Project Specific
Preliminary Water Quality Management Plan

For: **The Wren** (**APN 670-110-043)**
Cathedral City, CA 92234

DEVELOPMENT NO. E-XXXX
DESIGN REVIEW NO.

Prepared for:

Coachella Valley Community Development Group, Inc.
36101 Bob Hope Drive, Ste. E5
Rancho Mirage, CA 92270
Telephone: 626-277-6782

Prepared by:

Keith A. Christiansen P.E.
Christiansen & Company
5225 Canyon Crest Drive, Ste. 251
Riverside, California 92507
Telephone: 951-323-4713

Original Date Prepared: October 11, 2023

Revision Date(s):

OWNER'S CERTIFICATION

This project-specific Water Quality Management Plan (WQMP) has been prepared for:

Stefan Vogel
by **Keith A. Christiansen**
for the project known as The Wren, APN 670-110-043

This WQMP is intended to comply with the requirements of Cathedral City for APN 670-110-043, which includes the requirement for the preparation and implementation of a project-specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Cathedral City Water Quality Ordinance (Municipal Code Section CCMC Title 15.10).

If the undersigned transfers its interest in the subject property/project, the undersigned shall notify the successor in interest of its responsibility to implement this WQMP.

"I, the undersigned, certify under penalty of law that I am the owner of the property that is the subject of this WQMP, and that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

_____
Owner's Signature

Stefan Vogel
Owner's Printed Name

President
Owner's Title/Position

_____
Date

Stefan Vogel
36101 Bob Hope Drive, Ste. E5
Rancho Mirage, CA 92270
Telephone: 626-277-6782

ATTEST

_____
Notary Signature

_____
Printed Name

_____
Title/Position

_____
Date

THIS FORM SHALL BE NOTARIZED BEFORE ACCEPTANCE OF THE FINAL PROJECT SPECIFIC WQMP

Date: 10/11/23

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TABLES

APPENDICES

I. Project Description

Project Owner: **Stefan Vogel**
36101 Bob Hope Drive, Ste. E5
Rancho Mirage, CA 92270
Telephone: 626-277-6782

WQMP Preparer: Keith A. Christiansen P.E.
5225 Canyon Crest drive, Ste. 251
Riverside, California 92507
Telephone: 951-323-4713

Project Site Address:	**XXXXX Rosemount Avenue** **Cathedral City, CA 92234**
Planning Area/ Community Name/ Development Name:	The Wren
APN Number(s):	670-110-043
Latitude & Longitude:	33°49'39.9"N 116°27'24.6"W
Receiving Water:	**Whitewater River Channel,** **Coachella Valley Stormwater Channel**
Project Site Size:	10.48 ac.

Standard Industrial Classification (SIC) Code: **7000, 7011**

Formation of Home Owners' Association (HOA)
or Property Owners Association (POA): Y ☒ N ☐

Additional Permits/Approvals required for the Project:

AGENCY	Permit required
State Department of Fish and Wildlife, Fish and Game Code §1602 Streambed Alteration Agreement	Y ☐ N ☒
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Certification	Y ☐ N ☒
US Army Corps of Engineers, CWA Section 404 permit	Y ☐ N ☒
US Fish and Wildlife, Endangered Species Act Section 7 biological opinion	Y ☐ N ☒
Statewide Construction General Permit Coverage	Y ☒ N ☐
Statewide Industrial General Permit Coverage	Y ☒ N ☐
Other *(please list in the space below as required)* City of Cathedral City, Grading, Construction and Encroachment Permits.	

The Wren (APN 670-110-043) site is located at the northeast corner of Date Palm Drive and Rosemount Avenue in the City of Cathedral City, Ca. The existing site is vacant and approximately 10.48 acres. No offsite flows enter the site. Date Palm drive is an existing full width (43' curb to curb and 20' landscape area) and all flows within Date Palm Drive are isolated within the existing street section. Therefore, flows to Date Palm drive are not altered or added to. Rosemount Avenue along the south has a small portion of existing improvements (approximately 180' along the easterly frontage of said project. All flows from the intersection of Date Palm and Rosemount Avenue traverse easterly to the existing street improvements to the east.

The Wren proposed site shall be comprised of 12 Apartment buildings, clubhouse with pool, asphalt parking, landscaping, curbs, gutters and 5 storm drain systems (62.50 impervious surface) over 10.48 acres. All flows within the project are directed to the proposed project retention basin located along the easterly property line of the project site.

Appendix A of this project-specific WQMP includes a complete copy of the final Conditions of Approval. Appendix B of this project-specific WQMP includes:

a. A Vicinity Map identifying the project site and surrounding planning areas in sufficient detail; and

b. A Site Plan for the project. The Site Plan included as part of Appendix B depicts the following project features:

- Location and identification of all structural BMPs, including Source Control, LID/Site Design and Treatment Control BMPs.
- Landscaped areas.
- Paved areas and intended uses (i.e., parking, outdoor work area, outdoor material storage area, sidewalks, patios, tennis courts, etc.).
- Number and type of structures and intended uses (i.e., buildings, tenant spaces, dwelling units, community facilities such as pools, recreation facilities, tot lots, etc.).
- Infrastructure (i.e., streets, storm drains, etc.) that will revert to public agency ownership and operation.
- Location of existing and proposed public and private storm drainage facilities (i.e., storm drains, channels, basins, etc.), including catch basins and other inlets/outlet structures. Existing and proposed drainage facilities should be clearly differentiated.
- Location(s) of Receiving Waters to which the project directly or indirectly discharges.
- Location of points where onsite (or tributary offsite) flows exit the property/project site.
- Delineation of proposed drainage area boundaries, including tributary offsite areas, for each location where flows exit the project site and existing site (where existing site flows are required to be addressed). Each tributary area should be clearly denoted.
- Pre- and post-project topography.

Appendix I is a one page form that summarizes pertinent information relative to this project-specific WQMP.

II. Site Characterization

Land Use Designation or Zoning: **Residential**

Current Property Use: **Vacant**

Proposed Property Use: **Residential**

Availability of Soils Report: Y ☒ N ☐ *Note: A soils report is required if infiltration BMPs are utilized. Attach report in Appendix E.*

Phase 1 Site Assessment: Y ☐ N ☒ *Note: If prepared, attached remediation summary and use restrictions in Appendix H.*

Receiving Waters for Urban Runoff from Site

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use Designated Receiving Waters
WHITEWATER RIVER CHANNEL	None	MUN, AGR, GWR, REC1, REC2, COLD, WILD AND POW, intermittent WARM	3.14 MILES
COACHELLA VALLEY STORM WATER CHANNEL	Indicator Bacteria (pathogens), Pesticides (Toxaphene. Dieldrin, DDT) Organic Compounds (PCB'S), Nitrogen-ammonia (nutrients), Toxicity – source unknown	FRSH, REC I, REC II, WARM WILD, RARE	0 MILES

III. Pollutants of Concern

Table 1. Pollutant of Concern Summary

Pollutant Category	Potential for Project and/or Existing Site	Causing Receiving Water Impairment
Bacteria/Virus	YES	YES
Metals	YES	NO
Nutrients	YES	YES
Toxic Organic Compounds	NO	YES
Sediment/Turbidity	YES	NO
Trash & Debris	YES	NO
Oil & Grease	YES	NO
Other (specify pollutant):		
Other (specify pollutant):		

Note: PCBs are a toxic organic but not expected to be present or discharged from this site.

IV. Hydrologic Conditions of Concern

Local Jurisdiction Requires On-Site Retention of Urban Runoff:

Yes ☒ The project will be required to retain urban runoff onsite in conformance with local ordinance (See Table 6 of the WQMP Guidance document, "Local Land use Authorities Requiring Onsite Retention of Stormwater"). This section does not need to be completed; however, retention facility design details and sizing calculations must be included in Appendix F.

No ☐ This section must be completed.

This Project meets the following condition:

☐ **Condition A**: 1) Runoff from the Project is discharged directly to a publicly-owned, operated and maintained MS4 or engineered and maintained channel, 2) the discharge is in full compliance with local land use authority requirements for connections and discharges to the MS4 (including both quality and quantity requirements), 3) the discharge would not significantly impact stream habitat in proximate Receiving Waters, **and** 4) the discharge is authorized by the local land use authority.

☐ **Condition B**: The project disturbs less than 1 acre and is not part of a larger common plan of development that exceeds 1 acre of disturbance. The disturbed area calculation must include all disturbances associated with larger plans of development.

☐ **Condition C**: The project's runoff flow rate, volume, velocity and duration for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour and 10-year 24-hour rainfall events. This condition can be achieved by, where applicable, complying with the local land use authority's on-site retention ordinance, or minimizing impervious area on a site and incorporating other Site-Design BMP concepts and LID/Site Design BMPs that assure non-exceedance of pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the local land use authority.

☐ **None:** Refer to Section 3.4 of the Whitewater River Region WQMP Guidance document for additional requirements.

Supporting engineering studies, calculations, and reports are included in Appendix C.

	2 year – 24 hour		10 year – 24 hour	
	Precondition	**Post-condition**	**Precondition**	**Post-condition**
Discharge (cfs)				
Velocity (fps)				
Volume (cubic feet)				
Duration (minutes)				

V. Best Management Practices

This project implements Best Management Practices (BMPs) to address the Pollutants of Concern that may potentially be generated from the use of the Project Site. These BMPs have been selected and implemented to comply with Section 3.5 of the WQMP Guidance document, and consist of Site Design BMP concepts, Source Control, LID/Site Design and, if/where necessary, Treatment Control BMPs as described herein.

V.1 Site Design BMP Concepts, LID/Site Design and Treatment Control BMPs

Local Jurisdiction Requires On-Site Retention of Urban Runoff:

Yes ☒ The project will be required to retain Urban Runoff onsite in conformance with local ordinance (See Table 6 of the WQMP Guidance document, "Local Land use Authorities Requiring Onsite Retention of Stormwater). **The LID/Site Design measurable goal has thus been met (100%), and Sections V.1.A and V.1.B do not need to be completed**; however, retention facility design details and sizing calculations must be included in Appendix F, and '100%' should be entered into Column 3 of Table 6 below.

No ☐ Section V.1 must be completed.

This section of the Project-Specific WQMP documents the LID/Site Design BMPs and, if/where necessary, the Treatment Control BMPs that will be implemented on the project to meet the requirements detailed within Section 3.5.1 of the WQMP Guidance document. Section 3.5.1 includes requirements to implement Site Design Concepts and BMPs, and includes requirements to address Pollutants of Concern with BMPs. Further, sub-section 3.5.1.1 specifically requires that Pollutants of Concern be addressed with LID/Site Design BMPs to the extent feasible.

LID/Site Design BMPs are those BMPs listed within Table 2 below which promote retention and/or feature a natural treatment mechanism; off-site and regionally-based BMPs are also LID/Site Design BMPs, and therefore count towards the measurable goal, if they fit these criteria. This project incorporates LID/Site Design BMPs to fully address the Treatment Control BMP requirement where and to the extent feasible. If and where it has been acceptably demonstrated to the local land use authority that it is infeasible to fully meet this requirement with LID/Site Design BMPs, Section V.1.B (below) includes a description of the conventional Treatment Control BMPs that will be substituted to meet the same requirements.

In addressing Pollutants of Concern, BMPs are selected using Table 2 below.

Table 2. BMP Selection Matrix Based Upon Pollutant of Concern Removal Efficiency (1)

(Sources: Riverside County Flood Control & Water Conservation District Design Handbook for Low Impact Development Best Management Practices, dated September 2011, the Orange County Technical Guidance Document for Water Quality Management Plans, dated May 19, 2011, and the Caltrans Treatment BMP Technology Report, dated April 2010 and April 2008)

Pollutant of Concern	Landscape Swale[2, 3]	Landscape Strip[2, 3]	Biofiltration (with underdrain)[2, 3]	Extended Detention Basin[2]	Sand Filter Basin[2]	Infiltration Basin[2]	Infiltration Trench[2]	Permeable Pavement[2]	Bioretention (w/o underdrain)[2, 3]	Other BMPs Including Proprietary BMPs[4, 6]
Sediment & Turbidity	M	M	H	M	H	H	H	H	H	Varies by Product[5]
Nutrients	L/M	L/M	M	L/M	L/M	H	H	H	H	
Toxic Organic Compounds	M/H	M/H	M/H	L	L/M	H	H	H	H	
Trash & Debris	L	L	H	H	H	H	H	L	H	
Bacteria & Viruses (also: Pathogens)	L	M	H	L	M	H	H	H	H	
Oil & Grease	M	M	H	M	H	H	H	H	H	
Heavy Metals	M	M/H	M/H	L/M	M	H	H	H	H	

Abbreviations:

L: Low removal efficiency M: Medium removal efficiency H: High removal efficiency

Notes:

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

(2) Expected performance when designed in accordance with the most current edition of the document, "Riverside County, Whitewater River Region Stormwater Quality Best Management Practice Design Handbook".

(3) Performance dependent upon design which includes implementation of thick vegetative cover. Local water conservation and/or landscaping requirements should be considered; approval is based on the discretion of the local land use authority.

(4) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP (including proprietary filters, hydrodynamic separators, inserts, etc.), or newly developed/emerging stormwater treatment technologies.

(5) Expected performance should be based on evaluation of unit processes provided by BMP and available testing data. Approval is based on the discretion of the local land use authority.

(6) When used for primary treatment as opposed to pre-treatment, requires site-specific approval by the local land use authority.

V.1.A SITE DESIGN BMP CONCEPTS AND LID/SITE DESIGN BMPS

This section documents the Site Design BMP concepts and LID/Site Design BMPs that will be implemented on this project to comply with the requirements detailed in Section 3.5.1 of the WQMP Guidance document.

- Table 3 herein documents the implementation of the Site Design BMP Concepts described in sub-sections 3.5.1.3 and 3.5.1.4.
- Table 4 herein documents the extent to which this project has implemented the LID/Site Design goals described in sub-section 3.5.1.1.

Table 3. Implementation of Site Design BMP Concepts

Design Concept	Technique	Specific BMP	Included			Brief Reason for BMPs Indicated as No or N/A
			Yes	No	N/A	
Site Design BMP Concept 1	**Minimize Urban Runoff, Minimize Impervious Footprint, and Conserve Natural Areas** **(See WQMP Section 3.5.1.3)**	Conserve natural areas by concentrating or clustering development on the least environmentally sensitive portions of a site while leaving the remaining land in a natural, undisturbed condition.	☒	☐	☐	
		Conserve natural areas by incorporating the goals of the Multi-Species Habitat Conservation Plan or other natural resource plans.	☒	☐	☐	
		Preserve natural drainage features and natural depressional storage areas on the site.	☒	☐	☐	
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☒	☐	☐	
		Use natural drainage systems.	☐	☒	☐	Utilize Retention Basin
		Where applicable, incorporate Self-Treating Areas	☒	☐	☐	Depressed landscaping when available
		Where applicable, incorporate Self-Retaining Areas	☒	☐	☐	Depressed landscaping when available
		Increase the building floor to area ratio (i.e., number of stories above or below ground).	☒	☐	☐	
		Construct streets, sidewalks and parking lot aisles to minimum widths necessary, provided that public safety and a walkable environment for pedestrians are not compromised.	☒	☐	☐	
		Reduce widths of streets where off-street parking is available.	☐	☐	☒	Existing Street
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	☒	☐	☐	

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		Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it addresses site design concept).	☒	☐	☐	All onsite post drainage to Retention Basin

Table 3. Site Design BMP Concepts (continued)

Design Concept	Technique	Specific BMP	Included			Brief Reason for Each BMP Indicated as No or N/A
			Yes	No	N/A	
Site Design BMP Concept 2	**Minimize Directly Connected Impervious Area (See WQMP Section 3.5.1.4)**	Design residential and commercial sites to contain and infiltrate roof runoff, or direct roof runoff to landscaped swales or buffer areas.	☒	☐	☐	
		Drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	☒	☐	☐	
		Incorporate landscaped buffer areas between sidewalks and streets.	☒	☐	☐	
		Use natural or landscaped drainage swales in lieu of underground piping or imperviously lined swales.	☒	☐	☐	
		Where soil conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.	☐	☒	☐	Retention Basin
		Maximize the permeable area by constructing walkways, trails, patios, overflow parking, alleys, driveways, low-traffic streets, and other low-traffic areas with open-jointed paving materials or permeable surfaces such as pervious concrete, porous asphalt, unit pavers, and granular materials.	☐	☐	☒	Majority of site allows drainage to continue historically
		Use one or more of the following:				
		Rural swale system: street sheet flows to landscaped swale or gravel shoulder, curbs used at street corners, and culverts used under driveways and street crossings.	☐	☐	☒	Existing Streets
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to landscaped swale or biofilter.	☐	☒	☐	All onsite post drainage to Retention Basin
		Dual drainage system: first flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder; high flows connect directly to MS4s.	☐	☒	☐	All onsite post drainage to onsite Retention Basin

Design Concept	Technique	Specific BMP	Included			Brief Reason for Each BMP Indicated as No or N/A
			Yes	No	N/A	
		Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it addresses site design concept).	☒	☐	☐	All onsite post-development drainage flows into the on-site Retention/Infiltration Basins
		Use one or more of the following for design of driveways and private residential parking areas:				
		Design driveways with shared access, flared (single lane at street), or wheel strips (paving only under the tires).	☐	☒	☐	No shared Driveways
		Uncovered temporary or guest parking on residential lots paved with a permeable surface, or designed to drain into landscaping.	☒	☐	☐	

Table 3. Site Design BMP Concepts (continued)

Design Concept	Technique	Specific BMP	Included			Brief Reason for Each BMP Indicated as No or N/A
			Yes	No	N/A	
Site Design BMP Concept 2 (cont'd)	**Minimize Directly Connected Impervious Area (See WQMP Section 3.5.1.4)**	Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it addresses site design concept).	☒	☐	☐	All onsite drainage to onsite Retention Basin.
		Use one or more of the following for design of parking areas:				
		Where landscaping is proposed in parking areas, incorporate parking area landscaping into the drainage design.	☒	☐	☐	
		Overflow parking (parking stalls provided in excess of the Permittee's minimum parking requirements) may be constructed with permeable pavement.	☐	☐	☒	No. Blowsand area. Excessive maintenance
		Other comparable and equally effective Site Design BMP (or BMPs) as approved by the local land use authority (Note: Additional narrative required describing BMP and how it addresses site design concept).	☒	☐	☐	All onsite drainage to onsite Retention Basin.

Project Site Design BMP Concepts:

Site Design Concept 1

Conserve natural areas by concentrating on cluster development on the least sensitive portions of the site while leaving the remaining land in a natural, undisturbed condition- Yes
Conserve natural areas by incorporating the goals of the multi-species habitat conservation plan or other natural resource plan- Yes.
Preserve natural drainage features and natural depressional storage areas- Yes
Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs- Yes. Plant additional native trees and shrubs.
Use natural drainage systems- Yes. Majority of site allows historical drainage pattern
Where applicable, incorporate self-treating areas- Yes. Depressed landscape where available
Where applicable, incorporate self-retaining areas- Yes. Depressed landscape where available
Increase the building floor ratio- Yes. Two stories.
Construct streets, sidewalks and parking lot aisles to minimum width necessary- N/A. Existing Street
Reduce widths of streets where off-street parking is available- N/A. Existing Street
Minimize the use of impervious surfaces, such as decorative concrete in the landscape design- Yes Decorative concrete utilized. Openings in concrete
Other comparable and equally effective site design bmp as approved by the permittee- Yes. Retention Basin utilized.

Site Design Concept 2

Design residential and commercial sites to contain and infiltrate roof runoff, or direct roof runoff to landscaped swales or buffer areas. Yes. All onsite post drainage to Retention Basin.
Drain impervious sidewalks into adjacent landscaping- Yes. Runoff from sidewalks and walkways shall drain towards landscaping where possible.
Incorporate landscape buffer areas between sidewalks and streets- N/A. Existing Street
Where soil conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration- Yes. All onsite post drainage Retention basin.
Maximize the permeable area by constructing walkways, trails, patios, overflow parking, alleys, driveways, low-traffic streets and other low traffic areas with open jointed paving materials or permeable surfaces such as pervious concrete, porous asphalt, unit pavers and granular materials- Yes. Landscape areas have been increased.
Rural swale system: street sheet flows to landscaped swale or gravel shoulder, curbs used at street corners, and culverts used under driveways and street crossings. N/A. Existing Street.
Urban curb/swale system: street slopes to curb; periodic swale inlets drain to landscaping swale or biofilter. N/A. Existing Street
Dual drainage system: first flush captured and discharged to adjacent vegetated swale or gravel shoulder No. All onsite post drainage to Retention Basin.
Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it is addresses site design concept. Post Drainage to Retention basin for storm water retention.
Design driveways with shared access- No shared driveways.
Uncovered temporary or quest parking on residential lots paved with a permeable surface, or designed to drain into landscaping- Yes. Drainage to landscaping where possible.

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Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it is addresses site design concept). Retention Basin shall contain all first flush and incremental volumes.

Where landscaping is proposed in parking areas, incorporate parking area landscaping into the drainage design- Yes. Landscape areas to be depressed where feasible.
Overflow parking (parking stalls provided in excess of the permittee's minimum parking requirements) may be constructed with permeable pavement- No overflow parking.

Other comparable and equally effective Site Design BMP concept(s) as approved by the local land use authority (Note: Additional narrative required to describe BMP and how it is addresses site design concept). Onsite Retention Basin shall contain all first flush and incremental volumes.

BMP	IMPLEMENTATION	MAINTENANCE & INSPECTION REQUIREMENTS	MAINTENANCE & INSPECTION FREQUENCY
Retention Basin	OCCUPANCY	REFER TO SECTION VI	REFER TO SECTION VI

Alternative Project Site Design BMP Concepts:

N/A

Table 4. LID/Site Design BMPs Meeting the LID/Site Design Measurable Goal

(1) DRAINAGE SUB-AREA ID OR NO.	(2) LID/SITE DESIGN BMP TYPE* (See Table 2)	(3) POTENTIAL POLLUTANTS OF CONCERN WITHIN DRAINAGE SUB-AREA (Refer to Table 1)	(4) POTENTIAL POLLUTANTS WITHIN SUB-AREA CAUSING RECEIVING WATER IMPAIRMENTS (Refer to Table 1)	(5) EFFECTIVENESS OF LID/SITE DESIGN BMP AT ADDRESSING IDENTIFIED POTENTIAL POLLUTANTS (U, L, M, H/M, H; see Table 2)	(6) BMP MEETS WHICH DESIGN CRITERIA? (Identify as V_{BMP} OR Q_{BMP})	(7) TOTAL AREA WITHIN DRAINAGE SUB-AREA (Nearest 0.1 acre)
DMA1	RETENTION/INFILTRATION BASIN	BACTERIA, VIRUS	NONE	H/M	VBMP	10.48
TOTAL PROJECT AREA TREATED WITH LID/SITE DESIGN BMPs (NEAREST 0.1 ACRE)						10.48

*** LID/Site Design BMPs listed in this table are those that completely address the 'Treatment Control BMP requirement' for their drainage sub-area.**

Justification of infeasibility for sub-areas not addressed with LID/Site Design BMPs

N/A

V.1.B TREATMENT CONTROL BMPS

Conventional Treatment Control BMPs shall be implemented to address the project's Pollutants of Concern as required in WQMP Section 3.5.1 where, and to the extent that, Section V.1.A has demonstrated that it is infeasible to meet these requirements through implementation of LID/Site Design BMPs.

☒ The LID/Site Design BMPs described in Section V.1.A of this project-specific WQMP completely address the 'Treatment Control BMP requirement' for the entire project site (and where applicable, entire existing site) as required in Section 3.5.1.1 of the WQMP Guidance document. Supporting documentation for the sizing of these LID/Site Design BMPs is included in Appendix F. ***Section V.1.B does not need to be completed**.

☐ The LID/Site Design BMPs described in Section V.1.A of this project-specific WQMP do **NOT** completely address the 'Treatment Control BMP requirement' for the entire project site (or where applicable, entire existing site) as required in Section 3.5.1.1 of the WQMP. ***Section V.1.B must be completed.**

The Treatment Control BMPs identified in this section are selected, sized and implemented to treat the design criteria of V_{BMP} and/or Q_{BMP} for all project (and if required, existing site) drainage sub-areas which were not fully addressed using LID/Site Design BMPs. Supporting documentation for the sizing of these Treatment Control BMPs is included in Appendix F.

Table 5: Treatment Control BMP Summary

(1) DRAINAGE SUB-AREA ID OR NO.	(2) TREATMENT CONTROL BMP TYPE* (See Table 2)	(3) POTENTIAL POLLUTANTS OF CONCERN WITHIN DRAINAGE SUB-AREA (Refer to Table 1)	(4) POTENTIAL POLLUTANTS WITHIN SUB-AREA CAUSING RECEIVING WATER IMPAIRMENTS (Refer to Table 1)	(5) EFFECTIVENESS OF TREATMENT CONTROL BMP AT ADDRESSING IDENTIFIED POTENTIAL POLLUTANTS (U, L, M, H/M, H; see Table 2)	(6) BMP MEETS WHICH DESIGN CRITERIA? (Identify as V_{BMP} OR Q_{BMP})	(7) TOTAL AREA WITHIN DRAINAGE SUB-AREA (Nearest 0.1 acre)
	TOTAL PROJECT AREA TREATED WITH TREATMENT CONTROL BMPs (NEAREST 0.1 ACRE)					0

V.1.C MEASURABLE GOAL SUMMARY

This section documents the extent to which this project has met the measurable goal described in WQMP Section 3.5.1.1 of addressing 100% of the project's 'Treatment Control BMP requirement' with LID/Site Design BMPs. Projects required to retain Urban Runoff onsite in conformance with local ordinance are considered to have met the measurable goal; for these instances, '100%' is entered into Column 3 of the Table.

Table 6: Measurable Goal Summary

(1) Total Area Treated with LID/Site Design BMPs (Last row of Table 4)	(2) Total Area Treated with Treatment Control BMPs (Last row of Table 5)	(3) % of Treatment Control BMP Requirement addressed with LID/Site Design BMPs
10.48	0	100%

V.2 SOURCE CONTROL BMPS

This section identifies and describes the Source Control BMPs applicable and implemented on this project.

Table 7. Source Control BMPs

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	☒	☐	
Activity Restrictions	☒	☐	
Irrigation System and Landscape Maintenance	☒	☐	
Common Area Litter Control	☒	☐	
Street Sweeping Private Streets and Parking Lots	☒	☐	
Drainage Facility Inspection and Maintenance	☒	☐	
Structural Source Control BMPs			
Storm Drain Inlet Stenciling and Signage	☒	☐	
Landscape and Irrigation System Design	☒	☐	
Protect Slopes and Channels	☒	☐	
Provide Community Car Wash Racks	☒	☐	
Properly Design*:			
Fueling Areas	☐	☒	none on site
Air/Water Supply Area Drainage	☐	☒	none on site
Trash Storage Areas	☒	☐	
Loading Docks	☐	☒	none on site
Maintenance Bays	☐	☒	none on site
Vehicle and Equipment Wash Areas	☒	☐	
Outdoor Material Storage Areas	☐	☒	none on site
Outdoor Work Areas or Processing Areas	☐	☒	none on site
Provide Wash Water Controls for Food Preparation Areas	☒	☐	

*Details demonstrating proper design must be included in Appendix F.

NON STRUCTURAL SOURCE CONTROL BMP'S

1. BMP Educational Materials are included in Appendix D of this document and are available to the property owner and construction employees for BMP measures
2. Operational Activity shall be restricted to the confines of the project site. The Retention Basin shall be inspected and cleaned after every storm event. All cleaning of debris from grounds shall be on a weekly basis.
3. Irrigation system shall be maintained so as to minimize overspray and over-watering. All landscaping shall be maintained to accept proper watering methods and irrigation containment. Landscape maintenance waste shall be properly collected and disposed of to prevent discharges of waste into adjacent properties.
4. Litter shall be contained in designated trash enclosures.
5. Sweeping of private driveway shall be maintained by the Owner. Street Sweeping Maintenance shall commence at time of Occupancy and shall be weekly and after every storm event.

STRUCTURAL SOURCE CONTROL BMP'S

1. Where landscaping is proposed the landscaping shall be drought tolerant with minimal irrigation required. Irrigation shall be designed for minimal overspray and runoff.
2. There are no channels on the property.
3. There are no Fueling Areas on the property.
4. All trash enclosures are onsite and private
5. There are no Loading Docks on this expansion property.
6. There are no Maintenance Bays on the property.
7. There are no Vehicle and Equipment Wash areas.
8. There are no Material Storage Areas on the property.
9. There are no Outdoor Work Areas or Processing Areas on this property.
10. There are Food Preparation areas on this property

Appendix D includes copies of the educational materials (described in Section 3.5.2.1 of the WQMP Guidance document) that will be used in implementing this project-specific WQMP.

V.3 EQUIVALENT TREATMENT CONTROL BMP ALTERNATIVES

N/A

V.4 REGIONALLY-BASED BMPS

N/A

VI. Operation and Maintenance Responsibility for BMPs

Appendix G of this project-specific WQMP includes copies of CC&Rs, Covenant and Agreements, BMP Maintenance Agreement and/or other mechanisms used to ensure the ongoing operation, maintenance, funding, transfer and implementation of the project-specific WQMP requirements.

Maintenance of the retention basins and all Source Control BMPs shall be the responsibility of the property owner. Individual lots will be transferred from owner to owner.

Responsible parties for all maintenance and upkeep:

Coachella Valley Development Group Inc.
36101 Bob Hope Drive, Ste. E5
Rancho Mirage, CA 92270
Telephone: 626-277-6782
Contact: Stefan Vogel

Prior to occupancy the funding source, Coachella Valley Development Group Inc., must enter into a Maintenance Agreement with the City of Cathedral City to ensure that the property owner properly maintains all project specific BMP's as discussed and outlined in this document.

Drainage Facilities: START DATES 12/01/23

O and M Activities	Schedule and Frequency
1. Inspect, repair, and replace any broken or buried drain grates.	Inspect weekly and replace immediately.
2. Inspect and remove trash and debris from catch basin inlets, Storm Drain Mains. If sediment or trash exist remove and dispose as directed hereon. Inspect and maintain Retention Basin	Inspect prior to the rainy season (September) and after the rainy season (April). Provide Performance inspections subsequent to all rain events. Inspect Retention Basin prior to and after rain events, and clean if warranted.

Irrigation System & Landscape Maintenance: START DATES 12/01/23

O and M Activities	Schedule and Frequency
1. Inspect and repair broken sprinklers	Inspect weekly and replace immediately
2. Repair broken waterlines	Inspect daily and repair immediately
3. Inspect irrigation areas for signs of erosion and/ or discharge, also vegetation areas.	Inspect weekly repair source of erosion or discharge immediately

Street Sweeping and Vacuuming: START DATES 12/01/23

O and M Activities	Schedule and Frequency
1. Inspect storage area for tracked sediment or blow sand. Visible sediment tracking should be swept immediately	Inspect daily. Sweeping operations should occur daily.
2. Adjust brooms frequently; maximize efficiency of sweeping efforts	As needed
3. Pavement Areas	Sweep weekly and after every storm event.

