to reduce pollutant discharge into the storm drain facilities.

CA 32 Vehicle and Equipment Maintenance – Use off-site facilities, or designated areas with enclosing or coverings to reduce pollutant discharge into the storm drain facilities. In addition run a "dry site" to prevent pollution discharge into storm drains.

CA 40 Employee and Subcontractor Training – Have a training session for employees and subcontractors to understand the need for implementation and usage of BMPs.

ESC 2 Preservation of Existing Vegetation – Minimize the removal of existing trees and shrubs because they serve as erosion control.

ESC 10 Seeding and Planting – Provide soil stability by planting and seeding grasses, trees, shrubs, vines, and ground cover.

ESC 11Mulching – Stabilize cleared or freshly seeded areas with mulch.

ESC 20 Geotextiles and Mats – Natural or synthetics material can be used for soil stability.

ESC Dust Control – Reduce wind erosion and dust generated by construction activities by using dust control measures.

ESC 23 Construction Road Stabilization – All on-site vehicle transport routes should be stabilized immediately after grading and frequently maintained to prevent erosion and control dust.

ESC 24 –Stabilized Construction Entrance – Stabilize the entrance pad to construction area to reduce amount of sediment tracked off site.

ESC 30 Earth Dikes – Construct earth dikes of compacted soil to divert runoff or channel water to a desired location.

ESC 31 Temporary Drains and Swales – Use temporary drains and swales to divert off-site runoff around the construction site, stabilized areas and direct it into sediment basins or traps.

ESC 40 Outlet Protection – Use rock or grouted rock at outlet pipes to prevent scouring of soil caused by high velocities.

ESC 41 Check Dams – Check dams reduce velocities of concentrated flows, thereby reducing erosion, and promoting sedimentation behind the dams. Check dams are small and placed across swales and drainage ditches.

ESC 50 Silt Fence – Composed of filter fabric, which have been entrenched, attached to support poles and sometimes backed by wire fence support. Silt fences promote sedimentation behind the fence of sediment-laden water.

ESC 51 Straw Bale Barrier – Place straw bales end to end in a level contour in a shallow trench and stake them in place. The bales will detain runoff and promote sedimentation.

ESC 52 Sand Bag Barriers – By stacking sand bags on a level contour, creates a barrier to detain sediment-laden water. The barrier will promote sedimentation.

ESC 53 Brush or Rock Filter – Made of ¾ to 3-inch diameter rocks place on a level contour or composed of brush wrapped in filter cloth and staked to the toe of the slope will provide a sediment trap.

ESC 54 Storm Drain Inlet Protection – Devises that remove sediment from sediment laden storm water before entering the storm drain inlet or catch basin.

ESC 55 Sediment Trap – A sediment trap is a small, excavated or bermed area where runoff for small drainage areas can pass through allowing sediment to settle out.

4.5 Groundwater Impacts

5.0 CONCLUSION

The development of Moon Camp Tract # 16136 will have less than significant impacts to Hydrology and Water Quality following the implementation of all mitigation described in Section 4.0.

Table No. 9 – Project Impact Evaluation

Description of Impact Would the Project:	Without Mitigation Impact	With Mitigation Impact?
1. Violate any water quality standards or waste discharge requirements?	Potentially Significant Unless Mitigated	Less Than Significant Impact
2. 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 local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted?	Less Than Significant Impact	Less Than Significant Impact
3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site?	Potentially Significant Unless Mitigated	Less Than Significant Impact
4. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner, which would result in flooding on- or off-site?	Potentially Significant Unless Mitigated	Less Than Significant Impact
5. Create or contribute runoff water, which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?	Potentially Significant Unless Mitigated	Less Than Significant Impact
6. Otherwise substantially degrade water quality?	Potentially Significant Unless Mitigated	Less Than Significant Impact
7. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or flood Insurance Rate Map or other flood hazard delineation map?	No Impact	No Impact
8. Place within a 100-year flood hazard area structures, which would impede or redirect flood flows?	No Impact	No Impact

Table No. 9 – Project Impact Evaluation

Description of Impact Would the Project:	Without Mitigation Impact	With Mitigation Impact?
9. Exposed people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	No Impact	No Impact
10. Inundation by seiche, tsunami, or mudflow?	Potentially Significant Unless Mitigated	Less Than Significant Impact
11. Change in absorption rate?	Less Than Significant Impact	Less Than Significant Impact
12. Change in the amount of surface water in any water body?	Less Than Significant Impact	Less Than Significant Impact
13. Change in the current, or course of direction of water movement?	Potentially Significant Unless Mitigated	Less Than Significant Impact
14. Altered direction or rate of flow of ground water?	Less Than Significant Impact	Less Than Significant Impact
15. Storm water discharges that would significantly impair the beneficial uses of receiving waters or areas that provide water quality benefits (e.g., riparian corridors, wetlands, etc.)?	Potentially Significant Unless Mitigated	Less Than Significant Impact
16. Harm to the biological integrity of drainage system and water bodies?	Potentially Significant Unless Mitigated	Less Than Significant Impact

The following discussion briefly explains the reasoning behind the impact evaluation in Table 9.

1. The project has the potential to violate water quality standards due to an increase in the level of activity on Moon Camp Tract # 16136. Without mitigation, Moon Camp would be expected to increase pollutant loadings, including hydrocarbons, fertilizers, and pesticides. The mitigation described in Section 4.0 includes a comprehensive Water Quality Management Plan (WQMP) for Urban Runoff, including both Structural and Non-Structural BMPs, which complies with the requirements made by the Santa Ana Regional Water Quality Control Board. This mitigation will reduce the potential impacts to a less than significant impact level.

2. The project site slightly decreases the pervious surface, however the groundwater table would not likely experience significant impacts due to the clayey soils onsite. In addition, by adding the water quality basin or infiltration trench the underground aquifers may have some recharge.

