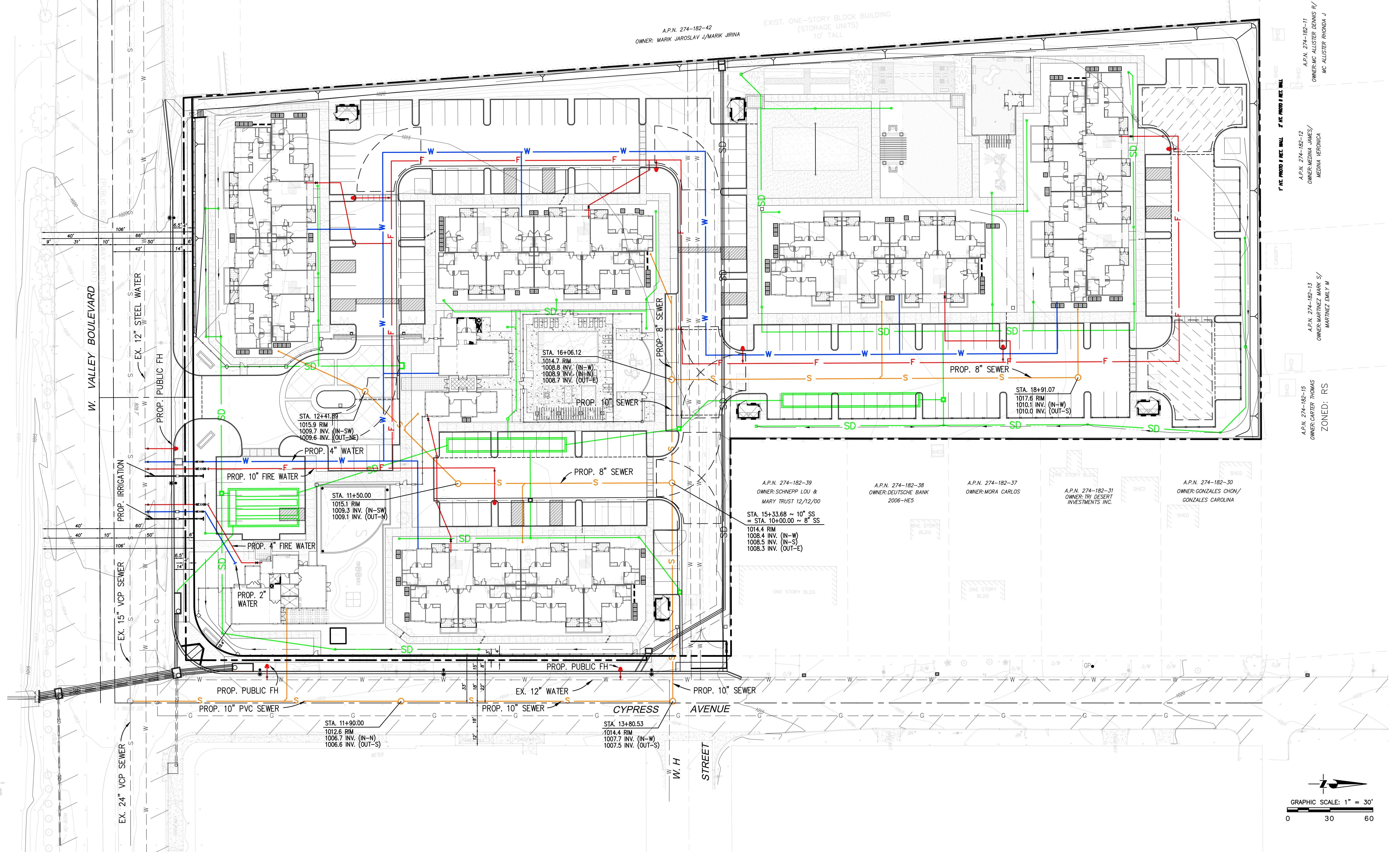


**Attachment I:
Hydrology**

I.1 - Drainage Study

LAS TERRAZAS UTILITY EXHIBIT



PRELIMINARY DRAINAGE STUDY

FOR

LAS TERRAZAS

APN: 0274-182-34, -43 & -46

**1189 W. VALLEY BLVD.,
COLTON, CA 92324**

Prepared For:
Amcal Multi-Housing Inc.
30141 Agoura Road, Suite 100
Agoura Hills, CA 91301-4311
Tel: (818) 706-0694
Fax: (818) 706-3752



September 22, 2014

Prepared by:
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INTRODUCTION

A. PROJECT LOCATION AND DESCRIPTION

The 5.92-acre site of proposed Las Terrazas project is located at 1189 W. Valley Blvd. near the City of Colton in the unincorporated area of County of San Bernardino, California. The project site is located between N. Hermosa Ave. and Cypress Ave. on W. Valley Blvd. It is bounded to the north by existing single family residential lots, to the east by Cypress Avenue, to the south by W. Valley Blvd., and to the west by an existing public storage facility. (See Vicinity Map on page 3 and Aerial Map on page 4). The project coordinates are 34.0703 Latitude (North) and -117.3431 Longitude (West).

The site comprises of 3 assessor's parcel lots – APN 274-182-43, 274-182-34 and 274-182-46. Currently, most of the proposed site is vacant undeveloped land with shrubs, grass and weeds grown throughout the site. The site slopes gently from the west and north to the south and southwest with about 10 feet of topographic relief across the site. Drainage flow at the site is dominated by sheet flowing across and along the existing ground contours towards Cypress Ave.

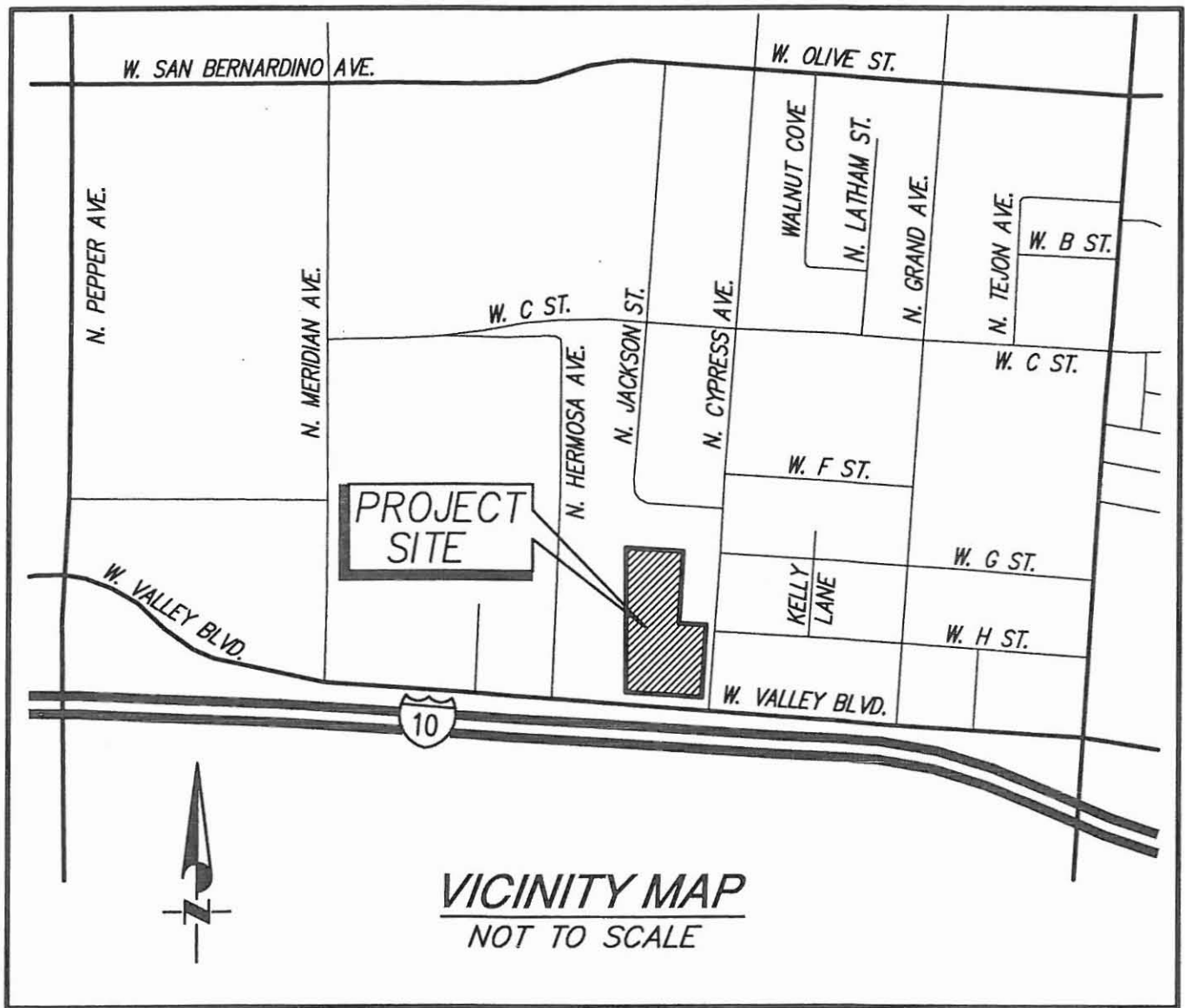
The proposed two-phase project development consist of five 2-story & 3-story high, totaled 112-unit apartment buildings with total building coverage of 47,490 square-feet (sq-ft), a single story 2,000 sq-ft community building, a single story 4,000 sq-ft child care center, common area of tot lots, gardens, BBQ and landscaped areas totaling about 84,100 sq-ft, a community swimming pool, and paved driveways and parking areas. The total residential building area is about 121,540 sq-ft and the density is about 18.9 dwelling units per acre. There are 194 parking spaces provided for the residential area and 11 parking spaces provided for the day care center. (See Site Plan and Project Information Sheet on Pages 5 and 6).

The proposed site is situated within Reach 4 Hydrologic Area (or designated Colton HSA 801.44) of the larger Santa Ana River Basin. (See Page A-30 for Santa Ana River and Tributaries Map). The Santa Ana River meanders south southwest through Rubidoux, Norco, Orange County and the City of Orange to ultimately discharge to the Pacific Ocean just north of Newport Beach. Portions of the Santa Ana River have been concrete lined, while other portions have been fully developed for recreational use and some portions are still undeveloped.

B. PURPOSE OF STUDY

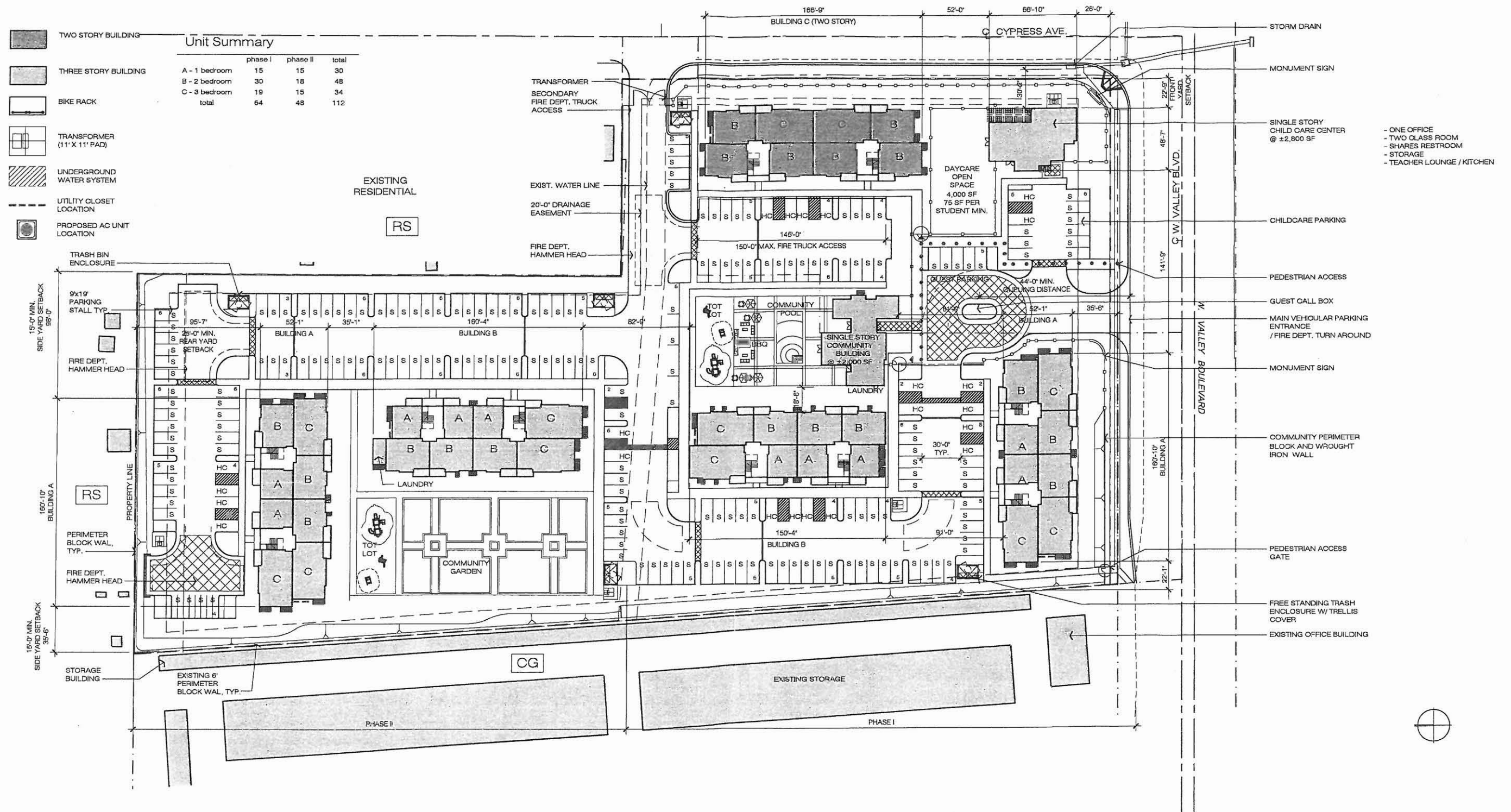
The main purposes of this preliminary drainage study are:-

- 1) to determine the design peak 100-year frequency storm runoff for project site and its tributary upstream offsite area, and the corresponding peak 10-year frequency storm runoff in the existing pre-developed condition and in the proposed developed condition;
- 2) to calculate the runoff volume of 24-hour duration event for the design 100-year return frequency storm generated from project site in both the existing pre-developed condition and the proposed developed condition using standard San Bernardino County's Synthetic Unit Hydrograph Method; The difference between the runoff volumes determined is the minimum detention storage volume required for project site.
- 3) to determine the flow-based Low Impact Development (LID) BMP design flow rate (Q_{bmp}) and volume-based LID Design Capture Volume (DCV) generated from proposed project development and subsequently to propose appropriate treatment control LID Best Management Practices (BMPs) to complete the Project Specific Water Quality Management Plan (WQMP) and to mitigate the increased developed flow rate and/or runoff volume to comply with the stormwater management requirements of Countywide Drainage Area Management Plan (DAMP) and Local Implementation Plan (LIP); and
- 4) to determine the hydraulic capacities of proposed storm drainage systems including various sizes of storm drain pipes, grated drop inlets, and parkway culvert to convey onsite and offsite storm runoffs to outlet downstream to proposed drainage facility and to existing curb and gutter of adjacent public streets.





AERIAL MAP



LAS TERRAZAS

UNINCORPORATED SAN BERNARDINO COUNTY, COLTON, CA

scale: 1" = 40'-0"

-02-

SITE PLAN STUDY - SCHEME 24
 LAS TERRAZAS AT COLTON CA
 UNINCORPORATED SAN BERNARDINO COUNTY
 APPLICANT / DEVELOPER
 AMCAL MULTI - HOUSING, INC.

ARCHITECT
 Withee Malcolm Architects, LLP
 JOB NO. B1057.301
 DATE: SEPTEMBER 12, 2014

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PROJECT INFORMATION

PROJECT LOCATION: Between N. Hermosa ave. & N. Cypress Ave.
on W. Valley Blvd. and 275 & 291 N. Cypress Ave.
Colton, CA 92324

APN: 0274-182-34, 43 & -46

TOTAL LOT AREA: 5.92 acres (257,988 SF)

TOTAL UNITS: 112 UNITS

TOTAL DENSITY: 18.9 DU/acre

CURRENT ZONING: SAN BERNARDINO COUNTY DEVELOPMENT CODE

OCCUPANCY: R-2, S-2, AND A

CONSTRUCTION TYPE: TYPE V

ARCHITECTURAL STYLE: MEDITERRANEAN

NUMBER OF STORIES: 2-3

BUILDING COVERAGE: 47,490 SF (18.4%)

TOTAL BUILDING AREA: 121,540 SF

BUILDING AREA TYPE 'A': 50,400 SF (3 STORIES x 2 BLDGS x 8,400 SF)

BUILDING AREA TYPE 'B': 47,280 SF (3 STORIES x 2 BLDGS x 7,880 SF)

BUILDING AREA TYPE 'C': 17,860 SF (2 STORY x 8,930 SF)

BUILDING AMMENITIES: 4,800 SF (2,500 DAYCARE + 2,300 COMMUNITY)

F.A.R.: 0.47 (121,540 SF/ 257,988 SF)

MINIMUM YARD SETBACKS:

FRONT YARD: 25'-0"

SIDE YARD: 15'-0"

REAR YARD: 25'-0"

AT BALCONY 22'-6"

BUILDABLE AREA SUMMARY

PHASE I - SOUTH (LIVABLE AREA)

PLAN	DESCRIPTION	QNTY	%	GROSS AREA	NET AREA	TOTAL GROSS AREA
A	1 BR 1 BA	15	23%	570 s.f.	525 s.f.	8,550 s.f.
B	2 BR 1 BA	30	47%	835 s.f.	780 s.f.	25,050 s.f.
C	3 BR 2 BA	19	30%	1,100 s.f.	1,020 s.f.	20,900 s.f.
		64	total units		0 s.f.	54,500 s.f.

BUILDABLE AREA SUMMARY

PHASE II - SOUTH (LIVABLE AREA)

PLAN	DESCRIPTION	QNTY	%	GROSS AREA	NET AREA	TOTAL GROSS AREA
A	1 BR 1 BA	15	31%	570 s.f.	525 s.f.	8,550 s.f.
B	2 BR 1 BA	18	38%	835 s.f.	780 s.f.	15,030 s.f.
C	3 BR 2 BA	15	31%	1,100 s.f.	1,020 s.f.	16,500 s.f.
		48	total units		0 s.f.	40,080 s.f.

AMENITIES:

COMMUNITY BUILDING - 2,000 sf

DAYCARE / LEARNING CENTER - 4,000 sf

TOT LOT / GARDEN / BBQ / LANDSCAPED AREAS - 84,100 sf

ADA UNITS REQUIRED (112 unit x 10%): 12 UNITS

ALL GROUND FLOOR UNIT SHALL BE ADA

ADAPTABLE UNITS PER CBC.2010 1104A.1.