Common Area Control

O and M Activities	Schedule and Frequency
1. Litter cleanup & Trash removal	Daily & As needed
2. Trash storage/ Enclosure areas	Daily & As needed

Records of all maintenance and inspections for the BMP's noted above shall be updated weekly.

Funding

Maintenance shall be provided by Coachella Valley Community Development Group, Inc., or their successor or assigns and is responsible for the proposed project improvements.

Appendix A

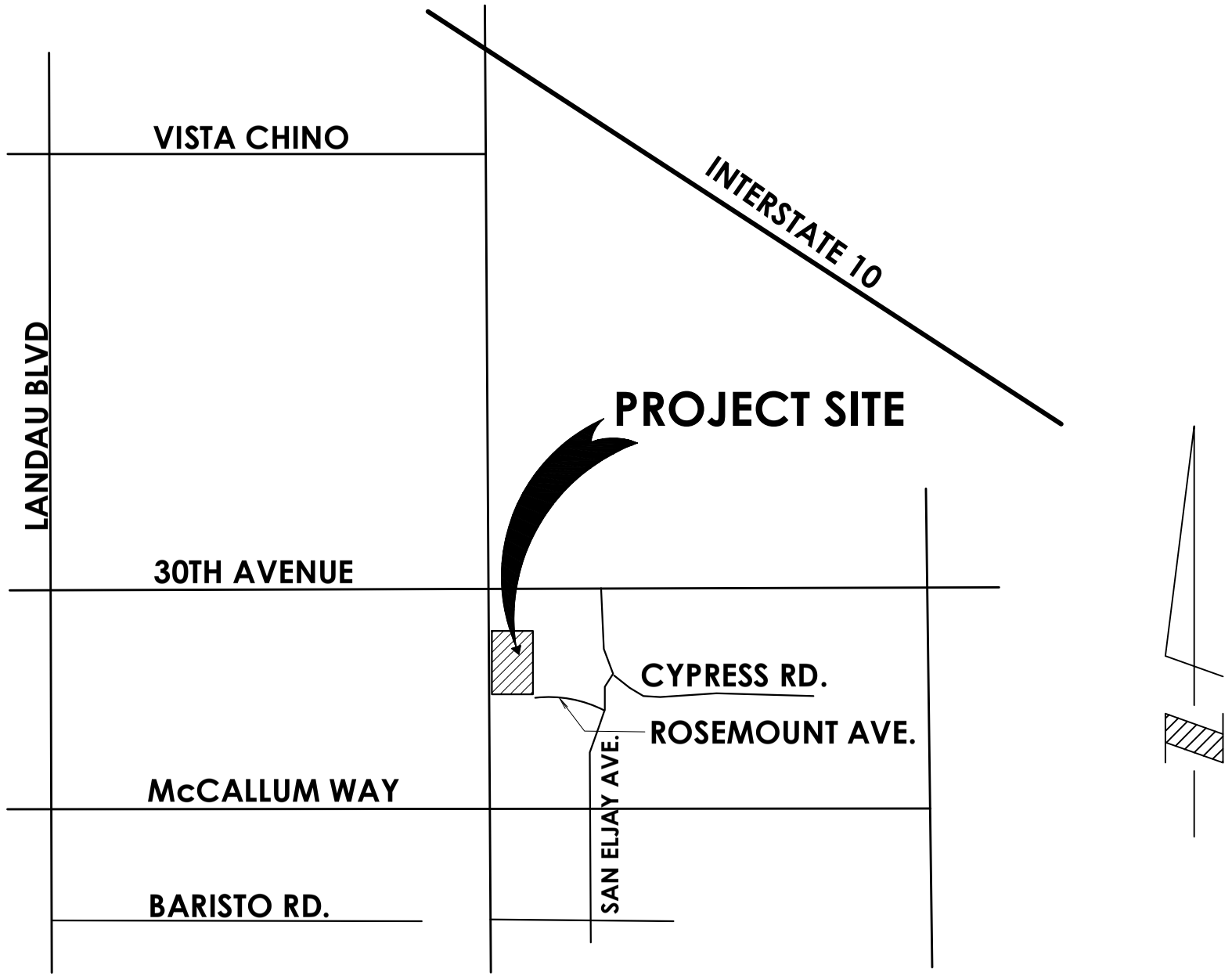
Conditions of Approval

Planning Commission Resolution XXXXX-XX XX

Dated _____

Appendix B

Vicinity Map, WQMP Site Plan, and Receiving Waters Map



VICINITY MAP

NTS

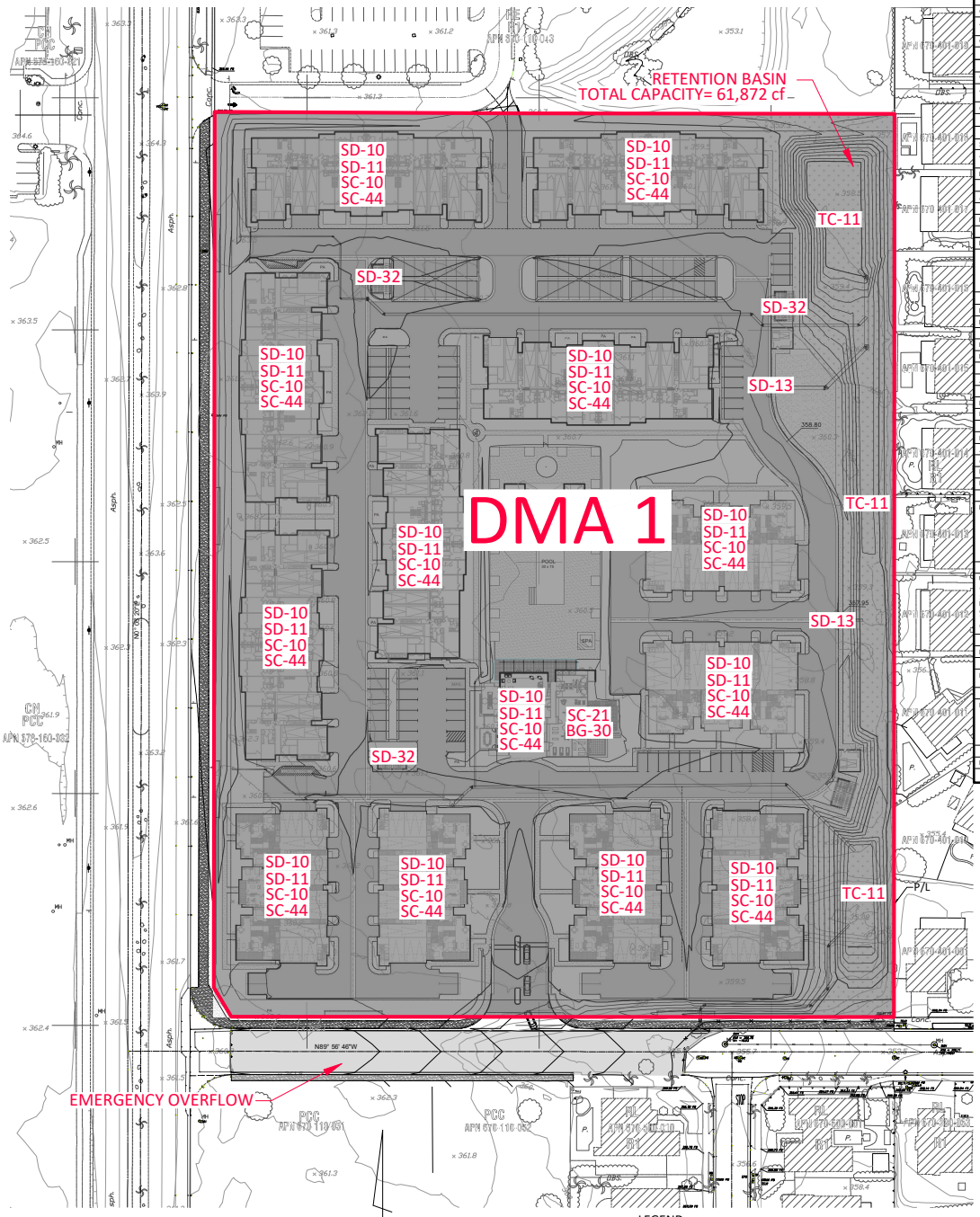
IN THE CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

WQMP SITE PLAN
THE WREN

APN 670-110-043

XXXXX ROSEMOUNT AVENUE

BEING A PORTION OF THE NORTHWEST QUARTER OF SECTION 15, TOWNSHIP 4, SOUTH, RANGE 5, EAST, S.B.B.M.



IN THE CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

WQMP SITE PLAN
THE WREN

EXHIBIT DATE: OCTOBER 6, 2023

DATA TABLE

APPLICANT:	COACHELLA VALLEY COMMUNITY DEELOPMENT GROUP, INC		
ADDRESS:	36101 BOB HOPE DRIVE, SUITE E5 RANCHO MIRAGE, CA 92270		
CONTACT:	STEFAN VOGEL	TELEPHONE:	(626) 277-6782
	email: stefan@buildbys2.com		
LAND OWNER:	DESERT CARE, LLC		
ADDRESS:	31190 CALLE CAYUGA CATHEDRAL CITY, CA 92234		
CONTACT:	STEFAN VOGEL	TELEPHONE:	(626) 277-6782
	email: stefan@buildbys2.com		
EXHIBIT PREPARER:	CHRISTIANSEN & COMPANY		
ADDRESS:	5225 CANYON CREST DRIVE, SUITE 251 RIVERSIDE, CA 92507		
CONTACT:	KEITH CHRISTIANSEN	TELEPHONE:	(951)323-4713
	email: keith@ccocivil.com		
ARCHITECT:	HUMPHREYS & PARTNERS ARCHITECTS, LP		
ADDRESS:	2350 BRISTOL STREET COSTA MESA, CA 92626		
CONTACT:	VELY ZAJEC	TELEPHONE:	(949)955-4500
	email: vely@humphreys.com		
LANDSCAPE ARCHITECT:	JSA LANDSCAPE ARCHITECT		
ADDRESS:	19146 COVENTRY LANE HUNTINGTON BEACH, CA 92646		
CONTACT:	JIM SHROPE	TELEPHONE:	(760)610-9873
	email: jshrope@outlook.com		
GEOTECHNICAL:	LANDMARK CONSULTANTS, INC.		
ADDRESS:	77-948 WILDCAT DRIVE PALM DESERT, CA 92211		
CONTACT:	GREG M. CHANDRA	TELEPHONE:	(760)360-0665
	email: gchandra@landmark-ca.com		
GEO/INFILTRATION:	SLADDEN ENGINEERING		
ADDRESS:	45090 GOLF CENTER PARKWAY INDIO, CA 92201		
CONTACT:	BRETT ANDERSON	TELEPHONE:	(760)863-0713
	email: banderson@sladdenengineering.com		
SOURCE OF TOPOGRAPHY:	INLAND AERIAL SURVEYS, INC.		
ADDRESS:	7117 ARLINGTON AVENUE, SUITE "A" RIVERSIDE, CA 92503		
DATE OF TOPOGRAPHY:	JULY 11, 2023	TELEPHONE:	(951) 687-4252

ASSESSOR'S PARCEL NUMBER: 670-110-043

PROPOSED IMPROVEMENT SCHEDULE: SCHEDULE "A"

LEGAL DESCRIPTION: PARCEL 1 OF PARCEL MAP NO. 27502, IN THE CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ON FILE IN BOOK 174, PAGES 85 AND 86 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA; EXCEPTING THEREFROM THAT PORTION WHICH LIES WITHIN THE BOUNDARIES OF PARCEL MAP NO. 34063 IN BOOK 218, PAGES 43–44, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, SAID LAND BEING SHOWN AS DESIGNATED REMAINDER ON SAID PARCEL MAP NO. 34063.

EXISTING ZONING:	PCC (PLANNED COMMUNITY COMMERCIAL)
PROPOSED ZONING:	R3 (MULTIPLE FAMILY RESIDENTIAL)
EXISTING GENERAL PLAN LAND USE:	CG (GENERAL COMMERCIAL)
PROPOSED GENERAL PLAN LAND USE:	RM (MEDIUM DENSITY RESIDENTIAL)

AREAS:

	ACREAGE:	OWNER / MAINTENANCE ENTITY:
EXISTING GROSS ACREAGE:	10.48 ACRES	
PROPOSED NET ACREAGE:	10.48 ACRES	PRIVATE
BUILDINGS (138724 SF)	3.18 ACRES	PRIVATE
ASPHALT (111774 SF)	2.57 ACRES	PRIVATE
CONCRETE (34951 SF)	0.80 ACRES	PRIVATE
LANDSCAPE (125947 SF)	2.89 ACRES	PRIVATE
RETENTION BASIN (45113 SF)	1.04 ACRES	PRIVATE

EXISTING EASEMENT NOTES:
1. AN EASEMENT FOR STREET PURPOSES IN FAVOR OF THE COUNTY OF SAN BERNARDINO AS RECORDED IN BOOK 2825 AT PAGE 265, DATED 1/1/61, REC. OF RIVERSIDE COUNTY, CA.
2. AN EASEMENT FOR PUBLIC HIGHWAY AND PUBLIC UTILITY PURPOSED IN FAVOR OF THE CITY OF CATHEDRAL CITY AS RECORDED PER INST. NO. 188899 , DATED 6/6/91, REC. OF RIVERSIDE COUNTY, CA.

UTILITY PURVEYORS:

WATER -	COACHELLA VALLEY WATER DISTRICT	PH: 760-398-2651
SEWER -	COACHELLA VALLEY WATER DISTRICT	PH: 760-398-2651
ELECTRIC -	SOUTHERN CALIFORNIA EDISON	PH: 760-202-4252
GAS -	SOUTHERN CALIFORNIA GAS COMPANY	PH: 800-427-2200
TELEPHONE -	FRONTIER	PH: 760-864-1726
CABLE -	SPECTRUM	PH: 760-346-3714

LIQUEFACTION: NO LIQUEFACTION AREA

FEMA FLOOD ZONE DESIGNATION: ZONE X (FLOOD HAZARD IS UNDETERMINED, BUT POSSIBLE) PER FIRM MAP NO. 06065C1579G / DATED: AUGUST 28, 2008

NOTE:
1. THIS MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
2. THERE ARE NO KNOWN WELLS ON PROPERTY OR WITHIN 200 FEET OF PROPERTY.
3. THERE ARE NO EXISTING DWELLINGS, BUILDINGS, OR OTHER STRUCTURES KNOWN ON THIS PROPERTY.
4. SUBDIVISION WILL SHOW COMPLIANCE WITH CITY/COUNTY WATER QUALITY MANAGEMENT PER A SEPARATE WQMP REPORT.

REVISIONS:	NO.	DATE:	DESCRIPTION:

WQMP DATA

DMA	AREA (AC.)	IMP%
DMA 1	10.48	62.5%

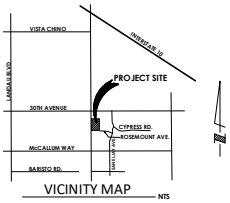
BMP DATA

BMP	DESCRIPTION
SD-10	SITE DESIGN & LANDSCAPE PLANNING
SD-11	ROOF RUNOFF CONTROLS
SD-12	EFFICIENT IRRIGATION
SD-13	STORM DRAIN SIGNAGE
SD-32	TRASH STORAGE AREAS
SC-10	NON-STORMWATER DISCHARGES
SC-21	VEHICLE AND EQUIPMENT CLEANING
SC-41	BUILDING & GROUNDS MAINTENANCE
SC-44	DRAINAGE SYSTEM MAINTENANCE
TC-11	INFILTRATION BASIN
BG-30	FOOD SERVICE FACILITIES

LEGEND

BTM INDICATES BOTTOM
L.F. INDICATE LINEAR FEET
FL INDICATES FLOWLINE
TC INDICATES TOP OF CURB
TP INDICATES TOP OF PAVEMENT
INV. INDICATES INVERT ELEVATION
TG INDICATES TOP OF GRATE
EG INDICATES EXISTING GRADE
FS INDICATES FINISHED HARD SURFACE
FG INDICATES FINISHED DIRT
P/L INDICATES PROPERTY LINE
TF INDICATES TOP OF FOOTING
TW INDICATES TOP OF WALL
P INDICATES PLANTER
INDICATES BLOCK WALL
INDICATES DECORATIVE CONCRETE PER LANDSCAPE PLAN
INDICATES PROPOSED ASPHALT
(750) INDICATES EXISTING CONTOUR
~50~ INDICATES PROPOSED CONTOUR

SCALE: 1"= 40'



DIGALERT — DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG — TOLL FREE 811 — A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

PRIVATE ENGINEERING NOTE: CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICE, CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING THE SAFETY OF PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

UNAUTHORIZED CHANGES & USES: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THESE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

"AS BUILT"

REVISION	CHECKED BY	DATE	APPROVED BY	DATE

BENCHMARK: DATE PALM/RAMON 116 — ELEV. 363.23

LOCATION: BENCHMARK: FD. CATHEDRAL CITY BRONZE DISC. IN CONCRETE MONUMENT AT THE NE COR. OF DATE PALM DR. & RAMON RD. APPROX. 20 FEET FROM EDGES OF PAVEMENT.

REGISTERED PROFESSIONAL ENGINEER — KEITH A. CHRISTIANSEN — No. 50083 — Exp. 6/30/25 — STATE OF CALIFORNIA

PREPARED UNDER THE DIRECT SUPERVISION OF:

KEITH A. CHRISTIANSEN — R.C.E. 50083 — DATE

Christiansen & Company — Land Development · Water · Engineering — 5225 Canyon Crest Drive, Ste 251, Riverside, CA 92507, Ph: 951-323-4713, Fax: 951-405-6233, email:keith@ccocivil.com

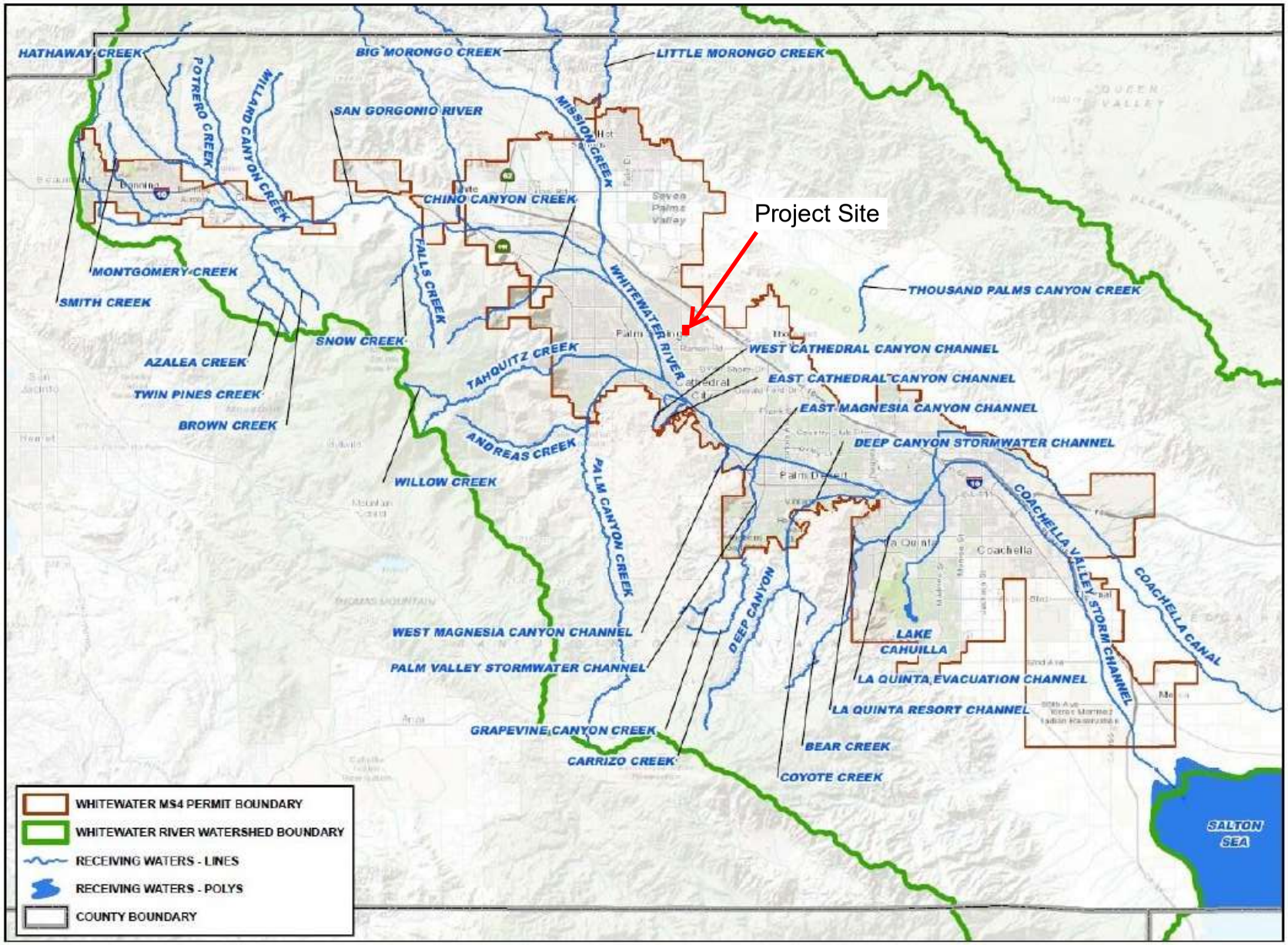
DESIGN BY:	K.A.C.
DRAWN BY:	C.A.C.
CHECKED BY:	K.A.C.

CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
WQMP SITE PLAN
THE WREN
APN 670-110-043
XXXXX ROSEMOUNT AVENUE
BEING A PORTION OF THE NORTHWEST QUARTER OF SECTION 15, TOWNSHIP 4, SOUTH, RANGE 5, EAST, S.B.B.M.

FILE NO. — DWG. NO.

SHEET 1 OF 1 SHEETS

Figure 2. Whitewater River Region Receiving Waters Map



Appendix C

Supporting Detail Related to Hydrologic Conditions of Concern

Preliminary Hydrology Study

FOR

The Wren

APN 670-110-043

Cathedral City, Ca. 92234

For: Coachella Valley Community Development Group, Inc.
36101 Bob Hope Drive, Ste. E5
Rancho Mirage, Ca. 92270
Telephone: 626-277-6782
Contact: Stefan Vogel

PREPARED BY: KEITH CHRISTIANSEN
DATE: October 2023

Christiansen & Company
5225 Canyon Crest Drive, Suite 251
Riverside, Ca. 92507

TABLE OF CONTENTS

INTRODUCTION

Preliminary Hydrology Study

FOR

The Wren

APN 670-110-043

Cathedral City, Ca. 92234

Site Description:

The Wren (APN 670-110-043) site is located at the northeast corner of Date Palm Drive and Rosemount Avenue in the City of Cathedral City, Ca. The existing site is vacant and approximately 10.48 acres. No offsite flows enter the site. Date Palm drive is an existing full width (43' curb to curb and 20' landscape area) and all flows within Date Palm Drive are isolated within the existing street section. Therefore, flows to Date Palm drive are not altered or added to. Rosemount Avenue along the south has a small portion of existing improvements (approximately 180' along the easterly frontage of said project. All flows from the intersection of Date Palm and Rosemount Avenue traverse easterly to the existing street improvements to the east.

The Wren proposed site shall be comprised of 12 Apartment buildings (204 units), clubhouse with pool, asphalt parking, landscaping, curbs, gutters and 5 storm drain systems (62.50% impervious surface) over 10.48 acres. All flows within the project are directed to the proposed project retention basin located along the easterly property line of the project site.

This study shall calculate the stormwater runoff volumes for the pre-and post-development conditions for 100yr-1hr, 3hr, 6hr and 24hr storm events. The 100yr-1hr event shall be used for all catch basin and storm drain sizing. (See Shortcut Synthetic Hydrograph Calculations and Hydrology Maps within this report

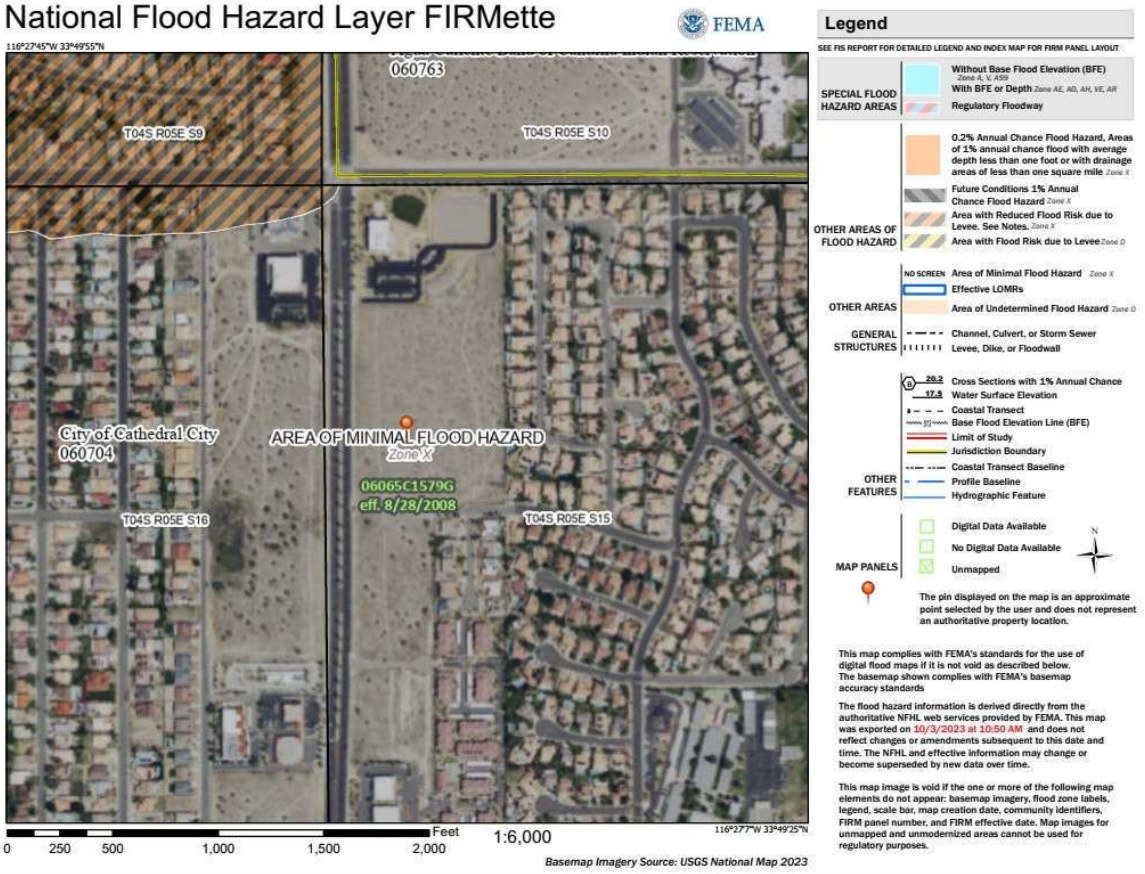
This project shall be required to retain volume from 100yr -3hr storm event for the Post development condition per the City of Cathedral City Public Works Department. Emergency overflow is provided per the southerly driveway approach (inverted section) located at the southeast corner of the property. Lastly, the project retention basin been calculated for both the WQMP BMP Design Volume Worksheet and Infiltration Basin Design. The project has ample volume per each WQMP Worksheet calculation.

Purpose of this study:

The purpose of this study is to determine the 100yr-1hr, 3hr, 6hr & 24hr runoff accumulated by the proposed project (see attached Hydrology Map). This study will analyze 100yr-3hr runoff for the proposed development for peak runoff and volume containment within the proposed lot retention basin. The report shall utilize the Shortcut Synthetic Unit Hydrograph to calculate maximum flows and volumes to the retention basin. An infiltration rate of 2"/hr shall be utilized for the retention basin storm capacity. Please note infiltration rates of 14.40 in/hr and 17.01 in/hr were measured per the Sladden Engineering Infiltration Report. Therefore, the City Ordinance maximum of 2"/hr shall be used in subsequent calculations.

Flood Rate Map

The project area is covered by FIRM Panel Number 06065C1595G and 06065C01615G, revised August 28, 2008, which indicates the project area lies within Zone X, indicating *"areas determined to be outside the 0.2%*". (See Map Below)



Existing Project Flows

Existing offsite flows from Date Palm Drive (Off1) and Rosemount Ave. (Off2) do not impact or pass through the development. The existing flow created from the vacant land (E1) drains historically northwest to southeast as noted on the Pre-Development Hydrology Map. Existing Tributary areas E1, Off1 and Off2 shall be calculated and noted on said Pre-Development Hydrology Map.

PROPOSED FLOOD CONTROL REQUIREMENTS

The drainage of this project site falls under the jurisdiction of the City of Cathedral City. Per the Master Drainage Plan for the City of Palm Desert, the peak volume for the 100yr-3hr storm is required to be retained on-site and street and associated storm drain systems are required to be sized to convey the 100-year 1-hour peak flow. Flows and volumes for T1, T1, T3, T4, T5, T6, Off1 and New Off2 shall be calculated,

Sources:

The majority soil type for this project is MaB per Web Soils Survey. This coincides with soil type "A" per RCFD&WCD.

Rainfall data for the above storm events was derived by NOAA ATLAS 14 and are as follows:

100yr-1hr : 1.93 "

100yr-3hr : 2.70"

100yr-6hr : 3.49"

100yr-24hr : 5.26"

Analysis:

In keeping with the recently accepted parameters of the City of Cathedral City, we find that per the RCFC&WCD manual the runoff index for this project will be 32, per WebSoil Survey the soil type will be "A". The development type is residential which leads us to use Plate E-6.2 when using an AMCII to acquire infiltration rate of 0.74.

Storm runoff volumes for the 100-year event were obtained utilizing the Synthetic Unit Hydrograph Shortcut Method, as described in the RCFC&WCD *Hydrology Manual*. The Short-Cut method is useful for evaluating those areas less than 100-200 acres with a lag time of less than 7 to 8 minutes. Peak flow storm rates were analyzed using the RCFCD Rational Method.

Total Vacant Area of Tributary draining to the southeast corner of the property is 10.48 acres. Offsite drainage (OFF1) from Date Palm Drive comprises 1.18 acres. Off2 from Rosemount Drive comprises 0.42 acres and E1 comprises 10.48 acres.

Total Proposed Area of Tributary draining to the proposed retention basin is 10.48 acres. Offsite drainage (OFF1) from Date Palm Drive comprises 1.18 acres. New Off2 draining to Rosemount Drive comprises 0.21acres. All proposed tributaries and the associated flows and volumes are noted below.