3. The proposed project will alter drainage areas and percent pervious areas on the Moon Camp site, which could be considered potentially significant to siltation and erosion potential unless mitigated. The proposed project includes storm drains, catch basins and cross culverts, which will reduce erosion. By placing inline filtration devices and water quality basins the suspended solids being deposited into Big Bear Lake will be reduces to a less then significant level.

4. The proposed project alters the drainage patterns on-site and slightly increases the amount of runoff leaving the site. Since the flow leaving the site will be contained in appropriately sized cross culverts and storm drain systems, there is no flooding on or off site.

5. The project creates runoff that has the potential to produce additional sources of polluted runoff as described in 1, above. The suggested water quality BMP's will reduce the impacts to a less than significant level.

6. The project has the potential to significantly impact water quality unless it is mitigated. See discussion in 1, above. Mitigation can reduce the impacts to a less than significant level.

7. There is no existing mapped flood hazard on-site. Therefore, there is no impact.

8. There is no existing mapped flood hazard on-site. Therefore, construction of the project would not place structures in a 100-year flood hazard area.

9. The proposed project contains adequate storm drain system to convey flows to the lake; therefore, no structures are expected to be affected by flooding. Also, no flooding hazard currently exist onsite resulting in no impacts.

10. The project is located in an area that has a potential to be affected by mudflows, in the natural areas with slopes greater then 33%. See discussion in Section 4 on "Burning and Bulking" . Mitigation can reduce the impacts to a less than significant level.

11. The absorption rate will not significantly change from existing to proposed condition due to the clayey content of onsite soils.

12. For the overall watershed there is an increase on 8.7 cfs in the 10-year storm and 9.5 cfs in a 100-year storm event. There is minimal change to the amount of surface water entering the lake. The additional flow is only two percent greater in the proposed condition than in the existing condition.

13. The direction of flow will alter due to proposed grading and changes in land uses. In the proposed project storm drains, catch basins and cross culverts are proposed providing less than significant level of impact.

14. There will be less then significant impacts to groundwater flow due to minor changes in impervious areas as discussed in 13, above.

15. The project is proposed in areas that will potentially contain riparian habitat. The area also discharges into Big Bear Lake, which is listed on the 303(d) list. Per the 303(d) list, the water body is impaired for various metals, noxious aquatic plants, nutrients, siltation and sedimentation. The Santa Ana Regional Board is currently developing TMDL standards for Big Bear Lake. It is anticipated that the Moon Camp project will have to conform to these future TMDLs by appropriate use of structural BMPs as outlined in Section 4.0. Mitigation associated with permit processing and development of the WQMP will reduce the impact to a less then significant level.

16. If the concentrated flows were not properly controlled and treated, the project would have the potential to harm biological integrity of the water body. The proposed storm drain and suggested treatment BMPs will reduce this impact to a less then significant level, see discussion in 15, above.

6.0 REFERENCES

Camp Dresser & McKee, et al., 1993. California Storm Water Best Management Practice Handbooks - Construction Activity. March 1993.

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Hicks & Hartwick, Inc. Moon Camp Tentative Tract No. 16136 Preliminary Drainage Study Hydrology and Hydraulics Summary Report. April 2002.

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San Bernardino County Department of Public Works, The County of San Bernardino, and Incorporated Cities of San Bernardino County within the Santa Ana Region. California Regional Water Quality Control Board Santa Ana Region National Pollutant Discharge Elimination System (NPDES) Permit and Water Discharge Requirements. Draft April 9, 2002.

San Bernardino County Stormwater Program. Guidelines for New Developments and Redevelopments. June 2000.

Moon Camp Tentative Tract 16136

APPENDIX A

Modified Rational Method - Existing Condition
10 year and 100 year

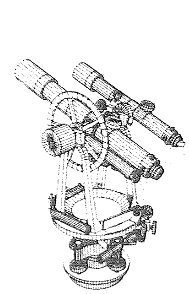
FAWNSKIN, CALIFORNIA
MOON CAMP
Tentative Tract 16136

PRELIMINARY DRAINAGE STUDY
HYDROLOGY AND HYDRAULICS
SUMMARY REPORT

APRIL 2002

EXHIBIT A
EXISTING HYDROLOGY

10-YEAR RUNOFF



Hicks & Hartwick, Inc.
CIVIL ENGINEERS - LAND SURVEYORS
37 EAST OLIVE AVENUE
REDLANDS, CALIFORNIA 92373
909.793.2257 or FAX 909.792.3763

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA A

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEAH.DAT
TIME/DATE OF STUDY: 11:20 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	3.0	3.0	D	Nat	..	16.6	4.60	.14	.140	12.2	779	.3440	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 3.00	9.4	12.5	D	Nat	.8	17.4	4.45	.14	.140	48.4	730	.1603	15.1	Qest.= 30.2cfs XFALL= .20000 n=.0300 D= 1.2
5.0ft-GUTTER FLOW TO PT.# 7.00	17.2	29.7	D	Nat	.9	18.3	4.29	.14	.140	111.0	869	.1438	17.1	Qest.= 80.5cfs XFALL= .20000 n=.0300 D= 1.4
7.00		29.7				18.3	4.29			111.0				FOR CONFLUENCE
5.00	4.7	4.7	D	Nat	..	18.4	4.29	.14	.140	17.4	890	.2719	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 6.00	12.6	17.3	D	Nat	.9	19.2	4.15	.14	.140	62.5	719	.1405	14.6	Qest.= 40.2cfs XFALL= .20000 n=.0300 D= 1.2
5.0ft-GUTTER FLOW TO PT.# 7.00	8.8	26.1	D	Nat	.8	20.0	4.04	.14	.140	91.6	719	.1293	15.8	Qest.= 77.9cfs XFALL= .20000 n=.0300 D= 1.4

CONFLUENCE ANALYSIS FOR POINT# 7.00

PEAK FLOW RATE(CFS) = 200.5
TIME OF CONCENTRATION(MIN.) = 18.3
MEAN VALUES: Fp(IN/HR) = .140; Ap = 1.000; Fm(IN/HR) = .140
EFFECTIVE AREA(ACRES) = 53.66 TOTAL AREA(ACRES) = 55.85