ADA UNITS PROVIDED: 12 UNITS

PARKING SUMMARY

PHASE I - RESIDENTIAL

PARKING REQUIRED (PER SB1818)

1 BR units 15 x 1.0 spaces = 15 spaces

2-3 BR units 49 x 2.0 spaces = 98 spaces

TOTAL RESIDENTIAL PARKING REQUIRED = 113 spaces*

*INCLUSIVE OF GUEST PARKING SPACES

PHASE II - RESIDENTIAL

PARKING REQUIRED (PER SB1818)

1 BR units 15 x 1.0 spaces = 15 spaces

2-3 BR units 33 x 2.0 spaces = 66 spaces

TOTAL RESIDENTIAL PARKING REQUIRED = 81 spaces*

*INCLUSIVE OF GUEST PARKING SPACES

COMMUNITY SERVICE BUILDINGS:

PARKING REQUIRED (PER SBC DEVELOPMENT CODE 83.11.04)

CHILDCARE CENTER @ 2,500 SF

1.0 space per 5 STUDENT

0.2 space x 45 student = 11 spaces

TOTAL PARKING REQUIRED = 11 spaces

GRAND TOTAL PARKING REQUIRED = 205 spaces

PARKING PROVIDED

RESIDENT. PARKING SPACES = 172 spaces

RESIDENT AC PARKING SPACES = 22 spaces

DAYCARE PARKING SPACES = 9 spaces

DAYCARE AC PARKING SPACES = 2 spaces

TOTAL PARKING PROVIDED = 205 spaces

OPEN SPACE SUMMARY

PRIVATE OPEN SPACE

REQUIRED

125 SF / UNITS (112 x 125 SF) = 14,000 SF

PROVIDED

60 SF AVG. x 112 UNITS = 6,720 SF

COMMON OPEN SPACE

REQUIRED:

112 units x 125 + 25 = 14,025 SF

TOTAL OPEN SPACE PROVIDED = 14,025 SF

PROVIDED:

OPEN SPACE (INCLUDING SETBACKS): 30,000 SF

COMMUNITY ROOMS: 5,400 SF

TOTAL OPEN SPACE PROVIDED = 35,400 SF

DEVELOPER: AMCAL Multi-Housing, Inc.

30141 AGOURA ROAD, SUITE 100

AGOURA HILLS, CA 91301

(818) 706-0694

VICINITY MAP



SITE AREA DIAGRAM



METHODOLOGY

The watershed studied (see enclosed Hydrology Maps in Appendix I), consists of proposed project site and the tributary offsite & upstream drainage area, is situated within the San Bernardino County's Valley Area of 100-year 1-hour isohyet of 1.25 inches and with slope for rainfall intensity curve of 0.60 (See Page A-2). The NOAA Atlas 14 Point Precipitation Frequency Estimates were obtained for project site by entering the project coordinates of 34.0703 Latitude (North) and -117.3431 Longitude (West) (See Pages A-3 & A-4). The westerly tributary offsite subarea is located within Soil Group B Type while the project onsite subarea is located within Soil Group A Type (See Pages A-5). Soil Group A typically has a low runoff potential with high infiltration rate.

The proportion imperviousness for the two drainage subareas studied was obtained from the Table of Actual Impervious Cover for Developed Areas (See Page A-11). The land use of the westerly upstream tributary offsite subarea is an existing public storage facility and thus was designated as Commercial Land Use with 90 percent impervious cover assigned. The project site is currently mostly a vacant undeveloped land along with a demolished single family residential lot. The weighted pervious ratio calculated is about 98 percent with a weighted SCS Curve Number of 65 (See Pages A-32 & A-33). The proposed project development is mostly designated as Multiple Family Residential - Apartment Land Use and with about 1.92 acres of open space & planting and landscaping areas. The weighted pervious ratio calculated is about 32 percent with a weighted SCS Curve Number of 32 (See Pages A-34 & A-35).

The San Bernardino County's Rational Method Hydrology Calculation, available in software program Version 7.1 developed by CivilCadd/CivilDesign, was used to determine the approximate time of concentration (TC) and the peak runoff for drainage subareas studied for the Design 100-year storm event and the corresponding 10-year storm event in both the existing pre-developed condition and in the proposed developed condition.

The San Bernardino County's Synthetic Unit Hydrograph Method Hydrology Calculation, available in software program Version 7.0 developed by CivilCadd/Civildesign, was used to determine the approximate area-averaged soil loss rate, F_m , and the area-averaged low loss fraction, Y_b , and then the program will calculate the corresponding peak flow rate and the hydrograph runoff volume for the Design 100-year 24-hour duration storm event in both the existing pre-

developed condition and in the proposed developed condition. The delta increases between the peak flow rates and between the runoff volumes are due to the proposed project development with higher impervious surface and thus mitigations of infiltration & detention will be required by the County.

The volume-based LID BMP design capture volume (DCV) and flow-based LID BMP design flow rate (Q_{bmp}) calculations were performed based on the guidelines, criteria and worksheets as contained in the Technical Guidance Document for Water Quality Management Plans dated June 7, 2013, prepared by CDM Smith Inc. for The County of San Bernardino Areawide Stormwater Program, for project site in proposed developed condition.

The excel spreadsheet of Sewer and Culvert Hydraulics version 1.01 developed by Urban Drainage and Flood Control District in Denver, Colorado, was utilized to perform simple hydraulic capacity computations for the parkway culvert and various sizes of proposed onsite storm drain pipes. The equation and chart related to hydraulic interception capacity of grated inlet at sump, as contained in OCEMA Local Drainage Manual, was used to compute the interception capacity of various sizes of grated inlets proposed.

SUMMARY OF HYDROLOGIC CHARACTERISTICS & DESIGN CRITERIA

Hydrology Calculations: San Bernardino County Rational Method &
Synthetic Unit Hydrograph Method

Design Storm: 100-Year Frequency Storm Event

100-Year 24-Hour Rainfall Intensity: 5.32" (NOAA Atlas 14 Pt. Precipitation)

100-Year 1-Hour Rainfall Intensity: 1.25"

2-Year 1-Hour Rainfall Intensity: 0.52"

Soils Group: "B" Type for Tributary Upstream Offsite Area
& "A" Type for Project Onsite Area

Existing Land Use: Offsite Area consists of Public Storage Facility
Onsite Area is Vacant Undeveloped Land

Proposed Development: 112-unit Apartment Buildings, Community Building,
Open Space & Landscaping Areas, Day Care Center,
Paved Parking Lots and Driveways.

Imperviousness: Weighted 68% for Apartments & Commercial with Open Space
& Landscape Areas (Prop. Condition – Onsite)
0% for Vacant Undeveloped Land (Existing Condition - Onsite)
40% for Single Family Residential (Existing Condition - Onsite)
90% for Public Storage Facility (Existing Condition – Offsite)

Peak Runoff from a 10-Year Storm Event shall be contained within the Street's
Top of Curbs.

Peak Runoff from a 100-Year Storm Event shall be contained within the Street's
Right-Of-Way Limits.

Finished Pad Elevation of Proposed Dwellings shall be at least One Foot
above the Water Surface Elevation of a 100-Year Storm Event.

All developed runoffs from Onsite shall be intercepted and treated by Treatment
Control LID BMPs installed within Proposed Site before outletting or discharging
to curb & gutter of Cypress Ave. and to downstream Public Drainage Facilities.

The measured averaged infiltration rate by Geocon West Inc. for proposed site's
soils varies from 1.2 to 2.9 inches per hour at about 15 feet depth.

DRAINAGE DISCUSSIONS

Appendix A presents the Valley Area of 100-Year 1-Hour Isohyetal Map with location of project site shown, NOAA Atlas 14 Point Precipitation Frequency Estimates for project site, Hydrologic Soils Group Map for Southwest-B Area with location of project site shown, Table of SCS Cover Type Descriptions and definition of cover quality, Table of Curve Numbers for Pervious Areas, Table of Actual Impervious Cover for Developed Areas, definition of various Antecedent Moisture Condition (AMC), Table of Curve Number Relationships, estimation of various soil loss rates, Chart of Rainfall Depth Versus Return Period for Partial Duration Series, Instructions for Estimating Volume- and Flow-Based LID BMP Design Runoff Quantities, Inset of NOAA Atlas 14 Precipitation Depths (2-Yr 1-Hr Rainfall), and Map of Santa Ana River & Tributaries, and Table of 303(d) List of Impaired Water Bodies.

Excerpts of geotechnical investigation report dated February 20, 2013, related to stormwater infiltration test results performed by Geocon West Inc. are as shown on pages A-21 to A-29. The tested & measured averaged infiltration rates at two boring locations, Boring No. B4 & B8, show infiltration rate varies from 1.2 inches per hour to 2.9 inches per hour at 10 to 15 feet depth where silty sand and sand layers are encountered. The upper soils at depths of 8 and 10 feet are still subject to hydro-collapse or hydro-consolidation. Thus, the site's soil is conducive to percolation of stormwater at depth of 15 feet as recommended by the soils engineer for effective and efficient stormwater infiltration treatment using proprietary type of underground storage structural BMPs.

Calculations of weighted pervious ratio and weighted SCS Curve Number for Onsite Subarea B in the existing pre-developed condition and proposed developed condition are shown on pages A-32 thru A-35.

Appendix B presents the summary and results of the San Bernardino County's Rational Method hydrology calculations for the design 100-year storm event and the corresponding 10-year storm event in the Existing Pre-Developed Condition for the watershed studied.

The watershed studied is divided into two drainage subareas, namely Subarea A and Subarea B, as shown on the enclosed Existing Pre-Developed Condition Hydrology Map in Appendix I.

Subarea A is the existing offsite public storage facility located westerly of project site and is about 3.39 acres in size. Currently, the drainage runoff from the site is

being collected and conveyed by concrete gutters and then outlet directly to project site and then it spreads out and sheet flows easterly to curb & gutter of Cypress Ave. There is a 14-foot wide drainage easement across project site recorded per Parcel Map No. 9726 for this offsite runoff purpose. This tributary offsite Subarea A, designated by hydrologic node numbers 1 to 2 as shown on aforementioned Hydrology Map, has a longest flow path of 522 feet with a slope of about 2.9 percent and an imperviousness of 90 percent was assigned. The computed time of concentration (TC) is 7.55 minutes (min.) with peak 100-year runoff (Q100) of 13.1 cfs & a velocity of about 1.2 feet per second (fps). The corresponding peak 10-year (Q10) is 8.2 cfs. The adjusted SCS CN for AMC-3 is 75.8 with a pervious ratio (Ap) of 0.10.

Subarea B is the onsite drainage area of project site and is 5.92 acres in size. The mostly sheet flow runoff from onsite area confluences with aforementioned tributary offsite runoff from Subarea A and then flow across to existing westerly curb & gutter of Cypress Ave. Subarea B, designated by hydrologic node numbers 4 to 3, has a longest flow path of 795 feet with a slope of about 1.6 percent and an imperviousness of 2 percent was assigned. The computed TC is 17.1 min. with Q100 of 12.5 cfs & a velocity of about 0.8 fps. The corresponding Q10 is 5.9 cfs. The adjusted SCS CN for AMC-3 is 83 with a Ap of 0.98.

Thus, the totaled 9.31 acres of watershed studied has a confluenced Q100 of 24.2 cfs with TC of 11.9 min. as shown in the Summary Table on aforementioned Hydrology Map. The confluenced runoff flows southerly along curb and gutter of Cypress Ave. and reaches an existing double 18-inch CMP storm drain culverts located at the northwest corner of Cypress Ave. & W. Valley Blvd. The culverts convey the runoff southerly across & beneath W. Valley Blvd. and outlet the runoff to an open concrete channel that drains easterly and located along the southerly side of W. Valley Blvd.

Appendix C presents the summary and results of the San Bernardino County's Rational Method hydrology calculations for the design 100-year storm event and the corresponding 10-year storm event in the Proposed Developed Condition for the project site. The tributary upstream offsite area, Subarea A, remains the same as that in the existing pre-developed condition. The boundary of watershed studied for onsite Subarea B is the same as that in the existing pre-developed condition and is about 5.92 acres in size.

The upstream offsite Q100 of 13.1 cfs from Subarea A will be intercepted by a proposed 4' x 4' grated drop inlet structure and to be conveyed easterly by proposed 24" PVC storm drain pipe and then ponding & bubbling out from a

concrete outlet structure that connect to a proposed 3-foot wide parkway culvert that discharge to westerly curb & gutter of Cypress Ave. as shown on the enclosed Proposed Developed Condition Hydrology Map. A proposed 10-foot wide storm drain easement along the alignment of the 24" PVC storm drain pipe will be recorded during final engineering phase.

The onsite Subarea B, designated by hydrologic node numbers 4 to 5 as shown on aforementioned Hydrology Map, consist of five 2-story & 3-story high, totaled 112-unit apartment buildings, a single story 2,000 sq-ft community building, a single story 4,000 sq-ft child care center, asphalt & concrete paved parking lots & driveways, concrete walkways, and with about 84,100 sq-ft of common area of tot lots, gardens, BBQ and landscaping & planting area. The estimated pervious ratio of the proposed project development is about 32 percent with corresponding SCS CN of 32 for AMC-2 (see pages A-34 & A-35).

Vegetated or grassy swales are proposed throughout the landscaping & planting areas of project site. The design of vegetated or grassy swales promotes the conveyance of stormwater at a slower, controlled rate and acts as a filter medium removing pollutants (especially bacteria & pathogens) and allowing minimal stormwater infiltration. Surface ponding of runoff is not recommended by soils engineer due to the presence of hydro-collapsible soils up to 10' deep throughout the whole project site and thus stormwater infiltration layer is recommended to occur at or below 15' depth. The buildings' downspouts will be directed to outlet to the nearby or adjacent vegetated or grassy swales. The runoff on grassy swales will be intercepted by numerous grated drop inlets or area drains and then conveyed via interconnected storm drain pipes and outlet to the selected underground storage LID BMP for treatment control, infiltration and detention routing purposes. Subarea B has a longest flow path of 1090 feet with a slope of about 0.89 percent. The computed TC is 14.91 min. with Q100 of 14.02 cfs & a velocity of about 1.2 fps. The corresponding Q10 is 8.14 cfs. The adjusted SCS CN for AMC-3 is 52.0 with Ap of 0.32.

Thus, the totaled 7.98 acres of watershed studied has a confluenced Q100 of 24.62 cfs with TC of 8.56 min. as shown in the Summary Table on aforementioned Hydrology Map. The offsite runoff from Subarea A will flows southerly on Cypress Ave. and will be picked up by a proposed 14' wide curb opening sump type catch basin on west side of Cypress Ave. and its double 18" diameter RCP storm drain lateral pipes. The onsite runoff from Subarea B will be discharged via proposed 24" diameter overflow PVC storm drain pipe and proposed 48" wide by 6" high rectangular parkway culvert to the back of a proposed 14' wide curb opening flow-by type catch basin on north side of Valley Blvd. and its 24"

diameter RCP storm drain lateral pipe. The runoffs from both Subareas A & B along with larger tributary offsite & upstream runoff will be intercepted by existing and proposed catch basins on Valley Blvd. & Cypress Ave. and will be conveyed via proposed replacement of double 24" diameter RCP storm drain pipes on Valley Blvd. and outlet to the existing Caltrans concrete ditch and an existing 24" CMP culvert located between south side of Valley Blvd. & north side of I-10 Freeway.

Comparing to the Q100 of Existing Pre-Developed Condition for onsite Subarea B, there is an increase in undetained developed Q100 of 1.52 cfs. Mitigation of the increased developed runoff is proposed thru the use of proprietary LID BMP of underground CMP storage pipes (See Appendix G) for infiltration and detention treatment. With adequate storage volume provide by the structural LID BMP, the outflow of developed Q100 will be the same as that of the existing pre-development condition Q100 of 12.5 cfs.

Appendix D presents the results of the San Bernardino County's Synthetic Unit Hydrograph Method hydrology calculations for the 24-hour duration event of the design 100-year return frequency in Existing Pre-Developed Condition for the onsite Subareas B studied. The lag time to be used for unit hydrograph computation for Subarea B is assumed to be 0.8 of time of concentration computed from Rational Method in Appendix B.

Subarea B with 5.92 acres has a computed TC of 17.1 minutes which is equivalent to a lag time of 0.228 hour. With a 100-year 24-hour rainfall depth of 5.32", a pervious ratio of 0.98 and an adjusted SCS CN of 83 for AMC-3, the computed soil loss rate, F_m , is 0.312 in/hr while the low loss fraction, Y_b , is 0.343. The computed 24-hour duration peak runoff rate and hydrograph runoff volume of design 100-year storm event is 11.41 cfs & 1.8038 acre-feet (ac-ft), respectively, and as shown on the Table of Summary on enclosed Existing Pre-Developed Condition Hydrology Map.

The runoff volume computed will be compared to the runoff volume calculated for proposed developed condition in order to determine the approximate onsite detention storage volume required to mitigate and to detain the increased developed runoff from proposed development as identified in Appendix C calculations.

Appendix E presents the results of the San Bernardino County's Synthetic Unit Hydrograph Method hydrology calculations for the 24-hour duration event of the design 100-year return frequency in Proposed Developed Condition for the onsite Subareas B studied. Similarly, the lag time to be used for unit hydrograph

computation for Subarea B is assumed to be 0.8 of time of concentration computed from Rational Method in Appendix C.

Subarea B with 5.92 acres has a computed TC of 14.91 minutes which is equivalent to a lag time of 0.199 hour. With a 100-year 24-hour rainfall depth of 5.32", a pervious ratio of 0.32 and an adjusted SCS CN of 52 for AMC-3, the computed soil loss rate, F_m , is 0.251 in/hr while the low loss fraction, Y_b , is 0.293. The computed 24-hour duration peak runoff rate and hydrograph runoff volume of design 100-year storm event is 14.66 cfs & 1.9297 acre-feet (ac-ft), respectively, and as shown on the Table of Summary on enclosed Proposed Developed Condition Hydrology Map.

Thus, there are delta increases in developed runoff volume of 0.126 ac-ft (or equivalent to about 5,484 cu-ft) and in developed runoff flow rate of 3.25 cfs (Note: $\Delta Q = 1.52$ cfs if comparing Q_s calculated from Rational Method Calculations.) for the design 100-year 24-hour duration storm event for onsite Subarea B. This increased developed runoff flood volume will need to be routed and detained onsite thru aforementioned privately maintained underground storage CMP pipes before the outflow at or below the pre-developed condition runoff of 12.5 cfs can be released to Cypress Ave. and the downstream accepting County MS4 of proposed double 24" RCP storm drain pipes on Valley Blvd.

Appendix F presents the standard San Bernardino County's Volume-Based BMP (DCV) and Flow-Based BMP (Q_{bmp}) design calculations for 2-year 1-hour rainfall intensity of 0.52 inch. The County DAMP requires installation of permanent storm water Low Impact Development (LID) Best Management Practices (BMPs) to capture and treat tributary onsite surface runoff from the proposed development before it can be discharged to the downstream public right-of-ways or public maintained MS4 drainage facility. For proposed project site, the receiving water bodies downstream within San Bernardino County is the Santa Ana River – Reach 4, as identified in the Project Specific WQMP prepared for the project. Per the Federal 303(d) list of impaired water bodies (See Page A-31) and as shown on the Santa Ana River & Tributaries Map (See Page A-30), Santa Ana River is impaired for Bacteria Indicators & Pathogens. Thus, the proposed treatment control LID BMPs selected must be able to treat and remove efficiently the identified pollutants of concern.

The DCV and Q_{bmp} calculated for Subarea B is 15,477 cu-ft and 0.809 cfs, respectively (See Pages F-2 to F-4). The proposed main treatment control LID BMP devices selected for onsite Subarea B are (1) three units of underground Contech CMP Detention & Infiltration Systems (CMP System) with total footprint

of 2,591 sq-ft and total storage volume of 15,544 cu-ft. provided. The calculated delta increase in developed runoff volume is 5,484 cu-ft as identified in Appendix E. Thus, the minimum onsite infiltration and detention storage volume required is the DCV of 15,477 cu-ft. The detained outlet flow from the CMP System will be limited to no more than the existing pre-developed Q100 of 12.5 cfs; and (2) the installation of three units of Bio Clean's Grate Inlet Skimmer Box (GISB) or Grate Inlet Filter Model #BC-GISB-24-24-24 (GISB locations as shown on enclosed Proposed Developed Condition Hydrology Map), which has treatment flow capacity of 3.7 cfs & bypass flow capacity of 4.4 cfs per manufacturer's specification (see Page G-27), to be installed inside the proposed 24"x24" grated drop inlet structures and they will act as pre-treatment devices prior to allowing the intercepted runoffs convey by inter-connected storm drain pipes and to outlet directly to the CMP Systems.