Low Loss Rates: 90%

HYDRAULIC CALCULATIONS

Please see highlighted values in Synthetic Unit Hydrograph (SUH).

Project Pre-development Flows (10.48 ac. -IMP%=5.0)

Pre-development

E1 – 10.48 acres – 5.0% imp.

Storm Event	Storm Volume	Max. Q
100yr-1hr	46544 cf	35.61 cfs
100yr-3hr	36112 cf	20.61 cfs
100yr-6hr	34343 cf	17.31 cfs
100yr-24hr	20687 cf	1.18 cfs

Off1 (Date Palm Drive) – 1.18 acres – 90% imp.

Storm Event	Storm Volume	Max. Q
100yr-1hr	7665 cf	4.68 cfs
100yr-3hr	9758 cf	2.99 cfs
100yr-6hr	11369 cf	2.62 cfs
100yr-24hr	12156 cf	0.54 cfs

Off2 (Rosemount Ave.) - 0.42 acres – 25.0% imp

Storm Event	Storm Volume	Max. Q
100yr-1hr	2068 cf	1.48 cfs
100yr-3hr	1745 cf	0.88 cfs
100yr-6hr	1693 cf	0.75 cfs
100yr-24hr	1000 cf	0.04 cfs

Therefore, total adjacent volume within Date Palm Drive = 12156 cf
Therefore, total volume existing to Rosemount Ave. = 46544+2068 = 48612 cf

Project Post-development Retention Basin Calculations (10.48 ac. - IMP%=62.5) – for Critical 100yr-3hr storm event

Total Developed Site – 10.48 acres – 62.5 imp% - Retention Basin Total Cap. at 5.0' depth=61872 cf

Storm Event	Storm Volume (cf)	Max. Q (cfs)	Vol. in Basin (cf)	Depth
100yr-3hr	66256	24.66	61382	4.96'

Please note that the based on the critical 100yr–3hr storm event and 2"/hr infiltration rate a maximum peak 39.66 cfs and 66256 cf shall flow into the Proposed Retention Basin. Please note the Proposed Retention Basin has a total capacity of 61872 cf at the 355.0 ft elevation (overflow point at southeasterly drive access to the retention basin. Total storm volume in the retention basin is 61382 cf (depth of 4.96') and therefore, the proposed retention basin shall contain 100% of the 100yr-3hr storm event as required by the City of Cathedral City Public Works Department.

Project Critical Post Development

Results from the 100yr – 1hr Short Cut Synthetic Unit Hydrograph analyses shall be used in the hydraulic calculations to determine inlet and storm drain pipe sizing. The storm drain system is proposed to capture and convey storm flow to the Proposed Project Retention Basin (see Post Development Hydrology Map).

T1 – Total Area = 1.81 ac – Imp%=79.4

Storm Event	Storm Volume	Max. Q (cfs)
100yr-1hr	11293 cf	7.05 cfs
100yr-3hr	13597 cf	4.46 cfs
100yr-6hr	14758 cf	3.89 cfs
100yr-24hr	14810 cf	0.72 cfs

T2 – Total Area = 1.68 ac – Imp%=81.9

Storm Event	Storm Volume	Max. Q (cfs)
100yr-1hr	10583 cf	6.58 cfs
100yr-3hr	12916 cf	4.17 cfs
100yr-6hr	14273 cf	3.64 cfs
100yr-24hr	14531 cf	0.93 cfs

T3 – Total Area = 1.94 ac – Imp%=90.0

Storm Event	Storm Volume	Max. Q (cfs)
100yr-1hr	12601 cf	7.70 cfs
100yr-3hr	16044 cf	4.92 cfs
100yr-6hr	18691 cf	4.31 cfs
100yr-24hr	19985 cf	1.16 cfs

T4 – Total Area = 3.19 ac – Imp%=78.4

Storm Event	Storm Volume	Max. Q (cfs)
100yr-1hr	19826 cf	12.41 cfs
100yr-3hr	23738 cf	7.85 cfs
100yr-6hr	25572 cf	6.84 cfs
100yr-24hr	25524 cf	1.70 cfs

T5 – Total Area = 0.60 ac – Imp%=67.70

Storm Event	Storm Volume	Max. Q (cfs)
100yr-1hr	3574 cf	2.29 cfs
100yr-3hr	4012 cf	1.43 cfs
100yr-6hr	4015 cf	1.24 cfs
100yr-24hr	3722 cf	0.28 cfs

T6 (Retention Basin) – Total Area = 1.45 ac – Imp%=5.0

Storm Event	Storm Volume	Max. Q (cfs)
100yr-1hr	6439 cf	4.63 cfs
100yr-3hr	4996 cf	2.85 cfs
100yr-6hr	4751 cf	2.40 cfs
100yr-24hr	2862 cf	0.16 cfs

(New Off2) – Total Area = 0.21 ac – Imp%=55.50

Storm Event	Storm Volume	Max. Q (cfs)
100yr-1hr	1189 cf	0.78 cfs
100yr-3hr	1227 cf	0.48 cfs
100yr-6hr	1186 cf	0.42 cfs
100yr-24hr	962 cf	0.08 cfs

Pipe Sizing

Calculations for preliminary pipe sized have been calculated with a Manning's Formula and minimum slope of 0.50% to show maximum pipe capacity. Please see calculations below for the proposed 8", 24" and 30" proposed storm drain lines for the project.

Gravity flow pipe maximums with pipe flowing full, per Mannings equation, N=0.012 (HDPE, PVC, or ABS pipe)

Check flow pipe capacity:
Diam.= 8 (in.) Slope= 0.005
n Factor= 0.012
Formulas
Area=(PI)*((Diam/2)^2)= 0.34906585 (sf)
Flow (max.)=(Area)*(1.49/n)*((diam./4)^0.6666)*(slope)^0.5= 0.93 (cfs)

Check flow pipe capacity:
Diam.= 24 (in.) Slope= 0.005
n Factor= 0.012
Formulas
Area=(Pl)*((Diam/2)^2)= 3.141592654 (sf)
Flow (max.)=(Area)*(1.49/n)*((diam./4)^0.6666)*(slope)^0.5= 17.38 (cfs)

Check flow pipe capacity:
Diam.= 30 (in.) Slope= 0.005
n Factor= 0.012
Formulas
Area=(Pl)*((Diam/2)^2)= 4.908738521 (sf)
Flow (max.)=(Area)*(1.49/n)*((diam./4)^0.6666)*(slope)^0.5= 31.51 (cfs)

All flows within these pipe diameters are less than the capacities noted above.

Catch Basin Sizing

Catch basins 2 through 5 are all Riv. Co. Std. 300 Catch Basins. All have been sized per the Nomograph located in this report. Catch Basins 2, 3 and 5 are all 4' in width and have the depth at entrance less than the proposed top of curb. Catch Basin 4 is a 7' wide basin and also has maximum depth below the proposed top of curb. Catch Basin 1 is a Nyoplast 2' x 3' Steel bar/MAG Grate Inlet. With 50% clogging factor the maximum depth at inlet is 0.525' as noted on the provided Capacity Chart provided in this report.

WQMP Worksheet (10.48 ac.)

10.48 acre area

WQMP Worksheet for the Whitewater River Basin for this project at 62.5% impervious equals the requirement of 6467 cf containment. The project retention has a total capacity of 61872 cf. Therefore, all WQMP measures for "first flush" are 100% contained.

Conclusions:

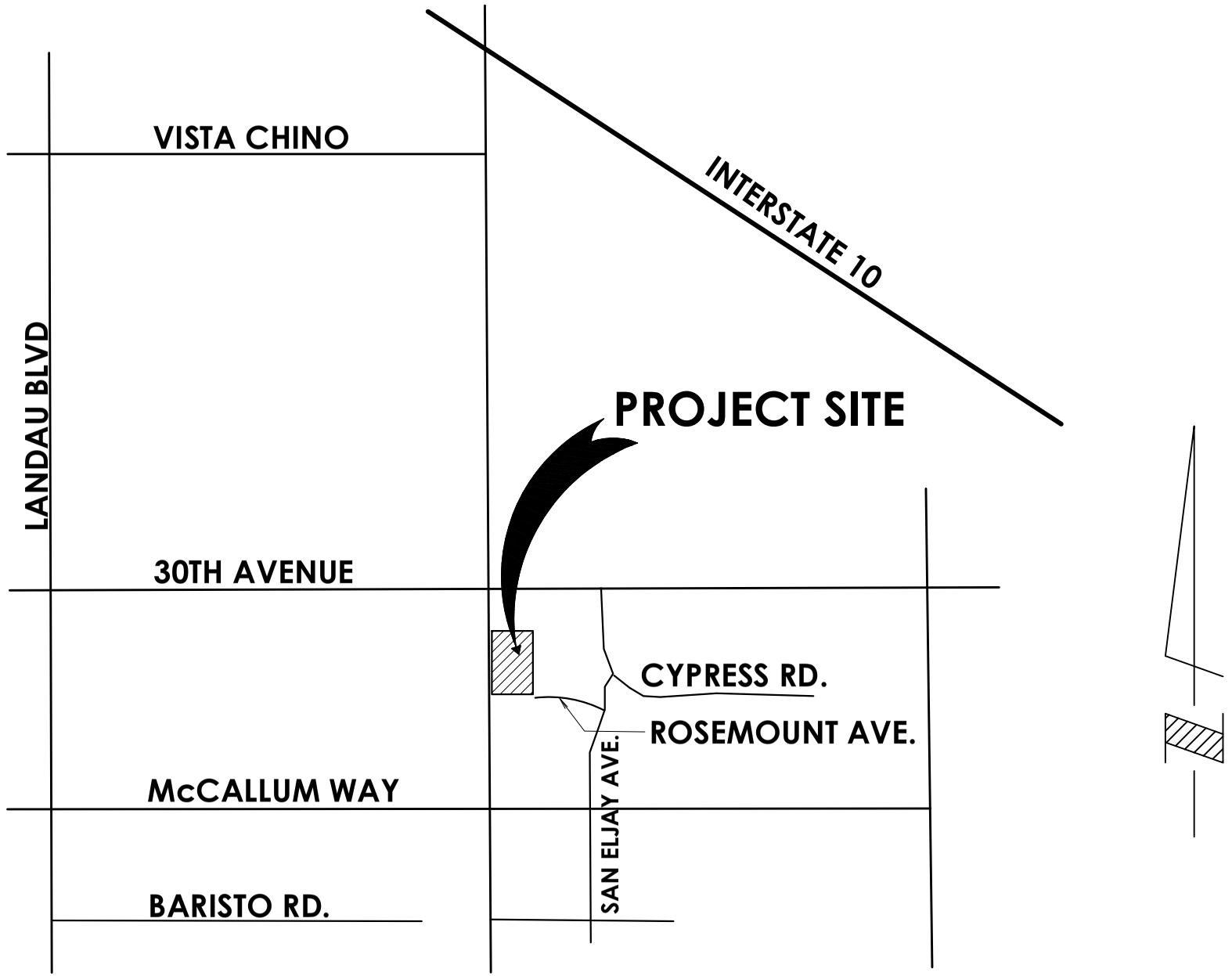
If the designs contained within this report and the plans that are based upon its findings are followed, the design shall provide protection and 100% containment for the above 100yr-3hr storm event. Any emergency overflow shall flow southerly along the proposed retention basin driveway located at the southeast corner of the property and flow easterly within the existing 6" Curb & Gutter of Rosemount Ave.

Lastly, flows to Date Palm Drive remain unchanged. Flows heading easterly on and along Rosemount Drive are greatly reduced:

Existing Flows to Rosemount Ave. = E1 + Off2 = 46544+2068 = 48612 cf
Post Development Flows to Rosemount Ave. = T5 + New Off2 = 4015 +1227 = 5242 cf

Reduction of flow to Rosemount Ave = 43370 cf or 89.2% reduction.

LOCATION MAP



VICINITY MAP

NTS

NOAA ATLAS 14 PRECIPITATION TABLE

NOAA Atlas 14, Volume 6, Version 2
Location name: Cathedral City, California, USA*
Latitude: 33.8286°, Longitude: -116.4574°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.075** (0.062-0.091)	**0.116** (0.097-0.141)	**0.179** (0.149-0.218)	**0.238** (0.196-0.292)	**0.329** (0.262-0.418)	**0.411** (0.320-0.534)	**0.506** (0.384-0.673)	**0.617** (0.455-0.845)	**0.796** (0.563-1.14)	**1.03** (0.706-1.53)
10-min	**0.107** (0.089-0.130)	**0.167** (0.139-0.202)	**0.257** (0.213-0.313)	**0.341** (0.280-0.418)	**0.472** (0.376-0.600)	**0.590** (0.459-0.765)	**0.725** (0.551-0.965)	**0.885** (0.653-1.21)	**1.14** (0.807-1.63)	**1.48** (1.01-2.19)
15-min	**0.129** (0.108-0.157)	**0.202** (0.168-0.245)	**0.311** (0.258-0.378)	**0.412** (0.339-0.506)	**0.571** (0.454-0.725)	**0.713** (0.555-0.925)	**0.877** (0.666-1.17)	**1.07** (0.789-1.46)	**1.38** (0.976-1.97)	**1.79** (1.22-2.65)
30-min	**0.200** (0.167-0.243)	**0.312** (0.260-0.379)	**0.481** (0.399-0.586)	**0.638** (0.525-0.783)	**0.884** (0.703-1.12)	**1.10** (0.860-1.43)	**1.36** (1.03-1.81)	**1.66** (1.22-2.27)	**2.14** (1.51-3.05)	**2.78** (1.90-4.11)
60-min	**0.285** (0.237-0.345)	**0.443** (0.369-0.538)	**0.683** (0.567-0.832)	**0.906** (0.745-1.11)	**1.26** (0.999-1.60)	**1.57** (1.22-2.03)	**1.93** (1.46-2.56)	**2.35** (1.74-3.22)	**3.04** (2.15-4.33)	**3.94** (2.69-5.83)
2-hr	**0.388** (0.323-0.470)	**0.595** (0.495-0.722)	**0.899** (0.746-1.09)	**1.17** (0.966-1.44)	**1.59** (1.27-2.02)	**1.96** (1.52-2.54)	**2.36** (1.79-3.14)	**2.82** (2.08-3.87)	**3.53** (2.50-5.04)	**4.16** (2.84-6.16)
3-hr	**0.462** (0.385-0.560)	**0.705** (0.587-0.856)	**1.06** (0.879-1.29)	**1.38** (1.13-1.69)	**1.85** (1.47-2.35)	**2.26** (1.76-2.93)	**2.70** (2.05-3.60)	**3.21** (2.37-4.39)	**3.96** (2.80-5.66)	**4.63** (3.16-6.84)
6-hr	**0.616** (0.513-0.747)	**0.944** (0.785-1.14)	**1.41** (1.17-1.72)	**1.82** (1.50-2.24)	**2.43** (1.93-3.09)	**2.94** (2.29-3.81)	**3.49** (2.65-4.65)	**4.11** (3.03-5.62)	**5.02** (3.55-7.16)	**5.78** (3.95-8.55)
12-hr	**0.751** (0.626-0.911)	**1.18** (0.977-1.43)	**1.77** (1.47-2.15)	**2.28** (1.88-2.81)	**3.04** (2.42-3.86)	**3.66** (2.85-4.75)	**4.33** (3.29-5.76)	**5.07** (3.74-6.94)	**6.14** (4.34-8.77)	**7.04** (4.81-10.4)
24-hr	**0.883** (0.781-1.02)	**1.41** (1.25-1.63)	**2.15** (1.89-2.48)	**2.78** (2.43-3.24)	**3.70** (3.13-4.45)	**4.45** (3.69-5.47)	**5.26** (4.26-6.62)	**6.14** (4.85-7.94)	**7.42** (5.63-9.99)	**8.49** (6.22-11.8)
2-day	**1.01** (0.895-1.17)	**1.62** (1.44-1.88)	**2.48** (2.19-2.87)	**3.22** (2.82-3.76)	**4.30** (3.64-5.18)	**5.18** (4.30-6.37)	**6.14** (4.98-7.72)	**7.18** (5.67-9.28)	**8.70** (6.59-11.7)	**9.96** (7.30-13.9)
3-day	**1.08** (0.953-1.24)	**1.73** (1.53-2.00)	**2.65** (2.34-3.06)	**3.44** (3.01-4.02)	**4.61** (3.90-5.55)	**5.57** (4.63-6.85)	**6.61** (5.36-8.32)	**7.75** (6.12-10.0)	**9.42** (7.14-12.7)	**10.8** (7.93-15.0)
4-day	**1.11** (0.986-1.28)	**1.79** (1.58-2.06)	**2.74** (2.42-3.17)	**3.57** (3.12-4.16)	**4.78** (4.05-5.76)	**5.79** (4.81-7.12)	**6.88** (5.58-8.66)	**8.08** (6.38-10.4)	**9.83** (7.45-13.2)	**11.3** (8.28-15.7)
7-day	**1.22** (1.08-1.40)	**1.95** (1.72-2.25)	**2.99** (2.64-3.46)	**3.90** (3.41-4.55)	**5.23** (4.43-6.30)	**6.33** (5.26-7.78)	**7.53** (6.11-9.48)	**8.85** (6.98-11.4)	**10.8** (8.17-14.5)	**12.4** (9.09-17.2)
10-day	**1.28** (1.14-1.48)	**2.06** (1.82-2.38)	**3.16** (2.78-3.66)	**4.12** (3.60-4.80)	**5.53** (4.69-6.66)	**6.71** (5.57-8.24)	**7.98** (6.47-10.0)	**9.38** (7.40-12.1)	**11.4** (8.67-15.4)	**13.2** (9.65-18.3)
20-day	**1.43** (1.26-1.65)	**2.29** (2.02-2.64)	**3.52** (3.10-4.07)	**4.60** (4.02-5.36)	**6.19** (5.24-7.46)	**7.52** (6.24-9.24)	**8.97** (7.28-11.3)	**10.6** (8.34-13.7)	**12.9** (9.80-17.4)	**14.9** (10.9-20.7)
30-day	**1.60** (1.42-1.85)	**2.57** (2.27-2.96)	**3.95** (3.48-4.57)	**5.17** (4.52-6.03)	**6.98** (5.91-8.40)	**8.50** (7.05-10.4)	**10.2** (8.23-12.8)	**12.0** (9.46-15.5)	**14.7** (11.1-19.8)	**16.9** (12.4-23.6)
45-day	**1.78** (1.58-2.05)	**2.84** (2.51-3.28)	**4.38** (3.86-5.06)	**5.74** (5.02-6.69)	**7.76** (6.58-9.35)	**9.47** (7.86-11.6)	**11.3** (9.20-14.3)	**13.4** (10.6-17.3)	**16.5** (12.5-22.2)	**19.1** (14.0-26.5)
60-day	**1.95** (1.72-2.24)	**3.10** (2.74-3.57)	**4.76** (4.20-5.51)	**6.24** (5.46-7.28)	**8.47** (7.17-10.2)	**10.3** (8.59-12.7)	**12.4** (10.1-15.6)	**14.7** (11.6-19.0)	**18.1** (13.7-24.4)	**21.0** (15.4-29.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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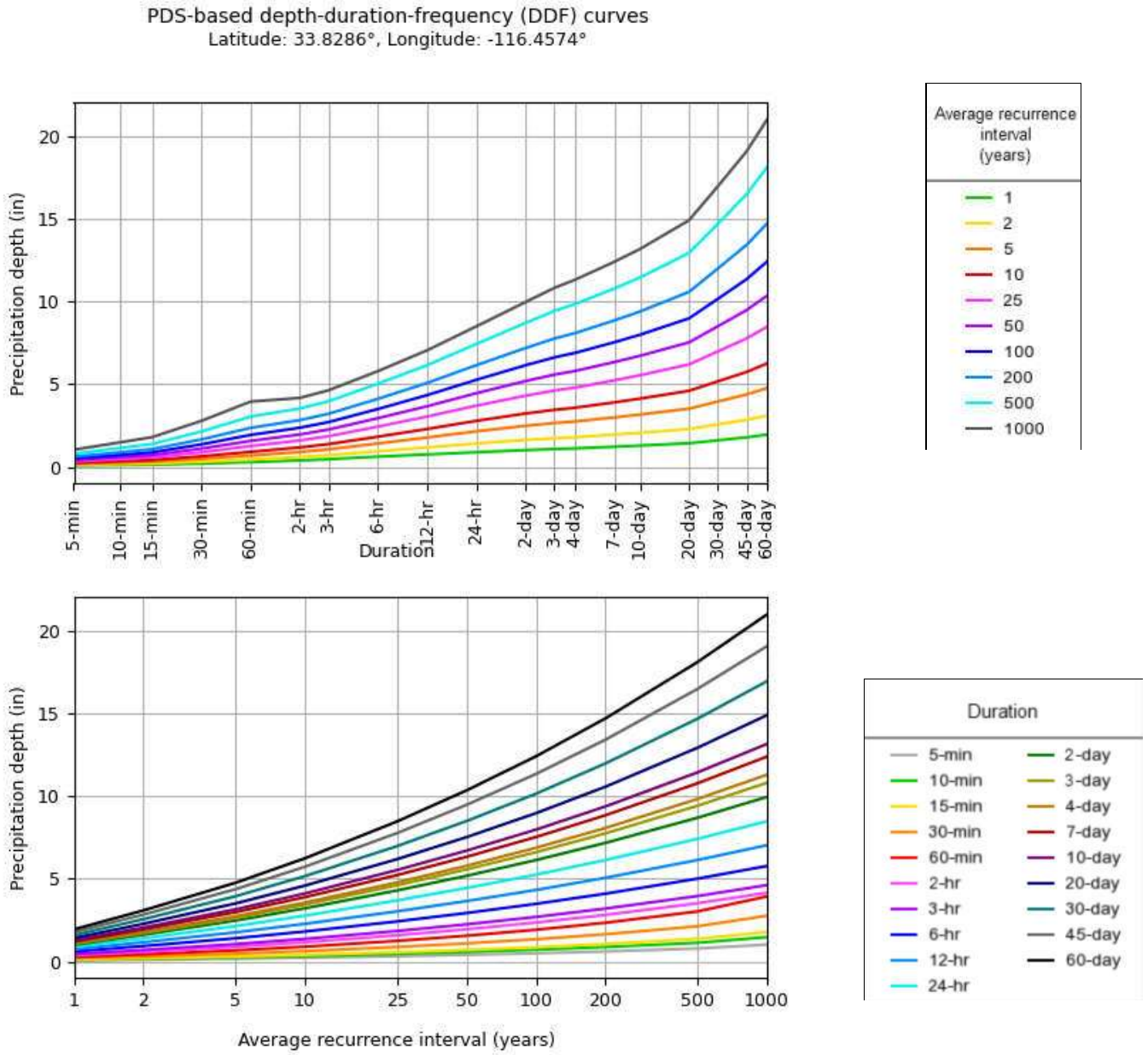
PF graphical



NOAA Atlas 14, Volume 6, Version 2 Created (GMT): Thu Aug 3 17:52:50 2023

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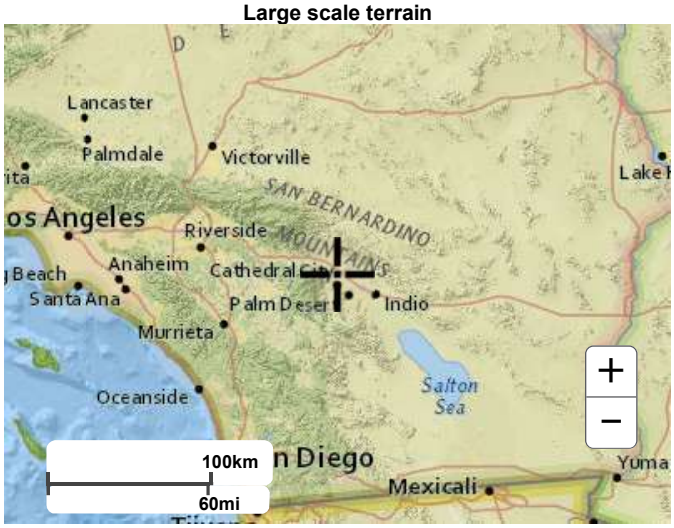
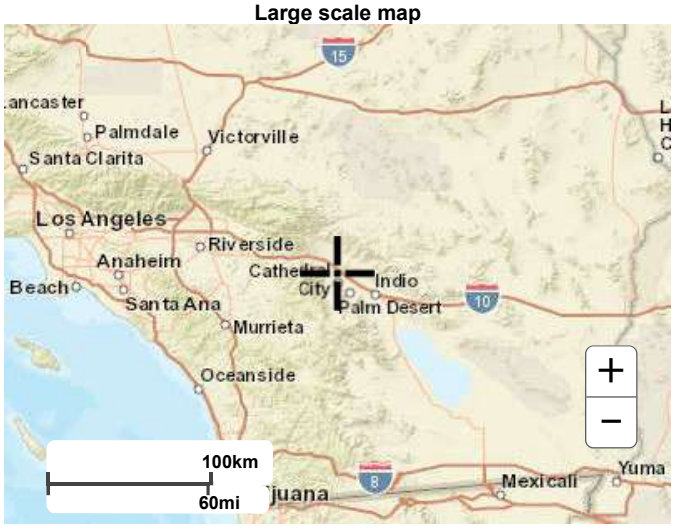
Maps & aerials

Small scale terrain

Large scale terrain



Large scale map



Large scale aerial

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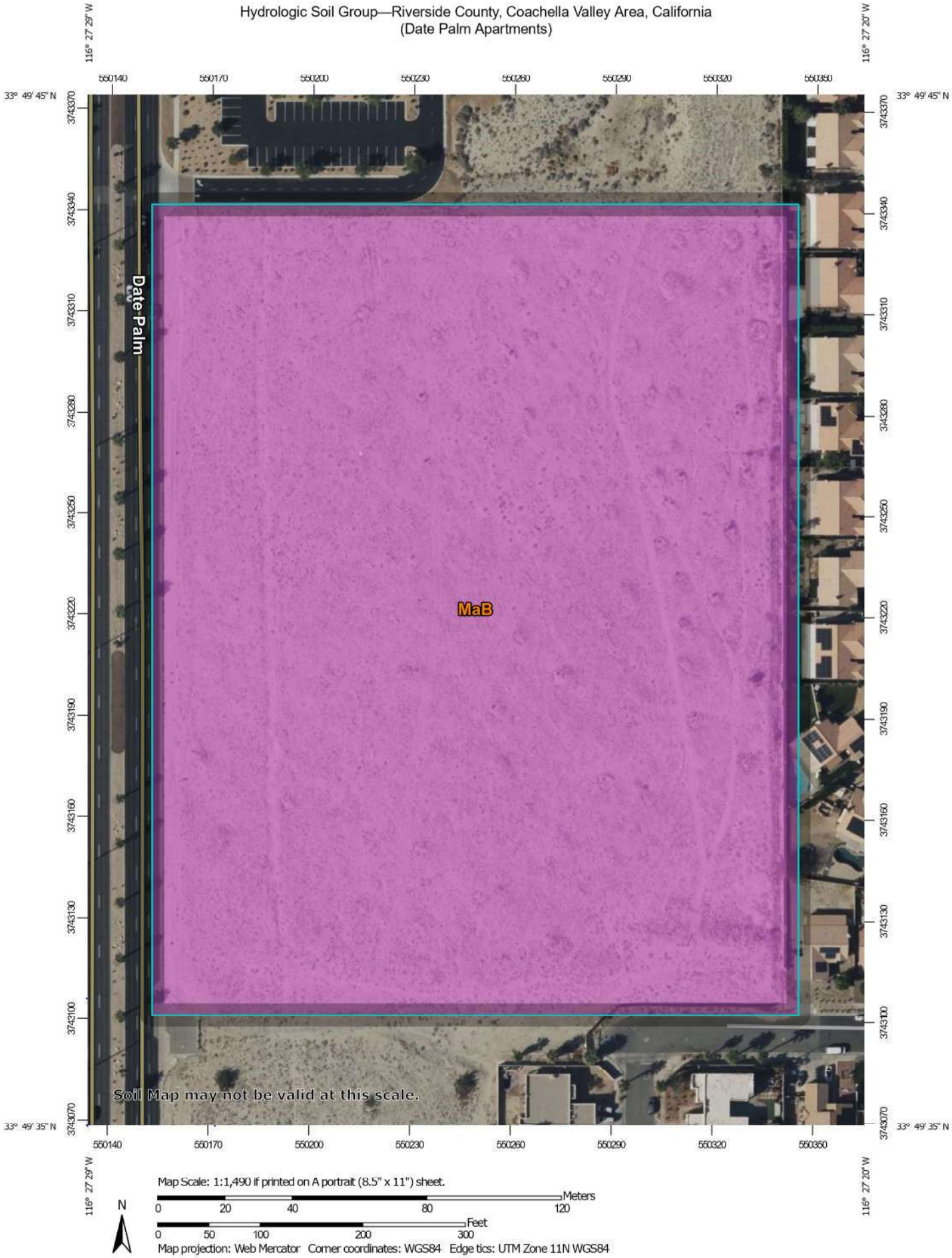
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

WEB SOILS SURVEY

Hydrologic Soil Group—Riverside County, Coachella Valley Area, California
(Date Palm Apartments)



Map Scale: 1:1,490 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Riverside County, Coachella Valley Area, California
Survey Area Data: Version 14, Sep 1, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 15, 2022—May 28, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
MaB	Myoma fine sand, 0 to 5 percent slopes	A	11.5	100.0%
Totals for Area of Interest			**11.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

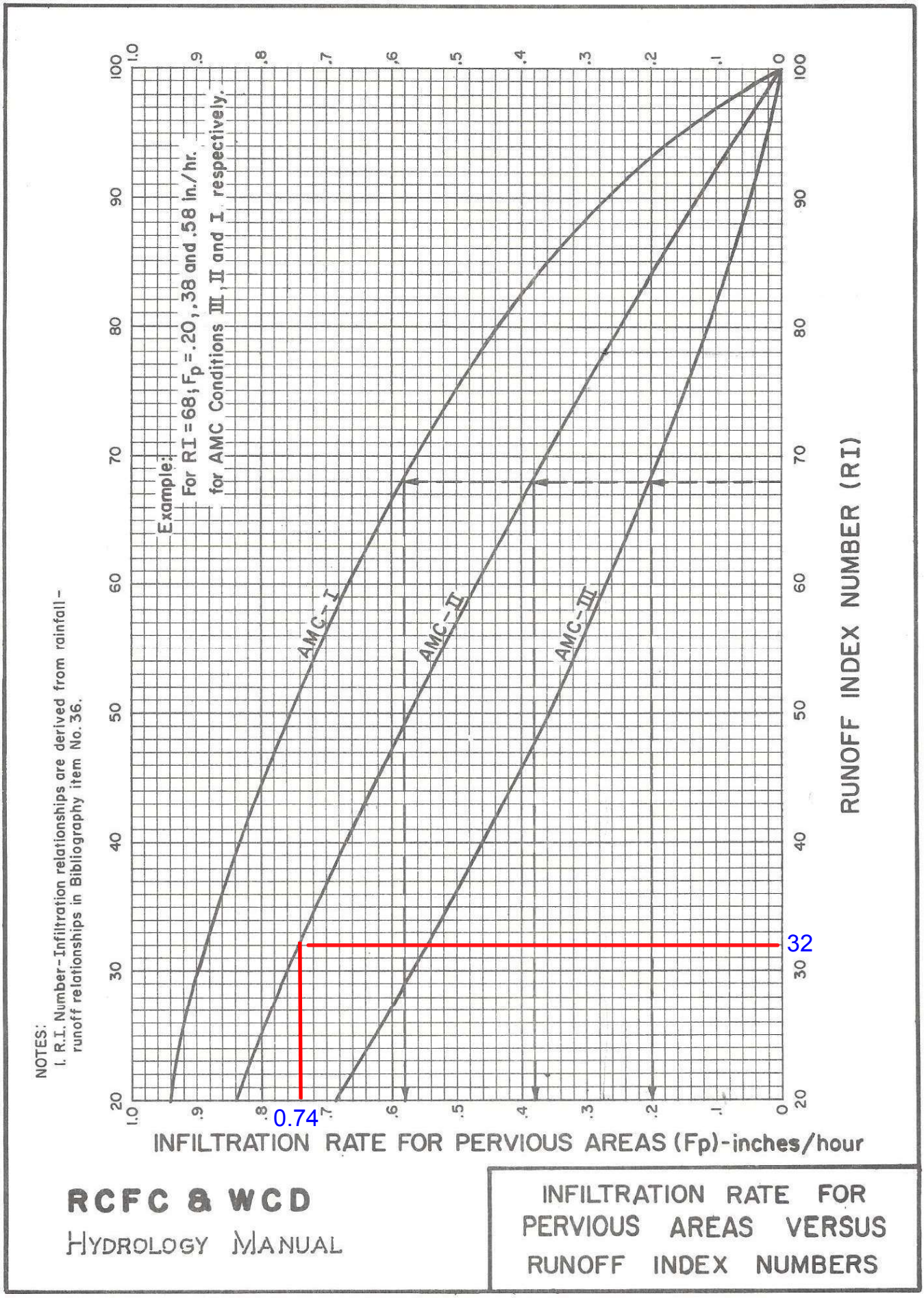
RCFC&WCD PLATES E-6.1, E-6.2 and E-6.3

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREAS



RCFC & WCD

HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS RUNOFF INDEX NUMBERS

PLATE E-6.2

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent(2)
Natural or Agriculture	0 - 10	0
Single Family Residential: (3)		
40,000 S. F. (1 Acre) Lots	10 - 25	20
20,000 S. F. (½ Acre) Lots	30 - 45	40
7,200 - 10,000 S. F. Lots	45 - 55	50
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 -100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area should always be made, and a review of aerial photos, where available may assist in estimating the percentage of impervious cover in developed areas.