Q(cfs)	Tc(min)	Fp(avg)	Ap(avg)	Fm(avg)	I(in/hr)	Ae(acres)	NODE
200.47	18.32	.140	1.00	.140	4.29	53.66	1.0
195.84	19.99	.140	1.00	.140	4.04	55.85	4.0

LARGEST CONFLUENCE Q= 200.5

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA A

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEAH.DAT
TIME/DATE OF STUDY: 11:20 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
5.0ft-GUTTER FLOW TO PT.# 8.00	24.9	78.5	C	Nat	1.3	19.6	4.09	.22	.165	277.3	1261	.0896	16.4	Qest.= 243.7cfs XFALL= .20000 n=.0300 D= 2.3
5.0ft-GUTTER FLOW TO PT.# 9.00	16.8	95.4	C	Nat	1.6	21.2	3.87	.22	.174	317.3	1233	.0487	13.1	Qest.= 305.0cfs XFALL= .20000 n=.0300 D= 2.7
9.00		95.4				21.2				317.3				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 95.36 TOTAL AREA(ACRES)= 97.55 PEAK FLOW RATE(CFS)= 317.33
TIME OF CONCENTRATION(MIN.)= 21.22 MEAN VALUES: Fp(IN/HR) = .174; Ap = 1.000; Fm(IN/HR) = .174

PEAK FLOW RATE TABLE

Q(cfs)	Tc(min)	Fp(avg)	Ap(avg)	Fm(avg)	I(in/hr)	Ae(acres)	NODE
317.34	21.22	.174	1.00	.174	3.87	95.36	1.0
306.92	22.91	.173	1.00	.173	3.67	97.55	4.0

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA B

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEBH.DAT
TIME/DATE OF STUDY: 11:22 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	8.5	8.5	C	1D/AC	..	10.3	6.43	.22	.218	47.3	997	.1956	..	INITIAL SUBAREA
3.00					.0						34	.0588	12.1	Qpipe= 47.3cfs n=.0240 D= 1.9 30.0"-PIPE
3.00		8.5				10.3				47.3				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 8.46 TOTAL AREA(ACRES)= 8.46 PEAK FLOW RATE(CFS)= 47.26
TIME OF CONCENTRATION(MIN.)= 10.34 MEAN VALUES: Fp(IN/HR) = .272; Ap = .800; Fm(IN/HR) = .218

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA C

[SAN BERNARDINO COUNTY]

FILE NAME:9373HECH.DAT
TIME/DATE OF STUDY: 11:24 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	3.0	3.0	C	2.5AC	..	9.4	6.85	.24	.245	17.9	794	.2355	..	INITIAL SUBAREA
2.00		3.0				9.4				17.9				STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 3.01 TOTAL AREA(ACRES) = 3.01 PEAK FLOW RATE(CFS) = 17.88
TIME OF CONCENTRATION(MIN.) = 9.40 MEAN VALUES: Fp(IN/HR) = .272; Ap = .900; Fm(IN/HR) = .245

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA D

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEDH.DAT
TIME/DATE OF STUDY: 11:25 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	2.3	2.3	C	2.5AC	..	10.0	6.53	.24	.245	12.8	774	.1602	..	INITIAL SUBAREA
2.00		2.3				10.0				12.8				STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 2.26 TOTAL AREA(ACRES) = 2.26 PEAK FLOW RATE(CFS) = 12.79
TIME OF CONCENTRATION(MIN.) = 10.05 MEAN VALUES: Fp(IN/HR) = .272; Ap = .900; Fm(IN/HR) = .245

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA E

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEEH.DAT
TIME/DATE OF STUDY: 11:26 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	1.5	1.5	C	Nat	..	19.9	4.05	.22	.218	5.0	683	.1069	..	INITIAL SUBAREA
2.00		1.5				19.9				5.0				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 1.45 TOTAL AREA(ACRES)= 1.45 PEAK FLOW RATE(CFS)= 5.00
TIME OF CONCENTRATION(MIN.)= 19.90 MEAN VALUES: Fp(IN/HR) = .218; Ap = 1.000; Fm(IN/HR) = .218

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA F

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEFH.DAT
TIME/DATE OF STUDY: 11:27 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)
[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	4.1	4.1	C	Nat	..	20.0	4.03	.22	.218	14.1	848	.1592	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 3.00	18.7	22.8	C	Nat	1.1	21.1	3.89	.22	.218	75.2	1044	.1935	17.3	Qest.= 44.4cfs XFALL= .20000 n=.0300 D= 1.2
5.0ft-GUTTER FLOW TO PT.# 4.00	22.1	44.9	C	Nat	1.5	22.5	3.71	.22	.218	141.1	1109	.0712	13.3	Qest.= 110.0cfs XFALL= .20000 n=.0300 D= 1.8
5.00					.1						51	.0588	15.9	Qpipe= 141.1cfs n=.0240 D= 2.8 45.0"-PIPE
5.00		44.9				22.6				141.1				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 44.88 TOTAL AREA(ACRES)= 44.88 PEAK FLOW RATE(CFS)= 141.09
TIME OF CONCENTRATION(MIN.)= 22.59 MEAN VALUES: Fp(IN/HR) = .218; Ap = 1.000; Fm(IN/HR) = .218

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA G

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEGH.DAT
TIME/DATE OF STUDY: 11:28 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	3.0	3.0	C	Nat	..	18.1	4.32	.22	.218	10.9	781	.2228	..	INITIAL SUBAREA
2.00		3.0				18.1				10.9				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 2.96 TOTAL AREA(ACRES)= 2.96 PEAK FLOW RATE(CFS)= 10.93
TIME OF CONCENTRATION(MIN.)= 18.13 MEAN VALUES: Fp(IN/HR) = .218; Ap = 1.000; Fm(IN/HR) = .218