Appendix G presents the layout and volume sizing of the three proposed Contech CMP Infiltration & Detention Systems as the main LID BMP for project site. The preliminary design layout and storage volume of proposed CMP Systems are as shown on Pages G-3 to G-8 and on enclosed Proposed Developed Condition Hydrology Map in Appendix I. The DYODS Program developed by Contech Construction Products Inc. was used to model the orientation of the CMP pipes to obtain the storage volume based on the length and width constraints at the three proposed locations. The proposed DMA-A CMP System consists of 82 feet long of 96" dia. CMP with 935 sq-ft of footprint and corresponding 6,026 cu-ft of storage volume to treat tributary area of 2.3 acres with prorated DCV of 5,948 cu-ft. The proposed DMA-B CMP System consists of 66 feet long of 96" dia. CMP with 759 sq-ft of footprint and corresponding 4,875 cu-ft of storage volume to treat tributary area of 1.8 acres with prorated DCV of 4,759 cu-ft. The proposed DMA-C CMP System consists of 69 feet long of 84" dia. CMP with 897 sq-ft of footprint and corresponding 4,643 cu-ft of storage volume to treat tributary area of 1.8 acres with prorated DCV of 4,606 cu-ft. Based on the soils testing conducted by project geotechnical engineer, the upper soil layer is subject to hydro-consolidation when saturated. Therefore, it is recommended by soils engineer that infiltration of stormwater to occur at or below a depth of 15 feet to minimize saturation of the soils supporting the proposed structures. Each of the CMP Systems will require pre-treatment unit to be installed upstream of it for better efficiency and effectiveness in handling of the trash, debris and other pollutants in stormwater runoff from buildings' roof, parking lots, driveways & pavements, sidewalks & walkways, and planting & landscaping areas. The selected pre-treatment BMP device is the installation of aforementioned three units of Bio Clean's Clean's GISB Model #BC-GISB-24-24-24, which has treatment flow capacity of 3.7 cfs & bypass flow capacity of 4.4 cfs, to be installed inside the proposed 24"x24" grated

drop inlet structures as shown on enclosed Proposed Developed Condition Hydrology Map. With the averaged design infiltration rate of 1.05 inches per hour at Borings B4 & B8 and with the proposed CMP Systems with total footprint of 2,591 sq-ft, the calculated DCV of 15,477 cu-ft can be infiltrated into the sandy soil layer at about 15 feet deep in about 68 hours of drawdown time period.

The brochure, installation, inspection and maintenance guides for typical Contech CMP Underground Detention & Infiltration System are as shown on pages G-9 thru G-24 for references. The CMP System is considered having high effectiveness in volume reduction, peak flow reduction, groundwater recharge, and bacteria & pathogens removal.

The detail, brochure, specifications, installation & maintenance guides for typical Bio Clean's Grate Inlet Skimmer Box (GISB) are as shown on pages G-25 to G-34 for references. The GISB is widely installed throughout Southern California and recognized as having high efficiency in removal of total suspended solids (TSS), oil & grease, and total phosphorus (TP) & total nitrogen (TN) pollutants from stormwater runoff.

Appendix H presents full flow hydraulic capacity calculation for proposed 3-foot wide parkway culvert per County Std. Plan No. 211 to be installed on west side of Cypress Ave. and southerly of the entry driveway, the full flow hydraulic capacity of various sizes of proposed onsite storm drain pipes, the interception capacity calculations for various sizes of proposed grated drop inlets, and the hydraulic capacity calculation of proposed 48" wide by 6" high modified curb outlet structure per County Std. Plan No. 210.

Appendix I presents the Hydrology Maps for proposed Las Terrazas project in the Existing Pre-Developed Condition and in the Proposed Developed Condition. The maps delineate and labels the watershed boundary studied, drainage subareas, drainage surface flow paths, existing and proposed storm drain pipes and drainage devices, computed peak runoff rates and runoff volumes, hydrologic node numbers and concentration points, total design runoffs at all subareas' confluences, site's exit or discharge point and table of summary of Rational Method and Synthetic Unit Hydrograph Method hydrology calculations.

TABLE 1 - SUMMARY OF RATIONAL METHOD & UNIT HYDROGRAPH METHOD HYDROLOGY CALCS FOR EXISTING PRE-DEVELOPED CONDITION

HYDROLOGIC SUBAREA	CONCEN. POINT	TOTAL AREA	LAND USE	Tc (min)	PEAK Q100 Flow (cfs)	PEAK Q10 Flow (cfs)	LAG TIME (min)	SOIL LOSS RATE (in/hr)	LOW LOSS FRACTION (Yb)	100-YR 24-HR Runoff Volume (acre-feet)	COMMENTS
OFFSITE A	1 TO 2	3.39 ac.	STORAGE FACILITY	7.66	13.1	8.2	-	-	-	-	Upstream offsite runoff flows thru Project Site to Curb & Gutter of Cypress Avenue
ONSITE B	4 TO 3	5.92 ac.	UNDEVEL. VACANT	17.1	12.5	5.9	13.68	0.312	0.343	1.80	Runoff Sheet Flows to Cypress Avenue
TOTAL:	-	9.31 ac.		-	24.2	13.9	-	-	-	-	Runoff flows to Exist. Downstream Double 18" CMP Storm Drain Pipes at Northwest Corner of Intersection of Cypress Ave. & W. Valley Blvd.

SUMMARY OF RATIONAL METHOD & UNIT HYDROGRAPH METHOD HYDROLOGY CALCS FOR PROPOSED DEVELOPED CONDITION

HYDROLOGIC SUBAREA	CONCEN. POINT	TOTAL AREA	LAND USE	Tc (min)	UNDETAINED PEAK Q100 Flow (cfs)	UNDETAINED PEAK Q10 Flow (cfs)	LAG TIME (min)	SOIL LOSS RATE Fm & LOSS FRACTION	DETAINED PEAK Q100 Outflow (cfs)	100-YR 24-HR Runoff Volume (acre-feet)	Detention Volume Required (cubic-feet)	Target BMP Flow Rate Qbmp (cfs)	LID BMP DCV (acre-feet)	COMMENTS
OFFSITE A	1 TO 2	3.39 ac.	STORAGE FACILITY	7.55	13.1	8.2	-	-	-	-	-	-	-	Upstream offsite runoff conveys thru Project Site via Proposed 24" PVC S.D. Pipe within Prop. 10' Easement & Outlet to Curb & Gutter of Cypress Avenue via S=3' Parkway Culvert
ONSITE B	4 TO 5	5.92 ac.	APARTMENTS & COMMUNITY BLDG & CHILD CARE CENTER	14.91	14.0	8.1	11.93	0.251 IN/HR Yb= 0.0293	12.5 cfs (same as Exst. Condition)	1.9297	1.9297 ac-ft - 1.8038 ac-ft =0.1259 ac-ft or 5,484 cu-ft	0.809 cfs	0.355 ac-ft or 15,477 cu-ft	Total Retention Volume from Site Design HSC = 125 cu-ft per WQMP Report Form 4.3-2 Total Area of Tot Lots, Gardens, BBQ, Planting & Landscape is 84,100 sq-ft ; Four Units of Bio Clean's Grate Inlet Skimmer Box as Pre-Treatment BMP inside Drop Inlets Three Underground Contech CMP Infiltration Systems providing 15,544 cu-ft Storage Volume
TOTAL:	-	9.31 ac.		-	24.6	15.1	-	-	-	-	Contech CMP Systems = 15,544 cu-ft CMP Systems' Footprint = 2,591 sq-ft Averaged Infiltration Rate= 1.05 inch/hour Averaged Drawdown Time = 68 hours			Filtered & Treated Onsite Runoff conveys by 18" PVC Overflow S.D. & join to Prop. 14' C.B. (MS4) near N/W corner of Valley Blvd. & Cypress Ave.; then confluences downstream to Prop. S.D. Manhole and Double 24" RCP S.D. Pipes that Outlet downstream to Caltrans Ditch & U-Headwall located north of I-10 Fwy.

CONCLUSIONS

From the calculations performed and summaries of this Preliminary Drainage Study and the enclosed Hydrology Maps, proposed Las Terrazas project will minimize negative impact to the adjacent and downstream properties. Thus, the tributary storm water runoff from the project site will not adversely affect persons or properties onsite and offsite as all onsite run-off will be completely treated by treatment control LID BMP devices before detained & routed runoff is allowed to outlet to existing curb & gutter of Cypress Ave. The proposed designs are also in conformance with the County of San Bernardino's drainage design criteria, guidelines and policies, and also in compliance with County Stormwater Program's water quality management and related design criteria and policies.

REFERENCES

- County of San Bernardino Hydrology Manual. August 1986.
- Detention Basin Design Criteria for San Bernardino County.
- Water Control Plan for the Santa Ana River Basin.
- California Stormwater Quality Association. New Development and Redevelopment Handbook. September 2004.
- California Stormwater Quality. Construction handbook. September 2004.
- The County of San Bernardino County Areawide Stormwater Program. Technical Guidance Document for Water Quality Management Plans. June 7, 2013.
- Geocon West Inc. Updated Geotechnical Investigation, Proposed Residential Development Las Terrazas at Colton, 275 an 291 Cypress Avenue, unincorporated San Bernardino County, California, APN: 0274-182-34, -43 & -46. February 20, 2013.

I.2 - Sewer

SEWER AREA STUDY

FOR

LAS TERRAZAS APARTMENTS

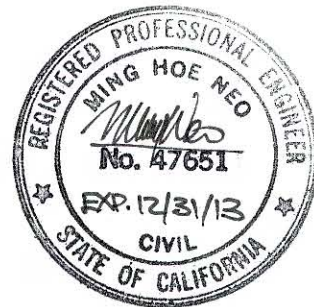
**1189 W. VALLEY BLVD.
CITY OF COLTON, CALIFORNIA**



Prepared: January 30, 2012

Prepared under the direction of:


Ming H. Neo / R.C.E. No. 47651



Prepared by:
Pacific Coast Civil, Inc.
30141 Agoura Road, Suite 200
Agoura Hills, CA 91301-4311
Tel: (818) 865-4168
Fax: (818) 865-4198

A) OBJECTIVE:

Introduction

The following Sewer Area Study has been prepared for proposed Las Terrazas Apartments in the unincorporated area of County of San Bernardino, California by Pacific Coast Civil, Inc. to show the hydraulic capacity of the proposed offsite 10-inch PVC sewer main and onsite 10-inch and 8-inch sewer laterals serving proposed development.

Site Description

The 4.9-acre site of proposed Las Terrazas Apartments project is located at 1189 W. Valley Blvd. near the City of Colton and near the northwest corner of Cypress Ave. and W. Valley Blvd. as shown on the enclosed Vicinity Map (see Page 4). The project site is currently a vacant undeveloped land and it is bounded to the north and east by single family residential lots, to the southeast by a vacant undeveloped lot, to the south by W. Valley Blvd., and to the west by a public storage facility.

Project Description

The proposed project development consist of three two-story, 72-unit apartment buildings with total building area of 66,000 square-feet (sq-ft), a 2,100 sq-ft community room, common area of tot lot, swimming pool, garden and BBQ area totaling about 25,000 sq-ft, and a one story 4,0000 sq-ft commercial building. (See Site Plan and Project Information Sheet on Pages 5 and 6). The preliminary estimated demand load of plumbing's fixture units (F.U.) from proposed development is about 1004 F.U. and is equivalent to about 208 gallons per minute (gpm).

There is a 15-inch VCP trunk sewer running easterly at 2.12% beneath W. Valley Blvd. and it is built per Valley Boulevard Intercepting Sewer. At the sewer manhole near Cypress Ave. intersection, the trunk sewer changes size to 24-inch VCP running easterly at 0.10%. The trunk sewer is maintains by City of Colton Waste Water Department. There is a 10-inch sewer stub built on the north side of the sewer manhole.

B) ANALYSIS CRITERIA:

The City of Colton uses Plumbing Fixture Units for sewer hydraulic capacity calculation and the typical design criteria is as listed below:

- Manning's Coefficient of 0.013 for all pipe sizes;
- 12-inch and smaller diameter pipes flowing at no more than 50 percent full;
- Minimum flow velocity is 2 fps;
- Maximum flow velocity is 10 fps;

C) SEWER ANALYSIS:

The proposed sewer main connection from project site is to core drill & join to the existing sewer manhole located at the intersection of Cypress Ave. & W. Valley Blvd. and per recommendation by City of Colton. The sewer manhole is about 8.19 feet deep from the 1013.10 feet rim elevation to the 1004.91 feet invert elevation of 24-inch trunk sewer. The proposed PVC sewer main pipe size is 10-inch diameter running northerly along Cypress Ave. at a slope of 0.32% for about 385 feet long to intersection of H St. & Cypress Ave. where a sewer manhole is proposed to be constructed. The 10-inch PVC sewer main then runs westerly along the project's northerly entry driveway for about 220 feet long before an onsite sewer manhole is to be constructed. Then, the proposed typical 8-inch PVC sewer mains run northerly and southerly along the main driveway to serve the apartment buildings and the commercial building.

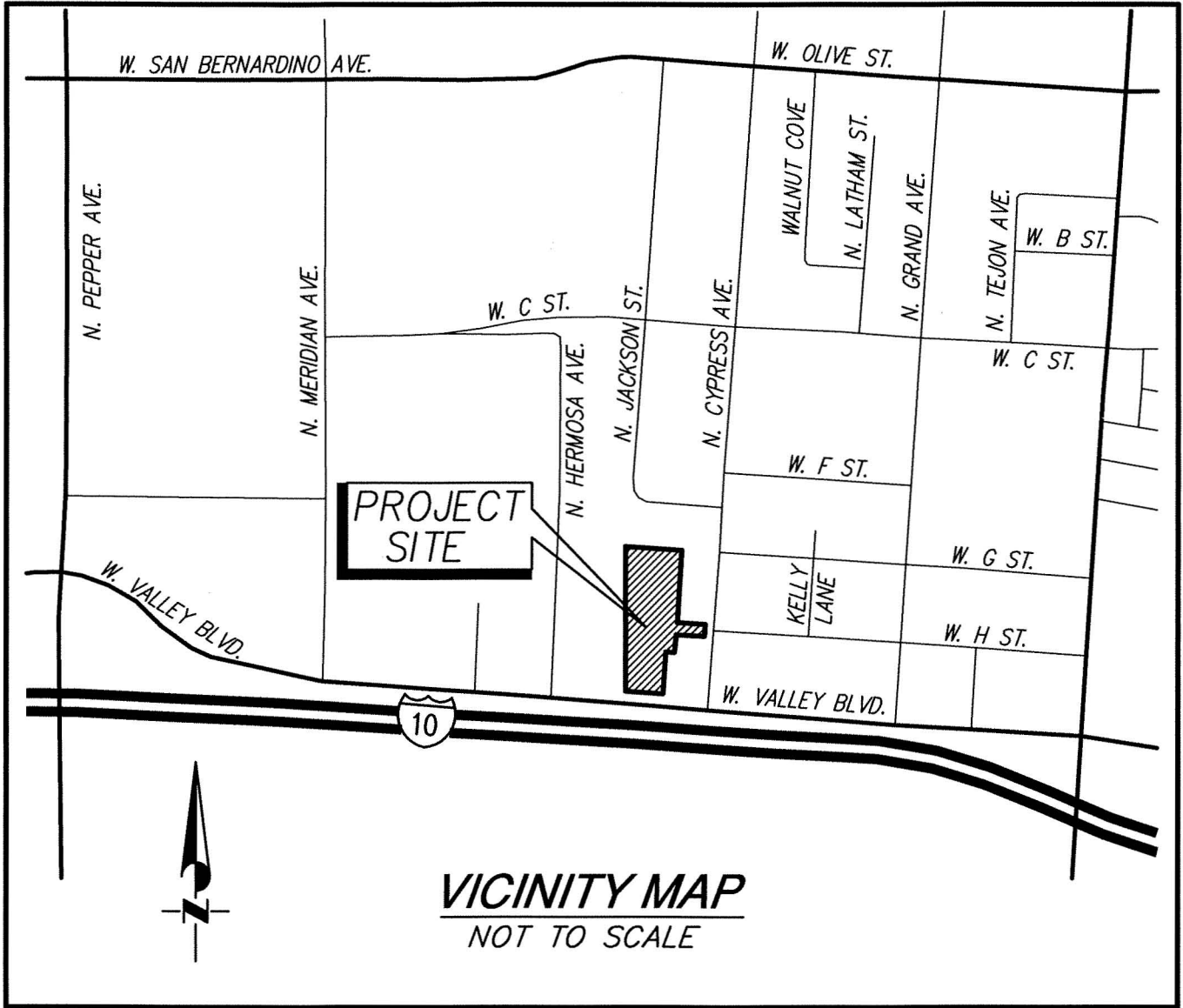
The Haestad Methods' FlowMaster Program was used for the hydraulic capacity calculations of proposed 10-inch and 8-inch PVC sewer mains. Manning's Formula with "n"=0.013 was selected to compute the discharge capacity of the two sewer pipe sizes proposed.

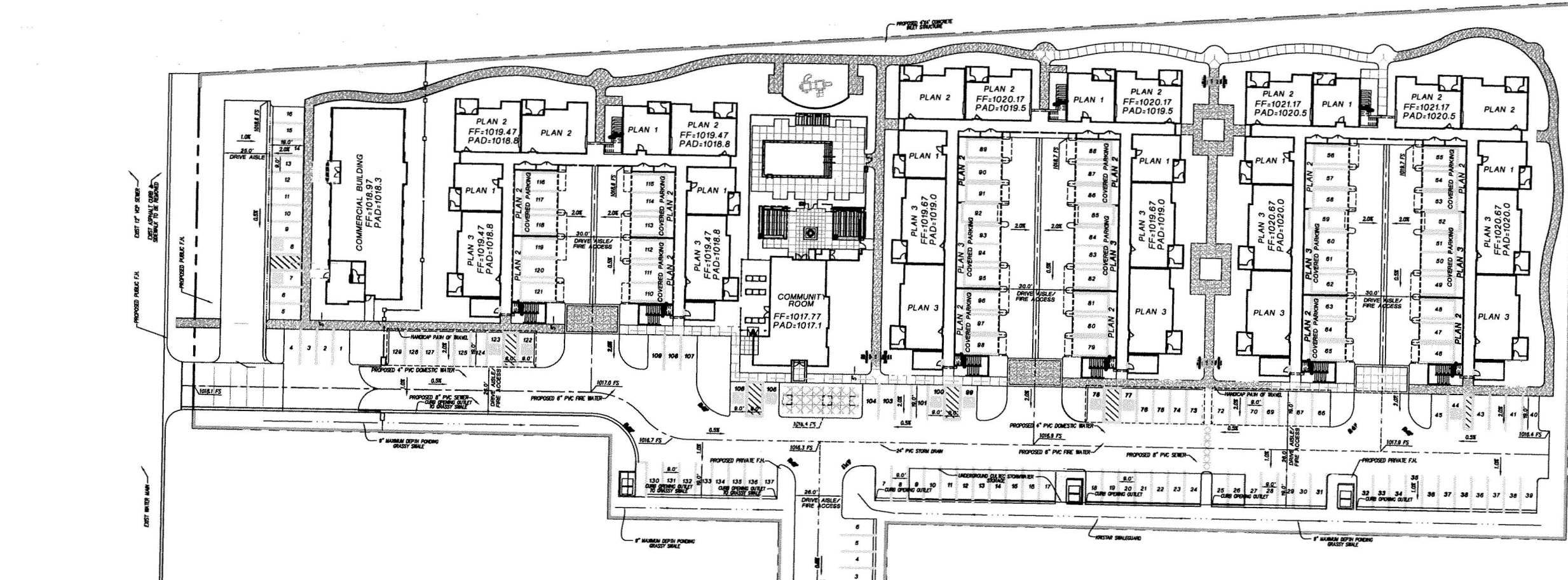
For the proposed 10-inch PVC sewer main runs at 0.32% slope along Cypress Ave. and along project's northerly entry driveway, the hydraulic capacity at half full depth is **230 gpm**, which is larger than the estimated sewage demand load of 208 gpm from proposed development of project site. (See See Appendix A for output of hydraulic calculations).