3. For typical horse ranch subdivisions increase impervious area 5 percent over the values recommended in the table above.

RCFC & WCD
HYDROLOGY MANUAL

IMPERVIOUS COVER FOR DEVELOPED AREAS

PLATE E-6.3

Synthetic Unit Hydrograph Calculations
100yr - 1hr, 3hr, 6hr & 24hr

PRE-DEVELOPMENT

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**
Entire Existing Property

Drainage Area (ac.)	**10.4815**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74 (AMC II)				
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**5**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.71 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))				
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2** (also used for drywell percolation rate)				

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **0.00001** s.f. **Bot. =** **0.0001** **s.f.** **Max. Depth (d)=** **0.0001** **Max. storage=** **0.00** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	3.7	0.8569	0.7067	N/A	0.1502	1.5877	476.30
0:10	4.8	1.1117	0.7067	N/A	0.4050	4.2802	1284.05
0:15	5.1	1.1812	0.7067	N/A	0.4745	5.0145	1504.35
0:20	4.9	1.1348	0.7067	N/A	0.4281	4.5249	1357.48
0:25	6.6	1.5286	0.7067	N/A	0.8219	8.6861	2605.83
0:30	7.3	1.6907	0.7067	N/A	0.9840	10.3995	3119.86
0:35	8.4	1.9454	0.7067	N/A	1.2387	13.0920	3927.61
0:40	9	2.0844	0.7067	N/A	1.3777	14.5607	4368.21
0:45	12.3	2.8487	0.7067	N/A	2.1420	22.6382	6791.47
0:50	17.6	4.0762	0.7067	N/A	**3.3695**	**35.6113**	**10683.39**
0:55	16.1	3.7288	0.7067	N/A	3.0221	31.9397	9581.90
1:00	4.2	0.9727	0.7067	N/A	0.2660	2.8115	843.46
	0	0.0000	0.7067	0.00	0.0000	0.0000	0.00
	0	0.0000	0.7067	0.00	0.0000	0.0000	0.00
1:15	0	0.0000	0.7067	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**46543.91**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.		Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	1.3	0.42	0.71		0.38	0.0421	0.4452	133.55
0:10	1.3	0.42	0.71		0.38	0.0421	0.4452	133.55
0:15	1.1	0.36	0.71		0.32	0.0356	0.3767	113.00
0:20	1.5	0.49	0.71		0.44	0.0486	0.5136	154.09
0:25	1.5	0.49	0.71		0.44	0.0486	0.5136	154.09
0:30	1.8	0.58	0.71		0.52	0.0583	0.6164	184.91
0:35	1.5	0.49	0.71		0.44	0.0486	0.5136	154.09
0:40	1.8	0.58	0.71		0.52	0.0583	0.6164	184.91
0:45	1.8	0.58	0.71		0.52	0.0583	0.6164	184.91
0:50	1.5	0.49	0.71		0.44	0.0486	0.5136	154.09
0:55	1.6	0.52	0.71		0.47	0.0518	0.5479	164.37
1:00	1.8	0.58	0.71		0.52	0.0583	0.6164	184.91
1:05	2.2	0.71	0.71		0.64	0.0713	0.7533	226.00
1:10	2.2	0.71	0.71		0.64	0.0713	0.7533	226.00
1:15	2.2	0.71	0.71		0.64	0.0713	0.7533	226.00
1:20	2	0.65	0.71		0.58	0.0648	0.6849	205.46
1:25	2.6	0.84	0.71	N/A		0.1357	1.4342	430.26
1:30	2.7	0.87	0.71	N/A		0.1681	1.7766	532.99
1:35	2.4	0.78	0.71		0.70	0.0778	0.8218	246.55
1:40	2.7	0.87	0.71	N/A		0.1681	1.7766	532.99
1:45	3.3	1.07	0.71	N/A		0.3625	3.8312	1149.36
1:50	3.1	1.00	0.71	N/A		0.2977	3.1463	943.90
1:55	2.9	0.94	0.71	N/A		0.2329	2.4615	738.45
2:00	3	0.97	0.71	N/A		0.2653	2.8039	841.17
2:05	3.1	1.00	0.71	N/A		0.2977	3.1463	943.90
2:10	4.2	1.36	0.71	N/A		0.6541	6.9131	2073.92
2:15	5	1.62	0.71	N/A		0.9133	9.6525	2895.76
2:20	3.5	1.13	0.71	N/A		0.4273	4.5161	1354.82
2:25	6.8	2.20	0.71	N/A		1.4965	15.8163	4744.88
2:30	7.3	2.37	0.71	N/A		1.6585	17.5284	5258.53
2:35	8.2	2.66	0.71	N/A		**1.9501**	**20.6103**	**6183.09**
2:40	5.9	1.91	0.71	N/A		1.2049	12.7344	3820.32
2:45	2	0.65	0.71		0.58	0.0648	0.6849	205.46
2:50	1.8	0.58	0.71		0.52	0.0583	0.6164	184.91
2:55	1.8	0.58	0.71		0.52	0.0583	0.6164	184.91
3:00	0.6	0.19	0.71		0.17	0.0194	0.2055	61.64
	0	0.00	0.71		0.00	0.0000	0.0000	0.00
	0	0.00	0.71		0.00	0.0000	0.0000	0.00
3:15	0	0.00	0.71		0.00	0.0000	0.0000	0.00
	0	0.00	0.71		0.00	0.0000	0.0000	0.00
	0	0.00	0.71		0.00	0.0000	0.0000	0.00
3:30	0	0.00	0.71		0.00	0.0000	0.0000	0.00
	0	0.00	0.71		0.00	0.0000	0.0000	0.00
	0	0.00	0.71		0.00	0.0000	0.0000	0.00
						Total volume (cf)		**36111.77**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	0.5	0.21	0.71	0.19	0.0209	0.2213	66.39
0:10	0.6	0.25	0.71	0.23	0.0251	0.2656	79.67
0:15	0.6	0.25	0.71	0.23	0.0251	0.2656	79.67
0:20	0.6	0.25	0.71	0.23	0.0251	0.2656	79.67
0:25	0.6	0.25	0.71	0.23	0.0251	0.2656	79.67
0:30	0.7	0.29	0.71	0.26	0.0293	0.3098	92.95
0:35	0.7	0.29	0.71	0.26	0.0293	0.3098	92.95
0:40	0.7	0.29	0.71	0.26	0.0293	0.3098	92.95
0:45	0.7	0.29	0.71	0.26	0.0293	0.3098	92.95
0:50	0.7	0.29	0.71	0.26	0.0293	0.3098	92.95
0:55	0.7	0.29	0.71	0.26	0.0293	0.3098	92.95
1:00	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:05	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:10	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:15	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:20	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:25	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:30	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:35	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:40	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:45	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:50	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
1:55	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
2:00	0.9	0.38	0.71	0.34	0.0377	0.3984	119.51
2:05	0.8	0.34	0.71	0.30	0.0335	0.3541	106.23
2:10	0.9	0.38	0.71	0.34	0.0377	0.3984	119.51
2:15	0.9	0.38	0.71	0.34	0.0377	0.3984	119.51
2:20	0.9	0.38	0.71	0.34	0.0377	0.3984	119.51
2:25	0.9	0.38	0.71	0.34	0.0377	0.3984	119.51
2:30	0.9	0.38	0.71	0.34	0.0377	0.3984	119.51
2:35	0.9	0.38	0.71	0.34	0.0377	0.3984	119.51
2:40	0.9	0.38	0.71	0.34	0.0377	0.3984	119.51
2:45	1	0.42	0.71	0.38	0.0419	0.4426	132.79
2:50	1	0.42	0.71	0.38	0.0419	0.4426	132.79
2:55	1	0.42	0.71	0.38	0.0419	0.4426	132.79
3:00	1	0.42	0.71	0.38	0.0419	0.4426	132.79
3:05	1	0.42	0.71	0.38	0.0419	0.4426	132.79
3:10	1.1	0.46	0.71	0.41	0.0461	0.4869	146.07
3:15	1.1	0.46	0.71	0.41	0.0461	0.4869	146.07
3:20	1.1	0.46	0.71	0.41	0.0461	0.4869	146.07
3:25	1.2	0.50	0.71	0.45	0.0503	0.5311	159.34
3:30	1.3	0.54	0.71	0.49	0.0544	0.5754	172.62
3:35	1.4	0.59	0.71	0.53	0.0586	0.6197	185.90
3:40	1.4	0.59	0.71	0.53	0.0586	0.6197	185.90
3:45	1.5	0.63	0.71	0.57	0.0628	0.6639	199.18
3:50	1.5	0.63	0.71	0.57	0.0628	0.6639	199.18
3:55	1.6	0.67	0.71	0.60	0.0670	0.7082	212.46
4:00	1.6	0.67	0.71	0.60	0.0670	0.7082	212.46
4:05	1.7	0.71	0.71	0.64	0.0712	0.7525	225.74
4:10	1.8	0.75	0.71	0.68	0.0754	0.7967	239.02
4:15	1.9	0.80	0.71	N/A	0.0890	0.9408	282.25

4:20	2	0.84	0.71	N/A	0.1309	1.3835	415.04
4:25	2.1	0.88	0.71	N/A	0.1728	1.8261	547.83
4:30	2.1	0.88	0.71	N/A	0.1728	1.8261	547.83
4:35	2.2	0.92	0.71	N/A	0.2147	2.2687	680.61
4:40	2.3	0.96	0.71	N/A	0.2565	2.7113	813.40
4:45	2.4	1.01	0.71	N/A	0.2984	3.1540	946.19
4:50	2.4	1.01	0.71	N/A	0.2984	3.1540	946.19
4:55	2.5	1.05	0.71	N/A	0.3403	3.5966	1078.97
5:00	2.6	1.09	0.71	N/A	0.3822	4.0392	1211.76
5:05	3.1	1.30	0.71	N/A	0.5916	6.2523	1875.69
5:10	3.6	1.51	0.71	N/A	0.8010	8.4654	2539.63
5:15	3.9	1.63	0.71	N/A	0.9266	9.7933	2937.99
5:20	4.2	1.76	0.71	N/A	1.0523	11.1212	3336.35
5:25	4.7	1.97	0.71	N/A	1.2617	13.3343	4000.29
5:30	5.6	2.35	0.71	N/A	**1.6386**	**17.3179**	**5195.37**
5:35	1.9	0.80	0.71	N/A	0.0890	0.9408	282.25
5:40	0.9	0.38	0.71	0.34	0.0377	0.3984	119.51
5:45	0.6	0.25	0.71	0.23	0.0251	0.2656	79.67
5:50	0.5	0.21	0.71	0.19	0.0209	0.2213	66.39
5:55	0.3	0.13	0.71	0.11	0.0126	0.1328	39.84
6:00	0.2	0.08	0.71	0.08	0.0084	0.0885	26.56
	0	0.00	0.71	0.00	0.0000	0.0000	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00
6:15	0	0.00	0.71	0.00	0.0000	0.0000	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00
6:30	0	0.00	0.71	0.00	0.0000	0.0000	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00
6:45	0	0.00	0.71	0.00	0.0000	0.0000	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00
7:00	0	0.00	0.71	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**34343.37**

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:15	0.2	0.04	1.24	0.04	0.0042	0.0445	40.03
0:30	0.3	0.06	1.23	0.06	0.0063	0.0667	60.04
0:45	0.3	0.06	1.21	0.06	0.0063	0.0667	60.04
1:00	0.4	0.08	1.20	0.08	0.0084	0.0889	80.05
1:15	0.3	0.06	1.18	0.06	0.0063	0.0667	60.04
1:30	0.3	0.06	1.17	0.06	0.0063	0.0667	60.04
1:45	0.3	0.06	1.16	0.06	0.0063	0.0667	60.04
2:00	0.4	0.08	1.14	0.08	0.0084	0.0889	80.05
2:15	0.4	0.08	1.13	0.08	0.0084	0.0889	80.05
2:30	0.4	0.08	1.11	0.08	0.0084	0.0889	80.05
2:45	0.5	0.11	1.10	0.09	0.0105	0.1112	100.07
3:00	0.5	0.11	1.09	0.09	0.0105	0.1112	100.07
3:15	0.5	0.11	1.07	0.09	0.0105	0.1112	100.07
3:30	0.5	0.11	1.06	0.09	0.0105	0.1112	100.07
3:45	0.5	0.11	1.05	0.09	0.0105	0.1112	100.07
4:00	0.6	0.13	1.03	0.11	0.0126	0.1334	120.08
4:15	0.6	0.13	1.02	0.11	0.0126	0.1334	120.08
4:30	0.7	0.15	1.01	0.13	0.0147	0.1557	140.09
4:45	0.7	0.15	0.99	0.13	0.0147	0.1557	140.09
5:00	0.8	0.17	0.98	0.15	0.0168	0.1779	160.11
5:15	0.6	0.13	0.97	0.11	0.0126	0.1334	120.08
5:30	0.7	0.15	0.96	0.13	0.0147	0.1557	140.09
5:45	0.8	0.17	0.94	0.15	0.0168	0.1779	160.11
6:00	0.8	0.17	0.93	0.15	0.0168	0.1779	160.11
6:15	0.9	0.19	0.92	0.17	0.0189	0.2001	180.12
6:30	0.9	0.19	0.91	0.17	0.0189	0.2001	180.12
6:45	1	0.21	0.89	0.19	0.0210	0.2224	200.13
7:00	1	0.21	0.88	0.19	0.0210	0.2224	200.13
7:15	1	0.21	0.87	0.19	0.0210	0.2224	200.13
7:30	1.1	0.23	0.86	0.21	0.0231	0.2446	220.14
7:45	1.2	0.25	0.85	0.23	0.0252	0.2668	240.16
8:00	1.3	0.27	0.83	0.25	0.0274	0.2891	260.17
8:15	1.5	0.32	0.82	0.28	0.0316	0.3336	300.20
8:30	1.5	0.32	0.81	0.28	0.0316	0.3336	300.20
8:45	1.6	0.34	0.80	0.30	0.0337	0.3558	320.21
9:00	1.7	0.36	0.79	0.32	0.0358	0.3780	340.22
9:15	1.9	0.40	0.78	0.36	0.0400	0.4225	380.25
9:30	2	0.42	0.77	0.38	0.0421	0.4447	400.26
9:45	2.1	0.44	0.76	0.40	0.0442	0.4670	420.28
10:00	2.2	0.46	0.74	0.42	0.0463	0.4892	440.29
10:15	1.5	0.32	0.73	0.28	0.0316	0.3336	300.20
10:30	1.5	0.32	0.72	0.28	0.0316	0.3336	300.20
10:45	2	0.42	0.71	0.38	0.0421	0.4447	400.26
11:00	2	0.42	0.70	0.38	0.0421	0.4447	400.26
11:15	1.9	0.40	0.69	0.36	0.0400	0.4225	380.25
11:30	1.9	0.40	0.68	0.36	0.0400	0.4225	380.25
11:45	1.7	0.36	0.67	0.32	0.0358	0.3780	340.22
12:00	1.8	0.38	0.66	0.34	0.0379	0.4003	360.24
12:15	2.5	0.53	0.65	0.47	0.0526	0.5559	500.33
12:30	2.6	0.55	0.64	0.49	0.0547	0.5782	520.34
12:45	2.8	0.59	0.63	0.53	0.0589	0.6226	560.37

13:00	2.9	0.61	0.62	0.55	0.0610	0.6449	580.38
13:15	3.4	0.72	0.61	N/A	0.1023	1.0812	973.04
13:30	3.4	0.72	0.60	N/A	**0.1116**	**1.1795**	**1061.52**
13:45	2.3	0.48	0.59	0.44	0.0484	0.5114	460.30
14:00	2.3	0.48	0.59	0.44	0.0484	0.5114	460.30
14:15	2.7	0.57	0.58	0.51	0.0568	0.6004	540.36
14:30	2.6	0.55	0.57	0.49	0.0547	0.5782	520.34
14:45	2.6	0.55	0.56	0.49	0.0547	0.5782	520.34
15:00	2.5	0.53	0.55	0.47	0.0526	0.5559	500.33
15:15	2.4	0.50	0.54	0.45	0.0505	0.5337	480.32
15:30	2.3	0.48	0.53	0.44	0.0484	0.5114	460.30
15:45	1.9	0.40	0.53	0.36	0.0400	0.4225	380.25
16:00	1.9	0.40	0.52	0.36	0.0400	0.4225	380.25
16:15	0.4	0.08	0.51	0.08	0.0084	0.0889	80.05
16:30	0.4	0.08	0.50	0.08	0.0084	0.0889	80.05
16:45	0.3	0.06	0.49	0.06	0.0063	0.0667	60.04
17:00	0.3	0.06	0.49	0.06	0.0063	0.0667	60.04
17:15	0.5	0.11	0.48	0.09	0.0105	0.1112	100.07
17:30	0.5	0.11	0.47	0.09	0.0105	0.1112	100.07
17:45	0.5	0.11	0.47	0.09	0.0105	0.1112	100.07
18:00	0.4	0.08	0.46	0.08	0.0084	0.0889	80.05
18:15	0.4	0.08	0.45	0.08	0.0084	0.0889	80.05
18:30	0.4	0.08	0.45	0.08	0.0084	0.0889	80.05
18:45	0.3	0.06	0.44	0.06	0.0063	0.0667	60.04
19:00	0.2	0.04	0.43	0.04	0.0042	0.0445	40.03
19:15	0.3	0.06	0.43	0.06	0.0063	0.0667	60.04
19:30	0.4	0.08	0.42	0.08	0.0084	0.0889	80.05
19:45	0.3	0.06	0.41	0.06	0.0063	0.0667	60.04
20:00	0.2	0.04	0.41	0.04	0.0042	0.0445	40.03
20:15	0.3	0.06	0.40	0.06	0.0063	0.0667	60.04
20:30	0.3	0.06	0.40	0.06	0.0063	0.0667	60.04
20:45	0.3	0.06	0.39	0.06	0.0063	0.0667	60.04
21:00	0.2	0.04	0.39	0.04	0.0042	0.0445	40.03
21:15	0.3	0.06	0.38	0.06	0.0063	0.0667	60.04
21:30	0.2	0.04	0.38	0.04	0.0042	0.0445	40.03
21:45	0.3	0.06	0.38	0.06	0.0063	0.0667	60.04
22:00	0.2	0.04	0.37	0.04	0.0042	0.0445	40.03
22:15	0.3	0.06	0.37	0.06	0.0063	0.0667	60.04
22:30	0.2	0.04	0.37	0.04	0.0042	0.0445	40.03
22:45	0.2	0.04	0.36	0.04	0.0042	0.0445	40.03
23:00	0.2	0.04	0.36	0.04	0.0042	0.0445	40.03
23:15	0.2	0.04	0.36	0.04	0.0042	0.0445	40.03
23:30	0.2	0.04	0.36	0.04	0.0042	0.0445	40.03
23:45	0.2	0.04	0.35	0.04	0.0042	0.0445	40.03
24:00	0.2	0.04	0.35	0.04	0.0042	0.0445	40.03
	0	0.00	0.35	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**20686.82**

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**
OFF1

Drainage Area (ac.)	**1.1800**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74 (AMC II)				
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**90**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.14 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))				
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2** (also used for drywell percolation rate)				

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **0.0001** s.f. **Bot. =** **0.0001** **s.f.** **Max. Depth (d)=** **0.0001** **Max. storage=** **0.00** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	3.7	0.8569	0.1406	N/A	0.7163	0.8523	255.69
0:10	4.8	1.1117	0.1406	N/A	0.9711	1.1554	346.63
0:15	5.1	1.1812	0.1406	N/A	1.0406	1.2381	371.43
0:20	4.9	1.1348	0.1406	N/A	0.9942	1.1830	354.89
0:25	6.6	1.5286	0.1406	N/A	1.3880	1.6514	495.43
0:30	7.3	1.6907	0.1406	N/A	1.5501	1.8443	553.30
0:35	8.4	1.9454	0.1406	N/A	1.8048	2.1475	644.24
0:40	9	2.0844	0.1406	N/A	1.9438	2.3128	693.84
0:45	12.3	2.8487	0.1406	N/A	2.7081	3.2222	966.65
0:50	17.6	4.0762	0.1406	N/A	**3.9356**	**4.6827**	**1404.80**
0:55	16.1	3.7288	0.1406	N/A	3.5882	4.2693	1280.79
1:00	4.2	0.9727	0.1406	N/A	0.8321	0.9901	297.03
	0	0.0000	0.1406	0.00	0.0000	0.0000	0.00
	0	0.0000	0.1406	0.00	0.0000	0.0000	0.00
1:15	0	0.0000	0.1406	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**7664.72**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	1.3	0.42	0.14	N/A		0.2806	0.3339	100.16
0:10	1.3	0.42	0.14	N/A		0.2806	0.3339	100.16
0:15	1.1	0.36	0.14	N/A		0.2158	0.2568	77.03
0:20	1.5	0.49	0.14	N/A		0.3454	0.4110	123.29
0:25	1.5	0.49	0.14	N/A		0.3454	0.4110	123.29
0:30	1.8	0.58	0.14	N/A		0.4426	0.5266	157.99
0:35	1.5	0.49	0.14	N/A		0.3454	0.4110	123.29
0:40	1.8	0.58	0.14	N/A		0.4426	0.5266	157.99
0:45	1.8	0.58	0.14	N/A		0.4426	0.5266	157.99
0:50	1.5	0.49	0.14	N/A		0.3454	0.4110	123.29
0:55	1.6	0.52	0.14	N/A		0.3778	0.4495	134.86
1:00	1.8	0.58	0.14	N/A		0.4426	0.5266	157.99
1:05	2.2	0.71	0.14	N/A		0.5722	0.6808	204.25
1:10	2.2	0.71	0.14	N/A		0.5722	0.6808	204.25
1:15	2.2	0.71	0.14	N/A		0.5722	0.6808	204.25
1:20	2	0.65	0.14	N/A		0.5074	0.6037	181.12
1:25	2.6	0.84	0.14	N/A		0.7018	0.8350	250.51
1:30	2.7	0.87	0.14	N/A		0.7342	0.8736	262.07
1:35	2.4	0.78	0.14	N/A		0.6370	0.7579	227.38
1:40	2.7	0.87	0.14	N/A		0.7342	0.8736	262.07
1:45	3.3	1.07	0.14	N/A		0.9286	1.1049	331.46
1:50	3.1	1.00	0.14	N/A		0.8638	1.0278	308.33
1:55	2.9	0.94	0.14	N/A		0.7990	0.9507	285.20
2:00	3	0.97	0.14	N/A		0.8314	0.9892	296.77
2:05	3.1	1.00	0.14	N/A		0.8638	1.0278	308.33
2:10	4.2	1.36	0.14	N/A		1.2202	1.4518	435.55
2:15	5	1.62	0.14	N/A		1.4794	1.7602	528.07
2:20	3.5	1.13	0.14	N/A		0.9934	1.1820	354.59
2:25	6.8	2.20	0.14	N/A		2.0626	2.4542	736.25
2:30	7.3	2.37	0.14	N/A		2.2246	2.6469	794.07
2:35	8.2	2.66	0.14	N/A		**2.5162**	**2.9939**	**898.16**
2:40	5.9	1.91	0.14	N/A		1.7710	2.1072	632.16
2:45	2	0.65	0.14	N/A		0.5074	0.6037	181.12
2:50	1.8	0.58	0.14	N/A		0.4426	0.5266	157.99
2:55	1.8	0.58	0.14	N/A		0.4426	0.5266	157.99
3:00	0.6	0.19	0.14	N/A		0.0538	0.0640	19.20
	0	0.00	0.14		0.00	0.0000	0.0000	0.00
	0	0.00	0.14		0.00	0.0000	0.0000	0.00
3:15	0	0.00	0.14		0.00	0.0000	0.0000	0.00
	0	0.00	0.14		0.00	0.0000	0.0000	0.00
	0	0.00	0.14		0.00	0.0000	0.0000	0.00
3:30	0	0.00	0.14		0.00	0.0000	0.0000	0.00
	0	0.00	0.14		0.00	0.0000	0.0000	0.00
	0	0.00	0.14		0.00	0.0000	0.0000	0.00
						Total volume (cf)		**9758.44**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	0.5	0.21	0.14	N/A	0.0688	0.0819	24.56
0:10	0.6	0.25	0.14	N/A	0.1107	0.1317	39.51
0:15	0.6	0.25	0.14	N/A	0.1107	0.1317	39.51
0:20	0.6	0.25	0.14	N/A	0.1107	0.1317	39.51
0:25	0.6	0.25	0.14	N/A	0.1107	0.1317	39.51
0:30	0.7	0.29	0.14	N/A	0.1526	0.1815	54.46
0:35	0.7	0.29	0.14	N/A	0.1526	0.1815	54.46
0:40	0.7	0.29	0.14	N/A	0.1526	0.1815	54.46
0:45	0.7	0.29	0.14	N/A	0.1526	0.1815	54.46
0:50	0.7	0.29	0.14	N/A	0.1526	0.1815	54.46
0:55	0.7	0.29	0.14	N/A	0.1526	0.1815	54.46
1:00	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:05	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:10	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:15	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:20	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:25	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:30	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:35	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:40	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:45	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:50	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
1:55	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
2:00	0.9	0.38	0.14	N/A	0.2363	0.2812	84.35
2:05	0.8	0.34	0.14	N/A	0.1944	0.2314	69.41
2:10	0.9	0.38	0.14	N/A	0.2363	0.2812	84.35
2:15	0.9	0.38	0.14	N/A	0.2363	0.2812	84.35
2:20	0.9	0.38	0.14	N/A	0.2363	0.2812	84.35
2:25	0.9	0.38	0.14	N/A	0.2363	0.2812	84.35
2:30	0.9	0.38	0.14	N/A	0.2363	0.2812	84.35
2:35	0.9	0.38	0.14	N/A	0.2363	0.2812	84.35
2:40	0.9	0.38	0.14	N/A	0.2363	0.2812	84.35
2:45	1	0.42	0.14	N/A	0.2782	0.3310	99.30
2:50	1	0.42	0.14	N/A	0.2782	0.3310	99.30
2:55	1	0.42	0.14	N/A	0.2782	0.3310	99.30
3:00	1	0.42	0.14	N/A	0.2782	0.3310	99.30
3:05	1	0.42	0.14	N/A	0.2782	0.3310	99.30
3:10	1.1	0.46	0.14	N/A	0.3201	0.3808	114.25
3:15	1.1	0.46	0.14	N/A	0.3201	0.3808	114.25
3:20	1.1	0.46	0.14	N/A	0.3201	0.3808	114.25
3:25	1.2	0.50	0.14	N/A	0.3620	0.4307	129.20
3:30	1.3	0.54	0.14	N/A	0.4038	0.4805	144.15
3:35	1.4	0.59	0.14	N/A	0.4457	0.5303	159.10
3:40	1.4	0.59	0.14	N/A	0.4457	0.5303	159.10
3:45	1.5	0.63	0.14	N/A	0.4876	0.5802	174.05
3:50	1.5	0.63	0.14	N/A	0.4876	0.5802	174.05
3:55	1.6	0.67	0.14	N/A	0.5295	0.6300	189.00
4:00	1.6	0.67	0.14	N/A	0.5295	0.6300	189.00
4:05	1.7	0.71	0.14	N/A	0.5714	0.6798	203.95
4:10	1.8	0.75	0.14	N/A	0.6132	0.7297	218.90
4:15	1.9	0.80	0.14	N/A	0.6551	0.7795	233.85