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA H

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEHH.DAT
TIME/DATE OF STUDY: 11:29 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	9.4	9.4	C	2.5AC	..	9.6	6.72	.24	.245	54.6	833	.2281	..	INITIAL SUBAREA
2.00		9.4				9.6				54.6				STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 9.36 TOTAL AREA(ACRES) = 9.36 PEAK FLOW RATE(CFS) = 54.58
TIME OF CONCENTRATION(MIN.) = 9.64 MEAN VALUES: Fp(IN/HR) = .272; Ap = .900; Fm(IN/HR) = .245

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA I

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEIH.DAT
TIME/DATE OF STUDY: 11:30 4/11/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	4.3	4.3	C	4D/AC	..	9.4	6.83	.16	.163	25.7	1050	.1762	..	INITIAL SUBAREA
											705	.1730	15.9	Qpipe= 25.7cfs n=.0240 D= 1.0 24.0"-PIPE
3.00 3.00	1.8	6.1	C	2.5AC	.7	10.2	6.48	.24	.188	34.7				ADD SUBAREA
											292	.0514	9.2	Qest.= 48.9cfs XFALL= .20000 n=.0300 D= 1.2
5.0ft-GUTTER FLOW TO PT.# 4.00	5.3	11.4	C	Nat	.6	10.7	6.25	.22	.202	61.9				
											73	.0274	9.8	Qpipe= 61.9cfs n=.0240 D= 2.3 39.0"-PIPE
5.00					.1									
5.00		11.4				10.8				61.9				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 11.38 TOTAL AREA(ACRES)= 11.38 PEAK FLOW RATE(CFS)= 61.91
TIME OF CONCENTRATION(MIN.)= 10.84 MEAN VALUES: Fp(IN/HR) = .242; Ap = .833; Fm(IN/HR) = .202

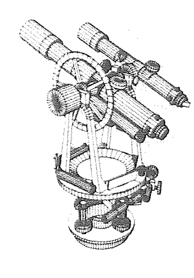
FAWNSKIN, CALIFORNIA
MOON CAMP
Tentative Tract 16136

PRELIMINARY DRAINAGE STUDY
HYDROLOGY AND HYDRAULICS
SUMMARY REPORT

APRIL 2002

EXHIBIT B
EXISTING HYDROLOGY

100-YEAR RUNOFF



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CIVIL ENGINEERS - LAND SURVEYORS
37 EAST OLIVE AVENUE
REDLANDS, CALIFORNIA 92373
909.793.2257 or FAX 909.792.3763

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA A

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEAT.DAT
TIME/DATE OF STUDY: 11:20 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	3.0	3.0	D	Nat	..	16.6	3.24	.40	.398	7.8	779	.3440	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 3.00	9.4	12.5	D	Nat	1.2	17.8	3.09	.40	.398	30.3	730	.1603	15.1	Qest.= 19.3cfs XFALL= .20000 n=.0300 D= .8
5.0ft-GUTTER FLOW TO PT.# 7.00	17.2	29.7	D	Nat	1.0	18.8	2.98	.40	.398	69.0	869	.1438	15.2	Qest.= 50.3cfs XFALL= .20000 n=.0300 D= 1.2
7.00		29.7				18.8	2.98			69.0				FOR CONFLUENCE
5.00	4.7	4.7	D	Nat	..	18.4	3.02	.40	.398	11.0	890	.2719	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 6.00	12.6	17.3	D	Nat	.9	19.2	2.93	.40	.398	39.4	719	.1405	14.1	Qest.= 25.2cfs XFALL= .20000 n=.0300 D= 1.2
5.0ft-GUTTER FLOW TO PT.# 7.00	8.8	26.1	D	Nat	.9	20.1	2.84	.40	.398	57.4	719	.1293	13.8	Qest.= 49.1cfs XFALL= .20000 n=.0300 D= 1.2

CONFLUENCE ANALYSIS FOR POINT# 7.00

PEAK FLOW RATE(CFS) = 125.6
TIME OF CONCENTRATION(MIN.) = 18.8
MEAN VALUES: Fp(IN/HR) = .398; Ap = 1.000; Fm(IN/HR) = .398
EFFECTIVE AREA(ACRES) = 54.15 TOTAL AREA(ACRES) = 55.85

Q(cfs)	Tc(min)	Fp(avg)	Ap(avg)	Fm(avg)	I(in/hr)	Ae(acres)	NODE
125.65	18.78	.398	1.00	.398	2.98	54.15	1.0
122.71	20.09	.398	1.00	.398	2.84	55.85	4.0

LARGEST CONFLUENCE Q= 125.6

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA A

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEAT.DAT
TIME/DATE OF STUDY: 11:20 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
											1261	.0896	15.0	Qest.= 151.5cfs XFALL= .20000 n=.0300 D= 1.9
5.0ft-GUTTER FLOW TO PT.# 8.00	24.9	79.0	C	Nat	1.4	20.2	2.83	.52	.436	170.1				
											1233	.0487	11.9	Qest.= 186.4cfs XFALL= .20000 n=.0300 D= 2.3
5.0ft-GUTTER FLOW TO PT.# 9.00	16.8	95.9	C	Nat	1.7	21.9	2.67	.52	.450	191.5				
9.00		95.9				21.9				191.5				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 95.85 TOTAL AREA(ACRES)= 97.55 PEAK FLOW RATE(CFS)= 191.46
TIME OF CONCENTRATION(MIN.)= 21.94 MEAN VALUES: Fp(IN/HR) = .450; Ap = 1.000; Fm(IN/HR) = .450

PEAK FLOW RATE TABLE

Q(cfs)	Tc(min)	Fp(avg)	Ap(avg)	Fm(avg)	I(in/hr)	Ae(acres)	NODE
191.46	21.94	.450	1.00	.450	2.67	95.85	1.0
185.53	23.26	.449	1.00	.449	2.56	97.55	4.0