For the proposed onsite 8-inch PVC sewer main at 0.40% minimum slope, the hydraulic capacity at half full depth is 140 gpm.

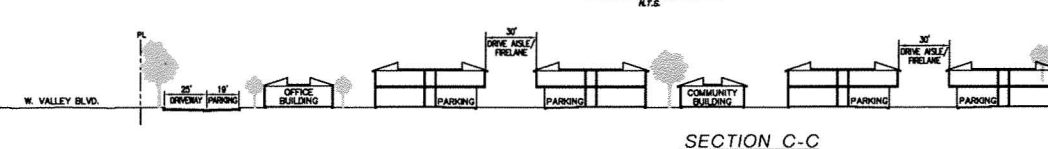
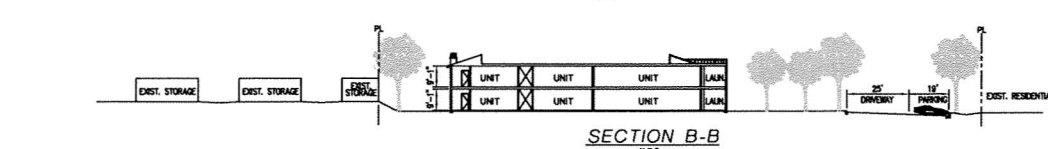
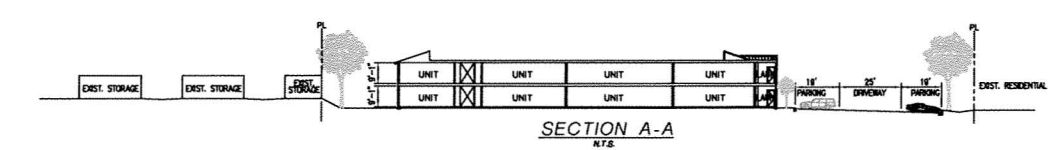
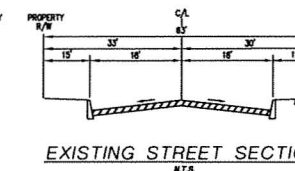
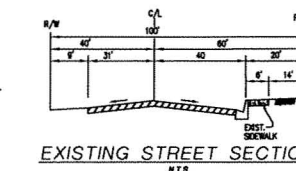
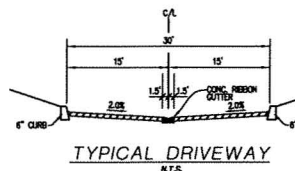
D) CONCLUSION:

Based on the sewer area study performed, the Las Terrazas Apartments would require 8-inch PVC sewer main onsite and 10-inch PVC sewer main along the northerly entry driveway and 10-inch PVC sewer main offsite on Cypress Ave. to provide adequate sewer service for proposed development.





SCALE: 1"=20'



EARTHWORK:
RAW CUT: 2,080 CY
RAW FILL: 6,355 CY
TOTAL IMPORT: 4,275 CY

SITE STATISTICS:
1. TOTAL GROSS SITE AREA: 20.00 ACRES
2. EXISTING ZONING: RM 10.0 (RESIDENTIAL MEDIUM DENSITY)
3. DENSITY PROPOSED: 14.8 UNITS PER ACRE (APARTMENTS)
4. EXISTING LAND USE: VACANT
5. PROPOSED LAND USE: MULTIFAMILY RESIDENTIAL
6. TOTAL NUMBER OF LOTS: EXISTING 1, PROPOSED 1

GENERAL BUILDING STATISTICS
PROJECT SUMMARY:
LOT SIZE: 20.00 ACRES
TOTAL RESIDENTIAL UNITS: 72
PROJECT DENSITY: 14.8 DU / ACRE
BUILDING AREA:
RESIDENTIAL GROSS: 64,000 SF
COMMON STORAGE/CLOSETS: 1,000 SF
STAIRS: 1,500 SF
LAUNDRY: 2,200 SF
COMMUNITY ROOM: 2,100 SF
COMMERCIAL: 4,000 SF
TOTAL BLDG. AREA: 72,800 SF

UNIT SUMMARY:

Plan Description	QNTY.	Area	Total Area
A 1 BR 1 BA	16 (20%)	700 SF	11,200 SF
B 2 BR 1 BA	30 (42%)	900 SF	27,000 SF
C 3 BR 2 BA	26 (36%)	1,400 SF	36,400 SF
TOTALS:	72		66,000 SF

PARKING SUMMARY:
RESIDENTIAL:
REQUIRED PER SBC DEVELOPMENT CODE 63.10.05: 72 UNITS x 1.0 SPACE = 72 SPACES
RESIDENTIAL GUESTS TO UNITS x 0.5 SPACES = 36 SPACES
RESIDENTIAL PARKING REQUIRED: 108 PARKING SPACES
REQUIRED PER SBC DEVELOPMENT CODE 63.10.05: 108 UNITS x 1.0 SPACE = 108 SPACES
RESIDENTIAL GUESTS TO UNITS x 0.5 SPACES = 54 SPACES
RESIDENTIAL PARKING REQUIRED: 162 PARKING SPACES
REQUIRED PER SBC DEVELOPMENT CODE 63.10.05: 162 UNITS x 1.0 SPACE = 162 SPACES
RESIDENTIAL GUESTS TO UNITS x 0.5 SPACES = 81 SPACES
RESIDENTIAL PARKING REQUIRED: 243 PARKING SPACES
COMMERCIAL:
REQUIRED PER SBC DEVELOPMENT CODE 63.10.05: 4,000 SF x 1.0 SPACE PER 200 SF = 20 PARKING SPACES
COMMERCIAL PARKING PROVIDED: 16 PARKING SPACES

OPEN SPACE SUMMARY:
OPEN SPACE (INCLUDING SETBACKS): 48,000 SF
OPEN SPACE (NOT INCLUDING SETBACKS): 33,717 SF
TOTAL: 81,717 SF

GENERAL SITE DEVELOPMENT DATA:
MAX BUILDING HEIGHT: 3 STORIES
BUILDING OCCUPANCY GROUP: R-3
BUILDING CONSTRUCTION TYPE: TYPE I

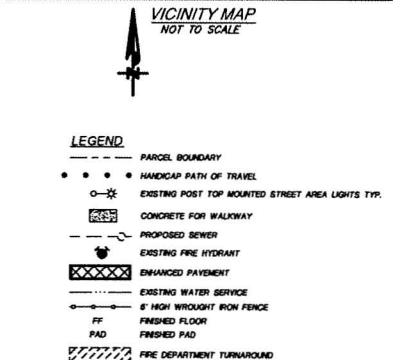
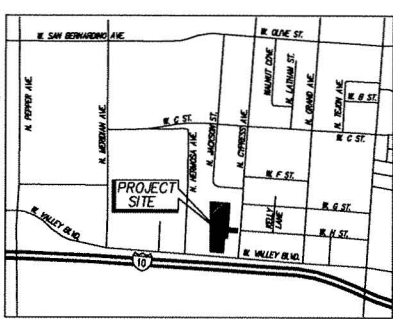
GENERAL NOTES:
1. BOUNDARY LINE DIMENSIONS ARE TAKEN FROM RECORD DATA.
2. UNIT SIZES, BUILDING FOOTPRINTS AND ARCHITECTURAL FLOOR PLANS THAT ARE SHOWN ON THE SITE PLAN MAP ARE FOR ILLUSTRATIVE PURPOSES. FINISHING DETERMINATION OF FINAL DEVELOPMENT LAYOUT AND PLANS APPROVAL SHALL BE GRANTED PROVIDED THE PROPOSED BUILDING SATISFIES ALL EXISTING CODES AND ORDINANCES.
3. NO EXISTING BUILDING STRUCTURES ON SITE.
4. WATER PURVEYOR: CITY OF COLTON.
5. PROJECT SITE TO BE COMPLIANT WITH SAN BERNARDINO COUNTY STANDARD URBAN STORMWATER MITIGATION PLAN REQUIREMENTS.
LEGAL DESCRIPTIONS:
ALL THAT CERTAIN REAL PROPERTY SITUATED IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:
PARCEL 2 OF PARCEL MAP 87K, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 88, PAGE 23 OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

BASIS OF BEARINGS:
THE BEARINGS SHOWN HEREON ARE BASED UPON THE CENTER LINE OF CYPRESS AVENUE, BEING 50'00"00" WIDE PER MAP RECORDED IN BOOK 88, PAGE 23 OF MISCELLANEOUS RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY.
BENCHMARK:
THE CALIFORNIA SPATIAL REFERENCE CENTER C.O.R.S. 7912, ELEVATION = 88.88 FEET NAVD 83.
ARCHITECT:
WITHEE MALCOLM ARCHITECTS, LLP
181 W. WILSON STREET
TORRANCE, CA 90504
TEL: (310) 370-0400
FAX: (310) 370-0405
ARCHITECT: ROCKY DE LA ROSA

FIRE DEPARTMENT NOTES:
1. DRIVEWAY WILL BE POSTED WITH SIGN OF REDUCED CURB STENCIL.
2. TWO PARKING/FIRE LANE(S) SHALL BE EQUIPPED WITH SAN BERNARDINO COUNTY FIRE DEPARTMENT APPROVED "TWO BOX" OR OTHER APPROVED DEVICES.
3. ALL FIRELANES CENTERLINE SHALL HAVE A MINIMUM TURNING RADIUS OF 32 FEET.

EASEMENT LEGEND:
A EXISTING 10' EASEMENT FOR TELEPHONE TO PARCEL TELEPHONE COMPANY, RECORDED REC. 35, 1985 AS INST. 80-384055 OF OFFICIAL RECORDS, (TO REMAIN)
B EXISTING 10' EASEMENT FOR DRAINAGE PURPOSE, RECORDED AUGUST 08, 1984 IN BOOK 88, PAGE 23 OF PARCEL MAPS, (TO REMAIN)

SETBACK REQUIREMENT:
FRONT YARD: 25'
SIDEYARD: 10'
REAR YARD: 25'
REAR YARD AT BALCONY: 33'



CUP NO. _____
LAS TERRAZAS
COUNTY OF SAN BERNARDINO
SITE DEVELOPMENT PLAN
1189 W. VALLEY BOULEVARD, COLTON, CA. 92324
UNINCORPORATED AREA OF
COUNTY OF SAN BERNARDINO
STATE OF CALIFORNIA
PCC W.O. 11-1020
SHEET 1 OF 1 SHEETS
DATE: 02/12/2012

DEVELOPER/APPLICANT:		REVISION BLOCK		PLAN QTY		PREPARED BY:	
REV.	DATE	REVISION DESCRIPTION	DATE	APP.	DATE	APP.	DATE
1	02/12/2012	ISSUED FOR PERMIT					

DEVELOPER/APPLICANT:
AMCAL MULTIHOUSING INC.
30141 AGOURA RD., SUITE 100
AGOURA HILLS, CA 91301
PH: (818) 706-0894
REPRESENTATIVE: DARIN HANSEN

DESIGNED BY: M.S.
DATE: 02/12/2012

REVIEWED BY: S.H.N.
DATE: 02/12/2012

PREPARED BY:
PACIFIC COAST CIVIL, INC.
30141 AGOURA ROAD, SUITE 200
AGOURA HILLS, CA 91301
PH: (818) 865-4168
FAX: (818) 865-4168

PROJECT INFORMATION

PROJECT LOCATION: Between N. Hermosa ave. and N. Cypress Ave. on W. Valley Blvd. Colton, CA

TOTAL LOT AREA: 4.9 acres

TOTAL UNITS: 72 UNITS

TOTAL DENSITY: 14.7 DU/acre

CURRENT ZONING: WEST VALLEY SPECIFIC PLAN

OCCUPANCY: R-2, S-2

CONSTRUCTION TYPE: TYPE V

BUILDING TYPE:

ARCHITECTURAL STYLE: MEDETTERRANEAN

NUMBER OF STORIES: 2

BUILDING COVERAGE: 62,500 SF (29.5%)

BUILDING AREA: 121,000 SF

F.A.R.: 0.57

MINIMUM YARD SETBACKS: 25'-0"

FRONT YARD: 15'-0"

SIDE YARD: 20'-0"

REAR YARD: 17'-6"

AT BALCONY

DEVELOPER: AMCAL Multi-Housing, Inc.
30141 AGOURA ROAD SUITE 100,
AGOURA HILLS, CA 91301
(818) 706-0694

UNIT SUMMARY

PLAN	DESCRIPTION	QNTY.	AREA	TOTAL AREA
1	1 BR 1 BA	18 (20%)	700 sf	12,600 sf
2	2 BR 2 BA	30 (47%)	900 sf	27,000 sf
3	3 BR 2 BA	24 (33%)	1,100 sf	26,400 sf
TOTAL UNITS:		72 total units provided	66,000 sf	

AMENITIES:

COMMUNITY ROOM - 2,100 sf

TOT LOT / GARDEN / BBQ - 25,000 sf

PARKING SUMMARY

RESIDENTIAL

PARKING REQUIRED (PER SBC DEVELOPMENT CODE 83.11.03)

2.0 space per dwelling units (covered)
72 units x 2.0 spaces = 144 spaces

0.5 spaces per dwelling units (guest uncovered)
72 units x 0.5 spaces = 36 spaces

TOTAL RESIDENTIAL PARKING REQUIRED = 188 spaces
*INCLUSIVE OF GUEST PARKING SPACES

PARKING REQUIRED (PER SB1818)

1.0 space per 1BR units
18 units x 1.0 space = 18 spaces

2.0 spaces per 2 AND 3 BR
54 units x 2.0 spaces = 108 spaces

TOTAL RESIDENTIAL PARKING REQUIRED = 126 spaces
*INCLUSIVE OF GUEST PARKING SPACES

PARKING PROVIDED

RESIDENT. PARKING SPACES = 119 spaces
GUEST PARKING SPACES = 8 spaces

TOTAL PARKING PROVIDED = 127 spaces

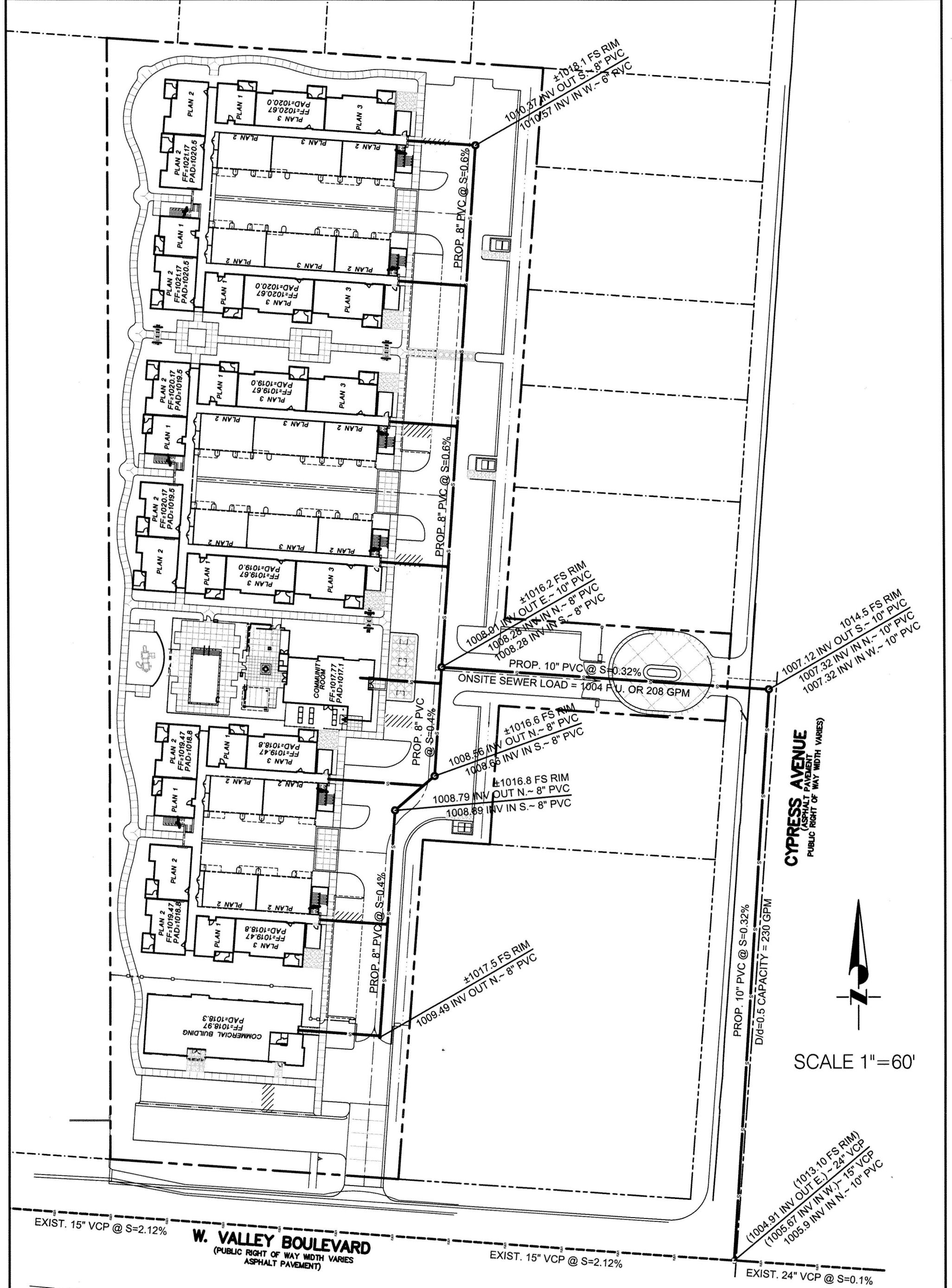
COMMERCIAL

PARKING REQUIRED (PER SBC DEVELOPMENT CODE 83.11.04)

1.0 space per 250 GLA
4,000 SF x 1/ 250 space/sf = 16 spaces


TOTAL COMMERCIAL PARKING REQUIRED = 16 spaces

TOTAL COMMERCIAL PARKING PROVIDED = 16 spaces



SEWER PIPE CAPACITY	1/2 FULL (GPM)	VELOCITY (FT/SEC)
PROP. 10" PVC SEWER @ S=0.32%	230	2.3
PROP. 8" PVC SEWER @ S=0.40%	140	2.2

PREPARED BY:



PACIFIC COAST CIVIL, INC.
 30141 AGOURA ROAD, SUITE 200
 AGOURA HILLS, CA 91301
 PH: (818) 865-4168
 FAX: (818) 865-4198

APPENDIX A

OUTPUT OF

HYDRAULIC CALCULATIONS

10" PVC Sewer Pipe Capacity at D/d=0.50
Worksheet for Circular Channel

Project Description	
Project File	q:\hydraulic\haestad\fmw\colton.fm2
Worksheet	10" PVC Sewer Pipe Capacity Calc
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.003200	ft/ft
Depth	5.0	in
Diameter	10.00	in

Results		
Discharge	230	gal(lmp)/min
Flow Area	0.27	ft ²
Wetted Perimeter	1.31	ft
Top Width	0.83	ft
Critical Depth	0.35	ft
Percent Full	50.00	
Critical Slope	0.006158	ft/ft
Velocity	2.27	ft/s
Velocity Head	0.08	ft
Specific Energy	0.50	ft
Froude Number	0.70	
Maximum Discharge	1.33	cfs
Full Flow Capacity	1.24	cfs
Full Flow Slope	0.000800	ft/ft
Flow is subcritical.		