4:20	2	0.84	0.14	N/A	0.6970	0.8293	248.79
4:25	2.1	0.88	0.14	N/A	0.7389	0.8791	263.74
4:30	2.1	0.88	0.14	N/A	0.7389	0.8791	263.74
4:35	2.2	0.92	0.14	N/A	0.7808	0.9290	278.69
4:40	2.3	0.96	0.14	N/A	0.8226	0.9788	293.64
4:45	2.4	1.01	0.14	N/A	0.8645	1.0286	308.59
4:50	2.4	1.01	0.14	N/A	0.8645	1.0286	308.59
4:55	2.5	1.05	0.14	N/A	0.9064	1.0785	323.54
5:00	2.6	1.09	0.14	N/A	0.9483	1.1283	338.49
5:05	3.1	1.30	0.14	N/A	1.1577	1.3774	413.23
5:10	3.6	1.51	0.14	N/A	1.3671	1.6266	487.98
5:15	3.9	1.63	0.14	N/A	1.4927	1.7761	532.83
5:20	4.2	1.76	0.14	N/A	1.6184	1.9256	577.67
5:25	4.7	1.97	0.14	N/A	1.8278	2.1747	652.42
5:30	5.6	2.35	0.14	N/A	**2.2047**	**2.6232**	**786.96**
5:35	1.9	0.80	0.14	N/A	0.6551	0.7795	233.85
5:40	0.9	0.38	0.14	N/A	0.2363	0.2812	84.35
5:45	0.6	0.25	0.14	N/A	0.1107	0.1317	39.51
5:50	0.5	0.21	0.14	N/A	0.0688	0.0819	24.56
5:55	0.3	0.13	0.14	0.11	0.0126	0.0149	4.48
6:00	0.2	0.08	0.14	0.08	0.0084	0.0100	2.99
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
6:15	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
6:30	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
6:45	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
7:00	0	0.00	0.14	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**11368.69**

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:15	0.2	0.04	0.25	0.04	0.0042	0.0050	4.51
0:30	0.3	0.06	0.24	0.06	0.0063	0.0075	6.76
0:45	0.3	0.06	0.24	0.06	0.0063	0.0075	6.76
1:00	0.4	0.08	0.24	0.08	0.0084	0.0100	9.01
1:15	0.3	0.06	0.24	0.06	0.0063	0.0075	6.76
1:30	0.3	0.06	0.23	0.06	0.0063	0.0075	6.76
1:45	0.3	0.06	0.23	0.06	0.0063	0.0075	6.76
2:00	0.4	0.08	0.23	0.08	0.0084	0.0100	9.01
2:15	0.4	0.08	0.22	0.08	0.0084	0.0100	9.01
2:30	0.4	0.08	0.22	0.08	0.0084	0.0100	9.01
2:45	0.5	0.11	0.22	0.09	0.0105	0.0125	11.27
3:00	0.5	0.11	0.22	0.09	0.0105	0.0125	11.27
3:15	0.5	0.11	0.21	0.09	0.0105	0.0125	11.27
3:30	0.5	0.11	0.21	0.09	0.0105	0.0125	11.27
3:45	0.5	0.11	0.21	0.09	0.0105	0.0125	11.27
4:00	0.6	0.13	0.21	0.11	0.0126	0.0150	13.52
4:15	0.6	0.13	0.20	0.11	0.0126	0.0150	13.52
4:30	0.7	0.15	0.20	0.13	0.0147	0.0175	15.77
4:45	0.7	0.15	0.20	0.13	0.0147	0.0175	15.77
5:00	0.8	0.17	0.20	0.15	0.0168	0.0200	18.02
5:15	0.6	0.13	0.19	0.11	0.0126	0.0150	13.52
5:30	0.7	0.15	0.19	0.13	0.0147	0.0175	15.77
5:45	0.8	0.17	0.19	0.15	0.0168	0.0200	18.02
6:00	0.8	0.17	0.19	0.15	0.0168	0.0200	18.02
6:15	0.9	0.19	0.18	0.17	0.0189	0.0225	20.28
6:30	0.9	0.19	0.18	0.17	0.0189	0.0225	20.28
6:45	1	0.21	0.18	N/A	0.0326	0.0387	34.86
7:00	1	0.21	0.18	N/A	0.0350	0.0416	37.44
7:15	1	0.21	0.17	N/A	0.0373	0.0444	40.00
7:30	1.1	0.23	0.17	N/A	0.0608	0.0723	65.06
7:45	1.2	0.25	0.17	N/A	0.0841	0.1001	90.11
8:00	1.3	0.27	0.17	N/A	0.1075	0.1279	115.13
8:15	1.5	0.32	0.16	N/A	0.1519	0.1807	162.66
8:30	1.5	0.32	0.16	N/A	0.1542	0.1835	165.11
8:45	1.6	0.34	0.16	N/A	0.1775	0.2112	190.07
9:00	1.7	0.36	0.16	N/A	0.2008	0.2389	215.01
9:15	1.9	0.40	0.15	N/A	0.2451	0.2916	262.45
9:30	2	0.42	0.15	N/A	0.2683	0.3193	287.35
9:45	2.1	0.44	0.15	N/A	0.2916	0.3469	312.22
10:00	2.2	0.46	0.15	N/A	0.3148	0.3745	337.07
10:15	1.5	0.32	0.15	N/A	0.1696	0.2018	181.65
10:30	1.5	0.32	0.14	N/A	0.1718	0.2044	183.92
10:45	2	0.42	0.14	N/A	0.2791	0.3320	298.82
11:00	2	0.42	0.14	N/A	0.2811	0.3345	301.05
11:15	1.9	0.40	0.14	N/A	0.2621	0.3119	280.72
11:30	1.9	0.40	0.14	N/A	0.2642	0.3143	282.90
11:45	1.7	0.36	0.13	N/A	0.2241	0.2667	239.99
12:00	1.8	0.38	0.13	N/A	0.2471	0.2941	264.65
12:15	2.5	0.53	0.13	N/A	0.3964	0.4716	424.48
12:30	2.6	0.55	0.13	N/A	0.4194	0.4990	449.09
12:45	2.8	0.59	0.13	N/A	0.4634	0.5513	496.21

13:00	2.9	0.61	0.12	N/A	0.4863	0.5786	520.77
13:15	3.4	0.72	0.12	N/A	0.5934	0.7060	635.43
13:30	3.4	0.72	0.12	N/A	**0.5952**	0.7082	**637.41**
13:45	2.3	0.48	0.12	N/A	0.3656	0.4350	391.53
14:00	2.3	0.48	0.12	N/A	0.3674	0.4372	393.46
14:15	2.7	0.57	0.11	N/A	0.4534	0.5394	485.49
14:30	2.6	0.55	0.11	N/A	0.4341	0.5165	464.83
14:45	2.6	0.55	0.11	N/A	0.4358	0.5185	466.68
15:00	2.5	0.53	0.11	N/A	0.4165	0.4955	445.98
15:15	2.4	0.50	0.11	N/A	0.3971	0.4725	425.24
15:30	2.3	0.48	0.11	N/A	0.3777	0.4494	404.48
15:45	1.9	0.40	0.10	N/A	0.2952	0.3512	316.09
16:00	1.9	0.40	0.10	N/A	0.2968	0.3531	317.80
16:15	0.4	0.08	0.10	0.08	0.0084	0.0100	9.01
16:30	0.4	0.08	0.10	0.08	0.0084	0.0100	9.01
16:45	0.3	0.06	0.10	0.06	0.0063	0.0075	6.76
17:00	0.3	0.06	0.10	0.06	0.0063	0.0075	6.76
17:15	0.5	0.11	0.10	0.09	0.0105	0.0125	11.27
17:30	0.5	0.11	0.09	N/A	0.0112	0.0133	12.00
17:45	0.5	0.11	0.09	N/A	0.0126	0.0150	13.50
18:00	0.4	0.08	0.09	0.08	0.0084	0.0100	9.01
18:15	0.4	0.08	0.09	0.08	0.0084	0.0100	9.01
18:30	0.4	0.08	0.09	0.08	0.0084	0.0100	9.01
18:45	0.3	0.06	0.09	0.06	0.0063	0.0075	6.76
19:00	0.2	0.04	0.09	0.04	0.0042	0.0050	4.51
19:15	0.3	0.06	0.08	0.06	0.0063	0.0075	6.76
19:30	0.4	0.08	0.08	0.08	0.0084	0.0100	9.01
19:45	0.3	0.06	0.08	0.06	0.0063	0.0075	6.76
20:00	0.2	0.04	0.08	0.04	0.0042	0.0050	4.51
20:15	0.3	0.06	0.08	0.06	0.0063	0.0075	6.76
20:30	0.3	0.06	0.08	0.06	0.0063	0.0075	6.76
20:45	0.3	0.06	0.08	0.06	0.0063	0.0075	6.76
21:00	0.2	0.04	0.08	0.04	0.0042	0.0050	4.51
21:15	0.3	0.06	0.08	0.06	0.0063	0.0075	6.76
21:30	0.2	0.04	0.08	0.04	0.0042	0.0050	4.51
21:45	0.3	0.06	0.07	0.06	0.0063	0.0075	6.76
22:00	0.2	0.04	0.07	0.04	0.0042	0.0050	4.51
22:15	0.3	0.06	0.07	0.06	0.0063	0.0075	6.76
22:30	0.2	0.04	0.07	0.04	0.0042	0.0050	4.51
22:45	0.2	0.04	0.07	0.04	0.0042	0.0050	4.51
23:00	0.2	0.04	0.07	0.04	0.0042	0.0050	4.51
23:15	0.2	0.04	0.07	0.04	0.0042	0.0050	4.51
23:30	0.2	0.04	0.07	0.04	0.0042	0.0050	4.51
23:45	0.2	0.04	0.07	0.04	0.0042	0.0050	4.51
24:00	0.2	0.04	0.07	0.04	0.0042	0.0050	4.51
	0	0.00	0.07	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**12155.64**

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**
OFF2

Drainage Area (ac.)	**0.4200**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74 (AMC II)				
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**25**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.57 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))				
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2** (also used for drywell percolation rate)				

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **0.0001** s.f. **Bot. =** **0.0001** **s.f.** **Max. Depth (d)=** **0.0001** **Max. storage=** **0.00** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol^3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	3.7	0.8569	0.5735	N/A	0.2834	0.1200	36.01
0:10	4.8	1.1117	0.5735	N/A	0.5382	0.2279	68.38
0:15	5.1	1.1812	0.5735	N/A	0.6077	0.2573	77.20
0:20	4.9	1.1348	0.5735	N/A	0.5613	0.2377	71.32
0:25	6.6	1.5286	0.5735	N/A	0.9551	0.4045	121.34
0:30	7.3	1.6907	0.5735	N/A	1.1172	0.4731	141.94
0:35	8.4	1.9454	0.5735	N/A	1.3719	0.5810	174.30
0:40	9	2.0844	0.5735	N/A	1.5109	0.6399	191.96
0:45	12.3	2.8487	0.5735	N/A	2.2752	0.9635	289.06
0:50	17.6	4.0762	0.5735	N/A	**3.5027**	**1.4834**	**445.01**
0:55	16.1	3.7288	0.5735	N/A	3.1553	1.3363	400.88
1:00	4.2	0.9727	0.5735	N/A	0.3992	0.1691	50.72
	0	0.0000	0.5735	0.00	0.0000	0.0000	0.00
	0	0.0000	0.5735	0.00	0.0000	0.0000	0.00
1:15	0	0.0000	0.5735	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**2068.12**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	1.3	0.42	0.57	0.38		0.0421	0.0178	5.35
0:10	1.3	0.42	0.57	0.38		0.0421	0.0178	5.35
0:15	1.1	0.36	0.57	0.32		0.0356	0.0151	4.53
0:20	1.5	0.49	0.57	0.44		0.0486	0.0206	6.17
0:25	1.5	0.49	0.57	0.44		0.0486	0.0206	6.17
0:30	1.8	0.58	0.57	0.52		0.0583	0.0247	7.41
0:35	1.5	0.49	0.57	0.44		0.0486	0.0206	6.17
0:40	1.8	0.58	0.57	0.52		0.0583	0.0247	7.41
0:45	1.8	0.58	0.57	0.52		0.0583	0.0247	7.41
0:50	1.5	0.49	0.57	0.44		0.0486	0.0206	6.17
0:55	1.6	0.52	0.57	0.47		0.0518	0.0220	6.59
1:00	1.8	0.58	0.57	0.52		0.0583	0.0247	7.41
1:05	2.2	0.71	0.57	N/A		0.1393	0.0590	17.70
1:10	2.2	0.71	0.57	N/A		0.1393	0.0590	17.70
1:15	2.2	0.71	0.57	N/A		0.1393	0.0590	17.70
1:20	2	0.65	0.57	N/A		0.0745	0.0316	9.47
1:25	2.6	0.84	0.57	N/A		0.2689	0.1139	34.16
1:30	2.7	0.87	0.57	N/A		0.3013	0.1276	38.28
1:35	2.4	0.78	0.57	N/A		0.2041	0.0864	25.93
1:40	2.7	0.87	0.57	N/A		0.3013	0.1276	38.28
1:45	3.3	1.07	0.57	N/A		0.4957	0.2099	62.98
1:50	3.1	1.00	0.57	N/A		0.4309	0.1825	54.75
1:55	2.9	0.94	0.57	N/A		0.3661	0.1550	46.51
2:00	3	0.97	0.57	N/A		0.3985	0.1688	50.63
2:05	3.1	1.00	0.57	N/A		0.4309	0.1825	54.75
2:10	4.2	1.36	0.57	N/A		0.7873	0.3334	100.03
2:15	5	1.62	0.57	N/A		1.0465	0.4432	132.96
2:20	3.5	1.13	0.57	N/A		0.5605	0.2374	71.21
2:25	6.8	2.20	0.57	N/A		1.6297	0.6902	207.05
2:30	7.3	2.37	0.57	N/A		1.7917	0.7588	227.64
2:35	8.2	2.66	0.57	N/A		**2.0833**	**0.8823**	**264.68**
2:40	5.9	1.91	0.57	N/A		1.3381	0.5667	170.01
2:45	2	0.65	0.57	N/A		0.0745	0.0316	9.47
2:50	1.8	0.58	0.57		0.52	0.0583	0.0247	7.41
2:55	1.8	0.58	0.57		0.52	0.0583	0.0247	7.41
3:00	0.6	0.19	0.57		0.17	0.0194	0.0082	2.47
	0	0.00	0.57		0.00	0.0000	0.0000	0.00
	0	0.00	0.57		0.00	0.0000	0.0000	0.00
3:15	0	0.00	0.57		0.00	0.0000	0.0000	0.00
	0	0.00	0.57		0.00	0.0000	0.0000	0.00
	0	0.00	0.57		0.00	0.0000	0.0000	0.00
3:30	0	0.00	0.57		0.00	0.0000	0.0000	0.00
	0	0.00	0.57		0.00	0.0000	0.0000	0.00
	0	0.00	0.57		0.00	0.0000	0.0000	0.00
						Total volume (cf)		**1745.31**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	0.5	0.21	0.57	0.19	0.0209	0.0089	2.66
0:10	0.6	0.25	0.57	0.23	0.0251	0.0106	3.19
0:15	0.6	0.25	0.57	0.23	0.0251	0.0106	3.19
0:20	0.6	0.25	0.57	0.23	0.0251	0.0106	3.19
0:25	0.6	0.25	0.57	0.23	0.0251	0.0106	3.19
0:30	0.7	0.29	0.57	0.26	0.0293	0.0124	3.72
0:35	0.7	0.29	0.57	0.26	0.0293	0.0124	3.72
0:40	0.7	0.29	0.57	0.26	0.0293	0.0124	3.72
0:45	0.7	0.29	0.57	0.26	0.0293	0.0124	3.72
0:50	0.7	0.29	0.57	0.26	0.0293	0.0124	3.72
0:55	0.7	0.29	0.57	0.26	0.0293	0.0124	3.72
1:00	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:05	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:10	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:15	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:20	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:25	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:30	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:35	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:40	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:45	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:50	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
1:55	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
2:00	0.9	0.38	0.57	0.34	0.0377	0.0160	4.79
2:05	0.8	0.34	0.57	0.30	0.0335	0.0142	4.26
2:10	0.9	0.38	0.57	0.34	0.0377	0.0160	4.79
2:15	0.9	0.38	0.57	0.34	0.0377	0.0160	4.79
2:20	0.9	0.38	0.57	0.34	0.0377	0.0160	4.79
2:25	0.9	0.38	0.57	0.34	0.0377	0.0160	4.79
2:30	0.9	0.38	0.57	0.34	0.0377	0.0160	4.79
2:35	0.9	0.38	0.57	0.34	0.0377	0.0160	4.79
2:40	0.9	0.38	0.57	0.34	0.0377	0.0160	4.79
2:45	1	0.42	0.57	0.38	0.0419	0.0177	5.32
2:50	1	0.42	0.57	0.38	0.0419	0.0177	5.32
2:55	1	0.42	0.57	0.38	0.0419	0.0177	5.32
3:00	1	0.42	0.57	0.38	0.0419	0.0177	5.32
3:05	1	0.42	0.57	0.38	0.0419	0.0177	5.32
3:10	1.1	0.46	0.57	0.41	0.0461	0.0195	5.85
3:15	1.1	0.46	0.57	0.41	0.0461	0.0195	5.85
3:20	1.1	0.46	0.57	0.41	0.0461	0.0195	5.85
3:25	1.2	0.50	0.57	0.45	0.0503	0.0213	6.39
3:30	1.3	0.54	0.57	0.49	0.0544	0.0231	6.92
3:35	1.4	0.59	0.57	0.53	0.0586	0.0248	7.45
3:40	1.4	0.59	0.57	0.53	0.0586	0.0248	7.45
3:45	1.5	0.63	0.57	0.57	0.0628	0.0266	7.98
3:50	1.5	0.63	0.57	0.57	0.0628	0.0266	7.98
3:55	1.6	0.67	0.57	N/A	0.0966	0.0409	12.27
4:00	1.6	0.67	0.57	N/A	0.0966	0.0409	12.27
4:05	1.7	0.71	0.57	N/A	0.1385	0.0586	17.59
4:10	1.8	0.75	0.57	N/A	0.1803	0.0764	22.91
4:15	1.9	0.80	0.57	N/A	0.2222	0.0941	28.23

4:20	2	0.84	0.57	N/A	0.2641	0.1118	33.55
4:25	2.1	0.88	0.57	N/A	0.3060	0.1296	38.87
4:30	2.1	0.88	0.57	N/A	0.3060	0.1296	38.87
4:35	2.2	0.92	0.57	N/A	0.3479	0.1473	44.20
4:40	2.3	0.96	0.57	N/A	0.3897	0.1651	49.52
4:45	2.4	1.01	0.57	N/A	0.4316	0.1828	54.84
4:50	2.4	1.01	0.57	N/A	0.4316	0.1828	54.84
4:55	2.5	1.05	0.57	N/A	0.4735	0.2005	60.16
5:00	2.6	1.09	0.57	N/A	0.5154	0.2183	65.48
5:05	3.1	1.30	0.57	N/A	0.7248	0.3069	92.08
5:10	3.6	1.51	0.57	N/A	0.9342	0.3956	118.69
5:15	3.9	1.63	0.57	N/A	1.0598	0.4488	134.65
5:20	4.2	1.76	0.57	N/A	1.1855	0.5020	150.61
5:25	4.7	1.97	0.57	N/A	1.3949	0.5907	177.22
5:30	5.6	2.35	0.57	N/A	**1.7718**	**0.7503**	**225.10**
5:35	1.9	0.80	0.57	N/A	0.2222	0.0941	28.23
5:40	0.9	0.38	0.57	0.34	0.0377	0.0160	4.79
5:45	0.6	0.25	0.57	0.23	0.0251	0.0106	3.19
5:50	0.5	0.21	0.57	0.19	0.0209	0.0089	2.66
5:55	0.3	0.13	0.57	0.11	0.0126	0.0053	1.60
6:00	0.2	0.08	0.57	0.08	0.0084	0.0035	1.06
	0	0.00	0.57	0.00	0.0000	0.0000	0.00
	0	0.00	0.57	0.00	0.0000	0.0000	0.00
6:15	0	0.00	0.57	0.00	0.0000	0.0000	0.00
	0	0.00	0.57	0.00	0.0000	0.0000	0.00
	0	0.00	0.57	0.00	0.0000	0.0000	0.00
6:30	0	0.00	0.57	0.00	0.0000	0.0000	0.00
	0	0.00	0.57	0.00	0.0000	0.0000	0.00
	0	0.00	0.57	0.00	0.0000	0.0000	0.00
6:45	0	0.00	0.57	0.00	0.0000	0.0000	0.00
	0	0.00	0.57	0.00	0.0000	0.0000	0.00
	0	0.00	0.57	0.00	0.0000	0.0000	0.00
7:00	0	0.00	0.57	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**1693.25**

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:15	0.2	0.04	1.01	0.04	0.0042	0.0018	1.60
0:30	0.3	0.06	1.00	0.06	0.0063	0.0027	2.41
0:45	0.3	0.06	0.98	0.06	0.0063	0.0027	2.41
1:00	0.4	0.08	0.97	0.08	0.0084	0.0036	3.21
1:15	0.3	0.06	0.96	0.06	0.0063	0.0027	2.41
1:30	0.3	0.06	0.95	0.06	0.0063	0.0027	2.41
1:45	0.3	0.06	0.94	0.06	0.0063	0.0027	2.41
2:00	0.4	0.08	0.93	0.08	0.0084	0.0036	3.21
2:15	0.4	0.08	0.92	0.08	0.0084	0.0036	3.21
2:30	0.4	0.08	0.90	0.08	0.0084	0.0036	3.21
2:45	0.5	0.11	0.89	0.09	0.0105	0.0045	4.01
3:00	0.5	0.11	0.88	0.09	0.0105	0.0045	4.01
3:15	0.5	0.11	0.87	0.09	0.0105	0.0045	4.01
3:30	0.5	0.11	0.86	0.09	0.0105	0.0045	4.01
3:45	0.5	0.11	0.85	0.09	0.0105	0.0045	4.01
4:00	0.6	0.13	0.84	0.11	0.0126	0.0053	4.81
4:15	0.6	0.13	0.83	0.11	0.0126	0.0053	4.81
4:30	0.7	0.15	0.82	0.13	0.0147	0.0062	5.61
4:45	0.7	0.15	0.81	0.13	0.0147	0.0062	5.61
5:00	0.8	0.17	0.80	0.15	0.0168	0.0071	6.42
5:15	0.6	0.13	0.79	0.11	0.0126	0.0053	4.81
5:30	0.7	0.15	0.78	0.13	0.0147	0.0062	5.61
5:45	0.8	0.17	0.77	0.15	0.0168	0.0071	6.42
6:00	0.8	0.17	0.76	0.15	0.0168	0.0071	6.42
6:15	0.9	0.19	0.75	0.17	0.0189	0.0080	7.22
6:30	0.9	0.19	0.74	0.17	0.0189	0.0080	7.22
6:45	1	0.21	0.73	0.19	0.0210	0.0089	8.02
7:00	1	0.21	0.72	0.19	0.0210	0.0089	8.02
7:15	1	0.21	0.71	0.19	0.0210	0.0089	8.02
7:30	1.1	0.23	0.70	0.21	0.0231	0.0098	8.82
7:45	1.2	0.25	0.69	0.23	0.0252	0.0107	9.62
8:00	1.3	0.27	0.68	0.25	0.0274	0.0116	10.43
8:15	1.5	0.32	0.67	0.28	0.0316	0.0134	12.03
8:30	1.5	0.32	0.66	0.28	0.0316	0.0134	12.03
8:45	1.6	0.34	0.65	0.30	0.0337	0.0143	12.83
9:00	1.7	0.36	0.64	0.32	0.0358	0.0151	13.63
9:15	1.9	0.40	0.63	0.36	0.0400	0.0169	15.24
9:30	2	0.42	0.62	0.38	0.0421	0.0178	16.04
9:45	2.1	0.44	0.61	0.40	0.0442	0.0187	16.84
10:00	2.2	0.46	0.60	0.42	0.0463	0.0196	17.64
10:15	1.5	0.32	0.60	0.28	0.0316	0.0134	12.03
10:30	1.5	0.32	0.59	0.28	0.0316	0.0134	12.03
10:45	2	0.42	0.58	0.38	0.0421	0.0178	16.04
11:00	2	0.42	0.57	0.38	0.0421	0.0178	16.04
11:15	1.9	0.40	0.56	0.36	0.0400	0.0169	15.24
11:30	1.9	0.40	0.55	0.36	0.0400	0.0169	15.24
11:45	1.7	0.36	0.54	0.32	0.0358	0.0151	13.63
12:00	1.8	0.38	0.54	0.34	0.0379	0.0160	14.43
12:15	2.5	0.53	0.53	0.47	0.0526	0.0223	20.05
12:30	2.6	0.55	0.52	0.49	0.0547	0.0232	20.85
12:45	2.8	0.59	0.51	N/A	0.0762	0.0323	29.05

13:00	2.9	0.61	0.51	N/A	0.1050	0.0445	40.02
13:15	3.4	0.72	0.50	N/A	0.2178	0.0923	83.03
13:30	3.4	0.72	0.49	N/A	**0.2254**	0.0955	**85.91**
13:45	2.3	0.48	0.48	0.44	0.0484	0.0205	18.44
14:00	2.3	0.48	0.48	0.44	0.0484	0.0205	18.44
14:15	2.7	0.57	0.47	N/A	0.1002	0.0424	38.18
14:30	2.6	0.55	0.46	N/A	0.0863	0.0365	32.88
14:45	2.6	0.55	0.45	N/A	0.0933	0.0395	35.57
15:00	2.5	0.53	0.45	N/A	0.0792	0.0336	30.20
15:15	2.4	0.50	0.44	N/A	0.0650	0.0275	24.78
15:30	2.3	0.48	0.43	N/A	0.0507	0.0215	19.33
15:45	1.9	0.40	0.43	0.36	0.0400	0.0169	15.24
16:00	1.9	0.40	0.42	0.36	0.0400	0.0169	15.24
16:15	0.4	0.08	0.41	0.08	0.0084	0.0036	3.21
16:30	0.4	0.08	0.41	0.08	0.0084	0.0036	3.21
16:45	0.3	0.06	0.40	0.06	0.0063	0.0027	2.41
17:00	0.3	0.06	0.40	0.06	0.0063	0.0027	2.41
17:15	0.5	0.11	0.39	0.09	0.0105	0.0045	4.01
17:30	0.5	0.11	0.38	0.09	0.0105	0.0045	4.01
17:45	0.5	0.11	0.38	0.09	0.0105	0.0045	4.01
18:00	0.4	0.08	0.37	0.08	0.0084	0.0036	3.21
18:15	0.4	0.08	0.37	0.08	0.0084	0.0036	3.21
18:30	0.4	0.08	0.36	0.08	0.0084	0.0036	3.21
18:45	0.3	0.06	0.36	0.06	0.0063	0.0027	2.41
19:00	0.2	0.04	0.35	0.04	0.0042	0.0018	1.60
19:15	0.3	0.06	0.35	0.06	0.0063	0.0027	2.41
19:30	0.4	0.08	0.34	0.08	0.0084	0.0036	3.21
19:45	0.3	0.06	0.34	0.06	0.0063	0.0027	2.41
20:00	0.2	0.04	0.33	0.04	0.0042	0.0018	1.60
20:15	0.3	0.06	0.33	0.06	0.0063	0.0027	2.41
20:30	0.3	0.06	0.32	0.06	0.0063	0.0027	2.41
20:45	0.3	0.06	0.32	0.06	0.0063	0.0027	2.41
21:00	0.2	0.04	0.32	0.04	0.0042	0.0018	1.60
21:15	0.3	0.06	0.31	0.06	0.0063	0.0027	2.41
21:30	0.2	0.04	0.31	0.04	0.0042	0.0018	1.60
21:45	0.3	0.06	0.31	0.06	0.0063	0.0027	2.41
22:00	0.2	0.04	0.30	0.04	0.0042	0.0018	1.60
22:15	0.3	0.06	0.30	0.06	0.0063	0.0027	2.41
22:30	0.2	0.04	0.30	0.04	0.0042	0.0018	1.60
22:45	0.2	0.04	0.29	0.04	0.0042	0.0018	1.60
23:00	0.2	0.04	0.29	0.04	0.0042	0.0018	1.60
23:15	0.2	0.04	0.29	0.04	0.0042	0.0018	1.60
23:30	0.2	0.04	0.29	0.04	0.0042	0.0018	1.60
23:45	0.2	0.04	0.29	0.04	0.0042	0.0018	1.60
24:00	0.2	0.04	0.29	0.04	0.0042	0.0018	1.60
	0	0.00	0.29	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**999.56**

POST-DEVELOPMENT

POST-DEVELOPMENT w/ RETENTION BASIN

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**

Drainage Area (ac.)	**10.4815**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74 (AMC II)				
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**62.5**		287450 sf impervious	
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.32 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))				
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2** (also used for drywell percolation rate)				

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **24000** s.f. **Bot. =** **3700** **s.f.** **Max. Depth (d)=** **5** **Max. storage=** **61872.29** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol^3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:05	3.7	0.8569	0.3238	N/A	0.5332	5.6350	1690.50	0.00	0.00	0.00	0.00	0.00	1690.50	3700.00	51.39	1639.11	0.13	0.00	0.00
0:10	4.8	1.1117	0.3238	N/A	0.7879	8.3275	2498.25	0.00	0.00	0.00	0.00	0.00	2498.25	4237.78	58.86	4078.50	0.33	0.00	0.00
0:15	5.1	1.1812	0.3238	N/A	0.8574	9.0618	2718.55	0.00	0.00	0.00	0.00	0.00	2718.55	5038.14	69.97	6727.08	0.54	0.00	0.00
0:20	4.9	1.1348	0.3238	N/A	0.8111	8.5723	2571.68	0.00	0.00	0.00	0.00	0.00	2571.68	5907.12	82.04	9216.72	0.74	0.00	0.00
0:25	6.6	1.5286	0.3238	N/A	1.2048	12.7334	3820.03	0.00	0.00	0.00	0.00	0.00	3820.03	6723.96	93.39	12943.36	1.05	0.00	0.00
0:30	7.3	1.6907	0.3238	N/A	1.3669	14.4469	4334.06	0.00	0.00	0.00	0.00	0.00	4334.06	7946.66	110.37	17167.06	1.39	0.00	0.00
0:35	8.4	1.9454	0.3238	N/A	1.6217	17.1394	5141.82	0.00	0.00	0.00	0.00	0.00	5141.82	9332.43	129.62	22179.25	1.79	0.00	0.00
0:40	9	2.0844	0.3238	N/A	1.7607	18.6080	5582.41	0.00	0.00	0.00	0.00	0.00	5582.41	10976.91	152.46	27609.21	2.23	0.00	0.00
0:45	12.3	2.8487	0.3238	N/A	2.5249	26.6856	8005.68	0.00	0.00	0.00	0.00	0.00	8005.68	12758.45	177.20	35437.68	2.86	0.00	0.00
0:50	17.6	4.0762	0.3238	N/A	**3.7524**	**39.6586**	**11897.59**	0.00	0.00	0.00	0.00	0.00	11897.59	15326.93	212.87	47122.40	3.81	0.00	0.00
0:55	16.1	3.7288	0.3238	N/A	3.4050	35.9870	10796.10	0.00	0.00	0.00	0.00	0.00	10796.10	19160.63	266.12	57652.38	4.66	0.00	0.00
1:00	4.2	0.9727	0.3238	N/A	0.6490	6.8589	2057.66	0.00	0.00	0.00	0.00	0.00	2057.66	22615.47	314.10	**59395.94**	**4.80**	0.00	0.00
	0	0.0000	0.3238	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23187.52	322.05	59073.89	4.77	0.00	0.00
	0	0.0000	0.3238	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23081.86	320.58	58753.31	4.75	0.00	0.00
1:15	0	0.0000	0.3238	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22976.68	319.12	58434.19	4.72	0.00	0.00
					Total volume (cf)		**61114.33**											**0.00**	