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA B

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEBT.DAT
TIME/DATE OF STUDY: 11:47 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	8.5	8.5	C	1D/AC	..	10.3	4.54	.45	.453	31.1	997	.1956	..	INITIAL SUBAREA
3.00					.1						34	.0588	11.0	Qpipe= 31.1cfs n=.0240 D= 1.5 27.0"-PIPE
3.00		8.5				10.3				31.1				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 8.46 TOTAL AREA(ACRES)= 8.46 PEAK FLOW RATE(CFS)= 31.08
TIME OF CONCENTRATION(MIN.)= 10.34 MEAN VALUES: Fp(IN/HR) = .566; Ap = .800; Fm(IN/HR) = .453

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA C

[SAN BERNARDINO COUNTY]

FILE NAME:9373HECT.DAT
TIME/DATE OF STUDY: 11:48 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	3.0	3.0	C	2.5AC	..	9.4	4.83	.51	.509	11.7	794	.2355	..	INITIAL SUBAREA
2.00		3.0				9.4				11.7				STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 3.01 TOTAL AREA(ACRES) = 3.01 PEAK FLOW RATE(CFS) = 11.71
TIME OF CONCENTRATION(MIN.) = 9.40 MEAN VALUES: Fp(IN/HR) = .566; Ap = .900; Fm(IN/HR) = .509

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA D

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEDT.DAT
TIME/DATE OF STUDY: 11:48 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	2.3	2.3	C	2.5AC	..	10.0	4.61	.51	.509	8.3	774	.1602	..	INITIAL SUBAREA
2.00		2.3				10.0				8.3				STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 2.26 TOTAL AREA(ACRES) = 2.26 PEAK FLOW RATE(CFS) = 8.34
TIME OF CONCENTRATION(MIN.) = 10.05 MEAN VALUES: Fp(IN/HR) = .566; Ap = .900; Fm(IN/HR) = .509

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA E

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEET.DAT
TIME/DATE OF STUDY: 11:49 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	1.5	1.5	C	Nat	..	19.9	2.86	.52	.518	3.1	683	.1069	..	INITIAL SUBAREA
2.00		1.5				19.9				3.1				STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 1.45 TOTAL AREA(ACRES) = 1.45 PEAK FLOW RATE(CFS) = 3.05
TIME OF CONCENTRATION(MIN.) = 19.90 MEAN VALUES: Fp(IN/HR) = .518; Ap = 1.000; Fm(IN/HR) = .518

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA F

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEFT.DAT
TIME/DATE OF STUDY: 11:49 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	4.1	4.1	C	Nat	..	20.0	2.84	.52	.518	8.6	848	.1592	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 3.00	18.7	22.8	C	Nat	1.1	21.1	2.74	.52	.518	45.6	1044	.1935	16.5	Qest.= 27.0cfs XFALL= .20000 n=.0300 D= 1.2
5.0ft-GUTTER FLOW TO PT.# 4.00	22.1	44.9	C	Nat	1.6	22.7	2.61	.52	.518	84.4	1109	.0712	12.2	Qest.= 66.4cfs XFALL= .20000 n=.0300 D= 1.5
5.00					.1						51	.0588	13.8	Qpipe= 84.4cfs n=.0240 D= 2.4 36.0"-PIPE
5.00		44.9				22.7				84.4				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 44.88 TOTAL AREA(ACRES)= 44.88 PEAK FLOW RATE(CFS)= 84.43
TIME OF CONCENTRATION(MIN.)= 22.74 MEAN VALUES: Fp(IN/HR) = .518; Ap = 1.000; Fm(IN/HR) = .518

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA G

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEGT.DAT
TIME/DATE OF STUDY: 11:50 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	3.0	3.0	C	Nat	..	18.1	3.05	.52	.518	6.7	781	.2228	..	INITIAL SUBAREA
2.00		3.0				18.1				6.7				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 2.96 TOTAL AREA(ACRES)= 2.96 PEAK FLOW RATE(CFS)= 6.75
TIME OF CONCENTRATION(MIN.)= 18.13 MEAN VALUES: Fp(IN/HR) = .518; Ap = 1.000; Fm(IN/HR) = .518

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA H

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEHT.DAT
TIME/DATE OF STUDY: 11:50 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	9.4	9.4	C	2.5AC	..	9.6	4.75	.51	.509	35.7	833	.2281	..	INITIAL SUBAREA
2.00		9.4				9.6				35.7				STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 9.36 TOTAL AREA(ACRES) = 9.36 PEAK FLOW RATE(CFS) = 35.69
TIME OF CONCENTRATION(MIN.) = 9.64 MEAN VALUES: Fp(IN/HR) = .566; Ap = .900; Fm(IN/HR) = .509

TRACT No. 16136 MOON CAMP (JN 9373)
EXISTING HYDROLOGY
AREA I

[SAN BERNARDINO COUNTY]

FILE NAME:9373HEIT.DAT
TIME/DATE OF STUDY: 11:51 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
					..						1050	.1762	..	INITIAL SUBAREA
2.00	4.3	4.3	C	4D/AC		9.4	4.82	.34	.340	17.3				
											705	.1730	14.4	Qpipe= 17.3cfs n=.0240 D= .8 24.0"-PIPE
3.00					.8									
3.00	1.8	6.1	C	2.5AC		10.2	4.55	.51	.391	22.9				ADD SUBAREA
5.0ft-GUTTER FLOW TO PT.#											292	.0514	8.4	Qest.= 32.0cfs XFALL= .20000 n=.0300 D= 1.0
					.6									
4.00	5.3	11.4	C	Nat		10.8	4.37	.52	.450	40.2				
											73	.0274	8.8	Qpipe= 40.2cfs n=.0240 D= 2.0 33.0"-PIPE
5.00					.1									
5.00		11.4				11.0				40.2				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 11.38 TOTAL AREA(ACRES)= 11.38 PEAK FLOW RATE(CFS)= 40.16
TIME OF CONCENTRATION(MIN.)= 10.99 MEAN VALUES: Fp(IN/HR) = .539; Ap = .833; Fm(IN/HR) = .450