8" PVC Sewer Pipe Capacity at D/d=0.50
Worksheet for Circular Channel

Project Description	
Project File	q:\hydraulic\haestad\fmw\colton.fm2
Worksheet	8" PVC Sewer Pipe Capacity Calc
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.004000	ft/ft
Depth	4.0	in
Diameter	8.00	in

Results		
Discharge	140	gal(Imp)/min
Flow Area	0.17	ft ²
Wetted Perimeter	1.05	ft
Top Width	0.67	ft
Critical Depth	0.29	ft
Percent Full	50.00	
Critical Slope	0.006694	ft/ft
Velocity	2.19	ft/s
Velocity Head	0.07	ft
Specific Energy	0.41	ft
Froude Number	0.75	
Maximum Discharge	0.82	cfs
Full Flow Capacity	0.76	cfs
Full Flow Slope	0.001000	ft/ft
Flow is subcritical.		

APPENDIX B

REFERENCES

RESIDENTIAL DRAINAGE LOAD

FIXTURE UNITS			
QUANT.	FIXTURE	FU	TOTAL
128	WATER CLOSET (FT)	3.0	384
125	LAV	1.0	125
127	SHOWER	2.0	254
73	KITCHEN SINK	2.0	146
73	DISH WASHER	-	-
-	ICE-MAKER	-	-
-	HOSE BIBB	-	-
TOTAL =			909.0

COMMUNITY CENTER DRAINAGE LOAD

FIXTURE UNITS			
QUANT.	FIXTURE	FU	TOTAL
3	LAV	1.0	3.0
2	WC	3.0	6.0
TOTAL =			9.0

COMMERCIAL BLDG. DRAINAGE LOAD

FIXTURE UNITS			
QUANT.	FIXTURE	FU	TOTAL
4	LAV	1.0	4.0
4	WC	3.0	12.0
TOTAL =			16.0

LAUNDRY ROOM DRAINAGE LOAD

FIXTURE UNITS			
QUANT.	FIXTURE	FU	TOTAL
1	FLOOR DRAIN	2.0	8.0
6	WASHING MACHINE	3.0	24.0
TOTAL =			30.0

MISCELLANEOUS DRAINAGE LOAD

FIXTURE UNITS			
QUANT.	FIXTURE	FU	TOTAL
3	FLOOR DRAIN	3.0	9.0
1	FLOOR SINK	3.0	3.0
1	MISCELLANEOUS	25.0	25.0
TOTAL =			37.0

SITE DRAINAGE LOAD

		FIXTURE UNITS
BUILDING/AREA		TOTAL FU
RESIDENTIAL		909.0
COMMUNITY CENTER		9.0
COMMERCIAL BUILDING		16.0
LAUNDRY ROOMS		30.0
MISCELLANEOUS LOAD		37.0
TOTAL =		1001.0

BUILDING HOT & COLD WATER DEMAND

FIXTURE UNITS				
QUANT.	FIXTURE	FU	CW	HW
128	WATER CLOSET (FT)	2.5	320	-
125	LAV	1.0	125	125
127	SHOWER	2.0	254	254
73	KITCHEN SINK	1.5	109.5	109.5
73	DISH WASHER	1.5	-	109.5
-	ICE-MAKER	0.5	-	-
-	HOSE BIBB	2.5	-	-
TOTAL =			918	598
GPM =			195	144

COMMUNITY CENTER HOT & COLD WATER DEMAND

FIXTURE UNITS				
QUANT.	FIXTURE	FU	CW	HW
3	LAV	1	3.0	3.0
2	WC	2.5	5.0	-
TOTAL =			8.0	3.0
GPM =			7	3

COMMERCIAL BLDG. HOT & COLD WATER DEMAND

FIXTURE UNITS				
QUANT.	FIXTURE	FU	CW	HW
4	LAV	1.0	4.0	4.0
4	WC	2.5	10.0	-
TOTAL =			14.0	4.0
GPM =			10.5	4


LAUNDRY ROOM HOT & COLD WATER DEMAND

FIXTURE UNITS				
QUANT.	FIXTURE	FU	CW	HW
1	FLOOR DRAIN	-	-	-
6	WASHING MACHINE	4.0	24.0	24.0
TOTAL =			24.0	24.0
GPM =			17	17

MISCELLANEOUS HOT & COLD WATER DEMAND

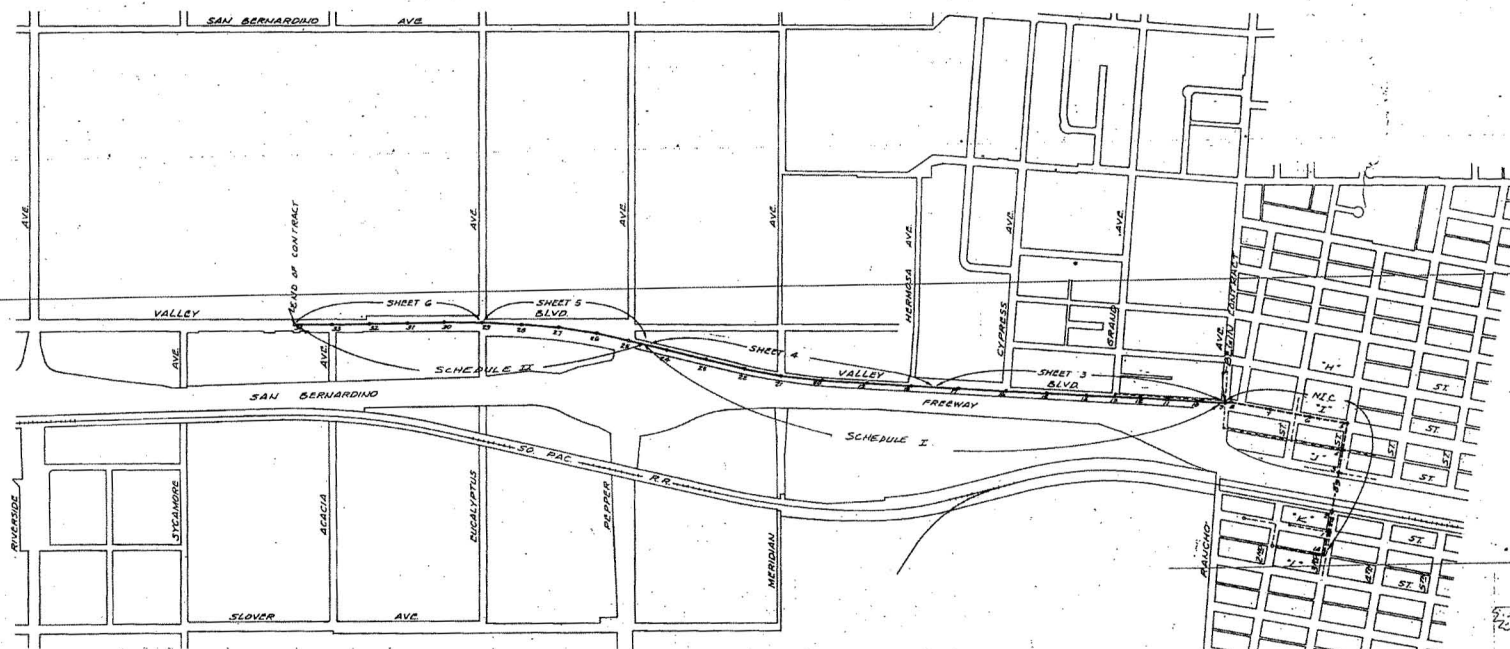
FIXTURE UNITS				
QUANT.	FIXTURE	FU	CW	HW
2	HOSE BIBB	2.5	5.0	-
15	HOSE BIBB (ADDED)	1.0	15.0	-
1	MISCELLANEOUS	20.0	20.0	10.0
TOTAL =			40.0	10.0
GPM =			24.5	8.0

SITE HOT & COLD WATER DEMAND

FIXTURE UNITS		
BUILDING/AREA	TOTAL CW	TOTAL HW
RESIDENTIAL	918.0	598.0
COMMUNITY CENTER	8.0	3.0
COMMERCIAL BUILDING	14.0	4.0
LAUNDRY ROOMS	24.0	24.0
MISCELLANEOUS LOAD	40.0	10.0
TOTAL =		1004.0
 TOTAL =		639.0
GPM =		208.0
		150.0





















8877



SCALE : 1" = 500'

INDEX MAP

• *LEGEND*

-  Plan of Sewer Main
 Plan of Wye (6" unless otherwise noted)
 Plan of Sewer Manhole
 Plan of Sewer Stub or Drop
 Plan of Existing Sewers showing size.
 Plan of Existing Water Lines showing size.
 Plan of Existing Gas Lines showing size.
 Plan of Existing Telephone Ducts.
 Plan of Existing Power or Telephone Poles
 Plan of Existing Guy Anchors.
 Plan of Existing Fire Hydrants.
 Plan of Existing Trees.
 Plan of Existing Fences.
 Profile of Ground Elevation
 Profile of Sewer Manhole.
 Profile of Sewer Main.
 Elevation of Sewer Invert
 Plan of Existing Paving

• ABBREVIATIONS •

- | | |
|-------|---------------------------|
| R.C.P | Reinforced Concrete Pipe. |
| V.C.P | Vitrified Clay Pipe. |
| C.M.P | Corrugated Metal Pipe. |
| A.C.P | Asbestos Cement Pipe. |
| P.P | Power Pole. |
| T.P | Telephone Pole. |
| F.H | Fire Hydrant. |
| I.P | Iron Pipe. |

• ESTIMATED QUANTITIES •

SCHEDULE I		SCHEDULE II	
10" x K&A - 195 LR		10" x K&A - 43 LR	
18" x VER - 504 LR		10" x VER - 136 LR	
15" x K&A - 239 LR		10" x K&A - 331 LR	
12" x K&A - 1050 LR			
MANHUBS - 16 GA.		MANHUBS - 11 GA.	
AC TRUNK REMAINING S&S		AC TRUNK REMAINING S&S	
34" x 6" WYES - 10 GA.		15" x 6" WYES - 5 GA.	
18" x 6" WYES - 2 GA.		12" x 6" WYES - 7 GA.	
15" x 6" WYES - 9 GA.		10" x 6" WYES - 10 GA.	
12" x 6" WYES - 3 GA.			

• GENERAL NOTES

The contractor shall notify these utilities prior to construction to allow for any relocations per the following: So. Cal. Gas Co. 855-9411, Pacific Electric 855-0001, Southern Union 713-526-4321, So. Cal. Edison 875-3100, West San Pedro Co. Water Dist. 875-1804, Cal-Nev Petroleum 877-2449.

All crossings of waterflood sewer lines shall conform to the latest State Health Dept. STD as to clearance and encasement.

Contractor shall obtain an excavation permit for excavating over 5' depth from the State Department of Industrial Safety and comply with all requirements thereof.

The location, size and type of existing paving, pipelines, conduits, underground structures, obstructions, etc. shown on the plans, and those of the latest available records. However, it shall be the duty of the bidder and/or the Contractor to determine for himself the location, size, type and depths of all paving, utilities, structures and obstructions affecting his work, and the Contractor shall save the City and the engineer harmless for any costs or damages because of their existence or location.

All construction shall conform to the Standard Specifications for Public Works Construction, 1970 edition, and City of Columbia Community Services Department, No. 301 for R.R. standards and Drawing No. 310. All Manholes, Cuts and Sewer, laterals to be constructed to the City of Columbia Standard No. 312. Street lighting

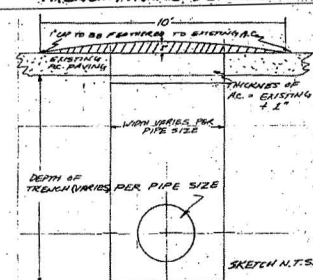
Stationing shown on profiles is the horizontal distance.
Pipe quantities listed on profiles are horizontal measurements
from center to center of manhole.

Where connections are made to existing manholes, the Invert shall be reconstructed as directed by the Engineer. Connections to existing manholes or lines, where shown on the plans, shall be made only upon completion and acceptance of the project or when directed by the Engineer.

It shall be the contractor's responsibility not to exceed the pipe manufacturer's requirements for maximum deflection in the installation of vertical or horizontal curves. Short length pipes may be required in some areas.

It shall be the sewer contractor's responsibility to adjust all man hole grade rings after paving.

• TRENCH PAVING DETAIL



CURRIE ENGINEERING COMPANY
CONSULTING ENGINEERS
Frank A. Currie R.C.E. 10663

CITY OF COLTON

VALLEY BLVD.
INTERCEPTING SEWER

PLAN 2238			
DRAWN	R.E.U.	DATE	6/7/66
TRACED	J.A.N.		SCALE
CHECKED	R.H.C.	FB	872
APPROVED <i>[Signature]</i>		SHEET 1 OF 6	
CITY ENGINEER, R.E. 1075			

2230

2238

SHEET 5

65-08

		LOCAL SEWER SIZE														
TRUNK SEWER SIZE		8"	10"	12"	15"	18"	21"	24"	27"	30"	33"	36"	39"	42"	45"	48"
	8"	0.17														
	10"	0.29	0.21													
	12"	0.42	0.33	0.25												
	15"	0.61	0.52	0.44	0.31											
	18"	0.79	0.71	0.63	0.50	0										
	21"	0.98	0.90	0.81	0.69	0.19	0									
	24"	1.17	1.08	1.00	0.88	0.38	0.19	0								
	27"	1.36	1.27	1.19	1.06	0.56	0.38	0.19	0							
	30"	1.54	1.46	1.38	1.25	0.75	0.56	0.38	0.19	0						
	33"	1.73	1.65	1.56	1.44	0.94	0.75	0.56	0.38	0.19	0					
	36"	1.92	1.83	1.75	1.63	1.13	0.94	0.75	0.56	0.38	0.19	0				
	39"	2.11	2.02	1.94	1.81	1.31	1.13	0.94	0.75	0.56	0.38	0.19	0			
	42"	2.29	2.21	2.13	2.00	1.50	1.31	1.13	0.94	0.75	0.56	0.38	0.19	0		
	45"	2.48	2.39	2.31	2.19	1.69	1.50	1.31	1.13	0.94	0.75	0.56	0.38	0.19	0	
	48"	2.67	2.58	2.50	2.38	1.88	1.69	1.50	1.31	1.13	0.94	0.75	0.56	0.38	0.19	0

Invert Difference Determined on Following Basis:

1. Water surface of local sewer is at same elevation as water surface of trunk sewer at design flow.
2. Depth of flow of local sewers 15" and smaller at design flow is one half full.
3. Depth of flow of local sewers 18" and larger at design flow is three quarters full.
4. Depth of flow of trunk sewers, all sizes, at design flow is three quarters full.

COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY
OFFICE OF CHIEF ENGINEER

STANDARD DRAWING

2-217

**NORMAL DROPS STRAIGHT THROUGH MANHOLES FOR MINIMUM GRADES OR GREATER
EXCEPT AS NOTED BELOW**

INLET		8"	10"	12"	15"	18"
OUTLET	8"	.10	.10	.10	.10	.10
	10"	.17	.10	.10	.10	.10
	12"	.33	.17	.10	.10	.10
	15"	.58	.42	.25	¢	—
	18"	.80	.71	.63	.50	¢

NOTE: FOR RIGHT ANGLE CONNECTIONS, ADD 0.10 OF A FOOT TO EACH OF THE ABOVE VALUES.

WHEN PIPES ON BOTH SIDES OF THE MANHOLE ARE THE SAME SIZE AND THE AVERAGE OF THE GRADES ON BOTH SIDES EXCEEDS 2.50 %, AN AVERAGE DROP SHALL BE TAKEN ACROSS THE MANHOLE, NOT TO EXCEED .60, INSTEAD OF THE VALUES IN THE ABOVE TABLE.

**NORMAL DROPS STRAIGHT THROUGH MANHOLES FOR GRADES LESS THAN MINIMUM
EXCEPT AS NOTED BELOW**

INLET		8"	10"	12"	15"	18"
OUTLET	8"	¢	—	—	—	—
	10"	.10	¢	—	—	—
	12"	.18	.10	¢	—	—
	15"	.31	.23	.14	¢	—
	18"	.80	.71	.63	.50	¢

NOTE: FOR RIGHT ANGLE CONNECTIONS ADD 0.10 OF A FOOT TO EACH OF THE ABOVE VALUES.

- NOTES:**
1. ¢ INDICATES NO DROP ACROSS M.H. AND ELEV. TO BE SHOWN AT THE CENTER OF MANHOLE.
 2. FOR TRAP M.H.'S ALL INLETS TO BE AT SAME ELEVATION. OUTLET MAY BE 0.05 OF A FOOT LOWER.
 3. PERMISSION FOR DEVIATIONS FROM THE ABOVE VALUES, OR SMALLER DROPS FOR PIPES OVER 18", TO BE APPROVED BY THE COUNTY ENGINEER.
 4. THE MINIMUM GRADES FOR VARIOUS PIPE SIZES ARE DETERMINED BY THE CHART ON COUNTY ENGINEER STANDARD S-C4

TABLE FOR COMPUTING NORMAL DROPS THROUGH MANHOLES

COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS

[Signature]
ASSISTANT DEPUTY

[Signature]
COUNTY ENGINEER

COUNTY ENGINEER
STANDARD **S-C5**

DATE: 3/80

DESIGN *[Signature]* RCE
10043

**FORM S1
SEWER SERVICE CERTIFICATION**

Applicant Name Las Terrazas Apartments **APNs** 0274-182-43

To be completed by the Sewering Agency.

This certifies that the property referenced on Form A is within the service area boundaries of this sewerage agency and that: (check applicable).

- ☒ There are currently existing sewer trunk line(s) of adequate capacity to provide sewerage service and such service will not exceed the design capacity of the lines.
- ☐ There are not currently existing sewer trunk line(s) of adequate capacity. However, it is financially and physically feasible to install sewer trunk lines that will permit adequate service to the referenced property.
- ☐ (Other) _____

This agency will commit to providing sewerage service to the referenced project subject to all applicable ordinances, resolutions, regulations, rules, policies, procedures, standards and date schedules. The applicant has agreed to the conditions of service including payment for the on-site and off-site capital improvements outlined on the attached list. (If any, please attach list). All sewer service facilities can and will be installed prior to occupancy of the proposed use and will comply with all federal, state, and country laws and regulations.

This commitment is subject to county review and approval of all necessary permits/applications, and shall expire on the following date _____ which represents the end of the three (3) year project approval period. Applicant must refile certification request if project extension of time request is filed.

By: Phil Santa Rosa Date: 2/16/12

Title: Public Utilities Engineering Aide

Name of Sewering Agency: City of Colton

Address: 1201 S. Rancho Ave. , Colton, CA , 92324

Phone No.: (909) 370-5551

Please attach a description or plot plan showing existing or proposed sewer trunk line(s) to the referenced property.

To be completed by the Publicly Owned Treatment Works (POTW) Waste Management Authority.

- ☒ This certifies that the above referenced property's proposed connection to this Publicly Owned Treatment Works will not result in sewage/septage flows which will exceed the plant's design capacity.
- ☐ This agency cannot certify that the referenced property's connection to this Public Owned Treatment Works will not resulting sewage/septage flows which will exceed the plant's design capacity.

The waste management authority (does/does not) have adequate facilities to accept the sewage from the referenced property (circle one).