Drawdown time = **271.15** cf/5min x **12.00** per/hr = **3253.80** cf/hr. Therefore, 59395.94 cf. / 3253.8 cf/hr = 18.2543294 hours for total drawdown plus storm event = **19.25 hrs total drawdown**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)	
0:05	1.3	0.42	0.32	N/A		0.0975	1.0299	308.98		0.00	0.00	0.00	0.00	0.00	308.98	3700.00	51.39	257.59	0.02	0.00	0.00	
0:10	1.3	0.42	0.32	N/A		0.0975	1.0299	308.98		0.00	0.00	0.00	0.00	0.00	308.98	3784.51	52.56	514.01	0.04	0.00	0.00	
0:15	1.1	0.36	0.32		0.32	0.0356	0.3767	113.00		0.00	0.00	0.00	0.00	0.00	113.00	3868.64	53.73	573.28	0.05	0.00	0.00	
0:20	1.5	0.49	0.32	N/A		0.1623	1.7148	514.44		0.00	0.00	0.00	0.00	0.00	514.44	3888.09	54.00	1033.72	0.08	0.00	0.00	
0:25	1.5	0.49	0.32	N/A		0.1623	1.7148	514.44		0.00	0.00	0.00	0.00	0.00	514.44	4039.16	56.10	1492.06	0.12	0.00	0.00	
0:30	1.8	0.58	0.32	N/A		0.2595	2.7421	822.63		0.00	0.00	0.00	0.00	0.00	822.63	4189.54	58.19	2256.49	0.18	0.00	0.00	
0:35	1.5	0.49	0.32	N/A		0.1623	1.7148	514.44		0.00	0.00	0.00	0.00	0.00	514.44	4440.34	61.67	2709.26	0.22	0.00	0.00	
0:40	1.8	0.58	0.32	N/A		0.2595	2.7421	822.63		0.00	0.00	0.00	0.00	0.00	822.63	4588.90	63.73	3468.15	0.28	0.00	0.00	
0:45	1.8	0.58	0.32	N/A		0.2595	2.7421	822.63		0.00	0.00	0.00	0.00	0.00	822.63	4837.88	67.19	4223.58	0.34	0.00	0.00	
0:50	1.5	0.49	0.32	N/A		0.1623	1.7148	514.44		0.00	0.00	0.00	0.00	0.00	514.44	5085.74	70.64	4667.39	0.38	0.00	0.00	
0:55	1.6	0.52	0.32	N/A		0.1947	2.0572	617.17		0.00	0.00	0.00	0.00	0.00	617.17	5231.35	72.66	5211.90	0.42	0.00	0.00	
1:00	1.8	0.58	0.32	N/A		0.2595	2.7421	822.63		0.00	0.00	0.00	0.00	0.00	822.63	5410.00	75.14	5959.38	0.48	0.00	0.00	
1:05	2.2	0.71	0.32	N/A		0.3891	4.1118	1233.54		0.00	0.00	0.00	0.00	0.00	1233.54	5655.25	78.55	7114.38	0.57	0.00	0.00	
1:10	2.2	0.71	0.32	N/A		0.3891	4.1118	1233.54		0.00	0.00	0.00	0.00	0.00	1233.54	6034.19	83.81	8264.12	0.67	0.00	0.00	
1:15	2.2	0.71	0.32	N/A		0.3891	4.1118	1233.54		0.00	0.00	0.00	0.00	0.00	1233.54	6411.42	89.05	9408.61	0.76	0.00	0.00	
1:20	2	0.65	0.32	N/A		0.3243	3.4269	1028.08		0.00	0.00	0.00	0.00	0.00	1028.08	6786.92	94.26	10342.43	0.84	0.00	0.00	
1:25	2.6	0.84	0.32	N/A		0.5187	5.4815	1644.46		0.00	0.00	0.00	0.00	0.00	1644.46	7093.30	98.52	11888.37	0.96	0.00	0.00	
1:30	2.7	0.87	0.32	N/A		0.5511	5.8240	1747.19		0.00	0.00	0.00	0.00	0.00	1747.19	7600.52	105.56	13530.00	1.09	0.00	0.00	
1:35	2.4	0.78	0.32	N/A		0.4539	4.7967	1439.00		0.00	0.00	0.00	0.00	0.00	1439.00	8139.13	113.04	14855.96	1.20	0.00	0.00	
1:40	2.7	0.87	0.32	N/A		0.5511	5.8240	1747.19		0.00	0.00	0.00	0.00	0.00	1747.19	8574.17	119.09	16484.06	1.33	0.00	0.00	
1:45	3.3	1.07	0.32	N/A		0.7455	7.8785	2363.56		0.00	0.00	0.00	0.00	0.00	2363.56	9108.34	126.50	18721.12	1.51	0.00	0.00	
1:50	3.1	1.00	0.32	N/A		0.6807	7.1937	2158.10		0.00	0.00	0.00	0.00	0.00	2158.10	9842.31	136.70	20742.52	1.68	0.00	0.00	
1:55	2.9	0.94	0.32	N/A		0.6159	6.5088	1952.65		0.00	0.00	0.00	0.00	0.00	1952.65	10505.52	145.91	22549.26	1.82	0.00	0.00	
2:00	3	0.97	0.32	N/A		0.6483	6.8513	2055.38		0.00	0.00	0.00	0.00	0.00	2055.38	11098.30	154.14	24450.49	1.98	0.00	0.00	
2:05	3.1	1.00	0.32	N/A		0.6807	7.1937	2158.10		0.00	0.00	0.00	0.00	0.00	2158.10	11722.09	162.81	26445.79	2.14	0.00	0.00	
2:10	4.2	1.36	0.32	N/A		1.0371	10.9604	3288.13		0.00	0.00	0.00	0.00	0.00	3288.13	12376.74	171.90	29562.02	2.39	0.00	0.00	
2:15	5	1.62	0.32	N/A		1.2963	13.6999	4109.96		0.00	0.00	0.00	0.00	0.00	4109.96	13399.15	186.10	33485.88	2.71	0.00	0.00	
2:20	3.5	1.13	0.32	N/A		0.8103	8.5634	2569.02		0.00	0.00	0.00	0.00	0.00	2569.02	14686.55	203.98	35850.92	2.90	0.00	0.00	
2:25	6.8	2.20	0.32	N/A		1.8795	19.8636	5959.08		0.00	0.00	0.00	0.00	0.00	5959.08	15462.51	214.76	41595.24	3.36	0.00	0.00	
2:30	7.3	2.37	0.32	N/A		2.0415	21.5758	6472.73		0.00	0.00	0.00	0.00	0.00	6472.73	17347.20	240.93	47827.04	3.86	0.00	0.00	
2:35	8.2	2.66	0.32	N/A		**2.3331**	**24.6576**	**7397.29**		0.00	0.00	0.00	0.00	0.00	7397.29	19391.82	269.33	54955.00	4.44	0.00	0.00	
2:40	5.9	1.91	0.32	N/A		1.5879	16.7817	5034.52		0.00	0.00	0.00	0.00	0.00	5034.52	21730.47	301.81	59687.71	4.82	0.00	0.00	
2:45	2	0.65	0.32	N/A		0.3243	3.4269	1028.08		0.00	0.00	0.00	0.00	0.00	1028.08	23283.25	323.38	60392.42	4.88	0.00	0.00	
2:50	1.8	0.58	0.32	N/A		0.2595	2.7421	822.63		0.00	0.00	0.00	0.00	0.00	822.63	23514.46	326.59	60888.45	4.92	0.00	0.00	
2:55	1.8	0.58	0.32	N/A		0.2595	2.7421	822.63		0.00	0.00	0.00	0.00	0.00	822.63	23677.21	328.85	**61382.23**	**4.96**	0.00	0.00	**ok MAX DEPTH=5.0'**
3:00	0.6	0.19	0.32		0.17	0.0194	0.2055	61.64		0.00	0.00	0.00	0.00	0.00	61.64	23839.21	331.10	61112.76	4.94	0.00	0.00	
	0	0.00	0.32		0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	23750.80	329.87	60782.89	4.91	0.00	0.00	
	0	0.00	0.32		0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	23642.57	328.37	60454.52	4.89	0.00	0.00	
3:15	0	0.00	0.32		0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	23534.84	326.87	60127.65	4.86	0.00	0.00	
	0	0.00	0.32		0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	23427.59	325.38	59802.27	4.83	0.00	0.00	
	0	0.00	0.32		0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	23320.83	323.90	59478.37	4.81	0.00	0.00	
3:30	0	0.00	0.32		0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	23214.56	322.42	59155.94	4.78	0.00	0.00	
	0	0.00	0.32		0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	23108.78	320.96	58834.99	4.75	0.00	0.00	
	0	0.00	0.32		0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	23003.47	319.49	58515.49	4.73	0.00	0.00	
						Total volume (cf)		**66256.43**										**Total Overflow (cf)**		**0.00**		

Drawdown time = 332.49 cf/5min x 12.0000 per/hr = 3989.88 cf/hr. Therefore, 58553.00 cf. / 3989.88 cf/hr = 14.6753787 hours for total drawdown plus storm event = **17.68 hrs total drawdown**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:05	0.5	0.21	0.32	0.19	0.0209	0.2213	66.39		0.00	0.00	0.00	0.00	0.00	66.39	3700.00	51.39	15.00	0.00	0.00	0.00
0:10	0.6	0.25	0.32	0.23	0.0251	0.2656	79.67		0.00	0.00	0.00	0.00	0.00	79.67	3704.92	51.46	43.22	0.00	0.00	0.00
0:15	0.6	0.25	0.32	0.23	0.0251	0.2656	79.67		0.00	0.00	0.00	0.00	0.00	79.67	3714.18	51.59	71.31	0.01	0.00	0.00
0:20	0.6	0.25	0.32	0.23	0.0251	0.2656	79.67		0.00	0.00	0.00	0.00	0.00	79.67	3723.40	51.71	99.26	0.01	0.00	0.00
0:25	0.6	0.25	0.32	0.23	0.0251	0.2656	79.67		0.00	0.00	0.00	0.00	0.00	79.67	3732.57	51.84	127.10	0.01	0.00	0.00
0:30	0.7	0.29	0.32	0.26	0.0293	0.3098	92.95		0.00	0.00	0.00	0.00	0.00	92.95	3741.70	51.97	168.08	0.01	0.00	0.00
0:35	0.7	0.29	0.32	0.26	0.0293	0.3098	92.95		0.00	0.00	0.00	0.00	0.00	92.95	3755.15	52.15	208.87	0.02	0.00	0.00
0:40	0.7	0.29	0.32	0.26	0.0293	0.3098	92.95		0.00	0.00	0.00	0.00	0.00	92.95	3768.53	52.34	249.48	0.02	0.00	0.00
0:45	0.7	0.29	0.32	0.26	0.0293	0.3098	92.95		0.00	0.00	0.00	0.00	0.00	92.95	3781.85	52.53	289.91	0.02	0.00	0.00
0:50	0.7	0.29	0.32	0.26	0.0293	0.3098	92.95		0.00	0.00	0.00	0.00	0.00	92.95	3795.12	52.71	330.15	0.03	0.00	0.00
0:55	0.7	0.29	0.32	0.26	0.0293	0.3098	92.95		0.00	0.00	0.00	0.00	0.00	92.95	3808.32	52.89	370.21	0.03	0.00	0.00
1:00	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3821.46	53.08	423.36	0.03	0.00	0.00
1:05	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3838.90	53.32	476.27	0.04	0.00	0.00
1:10	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3856.26	53.56	528.94	0.04	0.00	0.00
1:15	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3873.54	53.80	581.37	0.05	0.00	0.00
1:20	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3890.75	54.04	633.56	0.05	0.00	0.00
1:25	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3907.87	54.28	685.52	0.06	0.00	0.00
1:30	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3924.92	54.51	737.24	0.06	0.00	0.00
1:35	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3941.88	54.75	788.72	0.06	0.00	0.00
1:40	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3958.77	54.98	839.96	0.07	0.00	0.00
1:45	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3975.59	55.22	890.98	0.07	0.00	0.00
1:50	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	3992.32	55.45	941.76	0.08	0.00	0.00
1:55	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	4008.99	55.68	992.31	0.08	0.00	0.00
2:00	0.9	0.38	0.32	N/A	0.0532	0.5619	168.58		0.00	0.00	0.00	0.00	0.00	168.58	4025.57	55.91	1104.98	0.09	0.00	0.00
2:05	0.8	0.34	0.32	0.30	0.0335	0.3541	106.23		0.00	0.00	0.00	0.00	0.00	106.23	4062.54	56.42	1154.78	0.09	0.00	0.00
2:10	0.9	0.38	0.32	N/A	0.0532	0.5619	168.58		0.00	0.00	0.00	0.00	0.00	168.58	4078.88	56.65	1266.72	0.10	0.00	0.00
2:15	0.9	0.38	0.32	N/A	0.0532	0.5619	168.58		0.00	0.00	0.00	0.00	0.00	168.58	4115.60	57.16	1378.14	0.11	0.00	0.00
2:20	0.9	0.38	0.32	N/A	0.0532	0.5619	168.58		0.00	0.00	0.00	0.00	0.00	168.58	4152.16	57.67	1489.05	0.12	0.00	0.00
2:25	0.9	0.38	0.32	N/A	0.0532	0.5619	168.58		0.00	0.00	0.00	0.00	0.00	168.58	4188.55	58.17	1599.46	0.13	0.00	0.00
2:30	0.9	0.38	0.32	N/A	0.0532	0.5619	168.58		0.00	0.00	0.00	0.00	0.00	168.58	4224.78	58.68	1709.37	0.14	0.00	0.00
2:35	0.9	0.38	0.32	N/A	0.0532	0.5619	168.58		0.00	0.00	0.00	0.00	0.00	168.58	4260.84	59.18	1818.77	0.15	0.00	0.00
2:40	0.9	0.38	0.32	N/A	0.0532	0.5619	168.58		0.00	0.00	0.00	0.00	0.00	168.58	4296.73	59.68	1927.68	0.16	0.00	0.00
2:45	1	0.42	0.32	N/A	0.0951	1.0046	301.37		0.00	0.00	0.00	0.00	0.00	301.37	4332.46	60.17	2168.88	0.18	0.00	0.00
2:50	1	0.42	0.32	N/A	0.0951	1.0046	301.37		0.00	0.00	0.00	0.00	0.00	301.37	4411.60	61.27	2408.98	0.19	0.00	0.00
2:55	1	0.42	0.32	N/A	0.0951	1.0046	301.37		0.00	0.00	0.00	0.00	0.00	301.37	4490.37	62.37	2647.98	0.21	0.00	0.00
3:00	1	0.42	0.32	N/A	0.0951	1.0046	301.37		0.00	0.00	0.00	0.00	0.00	301.37	4568.79	63.46	2885.90	0.23	0.00	0.00
3:05	1	0.42	0.32	N/A	0.0951	1.0046	301.37		0.00	0.00	0.00	0.00	0.00	301.37	4646.85	64.54	3122.73	0.25	0.00	0.00
3:10	1.1	0.46	0.32	N/A	0.1369	1.4472	434.16		0.00	0.00	0.00	0.00	0.00	434.16	4724.55	65.62	3491.27	0.28	0.00	0.00
3:15	1.1	0.46	0.32	N/A	0.1369	1.4472	434.16		0.00	0.00	0.00	0.00	0.00	434.16	4845.47	67.30	3858.13	0.31	0.00	0.00
3:20	1.1	0.46	0.32	N/A	0.1369	1.4472	434.16		0.00	0.00	0.00	0.00	0.00	434.16	4965.83	68.97	4223.31	0.34	0.00	0.00
3:25	1.2	0.50	0.32	N/A	0.1788	1.8898	566.94		0.00	0.00	0.00	0.00	0.00	566.94	5085.65	70.63	4719.62	0.38	0.00	0.00
3:30	1.3	0.54	0.32	N/A	0.2207	2.3324	699.73		0.00	0.00	0.00	0.00	0.00	699.73	5248.49	72.90	5346.46	0.43	0.00	0.00
3:35	1.4	0.59	0.32	N/A	0.2626	2.7751	832.52		0.00	0.00	0.00	0.00	0.00	832.52	5454.15	75.75	6103.23	0.49	0.00	0.00
3:40	1.4	0.59	0.32	N/A	0.2626	2.7751	832.52		0.00	0.00	0.00	0.00	0.00	832.52	5702.44	79.20	6856.54	0.55	0.00	0.00
3:45	1.5	0.63	0.32	N/A	0.3045	3.2177	965.31		0.00	0.00	0.00	0.00	0.00	965.31	5949.60	82.63	7739.22	0.63	0.00	0.00
3:50	1.5	0.63	0.32	N/A	0.3045	3.2177	965.31		0.00	0.00	0.00	0.00	0.00	965.31	6239.20	86.66	8617.86	0.70	0.00	0.00
3:55	1.6	0.67	0.32	N/A	0.3463	3.6603	1098.09		0.00	0.00	0.00	0.00	0.00	1098.09	6527.48	90.66	9625.30	0.78	0.00	0.00
4:00	1.6	0.67	0.32	N/A	0.3463	3.6603	1098.09		0.00	0.00	0.00	0.00	0.00	1098.09	6858.01	95.25	10628.14	0.86	0.00	0.00
4:05	1.7	0.71	0.32	N/A	0.3882	4.1029	1230.88		0.00	0.00	0.00	0.00	0.00	1230.88	7187.04	99.82	11759.20	0.95	0.00	0.00
4:10	1.8	0.75	0.32	N/A	0.4301	4.5456	1363.67		0.00	0.00	0.00	0.00	0.00	1363.67	7558.14	104.97	13017.89	1.05	0.00	0.00
4:15	1.9	0.80	0.32	N/A	0.4720	4.9882	1496.45		0.00	0.00	0.00	0.00	0.00	1496.45	7971.11	110.71	14403.63	1.16	0.00	0.00

4:20	2	0.84	0.32	N/A	0.5139	5.4308	1629.24	0.00	0.00	0.00	0.00	0.00	1629.24	8425.76	117.02	15915.85	1.29	0.00	0.00
4:25	2.1	0.88	0.32	N/A	0.5557	5.8734	1762.03	0.00	0.00	0.00	0.00	0.00	1762.03	8921.91	123.92	17553.96	1.42	0.00	0.00
4:30	2.1	0.88	0.32	N/A	0.5557	5.8734	1762.03	0.00	0.00	0.00	0.00	0.00	1762.03	9459.37	131.38	19184.61	1.55	0.00	0.00
4:35	2.2	0.92	0.32	N/A	0.5976	6.3160	1894.81	0.00	0.00	0.00	0.00	0.00	1894.81	9994.38	138.81	20940.61	1.69	0.00	0.00
4:40	2.3	0.96	0.32	N/A	0.6395	6.7587	2027.60	0.00	0.00	0.00	0.00	0.00	2027.60	10570.51	146.81	22821.40	1.84	0.00	0.00
4:45	2.4	1.01	0.32	N/A	0.6814	7.2013	2160.39	0.00	0.00	0.00	0.00	0.00	2160.39	11187.59	155.38	24826.40	2.01	0.00	0.00
4:50	2.4	1.01	0.32	N/A	0.6814	7.2013	2160.39	0.00	0.00	0.00	0.00	0.00	2160.39	11845.42	164.52	26822.27	2.17	0.00	0.00
4:55	2.5	1.05	0.32	N/A	0.7233	7.6439	2293.17	0.00	0.00	0.00	0.00	0.00	2293.17	12500.26	173.61	28941.83	2.34	0.00	0.00
5:00	2.6	1.09	0.32	N/A	0.7651	8.0865	2425.96	0.00	0.00	0.00	0.00	0.00	2425.96	13195.67	183.27	31184.52	2.52	0.00	0.00
5:05	3.1	1.30	0.32	N/A	0.9745	10.2997	3089.90	0.00	0.00	0.00	0.00	0.00	3089.90	13931.49	193.49	34080.92	2.75	0.00	0.00
5:10	3.6	1.51	0.32	N/A	1.1839	12.5128	3753.83	0.00	0.00	0.00	0.00	0.00	3753.83	14881.79	206.69	37628.06	3.04	0.00	0.00
5:15	3.9	1.63	0.32	N/A	1.3096	13.8406	4152.19	0.00	0.00	0.00	0.00	0.00	4152.19	16045.59	222.86	41557.40	3.36	0.00	0.00
5:20	4.2	1.76	0.32	N/A	1.4352	15.1685	4550.55	0.00	0.00	0.00	0.00	0.00	4550.55	17334.78	240.76	45867.19	3.71	0.00	0.00
5:25	4.7	1.97	0.32	N/A	1.6446	17.3816	5214.49	0.00	0.00	0.00	0.00	0.00	5214.49	18748.80	260.40	50821.28	4.11	0.00	0.00
5:30	5.6	2.35	0.32	N/A	**2.0215**	**21.3652**	**6409.57**	0.00	0.00	0.00	0.00	0.00	6409.57	20374.22	282.98	56947.87	4.60	0.00	0.00
5:35	1.9	0.80	0.32	N/A	0.4720	4.9882	1496.45	0.00	0.00	0.00	0.00	0.00	1496.45	22384.32	310.89	**58133.43**	**4.70**	0.00	0.00
5:40	0.9	0.38	0.32	N/A	0.0532	0.5619	168.58	0.00	0.00	0.00	0.00	0.00	168.58	22773.30	316.30	57985.72	4.69	0.00	0.00
5:45	0.6	0.25	0.32	0.23	0.0251	0.2656	79.67	0.00	0.00	0.00	0.00	0.00	79.67	22724.83	315.62	57749.77	4.67	0.00	0.00
5:50	0.5	0.21	0.32	0.19	0.0209	0.2213	66.39	0.00	0.00	0.00	0.00	0.00	66.39	22647.42	314.55	57501.61	4.65	0.00	0.00
5:55	0.3	0.13	0.32	0.11	0.0126	0.1328	39.84	0.00	0.00	0.00	0.00	0.00	39.84	22566.00	313.42	57228.03	4.62	0.00	0.00
6:00	0.2	0.08	0.32	0.08	0.0084	0.0885	26.56	0.00	0.00	0.00	0.00	0.00	26.56	22476.24	312.17	56942.42	4.60	0.00	0.00
	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22382.53	310.87	56631.55	4.58	0.00	0.00
	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22280.54	309.45	56322.10	4.55	0.00	0.00
6:15	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22179.01	308.04	56014.06	4.53	0.00	0.00
	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22077.94	306.64	55707.42	4.50	0.00	0.00
	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21977.34	305.24	55402.18	4.48	0.00	0.00
6:30	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21877.19	303.85	55098.33	4.45	0.00	0.00
	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21777.50	302.47	54795.87	4.43	0.00	0.00
	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21678.26	301.09	54494.78	4.40	0.00	0.00
6:45	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21579.47	299.71	54195.06	4.38	0.00	0.00
	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21481.14	298.35	53896.71	4.36	0.00	0.00
	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21383.25	296.99	53599.72	4.33	0.00	0.00
7:00	0	0.00	0.32	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21285.81	295.64	53304.09	4.31	0.00	0.00
				Total volume (cf)			**64794.91**									**Total Overflow (cf)**		**0.00**	

Drawdown time = 263.80 cf/5min x 12 per/hr = 3165.6 cf/hr. Therefore, 58133.43 cf. / 3165.6 cf/hr = 18.3641115 hours for total drawdown plus storm event = **23.97 hrs total drawdown**

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	0.2	0.04	0.57	0.04	0.0042	0.0445	40.03		0.00	0.00	0.00	0.00	0.00	40.03	3700.00	40.03	0.00	0.00	0.00	0.00
0:30	0.3	0.06	0.56	0.06	0.0063	0.0667	60.04		0.00	0.00	0.00	0.00	0.00	60.04	3700.00	60.04	0.00	0.00	0.00	0.00
0:45	0.3	0.06	0.56	0.06	0.0063	0.0667	60.04		0.00	0.00	0.00	0.00	0.00	60.04	3700.00	60.04	0.00	0.00	0.00	0.00
1:00	0.4	0.08	0.55	0.08	0.0084	0.0889	80.05		0.00	0.00	0.00	0.00	0.00	80.05	3700.00	80.05	0.00	0.00	0.00	0.00
1:15	0.3	0.06	0.54	0.06	0.0063	0.0667	60.04		0.00	0.00	0.00	0.00	0.00	60.04	3700.00	60.04	0.00	0.00	0.00	0.00
1:30	0.3	0.06	0.54	0.06	0.0063	0.0667	60.04		0.00	0.00	0.00	0.00	0.00	60.04	3700.00	60.04	0.00	0.00	0.00	0.00
1:45	0.3	0.06	0.53	0.06	0.0063	0.0667	60.04		0.00	0.00	0.00	0.00	0.00	60.04	3700.00	60.04	0.00	0.00	0.00	0.00
2:00	0.4	0.08	0.52	0.08	0.0084	0.0889	80.05		0.00	0.00	0.00	0.00	0.00	80.05	3700.00	80.05	0.00	0.00	0.00	0.00
2:15	0.4	0.08	0.52	0.08	0.0084	0.0889	80.05		0.00	0.00	0.00	0.00	0.00	80.05	3700.00	80.05	0.00	0.00	0.00	0.00
2:30	0.4	0.08	0.51	0.08	0.0084	0.0889	80.05		0.00	0.00	0.00	0.00	0.00	80.05	3700.00	80.05	0.00	0.00	0.00	0.00
2:45	0.5	0.11	0.50	0.09	0.0105	0.1112	100.07		0.00	0.00	0.00	0.00	0.00	100.07	3700.00	100.07	0.00	0.00	0.00	0.00
3:00	0.5	0.11	0.50	0.09	0.0105	0.1112	100.07		0.00	0.00	0.00	0.00	0.00	100.07	3700.00	100.07	0.00	0.00	0.00	0.00
3:15	0.5	0.11	0.49	0.09	0.0105	0.1112	100.07		0.00	0.00	0.00	0.00	0.00	100.07	3700.00	100.07	0.00	0.00	0.00	0.00
3:30	0.5	0.11	0.49	0.09	0.0105	0.1112	100.07		0.00	0.00	0.00	0.00	0.00	100.07	3700.00	100.07	0.00	0.00	0.00	0.00
3:45	0.5	0.11	0.48	0.09	0.0105	0.1112	100.07		0.00	0.00	0.00	0.00	0.00	100.07	3700.00	100.07	0.00	0.00	0.00	0.00
4:00	0.6	0.13	0.47	0.11	0.0126	0.1334	120.08		0.00	0.00	0.00	0.00	0.00	120.08	3700.00	120.08	0.00	0.00	0.00	0.00
4:15	0.6	0.13	0.47	0.11	0.0126	0.1334	120.08		0.00	0.00	0.00	0.00	0.00	120.08	3700.00	120.08	0.00	0.00	0.00	0.00
4:30	0.7	0.15	0.46	0.13	0.0147	0.1557	140.09		0.00	0.00	0.00	0.00	0.00	140.09	3700.00	140.09	0.00	0.00	0.00	0.00
4:45	0.7	0.15	0.46	0.13	0.0147	0.1557	140.09		0.00	0.00	0.00	0.00	0.00	140.09	3700.00	140.09	0.00	0.00	0.00	0.00
5:00	0.8	0.17	0.45	0.15	0.0168	0.1779	160.11		0.00	0.00	0.00	0.00	0.00	160.11	3700.00	154.17	5.94	0.00	0.00	0.00
5:15	0.6	0.13	0.44	0.11	0.0126	0.1334	120.08		0.00	0.00	0.00	0.00	0.00	120.08	3701.95	154.25	0.00	0.00	0.00	0.00
5:30	0.7	0.15	0.44	0.13	0.0147	0.1557	140.09		0.00	0.00	0.00	0.00	0.00	140.09	3700.00	140.09	0.00	0.00	0.00	0.00
5:45	0.8	0.17	0.43	0.15	0.0168	0.1779	160.11		0.00	0.00	0.00	0.00	0.00	160.11	3700.00	154.17	5.94	0.00	0.00	0.00
6:00	0.8	0.17	0.43	0.15	0.0168	0.1779	160.11		0.00	0.00	0.00	0.00	0.00	160.11	3701.95	154.25	11.80	0.00	0.00	0.00
6:15	0.9	0.19	0.42	0.17	0.0189	0.2001	180.12		0.00	0.00	0.00	0.00	0.00	180.12	3703.87	154.33	37.59	0.00	0.00	0.00
6:30	0.9	0.19	0.42	0.17	0.0189	0.2001	180.12		0.00	0.00	0.00	0.00	0.00	180.12	3712.33	154.68	63.02	0.01	0.00	0.00
6:45	1	0.21	0.41	0.19	0.0210	0.2224	200.13		0.00	0.00	0.00	0.00	0.00	200.13	3720.68	155.03	108.13	0.01	0.00	0.00
7:00	1	0.21	0.40	0.19	0.0210	0.2224	200.13		0.00	0.00	0.00	0.00	0.00	200.13	3735.48	155.64	152.61	0.01	0.00	0.00
7:15	1	0.21	0.40	0.19	0.0210	0.2224	200.13		0.00	0.00	0.00	0.00	0.00	200.13	3750.07	156.25	196.49	0.02	0.00	0.00
7:30	1.1	0.23	0.39	0.21	0.0231	0.2446	220.14		0.00	0.00	0.00	0.00	0.00	220.14	3764.47	156.85	259.79	0.02	0.00	0.00
7:45	1.2	0.25	0.39	0.23	0.0252	0.2668	240.16		0.00	0.00	0.00	0.00	0.00	240.16	3785.23	157.72	342.22	0.03	0.00	0.00
8:00	1.3	0.27	0.38	0.25	0.0274	0.2891	260.17		0.00	0.00	0.00	0.00	0.00	260.17	3812.28	158.85	443.55	0.04	0.00	0.00
8:15	1.5	0.32	0.38	0.28	0.0316	0.3336	300.20		0.00	0.00	0.00	0.00	0.00	300.20	3845.53	160.23	583.52	0.05	0.00	0.00
8:30	1.5	0.32	0.37	0.28	0.0316	0.3336	300.20		0.00	0.00	0.00	0.00	0.00	300.20	3891.45	162.14	721.57	0.06	0.00	0.00
8:45	1.6	0.34	0.37	0.30	0.0337	0.3558	320.21		0.00	0.00	0.00	0.00	0.00	320.21	3936.74	164.03	877.75	0.07	0.00	0.00
9:00	1.7	0.36	0.36	0.32	0.0358	0.3780	340.22		0.00	0.00	0.00	0.00	0.00	340.22	3987.99	166.17	1051.81	0.08	0.00	0.00
9:15	1.9	0.40	0.36	N/A	0.0436	0.4609	414.83		0.00	0.00	0.00	0.00	0.00	414.83	4045.09	168.55	1298.09	0.10	0.00	0.00
9:30	2	0.42	0.35	N/A	0.0697	0.7370	663.28		0.00	0.00	0.00	0.00	0.00	663.28	4125.90	171.91	1789.46	0.14	0.00	0.00
9:45	2.1	0.44	0.35	N/A	0.0958	1.0125	911.28		0.00	0.00	0.00	0.00	0.00	911.28	4287.11	178.63	2522.11	0.20	0.00	0.00
10:00	2.2	0.46	0.34	N/A	0.1218	1.2876	1158.81		0.00	0.00	0.00	0.00	0.00	1158.81	4527.49	188.65	3492.28	0.28	0.00	0.00
10:15	1.5	0.32	0.34	0.28	0.0316	0.3336	300.20		0.00	0.00	0.00	0.00	0.00	300.20	4845.80	201.91	3590.57	0.29	0.00	0.00
10:30	1.5	0.32	0.33	0.28	0.0316	0.3336	300.20		0.00	0.00	0.00	0.00	0.00	300.20	4878.05	203.25	3687.51	0.30	0.00	0.00
10:45	2	0.42	0.33	N/A	0.0944	0.9977	897.97		0.00	0.00	0.00	0.00	0.00	897.97	4909.86	204.58	4380.91	0.35	0.00	0.00
11:00	2	0.42	0.32	N/A	0.0992	1.0483	943.50		0.00	0.00	0.00	0.00	0.00	943.50	5137.35	214.06	5110.35	0.41	0.00	0.00
11:15	1.9	0.40	0.32	N/A	0.0829	0.8760	788.42		0.00	0.00	0.00	0.00	0.00	788.42	5376.68	224.03	5674.74	0.46	0.00	0.00
11:30	1.9	0.40	0.31	N/A	0.0876	0.9255	832.98		0.00	0.00	0.00	0.00	0.00	832.98	5561.85	231.74	6275.97	0.51	0.00	0.00
11:45	1.7	0.36	0.31	N/A	0.0501	0.5298	476.80		0.00	0.00	0.00	0.00	0.00	476.80	5759.12	239.96	6512.81	0.53	0.00	0.00
12:00	1.8	0.38	0.30	N/A	0.0757	0.8006	720.51		0.00	0.00	0.00	0.00	0.00	720.51	5836.82	243.20	6990.12	0.56	0.00	0.00
12:15	2.5	0.53	0.30	N/A	0.2276	2.4050	2164.53		0.00	0.00	0.00	0.00	0.00	2164.53	5993.42	249.73	8904.92	0.72	0.00	0.00
12:30	2.6	0.55	0.29	N/A	0.2531	2.6747	2407.25		0.00	0.00	0.00	0.00	0.00	2407.25	6621.66	275.90	11036.26	0.89	0.00	0.00
12:45	2.8	0.59	0.29	N/A	0.2996	3.1662	2849.59		0.00	0.00	0.00	0.00	0.00	2849.59	7320.94	305.04	13580.81	1.10	0.00	0.00