Moon Camp Tentative Tract 16136

APPENDIX B

Modified Rational Method - Proposed Condition
10 year and 100 year

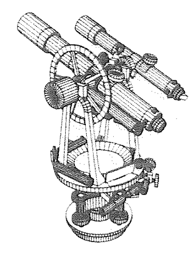
FAWNSKIN, CALIFORNIA
MOON CAMP
Tentative Tract 16136

PRELIMINARY DRAINAGE STUDY
HYDROLOGY AND HYDRAULICS
SUMMARY REPORT

APRIL 2002

EXHIBIT C
PROPOSED HYDROLOGY

10-YEAR RUNOFF



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37 EAST OLIVE AVENUE
REDLANDS, CALIFORNIA 92373
909.793.2257 or FAX 909.792.3763

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA A

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPAT.DAT
TIME/DATE OF STUDY: 9:28 4/10/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	3.0	3.0	D	Nat	..	16.6	3.24	.40	.398	7.8	779	.3440	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 3.00	9.4	12.5	D	Nat	1.2	17.8	3.09	.40	.398	30.3	730	.1603	15.1	Qest.= 19.3cfs XFALL= .20000 n=.0300 D= .8
5.0ft-GUTTER FLOW TO PT.# 7.00	17.2	29.7	D	Nat	1.0	18.8	2.98	.40	.398	69.0	869	.1438	15.2	Qest.= 50.3cfs XFALL= .20000 n=.0300 D= 1.2
7.00		29.7				18.8	2.98			69.0				FOR CONFLUENCE
5.00	4.7	4.7	D	Nat	..	18.4	3.02	.40	.398	11.0	890	.2719	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 6.00	12.6	17.3	D	Nat	.9	19.2	2.93	.40	.398	39.4	719	.1405	14.1	Qest.= 25.2cfs XFALL= .20000 n=.0300 D= 1.2
5.0ft-GUTTER FLOW TO PT.# 7.00	8.8	26.1	D	Nat	.9	20.1	2.84	.40	.398	57.4	719	.1293	13.8	Qest.= 49.1cfs XFALL= .20000 n=.0300 D= 1.2

CONFLUENCE ANALYSIS FOR POINT# 7.00

PEAK FLOW RATE(CFS) = 125.6
TIME OF CONCENTRATION(MIN.) = 18.8
MEAN VALUES: Fp(IN/HR) = .398; Ap = 1.000; Fm(IN/HR) = .398
EFFECTIVE AREA(ACRES) = 54.15 TOTAL AREA(ACRES) = 55.85

Q(cfs)	Tc(min)	Fp(avg)	Ap(avg)	Fm(avg)	I(in/hr)	Ae(acres)	NODE
125.65	18.78	.398	1.00	.398	2.98	54.15	1.0
122.71	20.09	.398	1.00	.398	2.84	55.85	4.0

LARGEST CONFLUENCE Q= 125.6

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA A

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPAT.DAT
TIME/DATE OF STUDY: 9:28 4/10/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
											1261	.0896	15.0	Qest.= 151.5cfs XFALL= .20000 n=.0300 D= 1.9
5.0ft-GUTTER FLOW TO PT.# 8.00	24.9	79.0	C	Nat	1.4	20.2	2.83	.52	.436	170.1				
											462	.0476	11.8	Qest.= 182.2cfs XFALL= .20000 n=.0300 D= 2.3
5.0ft-GUTTER FLOW TO PT.# 9.00	11.9	91.0	C	2.5AC	.7	20.9	2.77	.51	.445	189.9				
											86	.0814	19.4	Qpipe= 189.9cfs n=.0240 D= 2.9 48.0"-PIPE
10.00					.1									
											671	.0462	11.7	Qest.= 195.8cfs XFALL= .20000 n=.0300 D= 2.4
5.0ft-GUTTER FLOW TO PT.# 11.00	6.0	96.9	C	1D/AC	1.0	21.9	2.67	.45	.446	194.3				
11.00		96.9				21.9				194.3				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 96.91 TOTAL AREA(ACRES)= 98.61 PEAK FLOW RATE(CFS)= 194.30
TIME OF CONCENTRATION(MIN.)= 21.89 MEAN VALUES: Fp(IN/HR) = .457; Ap = .975; Fm(IN/HR) = .446

PEAK FLOW RATE TABLE

Q(cfs)	Tc(min)	Fp(avg)	Ap(avg)	Fm(avg)	I(in/hr)	Ae(acres)	NODE
194.30	21.89	.457	.98	.446	2.67	96.91	1.0
188.25	23.21	.456	.98	.445	2.57	98.61	4.0

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA B

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPBT.DAT
TIME/DATE OF STUDY: 9:31 4/10/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	6.6	6.6	C	1D/AC	..	8.7	5.10	.45	.453	27.5	603	.1658	..	INITIAL SUBAREA
3.00					.1						34	.0588	10.5	Qpipe= 27.5cfs n=.0240 D= 1.6 24.0"-PIPE
3.00		6.6				8.8				27.5				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 6.57 TOTAL AREA(ACRES)= 6.57 PEAK FLOW RATE(CFS)= 27.49
TIME OF CONCENTRATION(MIN.)= 8.75 MEAN VALUES: Fp(IN/HR) = .566; Ap = .800; Fm(IN/HR) = .453

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA C

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPCT.DAT
TIME/DATE OF STUDY: 6:28 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	2.3	2.3	C	2D/AC	.. ----	6.8	6.06	.40	.396	11.9	407	.1843	..	INITIAL SUBAREA
2.00		2.3			----	6.8				11.9	----	-----	----	STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 2.34 TOTAL AREA(ACRES) = 2.34 PEAK FLOW RATE(CFS) = 11.94
TIME OF CONCENTRATION(MIN.) = 6.80 MEAN VALUES: Fp(IN/HR) = .566; Ap = .700; Fm(IN/HR) = .396