☐ (Other) _____

By: Phil Santa Rosa Date: 2/16/12

Title: Public Utilities Engineering Aide

Name of POTW/Landfill: Colton Water Treatment Plant

Address: 1201 S. Rancho Ave. , Colton, CA , 92324

Phone No.: (909) 370-5551

Please attach a separate sheet describing the plant or landfill design capacity, sewage/sludge disposal capacity and existing excess capacity and the current number of committed connections, the current number of sewage commitments with their cumulative anticipated total flow.

The Department of Public Health, Division of Environmental Health Services has reviewed the above reference submittal:

- ☐ The referenced project is adequately serviced.
- ☐ The referenced project is not adequately serviced
- ☐ (Other) _____

cc: Planning Division DEHS
California Regional Water Quality Control Board

Date _____

I.3 - Water

1-23

2004

1903

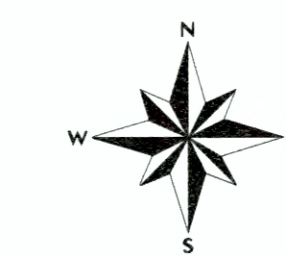


1804



1904 - Water System

- | Nodes | Main Pipes |
|--------------------------------|----------------------|
| AC Auto Control Valve | Distribution Main |
| AR Air Release Valve | Transmission Main |
| BD Bottom Drain | Hydrant Lateral |
| BF Backflow Device | Fire Service |
| BO Blowoff Valve | Private Fire Service |
| BV Butterfly Valve | |
| CS Corporation Stop | Service Pipes |
| CV Detector Check Valve | Municipal |
| DC Double Check Valve | Residential |
| DE Dead End | Commercial |
| EI Emergency Intertie | Landbase Lines |
| FH Fire Hydrant | Street Centerline |
| FI Fitting | Parcel Line |
| FV Foot Valve | Easement |
| GV Gate Valve | Steel Casing |
| ME Meter | Concrete Encasement |
| NU Null Node | |
| PR Pressure Regulating Station | |
| PS Pump Station | |
| RE Reducer | |
| RS Reservoir | |
| SM Service Meter | |
| SP Sampling Point | |
| TBM Turbine Meter | |
| TO Turnout | |
| WE Well | |



Scale 1:100



Nobel Systems

Date Plotted August 12, 2000

FORM A

PROPERTY INFORMATION FOR ADEQUATE SERVICE CERTIFICATION

Applicant complete the following information for subject property:

Applicant Name: AMCAL Multi-Housing, Inc. c/o Frank Chang
Mailing Address: 30141 Agoura Rd., Ste. 100, Agoura Hills, CA 91301-4332
Phone: (818) 706-0694 x186 FAX No.: (818) 706-3752 E-Mail: FChang@AmcalHousing.com
Proposed Use/Project: 72 apartments + 4,000 sf office/retail
Tentative Tract/Parcel Number: 8726
Assessor's Parcel Numbers: 0274-182-43
Property Address: no address (NW of Valley/Cypress intersection)
Community: Colton (ininc.)
Property Legal: Tract No. 8726 Lot No. 43 M.B. 11/9 Block No. Parcel 2

The following is a summary of the forms and when they are utilized to receive adequate service certification for the proposed project:

- | | |
|--|--------------------|
| 1. Proposed Water Service Utility Connection | Form A and Form W1 |
| 2. Proposed On-Site Well | Form A and Form W2 |
| 3. Sewer Service Utility Connection | Form A and Form S1 |
| 4. Proposed On-Site Sewage Disposal | Form A and Form S2 |

FORM W1
PUBLIC WATER SERVICE CERTIFICATION

Applicant Name AMCAL Multi-Housing **APNs** 0274-182-43

This certifies that the above referenced property is within the service area boundaries of this water service utility and that:

Service Information: (Check one)



There are currently existing adequate source, storage and distribution line capacities to provide potable water to the referenced site in sufficient quantities to satisfy the domestic water service and fire protection requirements of the proposed use. The water mains to serve each proposed service connection are currently installed and operable.



Financial arrangements have been made to install water mains for each proposed service outlet and any other necessary facilities to insure that the proposed use will have adequate source, storage and distribution line capacities to satisfy the domestic water service and fire protection requirements of the proposed use.



It is financially and physically feasible to install water service facilities that will provide adequate source, storage and distribution line capacities for each proposed service connection that will satisfy the domestic water service and fire protection requirements of the proposed use.

Easement Information: (Check one)



This agency has known water lines or easements on the subject property but they do not conflict with the proposed use as currently designed.



The agency has water lines and/or easements on the subject property which conflict with the proposed project as currently designed. Applicant must revise plans and resubmit them to this agency for approval.

Water main in easement on property belongs to Terrace Wtr. Co.

Fire Flow Information:

The proposed water system will provide: Fire flow conducted by your contractor 1/10/12



Gallons per minute 20 pounds per square inch for minimum _____ hour(s) duration.

There have been 0 service connections to the existing system. (For Tentative Map applications only.)

Please attach a description and plot map illustrating any affected water lines or easements and sign back page.

This commitment is subject to the ordinances, resolutions, regulations, rules, policies, procedures, standards and rate schedules of this water service agency and the applicant has agreed to the conditions of service including payment for the installation of the required on-site and off-site capital improvements outlined on the attached list (If any, please attach list). All water service facilities can and will be installed prior to construction of the proposed use and will comply with the California Waterwork Standards and applicable Fire Code and local Fire Code and local Fire agency regulations for fire flow. This commitment is subject to County approval of all necessary permits/applications and shall expire one (1) year from the following date.

Phil Santa Rosa - Engineering Assistant

1/19/12

Utility Manager or Designee

Date

Water Service Agency Name: City of Colton Public Utilities

Address: 160 South 10th St.- Colton , CA , 92324

Phone No.: (909) 370-5551

FORM W2
PRIVATE WATER SERVICE – (FOR DEHS TO COMPLETE)

Applicant Name _____ **APNs** _____

The County Department of Public Health, Division of Environmental Health Services finds that:

- ☐ The subject property has a water well approved for use by the proposed project.
- ☐ Water system plans have been approved by the fire authority and DEHS.
- ☐ DEHS has reviewed a ground water (hydrologic) report prepared for the subject property and signed by a Registered or Certified Engineering Geologist or Civil Engineer which indicates there is sufficient quantity and quality of the proposed use.
- ☐ (Other) _____

This commitment shall expire one (1) year from the following date.

Signature—DEHS

Date

**FORM S1
SEWER SERVICE CERTIFICATION**

Applicant Name AMCAL Multi-Housing **APNs** 0274-182-43
To be completed by the Sewering Agency.

This certifies that the property referenced on Form A is within the service area boundaries of this sewerage agency and that: (check applicable).

- ☒ There are currently existing sewer trunk line(s) of adequate capacity to provide sewerage service and such service will not exceed the design capacity of the lines.
- ☐ There are not currently existing sewer trunk line(s) of adequate capacity. However, it is financially and physically feasible to install sewer trunk lines that will permit adequate service to the referenced property.
- ☐ (Other) _____

This agency will commit to providing sewerage service to the referenced project subject to all applicable ordinances, resolutions, regulations, rules, policies, procedures, standards and date schedules. The applicant has agreed to the conditions of service including payment for the on-site and off-site capital improvements outlined on the attached list. (If any, please attach list). All sewer service facilities can and will be installed prior to occupancy of the proposed use and will comply with all federal, state, and country laws and regulations.

This commitment is subject to county review and approval of all necessary permits/applications, and shall expire on the following date _____ which represents the end of the three (3) year project approval period. Applicant must refile certification request if project extension of time request is filed.

By: Phil Santa Rosa Date: 1/19/12

Title: Engineering Assistant

Name of Sewering Agency: City of Colton Public Utilities

Address: 160 South 10th St. Colton, CA, 92324

Phone No.: (909) 370-5551

Please attach a description or plot plan showing existing or proposed sewer trunk line(s) to the referenced property.

.....

To be completed by the Publicly Owned Treatment Works (POTW) Waste Management Authority.

- ☐ This certifies that the above referenced property's proposed connection to this Publicly Owned Treatment Works will not result in sewage/septage flows which will exceed the plant's design capacity.
- ☐ This agency cannot certify that the referenced property's connection to this Public Owned Treatment Works will not resulting sewage/septage flows which will exceed the plant's design capacity.

The waste management authority (does/does not) have adequate facilities to accept the sewage from the referenced property (circle one).

☐ (Other) _____

By: _____ Date: _____

Title: _____

Name of POTW/Landfill: _____

Address: _____

Phone No.: () _____

Please attach a separate sheet describing the plant or landfill design capacity, sewage/sludge disposal capacity and existing excess capacity and the current number of committed connections, the current number of sewage commitments with their cumulative anticipated total flow.

The Department of Public Health, Division of Environmental Health Services has reviewed the above reference submittal:

- ☐ The referenced project is adequately serviced.
- ☐ The referenced project is not adequately serviced
- ☐ (Other) _____

cc: Planning Division DEHS
California Regional Water Quality Control Board

Date

FORM S2
ONSITE SEWAGE DISPOSAL CERTIFICATIONS

Applicant Name _____ **APNs** _____

The County Department of Public Health, Division of Environmental Health Services finds that:

- ☐ The subject property is in an area for which the department has sufficient information to assign sewage disposal design rate in compliance with the percolation report waiver criteria.
- ☐ The subject property has a percolation report which has EHS approval. The report contains sufficient information for the design of an on-site disposal system for the proposed use of the property.
- ☐ The subject property is required to have a percolation report for EHS review and approval.
- ☐ Existing septic system shall be certified by a qualified professional (P.E., C.E.G., REHS, C-42 contractor) that the system functions properly, meets code, and has the capacity required for the proposed project.

DEHS

Date

cc: Planning Division

I.4 - Water Quality Management Plan

Water Quality Management Plan

For:

Las Terrazas Apartment

1189 W. VALLEY BLVD. COLTON, CA 92324, [GRADING PERMIT NO.], [BUILDING PERMIT NO.],
TR. NO. 13223829-09, PARCEL NO. 8726, APN: 0274-182-33, -43 & -46

Prepared for:

AMCAL Multi-Housing, Inc.

30141 Agoura Road, Suite 100

Agoura Hills, CA 91301

Tel: (818) 706-0694

Prepared by:

United Civil, INC.

1180 Durfee Avenue, Suite 220

El Monte, CA 91733

Tel: (626) 575-9999



Approval Date: _____

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for AMCAL Multi-Housing, Inc. by United Civil, Inc. The WQMP is intended to comply with the requirements of the City of Colton and the NPDES Areawide Stormwater Program requiring the preparation of a WQMP. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	13223829-09/8726	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			0274-182-33, -43 & -46
Owner's Signature			
Owner Name: Amcal Las Terrazas Fund, L.P.			
Title			
Company	AMCAL Muulti-Housing		
Address	30141 Agoura Road, Suite 100		
Email			
Telephone #	(818) 706-0694		
Signature			Date

Preparer's Certification

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	13223829-09/8726	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			0274-182-33, -43 & -46

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of Regional Water Quality Control Board Order No. R8-2010-0036."


Engineer: Christopher H.M. Neo		<p>PE Stamp Below</p> 
Title	Principal	
Company	United Civil, Inc.	
Address	1180 Durfee Avenue, Suite 220	
Email	neo@uc-la.com	
Telephone #	(626) 575-9999	
Signature		
Date		

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Section 1 Discretionary Permit(s)

Form 1-1 Project Information					
Project Name		Las Terrazas Apartment			
Project Owner Contact Name:		Amcal Las Terrazas Fund, L.P.			
Mailing Address:	30141 Agoura Road, Suite 220, Agoura Hills, CA 91301	E-mail Address:		Telephone:	(818) 706-0694
Permit/Application Number(s):		Tract/Parcel Map Number(s):		13223829-09/8726	
Additional Information/ Comments:					
Description of Project:		<p>The 5.92-acre site of proposed Las Terrazas project is located at 1189 W. Valley Blvd. near the City of Colton in the unincorporated area of County of San Bernardino, California. The project site is located between N. Hermosa Ave. and Cypress Ave. on W. Valley Blvd. It is bounded to the north and upper half of the east by existing single family residential lots, to the lower half of the east by Cypress Avenue, to the south by W. Valley Blvd., and to the west by an existing public storage facility. (See enclosed Vicinity Map and Aerial Map). The project coordinates are 34.0703 Latitude (North) and -117.3431 Longitude (West). The existing zoning for the site are CG (General Commercial) and RS (Single Family). The proposed zoning are RM (Multiple Residential) & CG (General Commercial).</p> <p>The proposed project development consist of five three-story high, totaled 112-unit apartment buildings with building coverage of 49,210 square-feet (sq-ft), a 2,300 sq-ft community building, a 2,500 sq-ft daycare center, 84,100 sq-ft of common area of tot lots, gardens, BBQ area, and landscaped areas, a 20 feet by 40' swimming pool, The total residential building area is about 120,310 sq-ft and the density proposed is about 18.9 dwelling units per acre based on gross site area of 5.92 acres. There are 205 parking spaces provided for the residential area while there are 7 parking spaces provided for the community service buildings. There are asphalt, concrete & paver blocked paved driveways and parking lots proposed that totaled about 91,640 sq-ft. The area of open space including landscaping and planting areas is about 35,400 sq-ft. (See enclosed Site Plan and Project Information Sheet). Thus, the proposed project development falls under "New Development > 100,000 sq-ft" Project Category. The completed project including the community service buildings will be owned by property owner, Amcal Las Terrazas Fund, L.P. and it will lease out the apartment units and community service buildings to tenants. There is no homeowners association or property owner association to be formed for this project site.</p>			

Water Quality Management Plan (WQMP)

<p>Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.</p>	
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Section 2 Project Description

2.1 Project Information

This section of the WQMP should provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein.

The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

Form 2.1-1 Description of Proposed Project

¹ Development Category (Select all that apply):

<input type="checkbox"/> Significant re-development involving the addition or replacement of 5,000 ft ² or more of impervious surface on an already developed site	<input checked="" type="checkbox"/> New development involving the creation of 10,000 ft ² or more of impervious surface collectively over entire site	<input type="checkbox"/> Automotive repair shops with standard industrial classification (SIC) codes 5013, 5014, 5541, 7532- 7534, 7536-7539	<input type="checkbox"/> Restaurants (with SIC code 5812) where the land area of development is 5,000 ft ² or more
<input type="checkbox"/> Hillside developments of 5,000 ft ² or more which are located on areas with known erosive soil conditions or where the natural slope is 25 percent or more	<input type="checkbox"/> Developments of 2,500 ft ² of impervious surface or more adjacent to (within 200 ft) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters.	<input type="checkbox"/> Parking lots of 5,000 ft ² or more exposed to storm water	<input type="checkbox"/> Retail gasoline outlets that are either 5,000 ft ² or more, or have a projected average daily traffic of 100 or more vehicles per day

☐ Non-Priority / Non-Category Project *May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements.*

² Project Area (ft ²):	5.92 Acres	³ Number of Dwelling Units:	112	⁴ SIC Code:	1522, 8351 & 9221
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⁵ Is Project going to be phased? Yes ☒ No ☐ *If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.*

⁶ Does Project include roads? Yes ☐ No ☒ *If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)*

2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

Form 2.2-1 Property Ownership/Management

Describe property ownership/management responsible for long-term maintenance of WQMP stormwater facilities:

The completed project including the community service buildings will be owned by property owner, Amcal Las Terrazas Fund, L.P. All onsite utilities such as sewer, water, and storm drain will be privately maintained. There is no homeowners association or property owner association to be formed for this project site.

2.3 Potential Stormwater Pollutants

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-3 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern			
Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
Pathogens (Bacterial / Virus)	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Nutrients - Phosphorous	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Nutrients - Nitrogen	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Noxious Aquatic Plants	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Sediment	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Metals	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Oil and Grease	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Trash/Debris	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Pesticides / Herbicides	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Organic Compounds	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	

2.4 Water Quality Credits

A water quality credit program is applicable for certain types of development projects if it is not feasible to meet the requirements for on-site LID. Proponents for eligible projects, as described below, can apply for water quality credits that would reduce project obligations for selecting and sizing other treatment BMP or participating in other alternative compliance programs. Refer to Section 6.2 in the TGD for WQMP to determine if water quality credits are applicable for the project.

Form 2.4-1 Water Quality Credits

¹ Project Types that Qualify for Water Quality Credits: *Select all that apply*

<input type="checkbox"/> Redevelopment projects that reduce the overall impervious footprint of the project site. [Credit = % impervious reduced]	Higher density development projects <input checked="" type="checkbox"/> Vertical density [20%] <input type="checkbox"/> 7 units/ acre [5%]	<input type="checkbox"/> Mixed use development, (combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that demonstrate environmental benefits not realized through single use projects) [20%]	<input type="checkbox"/> Brownfield redevelopment (redevelop real property complicated by presence or potential of hazardous contaminants) [25%]
<input type="checkbox"/> Redevelopment projects in established historic district, historic preservation area, or similar significant core city center areas [10%]	<input type="checkbox"/> Transit-oriented developments (mixed use residential or commercial area designed to maximize access to public transportation) [20%]	<input type="checkbox"/> In-fill projects (conversion of empty lots & other underused spaces < 5 acres, substantially surrounded by urban land uses, into more beneficially used spaces, such as residential or commercial areas) [10%]	<input type="checkbox"/> Live-Work developments (variety of developments designed to support residential and vocational needs) [20%]

² Total Credit % 20 (Total all credit percentages up to a maximum allowable credit of 50 percent)

Description of Water Quality Credit Eligibility (if applicable)

Vertical density development

Section 3 Site and Watershed Description

Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed DMAs) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example.

Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet.***

Form 3-1 Site Location and Hydrologic Features			
Site coordinates take GPS measurement at approximate center of site	Latitude 34.0703	Longitude -117.3431	Thomas Bros Map page 606 B6
¹ San Bernardino County climatic region: <input checked="" type="checkbox"/> Valley <input type="checkbox"/> Mountain			
² Does the site have more than one drainage area (DA): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached</i>			
<pre> graph BT DA1DMAA[DA1 DMA A] --> Outlet1[Outlet 1] DA1DMAB[DA1 DMA B] --> Outlet1 DA2[DA2] --> Outlet2[Outlet 2] DA1DMAC[DA1 DMA C] --> DA1DMAA </pre>			
Example only – modify for project specific WQMP using additional form			
Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA		
DA1 DMA C flows to DA1 DMA A	<i>Ex. Bioretention overflow to vegetated bioswale with 4' bottom width, 5:1 side slopes and bed slope of 0.01. Conveys runoff for 1000' through DMA 1 to existing catch basin on SE corner of property</i>		
DA1 DMA A to Outlet 1			
DA1 DMA B to Outlet 1			
DA2 to Outlet 2			

Form 3-1 Site Location and Hydrologic Features

Site coordinates *take GPS measurement at approximate center of site*

Latitude 34.0703

Longitude -117.3431

Thomas Bros Map page 606 B6

¹ San Bernardino County climatic region: ☒ Valley ☐ Mountain

² Does the site have more than one drainage area (DA): Yes ☐ No ☒ *If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached*

Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA
DA1 DMA A flows to DA1 DMA B	Underground infiltration system overflow to underground infiltration system in DA1 DMA B thru proposed storm drain pipe.
DA1 DMA B flows to DA1 DMA C	Underground infiltration system overflow to the drywell system in DA1 DMA C thru proposed storm drain pipe.
DA1 DMA C to Outlet 1	Drywell system overflow to proposed catch basin on Cypress Avenue and outlet to the underground storm drain system on Cypress Avenue and Valley Boulevard.