13:00	2.9	0.61	0.29	N/A		0.3250	3.4348	3091.29	0.00	0.00	0.00	0.00	0.00	3091.29	8155.80	339.82	16332.28	1.32	0.00	0.00
13:15	3.4	0.72	0.28	N/A		0.4345	4.5922	4133.01	0.00	0.00	0.00	0.00	0.00	4133.01	9058.54	377.44	20087.85	1.62	0.00	0.00
13:30	3.4	0.72	0.28	N/A		**0.4388**	4.6373	**4173.54**	0.00	0.00	0.00	0.00	0.00	4173.54	10290.73	428.78	23832.61	1.93	0.00	0.00
13:45	2.3	0.48	0.27	N/A		0.2115	2.2357	2012.10	0.00	0.00	0.00	0.00	0.00	2012.10	11519.36	479.97	25364.73	2.05	0.00	0.00
14:00	2.3	0.48	0.27	N/A		0.2157	2.2795	2051.57	0.00	0.00	0.00	0.00	0.00	2051.57	12022.05	500.92	26915.38	2.18	0.00	0.00
14:15	2.7	0.57	0.26	N/A		0.3039	3.2123	2891.03	0.00	0.00	0.00	0.00	0.00	2891.03	12530.81	522.12	29284.29	2.37	0.00	0.00
14:30	2.6	0.55	0.26	N/A		0.2869	3.0325	2729.28	0.00	0.00	0.00	0.00	0.00	2729.28	13308.03	554.50	31459.08	2.54	0.00	0.00
14:45	2.6	0.55	0.26	N/A		0.2909	3.0746	2767.12	0.00	0.00	0.00	0.00	0.00	2767.12	14021.57	584.23	33641.96	2.72	0.00	0.00
15:00	2.5	0.53	0.25	N/A		0.2738	2.8936	2604.27	0.00	0.00	0.00	0.00	0.00	2604.27	14737.77	614.07	35632.16	2.88	0.00	0.00
15:15	2.4	0.50	0.25	N/A		0.2566	2.7121	2440.85	0.00	0.00	0.00	0.00	0.00	2440.85	15390.74	641.28	37431.73	3.02	0.00	0.00
15:30	2.3	0.48	0.24	N/A		0.2394	2.5298	2276.86	0.00	0.00	0.00	0.00	0.00	2276.86	15981.17	665.88	39042.70	3.16	0.00	0.00
15:45	1.9	0.40	0.24	N/A		0.1589	1.6799	1511.89	0.00	0.00	0.00	0.00	0.00	1511.89	16509.72	687.91	39866.69	3.22	0.00	0.00
16:00	1.9	0.40	0.24	N/A		0.1626	1.7187	1546.86	0.00	0.00	0.00	0.00	0.00	1546.86	16780.07	699.17	**40714.38**	3.29	0.00	0.00
16:15	0.4	0.08	0.23	0.08		0.0084	0.0889	80.05	0.00	0.00	0.00	0.00	0.00	80.05	17058.19	710.76	40083.68	3.24	0.00	0.00
16:30	0.4	0.08	0.23	0.08		0.0084	0.0889	80.05	0.00	0.00	0.00	0.00	0.00	80.05	16851.26	702.14	39461.59	3.19	0.00	0.00
16:45	0.3	0.06	0.23	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	16647.16	693.63	38828.00	3.14	0.00	0.00
17:00	0.3	0.06	0.22	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	16439.28	684.97	38203.07	3.09	0.00	0.00
17:15	0.5	0.11	0.22	0.09		0.0105	0.1112	100.07	0.00	0.00	0.00	0.00	0.00	100.07	16234.24	676.43	37626.71	3.04	0.00	0.00
17:30	0.5	0.11	0.22	0.09		0.0105	0.1112	100.07	0.00	0.00	0.00	0.00	0.00	100.07	16045.14	668.55	37058.23	2.99	0.00	0.00
17:45	0.5	0.11	0.21	0.09		0.0105	0.1112	100.07	0.00	0.00	0.00	0.00	0.00	100.07	15858.63	660.78	36497.52	2.95	0.00	0.00
18:00	0.4	0.08	0.21	0.08		0.0084	0.0889	80.05	0.00	0.00	0.00	0.00	0.00	80.05	15674.66	653.11	35924.46	2.90	0.00	0.00
18:15	0.4	0.08	0.21	0.08		0.0084	0.0889	80.05	0.00	0.00	0.00	0.00	0.00	80.05	15486.64	645.28	35359.23	2.86	0.00	0.00
18:30	0.4	0.08	0.20	0.08		0.0084	0.0889	80.05	0.00	0.00	0.00	0.00	0.00	80.05	15301.19	637.55	34801.74	2.81	0.00	0.00
18:45	0.3	0.06	0.20	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	15118.28	629.93	34231.85	2.77	0.00	0.00
19:00	0.2	0.04	0.20	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	14931.30	622.14	33649.74	2.72	0.00	0.00
19:15	0.3	0.06	0.20	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	14740.32	614.18	33095.60	2.67	0.00	0.00
19:30	0.4	0.08	0.19	0.08		0.0084	0.0889	80.05	0.00	0.00	0.00	0.00	0.00	80.05	14558.51	606.60	32569.05	2.63	0.00	0.00
19:45	0.3	0.06	0.19	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	14385.75	599.41	32029.68	2.59	0.00	0.00
20:00	0.2	0.04	0.19	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	14208.78	592.03	31477.67	2.54	0.00	0.00
20:15	0.3	0.06	0.19	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	14027.67	584.49	30953.23	2.50	0.00	0.00
20:30	0.3	0.06	0.18	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	13855.60	577.32	30435.95	2.46	0.00	0.00
20:45	0.3	0.06	0.18	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	13685.89	570.25	29925.74	2.42	0.00	0.00
21:00	0.2	0.04	0.18	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	13518.49	563.27	29402.50	2.38	0.00	0.00
21:15	0.3	0.06	0.18	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	13346.82	556.12	28906.42	2.34	0.00	0.00
21:30	0.2	0.04	0.17	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	13184.06	549.34	28397.11	2.29	0.00	0.00
21:45	0.3	0.06	0.17	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	13016.95	542.37	27914.78	2.26	0.00	0.00
22:00	0.2	0.04	0.17	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	12858.70	535.78	27419.02	2.22	0.00	0.00
22:15	0.3	0.06	0.17	0.06		0.0063	0.0667	60.04	0.00	0.00	0.00	0.00	0.00	60.04	12696.05	529.00	26950.06	2.18	0.00	0.00
22:30	0.2	0.04	0.17	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	12542.19	522.59	26467.50	2.14	0.00	0.00
22:45	0.2	0.04	0.17	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	12383.86	515.99	25991.53	2.10	0.00	0.00
23:00	0.2	0.04	0.16	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	12227.70	509.49	25522.07	2.06	0.00	0.00
23:15	0.2	0.04	0.16	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	12073.67	503.07	25059.03	2.03	0.00	0.00
23:30	0.2	0.04	0.16	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	11921.75	496.74	24602.31	1.99	0.00	0.00
23:45	0.2	0.04	0.16	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	11771.90	490.50	24151.84	1.95	0.00	0.00
24:00	0.2	0.04	0.16	0.04		0.0042	0.0445	40.03	0.00	0.00	0.00	0.00	0.00	40.03	11624.10	484.34	23707.53	1.92	0.00	0.00
	0	0.00	0.16	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11478.33	478.26	23229.27	1.88	0.00	0.00
					Total volume (cf)			**57344.59**									**Total Overflow (cf)**		**0.00**	

Drawdown time = 635.42 cf/5min x 12 per/hr = 7625.04 cf/hr. Therefore, 40714.38 cf. / 7625.04 cf/hr = **5.34** hours for total drawdown plus storm event = **29.15 hrs total drawdown**

POST DEVELOPMENT T1-T6

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**
T1

Drainage Area (ac.)	**1.8100**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74 (AMC II)				
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**79.4**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.21 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))				
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2** (also used for drywell percolation rate)				

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **0.0001** s.f. **Bot. =** **0.0001** **s.f.** **Max. Depth (d)=** **0.0001** **Max. storage=** **0.00** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	3.7	0.8569	0.2112	N/A	0.6457	1.1785	353.55
0:10	4.8	1.1117	0.2112	N/A	0.9005	1.6435	493.04
0:15	5.1	1.1812	0.2112	N/A	0.9700	1.7703	531.08
0:20	4.9	1.1348	0.2112	N/A	0.9236	1.6857	505.72
0:25	6.6	1.5286	0.2112	N/A	1.3174	2.4043	721.29
0:30	7.3	1.6907	0.2112	N/A	1.4795	2.7002	810.05
0:35	8.4	1.9454	0.2112	N/A	1.7342	3.1651	949.54
0:40	9	2.0844	0.2112	N/A	1.8732	3.4188	1025.63
0:45	12.3	2.8487	0.2112	N/A	2.6375	4.8136	1444.09
0:50	17.6	4.0762	0.2112	N/A	**3.8650**	**7.0539**	**2116.16**
0:55	16.1	3.7288	0.2112	N/A	3.5176	6.4198	1925.95
1:00	4.2	0.9727	0.2112	N/A	0.7615	1.3898	416.95
	0	0.0000	0.2112	0.00	0.0000	0.0000	0.00
	0	0.0000	0.2112	0.00	0.0000	0.0000	0.00
1:15	0	0.0000	0.2112	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**11293.06**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	1.3	0.42	0.21	N/A		0.2100	0.3833	114.98
0:10	1.3	0.42	0.21	N/A		0.2100	0.3833	114.98
0:15	1.1	0.36	0.21	N/A		0.1452	0.2650	79.50
0:20	1.5	0.49	0.21	N/A		0.2748	0.5015	150.46
0:25	1.5	0.49	0.21	N/A		0.2748	0.5015	150.46
0:30	1.8	0.58	0.21	N/A		0.3720	0.6789	203.68
0:35	1.5	0.49	0.21	N/A		0.2748	0.5015	150.46
0:40	1.8	0.58	0.21	N/A		0.3720	0.6789	203.68
0:45	1.8	0.58	0.21	N/A		0.3720	0.6789	203.68
0:50	1.5	0.49	0.21	N/A		0.2748	0.5015	150.46
0:55	1.6	0.52	0.21	N/A		0.3072	0.5607	168.20
1:00	1.8	0.58	0.21	N/A		0.3720	0.6789	203.68
1:05	2.2	0.71	0.21	N/A		0.5016	0.9155	274.64
1:10	2.2	0.71	0.21	N/A		0.5016	0.9155	274.64
1:15	2.2	0.71	0.21	N/A		0.5016	0.9155	274.64
1:20	2	0.65	0.21	N/A		0.4368	0.7972	239.16
1:25	2.6	0.84	0.21	N/A		0.6312	1.1520	345.60
1:30	2.7	0.87	0.21	N/A		0.6636	1.2111	363.34
1:35	2.4	0.78	0.21	N/A		0.5664	1.0337	310.12
1:40	2.7	0.87	0.21	N/A		0.6636	1.2111	363.34
1:45	3.3	1.07	0.21	N/A		0.8580	1.5659	469.78
1:50	3.1	1.00	0.21	N/A		0.7932	1.4477	434.30
1:55	2.9	0.94	0.21	N/A		0.7284	1.3294	398.82
2:00	3	0.97	0.21	N/A		0.7608	1.3885	416.56
2:05	3.1	1.00	0.21	N/A		0.7932	1.4477	434.30
2:10	4.2	1.36	0.21	N/A		1.1496	2.0981	629.44
2:15	5	1.62	0.21	N/A		1.4088	2.5712	771.36
2:20	3.5	1.13	0.21	N/A		0.9228	1.6842	505.26
2:25	6.8	2.20	0.21	N/A		1.9920	3.6356	1090.67
2:30	7.3	2.37	0.21	N/A		2.1540	3.9312	1179.37
2:35	8.2	2.66	0.21	N/A		**2.4456**	**4.4634**	**1339.03**
2:40	5.9	1.91	0.21	N/A		1.7004	3.1034	931.01
2:45	2	0.65	0.21	N/A		0.4368	0.7972	239.16
2:50	1.8	0.58	0.21	N/A		0.3720	0.6789	203.68
2:55	1.8	0.58	0.21	N/A		0.3720	0.6789	203.68
3:00	0.6	0.19	0.21	0.17		0.0194	0.0355	10.64
	0	0.00	0.21	0.00		0.0000	0.0000	0.00
	0	0.00	0.21	0.00		0.0000	0.0000	0.00
3:15	0	0.00	0.21	0.00		0.0000	0.0000	0.00
	0	0.00	0.21	0.00		0.0000	0.0000	0.00
	0	0.00	0.21	0.00		0.0000	0.0000	0.00
3:30	0	0.00	0.21	0.00		0.0000	0.0000	0.00
	0	0.00	0.21	0.00		0.0000	0.0000	0.00
	0	0.00	0.21	0.00		0.0000	0.0000	0.00
					Total volume (cf)			**13596.79**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	0.5	0.21	0.21		0.19	0.0209	0.0382	11.47
0:10	0.6	0.25	0.21	N/A		0.0401	0.0732	21.95
0:15	0.6	0.25	0.21	N/A		0.0401	0.0732	21.95
0:20	0.6	0.25	0.21	N/A		0.0401	0.0732	21.95
0:25	0.6	0.25	0.21	N/A		0.0401	0.0732	21.95
0:30	0.7	0.29	0.21	N/A		0.0820	0.1496	44.88
0:35	0.7	0.29	0.21	N/A		0.0820	0.1496	44.88
0:40	0.7	0.29	0.21	N/A		0.0820	0.1496	44.88
0:45	0.7	0.29	0.21	N/A		0.0820	0.1496	44.88
0:50	0.7	0.29	0.21	N/A		0.0820	0.1496	44.88
0:55	0.7	0.29	0.21	N/A		0.0820	0.1496	44.88
1:00	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:05	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:10	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:15	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:20	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:25	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:30	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:35	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:40	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:45	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:50	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
1:55	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
2:00	0.9	0.38	0.21	N/A		0.1657	0.3025	90.74
2:05	0.8	0.34	0.21	N/A		0.1238	0.2260	67.81
2:10	0.9	0.38	0.21	N/A		0.1657	0.3025	90.74
2:15	0.9	0.38	0.21	N/A		0.1657	0.3025	90.74
2:20	0.9	0.38	0.21	N/A		0.1657	0.3025	90.74
2:25	0.9	0.38	0.21	N/A		0.1657	0.3025	90.74
2:30	0.9	0.38	0.21	N/A		0.1657	0.3025	90.74
2:35	0.9	0.38	0.21	N/A		0.1657	0.3025	90.74
2:40	0.9	0.38	0.21	N/A		0.1657	0.3025	90.74
2:45	1	0.42	0.21	N/A		0.2076	0.3789	113.67
2:50	1	0.42	0.21	N/A		0.2076	0.3789	113.67
2:55	1	0.42	0.21	N/A		0.2076	0.3789	113.67
3:00	1	0.42	0.21	N/A		0.2076	0.3789	113.67
3:05	1	0.42	0.21	N/A		0.2076	0.3789	113.67
3:10	1.1	0.46	0.21	N/A		0.2495	0.4553	136.60
3:15	1.1	0.46	0.21	N/A		0.2495	0.4553	136.60
3:20	1.1	0.46	0.21	N/A		0.2495	0.4553	136.60
3:25	1.2	0.50	0.21	N/A		0.2914	0.5318	159.53
3:30	1.3	0.54	0.21	N/A		0.3332	0.6082	182.46
3:35	1.4	0.59	0.21	N/A		0.3751	0.6846	205.39
3:40	1.4	0.59	0.21	N/A		0.3751	0.6846	205.39
3:45	1.5	0.63	0.21	N/A		0.4170	0.7611	228.32
3:50	1.5	0.63	0.21	N/A		0.4170	0.7611	228.32
3:55	1.6	0.67	0.21	N/A		0.4589	0.8375	251.25
4:00	1.6	0.67	0.21	N/A		0.4589	0.8375	251.25
4:05	1.7	0.71	0.21	N/A		0.5008	0.9139	274.18
4:10	1.8	0.75	0.21	N/A		0.5426	0.9904	297.11
4:15	1.9	0.80	0.21	N/A		0.5845	1.0668	320.04

4:20	2	0.84	0.21	N/A	0.6264	1.1432	342.97
4:25	2.1	0.88	0.21	N/A	0.6683	1.2197	365.90
4:30	2.1	0.88	0.21	N/A	0.6683	1.2197	365.90
4:35	2.2	0.92	0.21	N/A	0.7102	1.2961	388.83
4:40	2.3	0.96	0.21	N/A	0.7520	1.3725	411.76
4:45	2.4	1.01	0.21	N/A	0.7939	1.4490	434.69
4:50	2.4	1.01	0.21	N/A	0.7939	1.4490	434.69
4:55	2.5	1.05	0.21	N/A	0.8358	1.5254	457.62
5:00	2.6	1.09	0.21	N/A	0.8777	1.6018	480.55
5:05	3.1	1.30	0.21	N/A	1.0871	1.9840	595.21
5:10	3.6	1.51	0.21	N/A	1.2965	2.3662	709.86
5:15	3.9	1.63	0.21	N/A	1.4221	2.5955	778.65
5:20	4.2	1.76	0.21	N/A	1.5478	2.8248	847.44
5:25	4.7	1.97	0.21	N/A	1.7572	3.2070	962.09
5:30	5.6	2.35	0.21	N/A	**2.1341**	**3.8949**	**1168.46**
5:35	1.9	0.80	0.21	N/A	0.5845	1.0668	320.04
5:40	0.9	0.38	0.21	N/A	0.1657	0.3025	90.74
5:45	0.6	0.25	0.21	N/A	0.0401	0.0732	21.95
5:50	0.5	0.21	0.21	0.19	0.0209	0.0382	11.47
5:55	0.3	0.13	0.21	0.11	0.0126	0.0229	6.88
6:00	0.2	0.08	0.21	0.08	0.0084	0.0153	4.59
	0	0.00	0.21	0.00	0.0000	0.0000	0.00
	0	0.00	0.21	0.00	0.0000	0.0000	0.00
6:15	0	0.00	0.21	0.00	0.0000	0.0000	0.00
	0	0.00	0.21	0.00	0.0000	0.0000	0.00
	0	0.00	0.21	0.00	0.0000	0.0000	0.00
6:30	0	0.00	0.21	0.00	0.0000	0.0000	0.00
	0	0.00	0.21	0.00	0.0000	0.0000	0.00
	0	0.00	0.21	0.00	0.0000	0.0000	0.00
6:45	0	0.00	0.21	0.00	0.0000	0.0000	0.00
	0	0.00	0.21	0.00	0.0000	0.0000	0.00
	0	0.00	0.21	0.00	0.0000	0.0000	0.00
7:00	0	0.00	0.21	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**14757.60**

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:15	0.2	0.04	0.37	0.04		0.0042	0.0077	6.91
0:30	0.3	0.06	0.37	0.06		0.0063	0.0115	10.37
0:45	0.3	0.06	0.36	0.06		0.0063	0.0115	10.37
1:00	0.4	0.08	0.36	0.08		0.0084	0.0154	13.82
1:15	0.3	0.06	0.35	0.06		0.0063	0.0115	10.37
1:30	0.3	0.06	0.35	0.06		0.0063	0.0115	10.37
1:45	0.3	0.06	0.35	0.06		0.0063	0.0115	10.37
2:00	0.4	0.08	0.34	0.08		0.0084	0.0154	13.82
2:15	0.4	0.08	0.34	0.08		0.0084	0.0154	13.82
2:30	0.4	0.08	0.33	0.08		0.0084	0.0154	13.82
2:45	0.5	0.11	0.33	0.09		0.0105	0.0192	17.28
3:00	0.5	0.11	0.32	0.09		0.0105	0.0192	17.28
3:15	0.5	0.11	0.32	0.09		0.0105	0.0192	17.28
3:30	0.5	0.11	0.32	0.09		0.0105	0.0192	17.28
3:45	0.5	0.11	0.31	0.09		0.0105	0.0192	17.28
4:00	0.6	0.13	0.31	0.11		0.0126	0.0230	20.74
4:15	0.6	0.13	0.30	0.11		0.0126	0.0230	20.74
4:30	0.7	0.15	0.30	0.13		0.0147	0.0269	24.19
4:45	0.7	0.15	0.30	0.13		0.0147	0.0269	24.19
5:00	0.8	0.17	0.29	0.15		0.0168	0.0307	27.65
5:15	0.6	0.13	0.29	0.11		0.0126	0.0230	20.74
5:30	0.7	0.15	0.29	0.13		0.0147	0.0269	24.19
5:45	0.8	0.17	0.28	0.15		0.0168	0.0307	27.65
6:00	0.8	0.17	0.28	0.15		0.0168	0.0307	27.65
6:15	0.9	0.19	0.27	0.17		0.0189	0.0346	31.10
6:30	0.9	0.19	0.27	0.17		0.0189	0.0346	31.10
6:45	1	0.21	0.27	0.19		0.0210	0.0384	34.56
7:00	1	0.21	0.26	0.19		0.0210	0.0384	34.56
7:15	1	0.21	0.26	0.19		0.0210	0.0384	34.56
7:30	1.1	0.23	0.26	0.21		0.0231	0.0422	38.02
7:45	1.2	0.25	0.25	0.23		0.0252	0.0461	41.47
8:00	1.3	0.27	0.25	0.25		0.0274	0.0499	44.93
8:15	1.5	0.32	0.25	N/A		0.0697	0.1272	114.50
8:30	1.5	0.32	0.24	N/A		0.0731	0.1335	120.14
8:45	1.6	0.34	0.24	N/A		0.0976	0.1781	160.30
9:00	1.7	0.36	0.24	N/A		0.1220	0.2227	200.40
9:15	1.9	0.40	0.23	N/A		0.1674	0.3056	275.01
9:30	2	0.42	0.23	N/A		0.1918	0.3500	315.02
9:45	2.1	0.44	0.23	N/A		0.2161	0.3944	354.97
10:00	2.2	0.46	0.22	N/A		0.2404	0.4387	394.87
10:15	1.5	0.32	0.22	N/A		0.0963	0.1758	158.24
10:30	1.5	0.32	0.22	N/A		0.0995	0.1816	163.47
10:45	2	0.42	0.21	N/A		0.2079	0.3794	341.46
11:00	2	0.42	0.21	N/A		0.2110	0.3851	346.58
11:15	1.9	0.40	0.21	N/A		0.1930	0.3523	317.10
11:30	1.9	0.40	0.20	N/A		0.1961	0.3579	322.12
11:45	1.7	0.36	0.20	N/A		0.1570	0.2866	257.97
12:00	1.8	0.38	0.20	N/A		0.1811	0.3305	297.44
12:15	2.5	0.53	0.19	N/A		0.3313	0.6047	544.21
12:30	2.6	0.55	0.19	N/A		0.3553	0.6484	583.56
12:45	2.8	0.59	0.19	N/A		0.4002	0.7305	657.43

13:00	2.9	0.61	0.19	N/A	0.4241	0.7741	696.67
13:15	3.4	0.72	0.18	N/A	0.5321	0.9712	874.09
13:30	3.4	0.72	0.18	N/A	**0.5349**	**0.9763**	**878.66**
13:45	2.3	0.48	0.18	N/A	0.3062	0.5589	503.01
14:00	2.3	0.48	0.17	N/A	0.3089	0.5638	507.45
14:15	2.7	0.57	0.17	N/A	0.3958	0.7223	650.08
14:30	2.6	0.55	0.17	N/A	0.3774	0.6887	619.84
14:45	2.6	0.55	0.17	N/A	0.3800	0.6934	624.10
15:00	2.5	0.53	0.16	N/A	0.3615	0.6597	593.74
15:15	2.4	0.50	0.16	N/A	0.3429	0.6259	563.32
15:30	2.3	0.48	0.16	N/A	0.3244	0.5920	532.83
15:45	1.9	0.40	0.16	N/A	0.2427	0.4429	398.60
16:00	1.9	0.40	0.15	N/A	0.2451	0.4473	402.54
16:15	0.4	0.08	0.15	0.08	0.0084	0.0154	13.82
16:30	0.4	0.08	0.15	0.08	0.0084	0.0154	13.82
16:45	0.3	0.06	0.15	0.06	0.0063	0.0115	10.37
17:00	0.3	0.06	0.15	0.06	0.0063	0.0115	10.37
17:15	0.5	0.11	0.14	0.09	0.0105	0.0192	17.28
17:30	0.5	0.11	0.14	0.09	0.0105	0.0192	17.28
17:45	0.5	0.11	0.14	0.09	0.0105	0.0192	17.28
18:00	0.4	0.08	0.14	0.08	0.0084	0.0154	13.82
18:15	0.4	0.08	0.14	0.08	0.0084	0.0154	13.82
18:30	0.4	0.08	0.13	0.08	0.0084	0.0154	13.82
18:45	0.3	0.06	0.13	0.06	0.0063	0.0115	10.37
19:00	0.2	0.04	0.13	0.04	0.0042	0.0077	6.91
19:15	0.3	0.06	0.13	0.06	0.0063	0.0115	10.37
19:30	0.4	0.08	0.13	0.08	0.0084	0.0154	13.82
19:45	0.3	0.06	0.12	0.06	0.0063	0.0115	10.37
20:00	0.2	0.04	0.12	0.04	0.0042	0.0077	6.91
20:15	0.3	0.06	0.12	0.06	0.0063	0.0115	10.37
20:30	0.3	0.06	0.12	0.06	0.0063	0.0115	10.37
20:45	0.3	0.06	0.12	0.06	0.0063	0.0115	10.37
21:00	0.2	0.04	0.12	0.04	0.0042	0.0077	6.91
21:15	0.3	0.06	0.11	0.06	0.0063	0.0115	10.37
21:30	0.2	0.04	0.11	0.04	0.0042	0.0077	6.91
21:45	0.3	0.06	0.11	0.06	0.0063	0.0115	10.37
22:00	0.2	0.04	0.11	0.04	0.0042	0.0077	6.91
22:15	0.3	0.06	0.11	0.06	0.0063	0.0115	10.37
22:30	0.2	0.04	0.11	0.04	0.0042	0.0077	6.91
22:45	0.2	0.04	0.11	0.04	0.0042	0.0077	6.91
23:00	0.2	0.04	0.11	0.04	0.0042	0.0077	6.91
23:15	0.2	0.04	0.11	0.04	0.0042	0.0077	6.91
23:30	0.2	0.04	0.11	0.04	0.0042	0.0077	6.91
23:45	0.2	0.04	0.11	0.04	0.0042	0.0077	6.91
24:00	0.2	0.04	0.11	0.04	0.0042	0.0077	6.91
	0	0.00	0.11	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**14809.96**

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**
T2

Drainage Area (ac.)	**1.6800**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74 (AMC II)				
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**81.9**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.19 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))				
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2** (also used for drywell percolation rate)				