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA D

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPDT.DAT
TIME/DATE OF STUDY: 6:35 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	2.4	2.4	C	2.5AC	..	8.2	5.33	.51	.509	10.4	579	.2522	..	INITIAL SUBAREA
26.ft-STREET FLOW TO PT.# 3.00	5.2	7.6	C	1D/AC	1.6	9.8	4.71	.45	.471	29.1	620	.0753	7.5	Qest.= 20.5cfs D= .4 ,D*V= 2.8 FLOODWIDTH=-1.8
26.ft-STREET FLOW TO PT.# 4.00	2.0	9.6	C	1D/AC	.9	10.7	4.41	.45	.467	34.1	322	.0258	5.8	Qest.= 32.6cfs D= .5 ,D*V= 2.7 FLOODWIDTH= 3.2
5.00					.1						75	.2267	18.6	Qpipe= 34.1cfs n=.0240 D= 1.2 21.0"-PIPE
5.00		9.6				10.8				34.1				STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 9.59 TOTAL AREA(ACRES) = 9.59 PEAK FLOW RATE(CFS) = 34.05
TIME OF CONCENTRATION(MIN.) = 10.77 MEAN VALUES: Fp(IN/HR) = .566; Ap = .825; Fm(IN/HR) = .467

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA E

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPET.DAT
TIME/DATE OF STUDY: 6:44 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	.2	.2	C	Com	..	5.8	6.75	.06	.057	1.3	280	.0304	..	INITIAL SUBAREA
											105	.1429	6.6	Qpipe= 1.3cfs n=.0240 D= .3 18.0"-PIPE
3.00					.3									
3.00		.2				6.1				1.3				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= .22 TOTAL AREA(ACRES)= .22 PEAK FLOW RATE(CFS)= 1.33
TIME OF CONCENTRATION(MIN.)= 6.09 MEAN VALUES: Fp(IN/HR) = .566; Ap = .100; Fm(IN/HR) = .057

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA F

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPFT.DAT
TIME/DATE OF STUDY: 6:45 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	1.0	1.0	C	Com	..	9.5	4.80	.06	.057	4.3	831	.0235	..	INITIAL SUBAREA
											102	.0882	7.8	Qpipe= 4.3cfs n=.0240 D= .5 18.0"-PIPE
3.00					.2									
3.00		1.0				9.7				4.3				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 1.00 TOTAL AREA(ACRES)= 1.00 PEAK FLOW RATE(CFS)= 4.27
TIME OF CONCENTRATION(MIN.)= 9.69 MEAN VALUES: Fp(IN/HR) = .566; Ap = .100; Fm(IN/HR) = .057

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA G

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPGT.DAT
TIME/DATE OF STUDY: 6:50 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	4.1	4.1	C	Nat	..	20.0	2.84	.52	.518	8.6	848	.1592	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 3.00	29.6	33.8	C	Nat	1.4	21.4	2.71	.52	.518	66.7	1298	.1726	16.0	Qest.= 37.2cfs XFALL= .20000 n=.0300 D= 1.2
4.00					.1						132	.0833	15.2	Qpipe= 66.7cfs n=.0240 D= 1.9 33.0"-PIPE
5.0ft-GUTTER FLOW TO PT.# 5.00	6.0	39.7	C	1D/AC	.8	22.3	2.64	.45	.508	76.1	537	.0689	11.8	Qest.= 72.6cfs XFALL= .20000 n=.0300 D= 1.5
6.00					.3						202	.0545	13.2	Qpipe= 76.1cfs n=.0240 D= 2.3 36.0"-PIPE
6.00		39.7				22.6				76.1				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= 39.71 TOTAL AREA(ACRES)= 39.71 PEAK FLOW RATE(CFS)= 76.06
TIME OF CONCENTRATION(MIN.)= 22.59 MEAN VALUES: Fp(IN/HR) = .524; Ap = .970; Fm(IN/HR) = .508

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA H

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPHT.DAT
TIME/DATE OF STUDY: 6:56 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	.3	.3	C	Com	..	7.6	5.63	.06	.057	1.5	511	.0274	..	INITIAL SUBAREA
											73	.1781	7.4	Qpipe= 1.5cfs n=.0240 D= .3 18.0"-PIPE
3.00					.2									
3.00		.3				7.7				1.5				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= .30 TOTAL AREA(ACRES)= .30 PEAK FLOW RATE(CFS)= 1.50
TIME OF CONCENTRATION(MIN.)= 7.73 MEAN VALUES: Fp(IN/HR) = .566; Ap = .100; Fm(IN/HR) = .057

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA I

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPIT.DAT
TIME/DATE OF STUDY: 6:56 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 1

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	.2	.2	C	Com	..	5.7	6.89	.06	.057	1.2	248	.0274	..	INITIAL SUBAREA
											87	.2644	8.0	Qpipe= 1.2cfs n=.0240 D= .2 18.0"-PIPE
3.00					.2									
3.00		.2				5.8				1.2				STREAM SUMMARY

EFFECTIVE AREA(ACRES)= .20 TOTAL AREA(ACRES)= .20 PEAK FLOW RATE(CFS)= 1.23
TIME OF CONCENTRATION(MIN.)= 5.84 MEAN VALUES: Fp(IN/HR) = .566; Ap = .100; Fm(IN/HR) = .057

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA J

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPJT.DAT
TIME/DATE OF STUDY: 7:11 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

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CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	4.3	4.3	C	4D/AC	..	9.4	4.82	.34	.340	17.3	1050	.1762	..	INITIAL SUBAREA
											499	.1884	14.8	Qpipe= 17.3cfs n=.0240 D= .8 24.0"-PIPE
3.00					.6									
											538	.0781	10.6	Qpipe= 17.3cfs n=.0240 D= 1.1 21.0"-PIPE
8.00					.8									
8.00		4.3				10.8	4.38			17.3				FOR CONFLUENCE
5.00	1.2	1.2	C	1D/AC	..	6.8	6.06	.45	.453	5.9	400	.2500	..	INITIAL SUBAREA
											1088	.0827	7.6	Qest.= 17.7cfs D= .4 ,D*V= 2.8 FLOODWIDTH=13.0
26.ft-STREET FLOW TO PT.# 6.00	6.0	7.2	C	1D/AC	2.8	9.6	4.77	.45	.453	28.0				
											212	.0142	5.0	Qest.= 40.7cfs D= .8 ,D*V= 3.9 FLOODWIDTH=32.3
64.ft-STREET FLOW TO PT.# 7.00	7.0	14.2	C	1D/AC	.7	10.3	4.53	.45	.453	51.9				
											210	.0190	8.2	Qpipe= 51.9cfs n=.0240 D= 2.3 39.0"-PIPE
8.00					.4									