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1

For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A	DMA B	DMA C	DMA D
¹ DMA drainage area (ft ²)	5.92			
² Existing site impervious area (ft ²)	3190			
³ Antecedent moisture condition <i>For desert areas, use</i> http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf	N/A			
⁴ Hydrologic soil group <i>Refer to Watershed Mapping Tool –</i> http://sbcounty.permitrack.com/WAP	A			
⁵ Longest flowpath length (ft)	780			
⁶ Longest flowpath slope (ft/ft)	0.016			
⁷ Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>	Barren			
⁸ Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating</i>	Poor			

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1 (use only as needed for additional DMA w/in DA 1)				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA E	DMA F	DMA G	DMA H
¹ DMA drainage area (ft ²)				
² Existing site impervious area (ft ²)				
³ Antecedent moisture condition <i>For desert areas, use</i> http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf				
⁴ Hydrologic soil group <i>Refer to Watershed Mapping Tool –</i> http://sbcounty.permitrack.com/WAP				
⁵ Longest flowpath length (ft)				
⁶ Longest flowpath slope (ft/ft)				
⁷ Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>				
⁸ Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating</i>				

Form 3-3 Watershed Description for Drainage Area

<p>Receiving waters</p> <p><i>Refer to Watershed Mapping Tool -</i></p> <p>http://sbcounty.permitrack.com/WAP</p> <p><i>See 'Drainage Facilities' link at this website</i></p>	<p>The downstream receiving water bodies within the San Bernardino County for Las Terrazas Apartments project are the Santa Ana River - Reach 3 and Reach 4 (Riverside HSA 801.27 and Colton HSA 801.44). Based on the Clean Water Act Section 303(d) list of impaired water bodies, Santa Ana River Reaches 3 & 4 are impaired for bacteria indicators and pathogens, and heavy metals. The waters on this 303(d) list do not meet Water Quality Standards associated with Beneficial Uses for the listed water bodies.</p>
<p>Applicable TMDLs</p> <p><i>Refer to Local Implementation Plan</i></p>	<p>N/A</p>
<p>303(d) listed impairments</p> <p><i>Refer to Local Implementation Plan and Watershed Mapping Tool -</i></p> <p>http://sbcounty.permitrack.com/WAP and State Water Resources Control Board website - http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml</p>	<p>Pathogens: Nonpoint source, Dairies; Metal: Copper, Lead</p>
<p>Environmentally Sensitive Areas (ESA)</p> <p><i>Refer to Watershed Mapping Tool -</i></p> <p>http://sbcounty.permitrack.com/WAP</p>	<p>N/A</p>
<p>Unlined Downstream Water Bodies</p> <p><i>Refer to Watershed Mapping Tool -</i></p> <p>http://sbcounty.permitrack.com/WAP</p>	<p>Santa Ana River</p>
<p>Hydrologic Conditions of Concern</p>	<p><input type="checkbox"/> Yes Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal</p> <p><input checked="" type="checkbox"/> No</p>
<p>Watershed-based BMP included in a RWQCB approved WAP</p>	<p><input checked="" type="checkbox"/> Yes Attach verification of regional BMP evaluation criteria in WAP</p> <ul style="list-style-type: none"> • More Effective than On-site LID • Remaining Capacity for Project DCV • Upstream of any Water of the US • Operational at Project Completion • Long-Term Maintenance Plan <p><input type="checkbox"/> No</p>

Section 4 Best Management Practices (BMP)

4.1 Source Control BMP

4.1.1 Pollution Prevention

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Environmental awareness education materials by the municipalities will be provided by the owner. Educational materials are available from the San Bernardino Stormwater Program and can be downloaded at: http://www.sbcountystormwater.org/gov_out.html
N2	Activity Restrictions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Conditions, covenants and restrictions (CCRs) will be prepared by the developer to communicate restrictions of activities for the purpose of surface water quality protection.
N3	Landscape Management BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	On-going landscape maintenance requirements consistent with the City of Colton with specific guidelines will be provided by the developer and the owner.
N4	BMP Maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The owner will be responsible for the maintenance and implementation of non-structural and structural BMP facilities.
N5	Title 22 CCR Compliance (How development will comply)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The project site shall comply with Title 22 of the California Code of Regulations and relevant sections of the California Health and Safety Code regarding hazardous waste management, which will be enforced by the County of San Bernardino Department of Public Health, Division of Environmental Health Services on behalf of the State.
N6	Local Water Quality Ordinances	<input checked="" type="checkbox"/>	<input type="checkbox"/>	This project will comply with the City of Colton Water Quality Ordinance.
N7	Spill Contingency Plan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A spill contingency plan will be provided by the developer. The Plan mandates stockpiling of cleanup materials, notification of responsible agencies, disposal of cleanup materials, documentation, etc.
N8	Underground Storage Tank Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No underground storage tank will be used for this project.

Form 4.1-1 Non-Structural Source Control BMPs

N9	Hazardous Materials Disclosure Compliance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The owner will comply with the Colton Fire Department hazardous material disclosure requirements where applicable.
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Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The developer will ensure all structures comply with Article 80 of the Uniform Fire Code, City codes, San Bernardino County Fire Department, and local standards.
N11	Litter/Debris Control Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The owner will be responsible for performing trash pick-up and sweeping of littered common areas on a weekly basis or whenever necessary, and proper disposal of waste collected. Responsibilities will also include investigating, noting and documenting improper disposal materials by the public.
N12	Employee Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All employees and any contractors will require training to ensure awareness of maintenance activities that may result in pollutants reaching the storm drain. Training will include, but not be limited to, spill cleanup procedures, proper waste disposal, housekeeping practices, etc.
N13	Housekeeping of Loading Docks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No loading docks are present in this project.
N14	Catch Basin Inspection Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All on-site catch basin inlets, ribbon gutters, and curb and gutters shall be inspected and cleaned out by the owner.
N15	Vacuum Sweeping of Private Streets and Parking Lots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The owner shall have vacuum sweeping of private streets and parking lots on a weekly basis or whenever necessary.
N16	Other Non-structural Measures for Public Agency Projects	<input type="checkbox"/>	<input checked="" type="checkbox"/>	This is not a public agency project.
N17	Comply with all other applicable NPDES permits	<input checked="" type="checkbox"/>	<input type="checkbox"/>	This project will comply with other applicable NPDES permits such as the Construction General Permit. BMPs that are part of a SWPPP will be included.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Storm drain system stencilling and signage will be applied/installed where necessary.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No outdoor material storage area in this project.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Trash storage areas will be designed and constructed to reduce pollution introduction per BMP handbook.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The developer will be responsible for implementing all efficient irrigation systems for common area landscaping including but not limited to provisions for water sensors and programmable irrigation cycles. The irrigation systems shall be in conformance with water use efficiency guidelines.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All landscape pockets, fingers, setback areas, parkway strips, street medians, etc., shall be finish-graded at a minimum of 1-2 inch below top of curb or sidewalk for increased retention/infiltration of stormwater and irrigation water.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Vegetated slopes and swales will be installed throughout the project site.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No dock area in this project.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No maintenance bay in this project.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No vehicle wash area in this project.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No outdoor processing area in this project.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No equipment wash area in this project.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No fueling area in this project.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project does not involve hillside landscaping.
S14	Wash water control for food preparation areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No food preparation area in this project.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No community car wash rack in this project.

4.1.2 Preventative LID Site Design Practices

Site design practices associated with new LID requirements in the MS4 Permit should be considered in the earliest phases of a project. Preventative site design practices can result in smaller DCV for LID BMP and hydromodification control BMP by reducing runoff generation. Describe site design and drainage plan including:

- A narrative of site design practices utilized or rationale for not using practices
- A narrative of how site plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

Form 4.1-3 Preventative LID Site Design Practices Checklist
Site Design Practices <i>If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets</i>
Minimize impervious areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Parkway landscaping and community garden have been designed to minimize impervious areas.
Maximize natural infiltration capacity: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Parkway landscaping, community garden, and underground infiltration system have been implemented to maximize natural infiltration capacity.
Preserve existing drainage patterns and time of concentration: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Changes to drainage patterns are minimized.
Disconnect impervious areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Parkway landscape and grassy swales are built throughout the site to reduce continuous impervious area.
Protect existing vegetation and sensitive areas: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Explanation: No sensitive area in this project.
Re-vegetate disturbed areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Parkway landscape and community garden are proposed in this project.
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Underground infiltration area will have minimal required compaction.
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Grassy swales are used to convey flow to the onsite storm drain system.
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Landscape area will be staked off during construction.

4.2 Project Performance Criteria

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in the MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection of any downstream waterbody segments with a HCOC. ***If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.***

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), the San Bernardino County Stormwater Program requires use of the P_6 method (MS4 Permit Section XI.D.6a.ii) – Form 4.2-1
- For HCOC pre- and post-development hydrologic calculation, the San Bernardino County Stormwater Program requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi²), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for HCOC performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)		
1 Project area DA 1 (ft ²): 257,988	2 Imperviousness after applying preventative site design practices (Imp%): 68	3 Runoff Coefficient (Rc): 0.48 $R_c = 0.858(\text{Imp}\%)^3 - 0.78(\text{Imp}\%)^2 + 0.774(\text{Imp}\%) + 0.04$
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2\text{yr-1hr}}$ (in): 0.516 http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html		
5 Compute P_6 , Mean 6-hr Precipitation (inches): 0.764 $P_6 = \text{Item 4} * C_1$, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)		
6 Drawdown Rate Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.		24-hrs <input type="checkbox"/> 48-hrs <input checked="" type="checkbox"/>
7 Compute design capture volume, DCV (ft ³): 15,477 $\text{DCV} = 1/12 * [\text{Item 1} * \text{Item 3} * \text{Item 5} * C_2]$, where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963) Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2		

Form 4.2-2 Summary of HCOC Assessment (DA 1)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☐ No ☒

Go to: <http://sbcounty.permitrack.com/WAP>

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below
(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft ³)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	1 <i>Form 4.2-3 Item 12</i>	2 <i>Form 4.2-4 Item 13</i>	3 <i>Form 4.2-5 Item 10</i>
Post-developed	4 <i>Form 4.2-3 Item 13</i>	5 <i>Form 4.2-4 Item 14</i>	6 <i>Form 4.2-5 Item 14</i>
Difference	7 <i>Item 4 – Item 1</i>	8 <i>Item 2 – Item 5</i>	9 <i>Item 6 – Item 3</i>
Difference (as % of pre-developed)	10 % <i>Item 7 / Item 1</i>	11 % <i>Item 8 / Item 2</i>	12 % <i>Item 9 / Item 3</i>

Form 4.2-3 HCOC Assessment for Runoff Volume (DA 1)

Weighted Curve Number Determination for: <u>Pre-developed DA</u>	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1a Land Cover type								
2a Hydrologic Soil Group (HSG)								
3a DMA Area, ft ² sum of areas of DMA should equal area of DA								
4a Curve Number (CN) use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP								
Weighted Curve Number Determination for: <u>Post-developed DA</u>	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1b Land Cover type								
2b Hydrologic Soil Group (HSG)								
3b DMA Area, ft ² sum of areas of DMA should equal area of DA								
4b Curve Number (CN) use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP								
5 Pre-Developed area-weighted CN:	7 Pre-developed soil storage capacity, S (in): $S = (1000 / \text{Item 5}) - 10$				9 Initial abstraction, I _a (in): $I_a = 0.2 * \text{Item 7}$			
6 Post-Developed area-weighted CN:	8 Post-developed soil storage capacity, S (in): $S = (1000 / \text{Item 6}) - 10$				10 Initial abstraction, I _a (in): $I_a = 0.2 * \text{Item 8}$			
11 Precipitation for 2 yr, 24 hr storm (in): Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html								
12 Pre-developed Volume (ft ³): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 9})^2 / ((\text{Item 11} - \text{Item 9} + \text{Item 7}))]$								
13 Post-developed Volume (ft ³): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 10})^2 / ((\text{Item 11} - \text{Item 10} + \text{Item 8}))]$								
14 Volume Reduction needed to meet HCOC Requirement, (ft ³): $V_{HCOC} = (\text{Item 13} * 0.95) - \text{Item 12}$								

Form 4.2-4 HCOC Assessment for Time of Concentration (DA 1)

Compute time of concentration for pre and post developed conditions for each DA (For projects using the Hydrology Manual complete the form below)

Variables	Pre-developed DA1 <i>Use additional forms if there are more than 4 DMA</i>				Post-developed DA1 <i>Use additional forms if there are more than 4 DMA</i>			
	DMA A	DMA B	DMA C	DMA D	DMA A	DMA B	DMA C	DMA D
1 Length of flowpath (ft) <i>Use Form 3-2 Item 5 for pre-developed condition</i>								
2 Change in elevation (ft)								
3 Slope (ft/ft), $S_o = \text{Item 2} / \text{Item 1}$								
4 Land cover								
5 Initial DMA Time of Concentration (min) <i>Appendix C-1 of the TGD for WQMP</i>								
6 Length of conveyance from DMA outlet to project site outlet (ft) <i>May be zero if DMA outlet is at project site outlet</i>								
7 Cross-sectional area of channel (ft ²)								
8 Wetted perimeter of channel (ft)								
9 Manning's roughness of channel (n)								
10 Channel flow velocity (ft/sec) $V_{fps} = (1.49 / \text{Item 9}) * (\text{Item 7}/\text{Item 8})^{0.67} * (\text{Item 3})^{0.5}$								
11 Travel time to outlet (min) $T_t = \text{Item 6} / (\text{Item 10} * 60)$								
12 Total time of concentration (min) $T_c = \text{Item 5} + \text{Item 11}$								
13 Pre-developed time of concentration (min):	<i>Minimum of Item 12 pre-developed DMA</i>							
14 Post-developed time of concentration (min):	<i>Minimum of Item 12 post-developed DMA</i>							
15 Additional time of concentration needed to meet HCOC requirement (min):	$T_{C-HCOC} = (\text{Item 13} * 0.95) - \text{Item 14}$							

Form 4.2-5 HCOC Assessment for Peak Runoff (DA 1)

Compute peak runoff for pre- and post-developed conditions

Variables	Pre-developed DA to Project Outlet (Use additional forms if more than 3 DMA)			Post-developed DA to Project Outlet (Use additional forms if more than 3 DMA)							
	DMA A	DMA B	DMA C	DMA A	DMA B	DMA C					
1 Rainfall Intensity for storm duration equal to time of concentration $I_{peak} = 10^{(LOG \text{ Form 4.2-1 Item 4} - 0.6 LOG \text{ Form 4.2-4 Item 5} / 60)}$											
2 Drainage Area of each DMA (Acres) <i>For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>											
3 Ratio of pervious area to total area <i>For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>											
4 Pervious area infiltration rate (in/hr) <i>Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP</i>											
5 Maximum loss rate (in/hr) $F_m = \text{Item 3} * \text{Item 4}$ <i>Use area-weighted F_m from DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>											
6 Peak Flow from DMA (cfs) $Q_p = \text{Item 2} * 0.9 * (\text{Item 1} - \text{Item 5})$											
7 Time of concentration adjustment factor for other DMA to site discharge point <i>Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)</i>	DMA A	n/a		n/a							
	DMA B		n/a		n/a						
	DMA C		n/a			n/a					
8 Pre-developed Q_p at T_c for DMA A: $Q_p = \text{Item } 6_{DMAA} + [\text{Item } 6_{DMAB} * (\text{Item } 1_{DMAA} - \text{Item } 5_{DMAB}) / (\text{Item } 1_{DMAB} - \text{Item } 5_{DMAB}) * \text{Item } 7_{DMAA/2}] + [\text{Item } 6_{DMAC} * (\text{Item } 1_{DMAA} - \text{Item } 5_{DMAC}) / (\text{Item } 1_{DMAC} - \text{Item } 5_{DMAC}) * \text{Item } 7_{DMAA/3}]$	9 Pre-developed Q_p at T_c for DMA B: $Q_p = \text{Item } 6_{DMAB} + [\text{Item } 6_{DMAA} * (\text{Item } 1_{DMAB} - \text{Item } 5_{DMAA}) / (\text{Item } 1_{DMAA} - \text{Item } 5_{DMAA}) * \text{Item } 7_{DMAB/1}] + [\text{Item } 6_{DMAC} * (\text{Item } 1_{DMAB} - \text{Item } 5_{DMAC}) / (\text{Item } 1_{DMAC} - \text{Item } 5_{DMAC}) * \text{Item } 7_{DMAB/3}]$			10 Pre-developed Q_p at T_c for DMA C: $Q_p = \text{Item } 6_{DMAC} + [\text{Item } 6_{DMAA} * (\text{Item } 1_{DMAC} - \text{Item } 5_{DMAA}) / (\text{Item } 1_{DMAA} - \text{Item } 5_{DMAA}) * \text{Item } 7_{DMAC/1}] + [\text{Item } 6_{DMAB} * (\text{Item } 1_{DMAC} - \text{Item } 5_{DMAB}) / (\text{Item } 1_{DMAB} - \text{Item } 5_{DMAB}) * \text{Item } 7_{DMAC/2}]$							
10 Peak runoff from pre-developed condition confluence analysis (cfs): <i>Maximum of Item 8, 9, and 10 (including additional forms as needed)</i>											
11 Post-developed Q_p at T_c for DMA A: <i>Same as Item 8 for post-developed values</i>	12 Post-developed Q_p at T_c for DMA B: <i>Same as Item 9 for post-developed values</i>			13 Post-developed Q_p at T_c for DMA C: <i>Same as Item 10 for post-developed values</i>							
14 Peak runoff from post-developed condition confluence analysis (cfs): <i>Maximum of Item 11, 12, and 13 (including additional forms as needed)</i>											
15 Peak runoff reduction needed to meet HCOC Requirement (cfs): $Q_{p-HCOC} = (\text{Item 14} * 0.95) - \text{Item 10}$											

4.3 Project Conformance Analysis

Complete the following forms for each project site DA to document that the proposed LID BMPs conform to the project DCV developed to meet performance criteria specified in the MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the MS4 Permit (see Section 5.3.1 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design and Hydrologic Source Controls (Form 4.3-2)
- Retention and Infiltration (Form 4.3-3)
- Harvested and Use (Form 4.3-4) or
- Biotreatment (Form 4.3-5).

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2.1 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is "Yes," provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Forms 4.3-2 and 4.3-4 to determine the feasibility of applicable HSC and harvest and use BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable HSC BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of LID HSC, retention and infiltration, and harvest and use BMPs are unable to mitigate the entire DCV, then biotreatment BMPs may be implemented by the project proponent. If biotreatment BMPs are used, then they must be sized to provide sufficient capacity for effective treatment of the remainder of the volume-based performance criteria that cannot be achieved with LID BMPs (TGD for WQMP Section 5.4.4.2).

Under no circumstances shall any portion of the DCV be released from the site without effective mitigation and/or treatment.

Form 4.3-1 Infiltration BMP Feasibility (DA 1)

Feasibility Criterion – Complete evaluation for each DA on the Project Site

1 Would infiltration BMP pose significant risk for groundwater related concerns? Yes ☐ No ☒

Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

2 Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes ☐ No ☒

(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than eight feet from building foundations or an alternative setback.
- A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

3 Would infiltration of runoff on a Project site violate downstream water rights? Yes ☐ No ☒

If Yes, Provide basis: (attach)

4 Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? Yes ☐ No ☒

If Yes, Provide basis: (attach)

5 Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? Yes ☐ No ☒

If Yes, Provide basis: (attach)

6 Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? Yes ☐ No ☒

See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

7 Any answer from Item 1 through Item 3 is "Yes": Yes ☐ No ☒

If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 8 below.

8 Any answer from Item 4 through Item 6 is "Yes": Yes ☐ No ☒

If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP. If no, then proceed to Item 9, below.

9 All answers to Item 1 through Item 6 are "No":

Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP. Proceed to Form 4.3-2, Hydrologic Source Control BMP.