CONFLUENCE ANALYSIS FOR POINT# 8.00

PEAK FLOW RATE(CFS) = 69.2
TIME OF CONCENTRATION(MIN.) = 10.7
MEAN VALUES: Fp(IN/HR) = .566; Ap = .754; Fm(IN/HR) = .427
EFFECTIVE AREA(ACRES) = 18.41 TOTAL AREA(ACRES) = 18.44

Q(cfs)	Tc(min)	Fp(avg)	Ap(avg)	Fm(avg)	I(in/hr)	Ae(acres)	NODE
68.89	10.83	.566	.75	.427	4.38	18.44	1.0
69.18	10.74	.566	.75	.427	4.40	18.41	4.0

LARGEST CONFLUENCE Q= 69.2

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA J

[SAN BERNARDINO COUNTY]

FILE NAME: 9373HPJT.DAT
TIME/DATE OF STUDY: 7:11 4/11/2002
10.0-YEAR STORM RATIONAL METHOD STUDY (AMC II LOSSES)

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	AREA (ACRES) SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
											142	.0352	11.1	Qpipe= 69.2cfs n=.0240 D= 2.3 39.0"-PIPE
9.00					.2									
9.00		18.4				11.0				69.2				STREAM SUMMARY

EFFECTIVE AREA(ACRES) = 18.41 TOTAL AREA(ACRES) = 18.44 PEAK FLOW RATE(CFS) = 69.18
TIME OF CONCENTRATION(MIN.) = 10.96 MEAN VALUES: Fp(IN/HR) = .566; Ap = .754; Fm(IN/HR) = .427

PEAK FLOW RATE TABLE

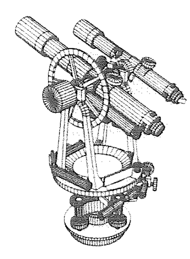
Q(cfs)	Tc(min)	Fp(avg)	Ap(avg)	Fm(avg)	I(in/hr)	Ae(acres)	NODE
69.18	10.96	.566	.75	.427	4.34	18.41	4.0
68.89	11.04	.566	.75	.427	4.32	18.44	1.0

FAWNSKIN, CALIFORNIA
MOON CAMP
Tentative Tract 16136

PRELIMINARY DRAINAGE STUDY
HYDROLOGY AND HYDRAULICS
SUMMARY REPORT
APRIL 2002

EXHIBIT D
PROPOSED HYDROLOGY

100-YEAR RUNOFF



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REDLANDS, CALIFORNIA 92373
909.793.2257 or FAX 909.792.3763

TRACT No. 16136 MOON CAMP (JN 9373)
PROPOSED HYDROLOGY
AREA A

[SAN BERNARDINO COUNTY]

FILE NAME:9373HPAH.DAT
TIME/DATE OF STUDY: 9:24 4/10/2002
100.0-YEAR STORM RATIONAL METHOD STUDY (AMC III LOSSES)
[(c) 1983-1994 ADVANCED ENGINEERING SOFTWARE]

CALCULATED BY: R.CLARK
CHECKED BY: R.CLARK
PAGE NUMBER 1 OF 2

CONCENTRATION POINT NUMBER	AREA (ACRES) SUBAREA	SUM	SOIL TYPE	DEV. TYPE	Tt MIN.	Tc MIN.	I in/h	Fm	Fm (Avg)	Q SUM	PATH (ft)	SLOPE ft/ft	V FPS.	HYDRAULICS AND NOTES
2.00	3.0	3.0	D	Nat	..	16.6	4.60	.14	.140	12.2	779	.3440	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 3.00	9.4	12.5	D	Nat	.8	17.4	4.45	.14	.140	48.4	730	.1603	15.1	Qest.= 30.2cfs XFALL= .20000 n=.0300 D= 1.2
5.0ft-GUTTER FLOW TO PT.# 7.00	17.2	29.7	D	Nat	.9	18.3	4.29	.14	.140	111.0	869	.1438	17.1	Qest.= 80.5cfs XFALL= .20000 n=.0300 D= 1.4
7.00		29.7				18.3	4.29			111.0				FOR CONFLUENCE
5.00	4.7	4.7	D	Nat	..	18.4	4.29	.14	.140	17.4	890	.2719	..	INITIAL SUBAREA
5.0ft-GUTTER FLOW TO PT.# 6.00	12.6	17.3	D	Nat	.9	19.2	4.15	.14	.140	62.5	719	.1405	14.6	Qest.= 40.2cfs XFALL= .20000 n=.0300 D= 1.2
5.0ft-GUTTER FLOW TO PT.# 7.00	8.8	26.1	D	Nat	.8	20.0	4.04	.14	.140	91.6	719	.1293	15.8	Qest.= 77.9cfs XFALL= .20000 n=.0300 D= 1.4

CONFLUENCE ANALYSIS FOR POINT# 7.00

PEAK FLOW RATE(CFS) = 200.5
TIME OF CONCENTRATION(MIN.) = 18.3
MEAN VALUES: Fp(IN/HR) = .140; Ap = 1.000; Fm(IN/HR) = .140
EFFECTIVE AREA(ACRES) = 53.66 TOTAL AREA(ACRES) = 55.85

Q(cfs)	Tc(min)	Fp(avg)	Ap(avg)	Fm(avg)	I(in/hr)	Ae(acres)	NODE
200.47	18.32	.140	1.00	.140	4.29	53.66	1.0
195.84	19.99	.140	1.00	.140	4.04	55.85	4.0

LARGEST CONFLUENCE Q= 200.5