4.3.1 Site Design Hydrologic Source Control BMP

Section XI.E. of the Permit emphasizes the use of LID preventative measures; and the use of LID HSC BMPs reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable HSC shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of HSC, if a project cannot feasibly meet BMP sizing requirements or cannot fully address HCOCs, feasibility of all applicable HSC must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design HSC BMP. Refer to Section 5.4.1 in the TGD for more detailed guidance.

Form 4.3-2 Site Design Hydrologic Source Control BMPs (DA 1)			
1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, complete Items 2-5; If no, proceed to Item 6	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type (Use additional forms for more BMPs)
2 Total impervious area draining to pervious area (ft ²)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft ³) $V = \text{Item 2} * \text{Item 3} * (0.5/12)$, assuming retention of 0.5 inches of runoff			
5 Sum of retention volume achieved from impervious area dispersion (ft ³):		$V_{\text{retention}} = \text{Sum of Item 4 for all BMPs}$	
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type (Use additional forms for more BMPs)
7 Ponding surface area (ft ²)			
8 Ponding depth (ft)			
9 Surface area of amended soil/gravel (ft ²)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft ³) $V_{\text{retention}} = (\text{Item 7} * \text{Item 8}) + (\text{Item 9} * \text{Item 10} * \text{Item 11})$			
13 Runoff volume retention from on-lot infiltration (ft ³):		$V_{\text{retention}} = \text{Sum of Item 12 for all BMPs}$	

Form 4.3-2 cont. Site Design Hydrologic Source Control BMPs (DA 1)

14	Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, complete Items 15-20. If no, proceed to Item 21</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
15	Rooftop area planned for ET BMP (ft ²)			
16	Average wet season ET demand (in/day) <i>Use local values, typical ~ 0.1</i>			
17	Daily ET demand (ft ³ /day) <i>Item 15 * (Item 16 / 12)</i>			
18	Drawdown time (hrs) <i>Copy Item 6 in Form 4.2-1</i>			
19	Retention Volume (ft ³) <i>V_{retention} = Item 17 * (Item 18 / 24)</i>			
20	Runoff volume retention from evapotranspiration BMPs (ft ³): <i>V_{retention} = Sum of Item 19 for all BMPs</i>			
21	Implementation of Street Trees: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>If yes, complete Items 22-25. If no, proceed to Item 26</i>	DA 1 DMA BMP Type Street Tree	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
22	Number of Street Trees	120		
23	Average canopy cover over impervious area (ft ²)	250		
24	Runoff volume retention from street trees (ft ³) <i>V_{retention} = Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches</i>	125		
25	Runoff volume retention from street tree BMPs (ft ³): 125 <i>V_{retention} = Sum of Item 24 for all BMPs</i>			
26	Implementation of residential rain barrel/cisterns: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, complete Items 27-29; If no, proceed to Item 30</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
27	Number of rain barrels/cisterns			
28	Runoff volume retention from rain barrels/cisterns (ft ³) <i>V_{retention} = Item 27 * 3</i>			
29	Runoff volume retention from residential rain barrels/Cisterns (ft ³): <i>V_{retention} = Sum of Item 28 for all BMPs</i>			
30	Total Retention Volume from Site Design Hydrologic Source Control BMPs: 125 <i>Sum of Items 5, 13, 20, 25 and 29</i>			

4.3.2 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix D of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5.1 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)

1 Remaining LID DCV not met by site design HSC BMP (ft³): 15,352 $V_{unmet} = \text{Form 4.2-1 Item 7} - \text{Form 4.3-2 Item 30}$

BMP Type Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs	DA 1 DMA A BMP Type Underground Infiltration	DA 1 DMA B BMP Type Underground Infiltration	DA 1 DMA C BMP Type Underground Infiltration (Use additional forms for more BMPs)
2 Infiltration rate of underlying soils (in/hr) See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods	2.9	2.1	1.2
3 Infiltration safety factor See TGD Section 5.4.2 and Appendix D	2	2	2
4 Design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$	1.45	1.05	0.6
5 Ponded water drawdown time (hr) Copy Item 6 in Form 4.2-1	48	48	48
6 Maximum ponding depth (ft) BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details	N/A	N/A	N/A
7 Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$	N/A	N/A	N/A
8 Infiltrating surface area, SA_{BMP} (ft ²) the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP	N/A	N/A	N/A
9 Amended soil depth, d_{media} (ft) Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details	N/A	N/A	N/A
10 Amended soil porosity	N/A	N/A	N/A
11 Gravel depth, d_{media} (ft) Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details	N/A	N/A	N/A
12 Gravel porosity	N/A	N/A	N/A
13 Duration of storm as basin is filling (hrs) Typical ~ 3hrs	3	3	3
14 Above Ground Retention Volume (ft ³) $V_{retention} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$	N/A	N/A	N/A
15 Underground Retention Volume (ft ³) Volume determined using manufacturer's specifications and calculations	6,026	4,875	4,643
16 Total Retention Volume from LID Infiltration BMPs: 15,544 (Sum of Items 14 and 15 for all infiltration BMP included in plan)			
17 Fraction of DCV achieved with infiltration BMP: 100% $\text{Retention\%} = \text{Item 16} / \text{Form 4.2-1 Item 7}$			
18 Is full LID DCV retained on-site with combination of hydrologic source control and LID retention and infiltration BMPs? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the			

applicable category of development and repeat all above calculations.

4.3.3 Harvest and Use BMP

Harvest and use BMP may be considered if the full LID DCV cannot be met by maximizing infiltration BMPs. Use Form 4.3-4 to compute on-site retention of runoff from proposed harvest and use BMPs.

Volume retention estimates for harvest and use BMPs are sensitive to the on-site demand for captured stormwater. Since irrigation water demand is low in the wet season, when most rainfall events occur in San Bernardino County, the volume of water that can be used within a specified drawdown period is relatively low. The bottom portion of Form 4.3-4 facilitates the necessary computations to show infeasibility if a minimum incremental benefit of 40 percent of the LID DCV would not be achievable with MEP implementation of on-site harvest and use of stormwater (Section 5.5.4 of the TGD for WQMP).

Form 4.3-4 Harvest and Use BMPs (DA 1)			
1 Remaining LID DCV not met by site design HSC or infiltration BMP (ft ³): <i>V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30 - Form 4.3-3 Item 16</i>			
BMP Type(s) Compute runoff volume retention from proposed harvest and use BMP (Select BMPs from Table 5-4 of the TGD for WQMP) - Use additional forms for more BMPs	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type (Use additional forms for more BMPs)
2 Describe cistern or runoff detention facility			
3 Storage volume for proposed detention type (ft ³) <i>Volume of cistern</i>			
4 Landscaped area planned for use of harvested stormwater (ft ²)			
5 Average wet season daily irrigation demand (in/day) Use local values, typical ~ 0.1 in/day			
6 Daily water demand (ft ³ /day) <i>Item 4 * (Item 5 / 12)</i>			
7 Drawdown time (hrs) <i>Copy Item 6 from Form 4.2-1</i>			
8 Retention Volume (ft ³) <i>V_{retention} = Minimum of (Item 3) or (Item 6 * (Item 7 / 24))</i>			
9 Total Retention Volume (ft ³) from Harvest and Use BMP <i>Sum of Item 8 for all harvest and use BMP included in plan</i>			
10 Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest and use BMPs? Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, demonstrate conformance using Form 4.3-10. If no, then re-evaluate combinations of all LID BMP and optimize their implementation such that the maximum portion of the DCV is retained on-site (using a single BMP type or combination of BMP types). If the full DCV cannot be mitigated after this optimization process, proceed to Section 4.3.4.</i>			

4.3.4 Biotreatment BMP

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration, and harvest and use BMPs. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Use Form 4.3-5 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV w. Biotreatment computations are included as follows:

- Use Form 4.3-6 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);
- Use Form 4.3-7 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);
- Use Form 4.3-8 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

Form 4.3-5 Selection and Evaluation of Biotreatment BMP (DA 1)			
1 Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft ³): <i>Form 4.2-1 Item 7 - Form 4.3-2 Item 30 - Form 4.3-3 Item 16- Form 4.3-4 Item 9</i>		List pollutants of concern <i>Copy from Form 2.3-1.</i>	
2 Biotreatment BMP Selected <i>(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)</i>	Volume-based biotreatment <i>Use Forms 4.3-6 and 4.3-7 to compute treated volume</i>		Flow-based biotreatment <i>Use Form 4.3-8 to compute treated volume</i>
	<input type="checkbox"/> Bioretention with underdrain <input type="checkbox"/> Planter box with underdrain <input type="checkbox"/> Constructed wetlands <input type="checkbox"/> Wet extended detention <input type="checkbox"/> Dry extended detention		<input type="checkbox"/> Vegetated swale <input type="checkbox"/> Vegetated filter strip <input type="checkbox"/> Proprietary biotreatment
3 Volume biotreated in volume based biotreatment BMP (ft ³): <i>Form 4.3-6 Item 15 + Form 4.3-7 Item 13</i>	4 Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft ³): <i>Item 1 - Item 3</i>		5 Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % <i>Item 4 / Item 1</i>
6 Flow-based biotreatment BMP capacity provided (cfs): <i>Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)</i>			
7 Metrics for MEP determination: <ul style="list-style-type: none"> • Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development: <input type="checkbox"/> <i>If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP.</i> 			

Form 4.3-6 Volume Based Biotreatment (DA 1) – Bioretention and Planter Boxes with Underdrains

Biotreatment BMP Type <i>(Bioretention w/underdrain, planter box w/underdrain, other comparable BMP)</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
1 Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP</i>			
2 Amended soil infiltration rate <i>Typical ~ 5.0</i>			
3 Amended soil infiltration safety factor <i>Typical ~ 2.0</i>			
4 Amended soil design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$			
5 Ponded water drawdown time (hr) <i>Copy Item 6 from Form 4.2-1</i>			
6 Maximum ponding depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
7 Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$			
8 Amended soil surface area (ft ²)			
9 Amended soil depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
10 Amended soil porosity, n			
11 Gravel depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
12 Gravel porosity, n			
13 Duration of storm as basin is filling (hrs) <i>Typical ~ 3hrs</i>			
14 Biotreated Volume (ft ³) $V_{biotreated} = \text{Item 8} * [(\text{Item 7}/2) + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$			
15 Total biotreated volume from bioretention and/or planter box with underdrains BMP: <i>Sum of Item 14 for all volume-based BMPs included in this form</i>			

Form 4.3-7 Volume Based Biotreatment (DA 1) – Constructed Wetlands and Extended Detention

Biotreatment BMP Type <i>Constructed wetlands, extended wet detention, extended dry detention, or other comparable proprietary BMP. If BMP includes multiple modules (e.g. forebay and main basin), provide separate estimates for storage and pollutants treated in each module.</i>	DA DMA BMP Type		DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>	
	Forebay	Basin	Forebay	Basin
1 Pollutants addressed with BMP forebay and basin <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP</i>				
2 Bottom width (ft)				
3 Bottom length (ft)				
4 Bottom area (ft ²) $A_{bottom} = \text{Item 2} * \text{Item 3}$				
5 Side slope (ft/ft)				
6 Depth of storage (ft)				
7 Water surface area (ft ²) $A_{surface} = (\text{Item 2} + (2 * \text{Item 5} * \text{Item 6})) * (\text{Item 3} + (2 * \text{Item 5} * \text{Item 6}))$				
8 Storage volume (ft ³) <i>For BMP with a forebay, ensure fraction of total storage is within ranges specified in BMP specific fact sheets, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i> $V = \text{Item 6} / 3 * [\text{Item 4} + \text{Item 7} + (\text{Item 4} * \text{Item 7})^{0.5}]$				
9 Drawdown Time (hrs) <i>Copy Item 6 from Form 2.1</i>				
10 Outflow rate (cfs) $Q_{BMP} = (\text{Item 8}_{forebay} + \text{Item 8}_{basin}) / (\text{Item 9} * 3600)$				
11 Duration of design storm event (hrs)				
12 Biotreated Volume (ft ³) $V_{biotreated} = (\text{Item 8}_{forebay} + \text{Item 8}_{basin}) + (\text{Item 10} * \text{Item 11} * 3600)$				
13 Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : <i>(Sum of Item 12 for all BMP included in plan)</i>				

Form 4.3-8 Flow Based Biotreatment (DA 1)

Biotreatment BMP Type <i>Vegetated swale, vegetated filter strip, or other comparable proprietary BMP</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
1 Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5</i>			
2 Flow depth for water quality treatment (ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
3 Bed slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
4 Manning's roughness coefficient			
5 Bottom width (ft) $b_w = (\text{Form 4.3-5 Item 6} * \text{Item 4}) / (1.49 * \text{Item 2}^{1.67} * \text{Item 3}^{0.5})$			
6 Side Slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
7 Cross sectional area (ft ²) $A = (\text{Item 5} * \text{Item 2}) + (\text{Item 6} * \text{Item 2}^2)$			
8 Water quality flow velocity (ft/sec) $V = \text{Form 4.3-5 Item 6} / \text{Item 7}$			
9 Hydraulic residence time (min) <i>Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
10 Length of flow based BMP (ft) $L = \text{Item 8} * \text{Item 9} * 60$			
11 Water surface area at water quality flow depth (ft ²) $SA_{top} = (\text{Item 5} + (2 * \text{Item 2} * \text{Item 6})) * \text{Item 10}$			

4.3.5 Conformance Summary

Complete Form 4.3-9 to demonstrate how on-site LID DCV is met with proposed site design hydrologic source control, infiltration, harvest and use, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)	
1	Total LID DCV for the Project DA-1 (ft ³): <i>Copy Item 7 in Form 4.2-1</i>
2	On-site retention with site design hydrologic source control LID BMP (ft ³): <i>Copy Item 30 in Form 4.3-2</i>
3	On-site retention with LID infiltration BMP (ft ³): <i>Copy Item 16 in Form 4.3-3</i>
4	On-site retention with LID harvest and use BMP (ft ³): <i>Copy Item 9 in Form 4.3-4</i>
5	On-site biotreatment with volume based biotreatment BMP (ft ³): <i>Copy Item 3 in Form 4.3-5</i>
6	Flow capacity provided by flow based biotreatment BMP (cfs): <i>Copy Item 6 in Form 4.3-5</i>
7	<p>LID BMP performance criteria are achieved if answer to any of the following is "Yes":</p> <ul style="list-style-type: none"> Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, sum of Items 2, 3, and 4 is greater than Item 1</i> Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3-5 Item 6 and Items 2, 3 and 4 are maximized</i> On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, Form 4.3-1 Items 7 and 8 were both checked yes</i>
8	<p>If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:</p> <ul style="list-style-type: none"> Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: <input type="checkbox"/> <i>Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, $V_{alt} = (Item\ 1 - Item\ 2 - Item\ 3 - Item\ 4 - Item\ 5) * (100 - Form\ 2.4-1\ Item\ 2)\%$</i> An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: <input type="checkbox"/> <i>Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed</i>

4.3.6 Hydromodification Control BMP

Use Form 4.3-10 to compute the remaining runoff volume retention, after LID BMP are implemented, needed to address HCOC, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential HCOC. Describe hydromodification control BMP that address HCOC, which may include off-site BMP and/or in-stream controls. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

Form 4.3-10 Hydromodification Control BMPs (DA 1)	
1 Volume reduction needed for HCOC performance criteria (ft ³): <i>(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1</i>	2 On-site retention with site design hydrologic source control, infiltration, and harvest and use LID BMP (ft ³): <i>Sum of Form 4.3-9 Items 2, 3, and 4 Evaluate option to increase implementation of on-site retention in Forms 4.3-2, 4.3-3, and 4.3-4 in excess of LID DCV toward achieving HCOC volume reduction</i>
3 Remaining volume for HCOC volume capture (ft ³): <i>Item 1 – Item 2</i>	4 Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft ³): <i>Existing downstream BMP may be used to demonstrate additional volume capture (if so, attach to this WQMP a hydrologic analysis showing how the additional volume would be retained during a 2-yr storm event for the regional watershed)</i>
5 If Item 4 is less than Item 3, incorporate in-stream controls on downstream waterbody segment to prevent impacts due to hydromodification <input type="checkbox"/> <i>Attach in-stream control BMP selection and evaluation to this WQMP</i>	
6 Is Form 4.2-2 Item 11 less than or equal to 5%: Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i> <ul style="list-style-type: none"> • Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site or off-site retention BMP <input type="checkbox"/> <i>BMP upstream of a waterbody segment with a potential HCOC may be used to demonstrate increased time of concentration through hydrograph attenuation (if so, show that the hydraulic residence time provided in BMP for a 2-year storm event is equal or greater than the addition time of concentration requirement in Form 4.2-4 Item 15)</i> • Increase time of concentration by preserving pre-developed flow path and/or increase travel time by reducing slope and increasing cross-sectional area and roughness for proposed on-site conveyance facilities <input type="checkbox"/> • Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California <input type="checkbox"/> 	
7 Form 4.2-2 Item 12 less than or equal to 5%: Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i> <ul style="list-style-type: none"> • Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site or off-site retention BMPs <input type="checkbox"/> <i>BMPs upstream of a waterbody segment with a potential HCOC may be used to demonstrate additional peak runoff reduction through hydrograph attenuation (if so, attach to this WQMP, a hydrograph analysis showing how the peak runoff would be reduced during a 2-yr storm event)</i> • Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California <input type="checkbox"/> 	

4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, harvest and use, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance. Alternative compliance plans may include one or more of the following elements:

- On-site structural treatment control BMP - All treatment control BMP should be located as close to possible to the pollutant sources and should not be located within receiving waters;
- Off-site structural treatment control BMP - Pollutant removal should occur prior to discharge of runoff to receiving waters;
- Urban runoff fund or In-lieu program, if available

Depending upon the proposed alternative compliance plan, approval by the executive officer may or may not be required (see Section 6 of the TGD for WQMP).

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMP included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and may require a Maintenance Agreement (consult the jurisdiction's LIP). If a Maintenance Agreement is required, it must also be attached to the WQMP.

Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)			
BMP	Responsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
INF-7	Owner	Quarterly inspection of the ConTech CMP Underground Infiltration system is recommended. Accumulated sediment is removed and the system is cleaned out if necessary to ensure optimum performance. Clean out is recommended to be scheduled during dry weather. Accumulated sediment and trash can typically be evacuated through the manhole over the out orifice. Please refer to the attached "Contech CMP Underground Storm Water Detention and Retention Systems Maintenance" for detailed instructions.	Quarterly (Prior to the start of rainy season [October 1st])
PRE-2	Owner	Quarterly inspection of catch basin filter inserts is recommended. Accumulated sediment and trash is removed and the system is cleaned out if necessary to ensure optimum performance. Clean out is recommended to be scheduled during dry weather. Accumulated sediment and trash can typically be evacuated through the manhole. Please refer to the attached "Grate Inlet Skimmer Box" for detailed instructions.	Quarterly (Prior to the start of rainy season [October 1st])
N3	Owner	Landscape maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with County guidelines for use of fertilizers and pesticides. Maintenance includes mowing, weeding, and debris removal	Weekly

		on a weekly basis.	
N5	Owner	Verify compliance annually with Title 22 of the California Code of Regulations (CCR) and relevant sections of the California Health & Safety Code regarding hazardous waste management.	Annually (Prior to the start of rainy season [October 1st])
N10	Owner	Verify compliance annually with Article 80 of the Uniform Fire Code enforced by the fire protection agency.	Annually (Prior to the start of rainy season [October 1st])
N14	Owner	All on-site catch basin inlets, ribbon gutters, and curb and gutters shall be inspected and cleaned out by the owner at least once prior to the storm season, no later than October 1st each year.	Annually (Prior to the start of rainy season [October 1st])
N15	Owner	The owner shall have vacuum sweeping of private streets and parking lots on a weekly basis or whenever necessary.	Weekly
S1	Owner	Stencils and signage will be inspected for legibility at least once prior to the storm season, no later than October 1st each year.	Annually (Prior to the start of rainy season [October 1st])