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **0.0001** s.f. **Bot. =** **0.0001** **s.f.** **Max. Depth (d)=** **0.0001** **Max. storage=** **0.00** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol^3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	3.7	0.8569	0.1945	N/A	0.6624	1.1221	336.62
0:10	4.8	1.1117	0.1945	N/A	0.9171	1.5536	466.09
0:15	5.1	1.1812	0.1945	N/A	0.9866	1.6713	501.40
0:20	4.9	1.1348	0.1945	N/A	0.9403	1.5929	477.86
0:25	6.6	1.5286	0.1945	N/A	1.3340	2.2598	677.95
0:30	7.3	1.6907	0.1945	N/A	1.4961	2.5345	760.34
0:35	8.4	1.9454	0.1945	N/A	1.7509	2.9660	889.80
0:40	9	2.0844	0.1945	N/A	1.8899	3.2014	960.42
0:45	12.3	2.8487	0.1945	N/A	2.6541	4.4961	1348.83
0:50	17.6	4.0762	0.1945	N/A	**3.8816**	**6.5755**	**1972.64**
0:55	16.1	3.7288	0.1945	N/A	3.5342	5.9870	1796.09
1:00	4.2	0.9727	0.1945	N/A	0.7782	1.3182	395.47
	0	0.0000	0.1945	0.00	0.0000	0.0000	0.00
	0	0.0000	0.1945	0.00	0.0000	0.0000	0.00
1:15	0	0.0000	0.1945	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**10583.49**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	1.3	0.42	0.19	N/A		0.2267	0.3840	115.19
0:10	1.3	0.42	0.19	N/A		0.2267	0.3840	115.19
0:15	1.1	0.36	0.19	N/A		0.1619	0.2742	82.25
0:20	1.5	0.49	0.19	N/A		0.2915	0.4937	148.12
0:25	1.5	0.49	0.19	N/A		0.2915	0.4937	148.12
0:30	1.8	0.58	0.19	N/A		0.3887	0.6584	197.51
0:35	1.5	0.49	0.19	N/A		0.2915	0.4937	148.12
0:40	1.8	0.58	0.19	N/A		0.3887	0.6584	197.51
0:45	1.8	0.58	0.19	N/A		0.3887	0.6584	197.51
0:50	1.5	0.49	0.19	N/A		0.2915	0.4937	148.12
0:55	1.6	0.52	0.19	N/A		0.3239	0.5486	164.58
1:00	1.8	0.58	0.19	N/A		0.3887	0.6584	197.51
1:05	2.2	0.71	0.19	N/A		0.5183	0.8779	263.38
1:10	2.2	0.71	0.19	N/A		0.5183	0.8779	263.38
1:15	2.2	0.71	0.19	N/A		0.5183	0.8779	263.38
1:20	2	0.65	0.19	N/A		0.4535	0.7682	230.45
1:25	2.6	0.84	0.19	N/A		0.6479	1.0975	329.24
1:30	2.7	0.87	0.19	N/A		0.6803	1.1524	345.71
1:35	2.4	0.78	0.19	N/A		0.5831	0.9877	296.31
1:40	2.7	0.87	0.19	N/A		0.6803	1.1524	345.71
1:45	3.3	1.07	0.19	N/A		0.8747	1.4817	444.50
1:50	3.1	1.00	0.19	N/A		0.8099	1.3719	411.57
1:55	2.9	0.94	0.19	N/A		0.7451	1.2621	378.64
2:00	3	0.97	0.19	N/A		0.7775	1.3170	395.10
2:05	3.1	1.00	0.19	N/A		0.8099	1.3719	411.57
2:10	4.2	1.36	0.19	N/A		1.1663	1.9756	592.69
2:15	5	1.62	0.19	N/A		1.4255	2.4147	724.42
2:20	3.5	1.13	0.19	N/A		0.9395	1.5914	477.43
2:25	6.8	2.20	0.19	N/A		2.0087	3.4027	1020.80
2:30	7.3	2.37	0.19	N/A		2.1707	3.6771	1103.13
2:35	8.2	2.66	0.19	N/A		**2.4623**	**4.1711**	**1251.32**
2:40	5.9	1.91	0.19	N/A		1.7171	2.9087	872.61
2:45	2	0.65	0.19	N/A		0.4535	0.7682	230.45
2:50	1.8	0.58	0.19	N/A		0.3887	0.6584	197.51
2:55	1.8	0.58	0.19	N/A		0.3887	0.6584	197.51
3:00	0.6	0.19	0.19		0.17	0.0194	0.0329	9.88
	0	0.00	0.19		0.00	0.0000	0.0000	0.00
	0	0.00	0.19		0.00	0.0000	0.0000	0.00
3:15	0	0.00	0.19		0.00	0.0000	0.0000	0.00
	0	0.00	0.19		0.00	0.0000	0.0000	0.00
	0	0.00	0.19		0.00	0.0000	0.0000	0.00
3:30	0	0.00	0.19		0.00	0.0000	0.0000	0.00
	0	0.00	0.19		0.00	0.0000	0.0000	0.00
	0	0.00	0.19		0.00	0.0000	0.0000	0.00
						Total volume (cf)		**12916.38**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	0.5	0.21	0.19		0.19	0.0209	0.0355	10.64
0:10	0.6	0.25	0.19	N/A		0.0567	0.0961	28.83
0:15	0.6	0.25	0.19	N/A		0.0567	0.0961	28.83
0:20	0.6	0.25	0.19	N/A		0.0567	0.0961	28.83
0:25	0.6	0.25	0.19	N/A		0.0567	0.0961	28.83
0:30	0.7	0.29	0.19	N/A		0.0986	0.1671	50.12
0:35	0.7	0.29	0.19	N/A		0.0986	0.1671	50.12
0:40	0.7	0.29	0.19	N/A		0.0986	0.1671	50.12
0:45	0.7	0.29	0.19	N/A		0.0986	0.1671	50.12
0:50	0.7	0.29	0.19	N/A		0.0986	0.1671	50.12
0:55	0.7	0.29	0.19	N/A		0.0986	0.1671	50.12
1:00	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:05	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:10	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:15	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:20	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:25	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:30	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:35	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:40	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:45	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:50	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
1:55	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
2:00	0.9	0.38	0.19	N/A		0.1824	0.3089	92.68
2:05	0.8	0.34	0.19	N/A		0.1405	0.2380	71.40
2:10	0.9	0.38	0.19	N/A		0.1824	0.3089	92.68
2:15	0.9	0.38	0.19	N/A		0.1824	0.3089	92.68
2:20	0.9	0.38	0.19	N/A		0.1824	0.3089	92.68
2:25	0.9	0.38	0.19	N/A		0.1824	0.3089	92.68
2:30	0.9	0.38	0.19	N/A		0.1824	0.3089	92.68
2:35	0.9	0.38	0.19	N/A		0.1824	0.3089	92.68
2:40	0.9	0.38	0.19	N/A		0.1824	0.3089	92.68
2:45	1	0.42	0.19	N/A		0.2243	0.3799	113.97
2:50	1	0.42	0.19	N/A		0.2243	0.3799	113.97
2:55	1	0.42	0.19	N/A		0.2243	0.3799	113.97
3:00	1	0.42	0.19	N/A		0.2243	0.3799	113.97
3:05	1	0.42	0.19	N/A		0.2243	0.3799	113.97
3:10	1.1	0.46	0.19	N/A		0.2661	0.4508	135.25
3:15	1.1	0.46	0.19	N/A		0.2661	0.4508	135.25
3:20	1.1	0.46	0.19	N/A		0.2661	0.4508	135.25
3:25	1.2	0.50	0.19	N/A		0.3080	0.5218	156.53
3:30	1.3	0.54	0.19	N/A		0.3499	0.5927	177.82
3:35	1.4	0.59	0.19	N/A		0.3918	0.6637	199.10
3:40	1.4	0.59	0.19	N/A		0.3918	0.6637	199.10
3:45	1.5	0.63	0.19	N/A		0.4337	0.7346	220.38
3:50	1.5	0.63	0.19	N/A		0.4337	0.7346	220.38
3:55	1.6	0.67	0.19	N/A		0.4755	0.8056	241.67
4:00	1.6	0.67	0.19	N/A		0.4755	0.8056	241.67
4:05	1.7	0.71	0.19	N/A		0.5174	0.8765	262.95
4:10	1.8	0.75	0.19	N/A		0.5593	0.9474	284.23
4:15	1.9	0.80	0.19	N/A		0.6012	1.0184	305.52

4:20	2	0.84	0.19	N/A	0.6431	1.0893	326.80
4:25	2.1	0.88	0.19	N/A	0.6849	1.1603	348.08
4:30	2.1	0.88	0.19	N/A	0.6849	1.1603	348.08
4:35	2.2	0.92	0.19	N/A	0.7268	1.2312	369.37
4:40	2.3	0.96	0.19	N/A	0.7687	1.3022	390.65
4:45	2.4	1.01	0.19	N/A	0.8106	1.3731	411.93
4:50	2.4	1.01	0.19	N/A	0.8106	1.3731	411.93
4:55	2.5	1.05	0.19	N/A	0.8525	1.4441	433.22
5:00	2.6	1.09	0.19	N/A	0.8943	1.5150	454.50
5:05	3.1	1.30	0.19	N/A	1.1037	1.8697	560.92
5:10	3.6	1.51	0.19	N/A	1.3131	2.2244	667.33
5:15	3.9	1.63	0.19	N/A	1.4388	2.4373	731.18
5:20	4.2	1.76	0.19	N/A	1.5644	2.6501	795.04
5:25	4.7	1.97	0.19	N/A	1.7738	3.0048	901.45
5:30	5.6	2.35	0.19	N/A	**2.1507**	**3.6433**	**1093.00**
5:35	1.9	0.80	0.19	N/A	0.6012	1.0184	305.52
5:40	0.9	0.38	0.19	N/A	0.1824	0.3089	92.68
5:45	0.6	0.25	0.19	N/A	0.0567	0.0961	28.83
5:50	0.5	0.21	0.19	0.19	0.0209	0.0355	10.64
5:55	0.3	0.13	0.19	0.11	0.0126	0.0213	6.39
6:00	0.2	0.08	0.19	0.08	0.0084	0.0142	4.26
	0	0.00	0.19	0.00	0.0000	0.0000	0.00
	0	0.00	0.19	0.00	0.0000	0.0000	0.00
6:15	0	0.00	0.19	0.00	0.0000	0.0000	0.00
	0	0.00	0.19	0.00	0.0000	0.0000	0.00
	0	0.00	0.19	0.00	0.0000	0.0000	0.00
6:30	0	0.00	0.19	0.00	0.0000	0.0000	0.00
	0	0.00	0.19	0.00	0.0000	0.0000	0.00
	0	0.00	0.19	0.00	0.0000	0.0000	0.00
6:45	0	0.00	0.19	0.00	0.0000	0.0000	0.00
	0	0.00	0.19	0.00	0.0000	0.0000	0.00
	0	0.00	0.19	0.00	0.0000	0.0000	0.00
7:00	0	0.00	0.19	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**14273.05**

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:15	0.2	0.04	0.34	0.04	0.0042	0.0071	6.42
0:30	0.3	0.06	0.34	0.06	0.0063	0.0107	9.62
0:45	0.3	0.06	0.33	0.06	0.0063	0.0107	9.62
1:00	0.4	0.08	0.33	0.08	0.0084	0.0143	12.83
1:15	0.3	0.06	0.33	0.06	0.0063	0.0107	9.62
1:30	0.3	0.06	0.32	0.06	0.0063	0.0107	9.62
1:45	0.3	0.06	0.32	0.06	0.0063	0.0107	9.62
2:00	0.4	0.08	0.31	0.08	0.0084	0.0143	12.83
2:15	0.4	0.08	0.31	0.08	0.0084	0.0143	12.83
2:30	0.4	0.08	0.31	0.08	0.0084	0.0143	12.83
2:45	0.5	0.11	0.30	0.09	0.0105	0.0178	16.04
3:00	0.5	0.11	0.30	0.09	0.0105	0.0178	16.04
3:15	0.5	0.11	0.30	0.09	0.0105	0.0178	16.04
3:30	0.5	0.11	0.29	0.09	0.0105	0.0178	16.04
3:45	0.5	0.11	0.29	0.09	0.0105	0.0178	16.04
4:00	0.6	0.13	0.28	0.11	0.0126	0.0214	19.25
4:15	0.6	0.13	0.28	0.11	0.0126	0.0214	19.25
4:30	0.7	0.15	0.28	0.13	0.0147	0.0249	22.45
4:45	0.7	0.15	0.27	0.13	0.0147	0.0249	22.45
5:00	0.8	0.17	0.27	0.15	0.0168	0.0285	25.66
5:15	0.6	0.13	0.27	0.11	0.0126	0.0214	19.25
5:30	0.7	0.15	0.26	0.13	0.0147	0.0249	22.45
5:45	0.8	0.17	0.26	0.15	0.0168	0.0285	25.66
6:00	0.8	0.17	0.26	0.15	0.0168	0.0285	25.66
6:15	0.9	0.19	0.25	0.17	0.0189	0.0321	28.87
6:30	0.9	0.19	0.25	0.17	0.0189	0.0321	28.87
6:45	1	0.21	0.25	0.19	0.0210	0.0356	32.08
7:00	1	0.21	0.24	0.19	0.0210	0.0356	32.08
7:15	1	0.21	0.24	0.19	0.0210	0.0356	32.08
7:30	1.1	0.23	0.24	0.21	0.0231	0.0392	35.29
7:45	1.2	0.25	0.23	0.23	0.0252	0.0428	38.49
8:00	1.3	0.27	0.23	N/A	0.0438	0.0742	66.80
8:15	1.5	0.32	0.23	N/A	0.0891	0.1509	135.83
8:30	1.5	0.32	0.22	N/A	0.0923	0.1563	140.65
8:45	1.6	0.34	0.22	N/A	0.1164	0.1972	177.52
9:00	1.7	0.36	0.22	N/A	0.1406	0.2381	214.33
9:15	1.9	0.40	0.21	N/A	0.1857	0.3147	283.19
9:30	2	0.42	0.21	N/A	0.2098	0.3555	319.92
9:45	2.1	0.44	0.21	N/A	0.2339	0.3962	356.61
10:00	2.2	0.46	0.20	N/A	0.2579	0.4369	393.25
10:15	1.5	0.32	0.20	N/A	0.1136	0.1925	173.23
10:30	1.5	0.32	0.20	N/A	0.1166	0.1974	177.70
10:45	2	0.42	0.20	N/A	0.2247	0.3806	342.52
11:00	2	0.42	0.19	N/A	0.2275	0.3855	346.91
11:15	1.9	0.40	0.19	N/A	0.2093	0.3546	319.17
11:30	1.9	0.40	0.19	N/A	0.2122	0.3594	323.46
11:45	1.7	0.36	0.18	N/A	0.1729	0.2928	263.55
12:00	1.8	0.38	0.18	N/A	0.1967	0.3331	299.83
12:15	2.5	0.53	0.18	N/A	0.3467	0.5872	528.52
12:30	2.6	0.55	0.18	N/A	0.3704	0.6274	564.70
12:45	2.8	0.59	0.17	N/A	0.4151	0.7032	632.91

13:00	2.9	0.61	0.17	N/A	0.4388	0.7433	668.99
13:15	3.4	0.72	0.17	N/A	0.5466	0.9259	833.33
13:30	3.4	0.72	0.17	N/A	**0.5492**	0.9303	**837.24**
13:45	2.3	0.48	0.16	N/A	0.3202	0.5425	488.24
14:00	2.3	0.48	0.16	N/A	0.3227	0.5467	492.04
14:15	2.7	0.57	0.16	N/A	0.4094	0.6934	624.10
14:30	2.6	0.55	0.16	N/A	0.3907	0.6619	595.72
14:45	2.6	0.55	0.15	N/A	0.3931	0.6660	599.36
15:00	2.5	0.53	0.15	N/A	0.3744	0.6343	570.88
15:15	2.4	0.50	0.15	N/A	0.3557	0.6026	542.33
15:30	2.3	0.48	0.15	N/A	0.3370	0.5708	513.74
15:45	1.9	0.40	0.14	N/A	0.2551	0.4321	388.85
16:00	1.9	0.40	0.14	N/A	0.2573	0.4358	392.22
16:15	0.4	0.08	0.14	0.08	0.0084	0.0143	12.83
16:30	0.4	0.08	0.14	0.08	0.0084	0.0143	12.83
16:45	0.3	0.06	0.14	0.06	0.0063	0.0107	9.62
17:00	0.3	0.06	0.13	0.06	0.0063	0.0107	9.62
17:15	0.5	0.11	0.13	0.09	0.0105	0.0178	16.04
17:30	0.5	0.11	0.13	0.09	0.0105	0.0178	16.04
17:45	0.5	0.11	0.13	0.09	0.0105	0.0178	16.04
18:00	0.4	0.08	0.13	0.08	0.0084	0.0143	12.83
18:15	0.4	0.08	0.12	0.08	0.0084	0.0143	12.83
18:30	0.4	0.08	0.12	0.08	0.0084	0.0143	12.83
18:45	0.3	0.06	0.12	0.06	0.0063	0.0107	9.62
19:00	0.2	0.04	0.12	0.04	0.0042	0.0071	6.42
19:15	0.3	0.06	0.12	0.06	0.0063	0.0107	9.62
19:30	0.4	0.08	0.12	0.08	0.0084	0.0143	12.83
19:45	0.3	0.06	0.11	0.06	0.0063	0.0107	9.62
20:00	0.2	0.04	0.11	0.04	0.0042	0.0071	6.42
20:15	0.3	0.06	0.11	0.06	0.0063	0.0107	9.62
20:30	0.3	0.06	0.11	0.06	0.0063	0.0107	9.62
20:45	0.3	0.06	0.11	0.06	0.0063	0.0107	9.62
21:00	0.2	0.04	0.11	0.04	0.0042	0.0071	6.42
21:15	0.3	0.06	0.11	0.06	0.0063	0.0107	9.62
21:30	0.2	0.04	0.10	0.04	0.0042	0.0071	6.42
21:45	0.3	0.06	0.10	0.06	0.0063	0.0107	9.62
22:00	0.2	0.04	0.10	0.04	0.0042	0.0071	6.42
22:15	0.3	0.06	0.10	0.06	0.0063	0.0107	9.62
22:30	0.2	0.04	0.10	0.04	0.0042	0.0071	6.42
22:45	0.2	0.04	0.10	0.04	0.0042	0.0071	6.42
23:00	0.2	0.04	0.10	0.04	0.0042	0.0071	6.42
23:15	0.2	0.04	0.10	0.04	0.0042	0.0071	6.42
23:30	0.2	0.04	0.10	0.04	0.0042	0.0071	6.42
23:45	0.2	0.04	0.10	0.04	0.0042	0.0071	6.42
24:00	0.2	0.04	0.10	0.04	0.0042	0.0071	6.42
	0	0.00	0.10	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**14531.47**

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**
T3

Drainage Area (ac.)	**1.9400**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74	(AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**90**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.14	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2**	(also used for drywell percolation rate)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **0.0001** s.f. **Bot. =** **0.0001** **s.f.** **Max. Depth (d)=** **0.0001** **Max. storage=** **0.00** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	3.7	0.8569	0.1406	N/A	0.7163	1.4012	420.37
0:10	4.8	1.1117	0.1406	N/A	0.9711	1.8996	569.88
0:15	5.1	1.1812	0.1406	N/A	1.0406	2.0355	610.65
0:20	4.9	1.1348	0.1406	N/A	0.9942	1.9449	583.47
0:25	6.6	1.5286	0.1406	N/A	1.3880	2.7151	814.52
0:30	7.3	1.6907	0.1406	N/A	1.5501	3.0322	909.66
0:35	8.4	1.9454	0.1406	N/A	1.8048	3.5306	1059.17
0:40	9	2.0844	0.1406	N/A	1.9438	3.8024	1140.72
0:45	12.3	2.8487	0.1406	N/A	2.7081	5.2975	1589.24
0:50	17.6	4.0762	0.1406	N/A	**3.9356**	**7.6986**	**2309.58**
0:55	16.1	3.7288	0.1406	N/A	3.5882	7.0190	2105.71
1:00	4.2	0.9727	0.1406	N/A	0.8321	1.6278	488.33
	0	0.0000	0.1406	0.00	0.0000	0.0000	0.00
	0	0.0000	0.1406	0.00	0.0000	0.0000	0.00
1:15	0	0.0000	0.1406	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**12601.31**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	1.3	0.42	0.14	N/A		0.2806	0.5489	164.67
0:10	1.3	0.42	0.14	N/A		0.2806	0.5489	164.67
0:15	1.1	0.36	0.14	N/A		0.2158	0.4221	126.64
0:20	1.5	0.49	0.14	N/A		0.3454	0.6757	202.70
0:25	1.5	0.49	0.14	N/A		0.3454	0.6757	202.70
0:30	1.8	0.58	0.14	N/A		0.4426	0.8658	259.74
0:35	1.5	0.49	0.14	N/A		0.3454	0.6757	202.70
0:40	1.8	0.58	0.14	N/A		0.4426	0.8658	259.74
0:45	1.8	0.58	0.14	N/A		0.4426	0.8658	259.74
0:50	1.5	0.49	0.14	N/A		0.3454	0.6757	202.70
0:55	1.6	0.52	0.14	N/A		0.3778	0.7390	221.71
1:00	1.8	0.58	0.14	N/A		0.4426	0.8658	259.74
1:05	2.2	0.71	0.14	N/A		0.5722	1.1193	335.80
1:10	2.2	0.71	0.14	N/A		0.5722	1.1193	335.80
1:15	2.2	0.71	0.14	N/A		0.5722	1.1193	335.80
1:20	2	0.65	0.14	N/A		0.5074	0.9926	297.77
1:25	2.6	0.84	0.14	N/A		0.7018	1.3728	411.85
1:30	2.7	0.87	0.14	N/A		0.7342	1.4362	430.87
1:35	2.4	0.78	0.14	N/A		0.6370	1.2461	373.82
1:40	2.7	0.87	0.14	N/A		0.7342	1.4362	430.87
1:45	3.3	1.07	0.14	N/A		0.9286	1.8165	544.95
1:50	3.1	1.00	0.14	N/A		0.8638	1.6897	506.92
1:55	2.9	0.94	0.14	N/A		0.7990	1.5630	468.89
2:00	3	0.97	0.14	N/A		0.8314	1.6264	487.91
2:05	3.1	1.00	0.14	N/A		0.8638	1.6897	506.92
2:10	4.2	1.36	0.14	N/A		1.2202	2.3869	716.07
2:15	5	1.62	0.14	N/A		1.4794	2.8940	868.19
2:20	3.5	1.13	0.14	N/A		0.9934	1.9433	582.98
2:25	6.8	2.20	0.14	N/A		2.0626	4.0348	1210.44
2:30	7.3	2.37	0.14	N/A		2.2246	4.3517	1305.51
2:35	8.2	2.66	0.14	N/A		**2.5162**	**4.9221**	**1476.63**
2:40	5.9	1.91	0.14	N/A		1.7710	3.4644	1039.31
2:45	2	0.65	0.14	N/A		0.5074	0.9926	297.77
2:50	1.8	0.58	0.14	N/A		0.4426	0.8658	259.74
2:55	1.8	0.58	0.14	N/A		0.4426	0.8658	259.74
3:00	0.6	0.19	0.14	N/A		0.0538	0.1052	31.57
	0	0.00	0.14	0.00		0.0000	0.0000	0.00
	0	0.00	0.14	0.00		0.0000	0.0000	0.00
3:15	0	0.00	0.14	0.00		0.0000	0.0000	0.00
	0	0.00	0.14	0.00		0.0000	0.0000	0.00
	0	0.00	0.14	0.00		0.0000	0.0000	0.00
3:30	0	0.00	0.14	0.00		0.0000	0.0000	0.00
	0	0.00	0.14	0.00		0.0000	0.0000	0.00
	0	0.00	0.14	0.00		0.0000	0.0000	0.00
					Total volume (cf)			**16043.54**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	0.5	0.21	0.14	N/A	0.0688	0.1346	40.38
0:10	0.6	0.25	0.14	N/A	0.1107	0.2165	64.95
0:15	0.6	0.25	0.14	N/A	0.1107	0.2165	64.95
0:20	0.6	0.25	0.14	N/A	0.1107	0.2165	64.95
0:25	0.6	0.25	0.14	N/A	0.1107	0.2165	64.95
0:30	0.7	0.29	0.14	N/A	0.1526	0.2984	89.53
0:35	0.7	0.29	0.14	N/A	0.1526	0.2984	89.53
0:40	0.7	0.29	0.14	N/A	0.1526	0.2984	89.53
0:45	0.7	0.29	0.14	N/A	0.1526	0.2984	89.53
0:50	0.7	0.29	0.14	N/A	0.1526	0.2984	89.53
0:55	0.7	0.29	0.14	N/A	0.1526	0.2984	89.53
1:00	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:05	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:10	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:15	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:20	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:25	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:30	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:35	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:40	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:45	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:50	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
1:55	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
2:00	0.9	0.38	0.14	N/A	0.2363	0.4623	138.68
2:05	0.8	0.34	0.14	N/A	0.1944	0.3804	114.11
2:10	0.9	0.38	0.14	N/A	0.2363	0.4623	138.68
2:15	0.9	0.38	0.14	N/A	0.2363	0.4623	138.68
2:20	0.9	0.38	0.14	N/A	0.2363	0.4623	138.68
2:25	0.9	0.38	0.14	N/A	0.2363	0.4623	138.68
2:30	0.9	0.38	0.14	N/A	0.2363	0.4623	138.68
2:35	0.9	0.38	0.14	N/A	0.2363	0.4623	138.68
2:40	0.9	0.38	0.14	N/A	0.2363	0.4623	138.68
2:45	1	0.42	0.14	N/A	0.2782	0.5442	163.26
2:50	1	0.42	0.14	N/A	0.2782	0.5442	163.26
2:55	1	0.42	0.14	N/A	0.2782	0.5442	163.26
3:00	1	0.42	0.14	N/A	0.2782	0.5442	163.26
3:05	1	0.42	0.14	N/A	0.2782	0.5442	163.26
3:10	1.1	0.46	0.14	N/A	0.3201	0.6261	187.84
3:15	1.1	0.46	0.14	N/A	0.3201	0.6261	187.84
3:20	1.1	0.46	0.14	N/A	0.3201	0.6261	187.84
3:25	1.2	0.50	0.14	N/A	0.3620	0.7081	212.42
3:30	1.3	0.54	0.14	N/A	0.4038	0.7900	236.99
3:35	1.4	0.59	0.14	N/A	0.4457	0.8719	261.57
3:40	1.4	0.59	0.14	N/A	0.4457	0.8719	261.57
3:45	1.5	0.63	0.14	N/A	0.4876	0.9538	286.15
3:50	1.5	0.63	0.14	N/A	0.4876	0.9538	286.15
3:55	1.6	0.67	0.14	N/A	0.5295	1.0358	310.73
4:00	1.6	0.67	0.14	N/A	0.5295	1.0358	310.73
4:05	1.7	0.71	0.14	N/A	0.5714	1.1177	335.30
4:10	1.8	0.75	0.14	N/A	0.6132	1.1996	359.88
4:15	1.9	0.80	0.14	N/A	0.6551	1.2815	384.46

4:20	2	0.84	0.14	N/A	0.6970	1.3634	409.03
4:25	2.1	0.88	0.14	N/A	0.7389	1.4454	433.61
4:30	2.1	0.88	0.14	N/A	0.7389	1.4454	433.61
4:35	2.2	0.92	0.14	N/A	0.7808	1.5273	458.19
4:40	2.3	0.96	0.14	N/A	0.8226	1.6092	482.77
4:45	2.4	1.01	0.14	N/A	0.8645	1.6911	507.34
4:50	2.4	1.01	0.14	N/A	0.8645	1.6911	507.34
4:55	2.5	1.05	0.14	N/A	0.9064	1.7731	531.92
5:00	2.6	1.09	0.14	N/A	0.9483	1.8550	556.50
5:05	3.1	1.30	0.14	N/A	1.1577	2.2646	679.38
5:10	3.6	1.51	0.14	N/A	1.3671	2.6742	802.27
5:15	3.9	1.63	0.14	N/A	1.4927	2.9200	876.00
5:20	4.2	1.76	0.14	N/A	1.6184	3.1658	949.73
5:25	4.7	1.97	0.14	N/A	1.8278	3.5754	1072.62
5:30	5.6	2.35	0.14	N/A	**2.2047**	**4.3127**	**1293.82**
5:35	1.9	0.80	0.14	N/A	0.6551	1.2815	384.46
5:40	0.9	0.38	0.14	N/A	0.2363	0.4623	138.68
5:45	0.6	0.25	0.14	N/A	0.1107	0.2165	64.95
5:50	0.5	0.21	0.14	N/A	0.0688	0.1346	40.38
5:55	0.3	0.13	0.14	0.11	0.0126	0.0246	7.37
6:00	0.2	0.08	0.14	0.08	0.0084	0.0164	4.92
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
6:15	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
6:30	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
6:45	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
7:00	0	0.00	0.14	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**18690.90**

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:15	0.2	0.04	0.25	0.04	0.0042	0.0082	7.41
0:30	0.3	0.06	0.24	0.06	0.0063	0.0123	11.11
0:45	0.3	0.06	0.24	0.06	0.0063	0.0123	11.11
1:00	0.4	0.08	0.24	0.08	0.0084	0.0165	14.82
1:15	0.3	0.06	0.24	0.06	0.0063	0.0123	11.11
1:30	0.3	0.06	0.23	0.06	0.0063	0.0123	11.11
1:45	0.3	0.06	0.23	0.06	0.0063	0.0123	11.11
2:00	0.4	0.08	0.23	0.08	0.0084	0.0165	14.82
2:15	0.4	0.08	0.22	0.08	0.0084	0.0165	14.82
2:30	0.4	0.08	0.22	0.08	0.0084	0.0165	14.82
2:45	0.5	0.11	0.22	0.09	0.0105	0.0206	18.52
3:00	0.5	0.11	0.22	0.09	0.0105	0.0206	18.52
3:15	0.5	0.11	0.21	0.09	0.0105	0.0206	18.52
3:30	0.5	0.11	0.21	0.09	0.0105	0.0206	18.52
3:45	0.5	0.11	0.21	0.09	0.0105	0.0206	18.52
4:00	0.6	0.13	0.21	0.11	0.0126	0.0247	22.23
4:15	0.6	0.13	0.20	0.11	0.0126	0.0247	22.23
4:30	0.7	0.15	0.20	0.13	0.0147	0.0288	25.93
4:45	0.7	0.15	0.20	0.13	0.0147	0.0288	25.93
5:00	0.8	0.17	0.20	0.15	0.0168	0.0329	29.63
5:15	0.6	0.13	0.19	0.11	0.0126	0.0247	22.23
5:30	0.7	0.15	0.19	0.13	0.0147	0.0288	25.93
5:45	0.8	0.17	0.19	0.15	0.0168	0.0329	29.63
6:00	0.8	0.17	0.19	0.15	0.0168	0.0329	29.63
6:15	0.9	0.19	0.18	0.17	0.0189	0.0370	33.34
6:30	0.9	0.19	0.18	0.17	0.0189	0.0370	33.34
6:45	1	0.21	0.18	N/A	0.0326	0.0637	57.32
7:00	1	0.21	0.18	N/A	0.0350	0.0684	61.55
7:15	1	0.21	0.17	N/A	0.0373	0.0731	65.76
7:30	1.1	0.23	0.17	N/A	0.0608	0.1189	106.97
7:45	1.2	0.25	0.17	N/A	0.0841	0.1646	148.14
8:00	1.3	0.27	0.17	N/A	0.1075	0.2103	189.28
8:15	1.5	0.32	0.16	N/A	0.1519	0.2971	267.43
8:30	1.5	0.32	0.16	N/A	0.1542	0.3016	271.46
8:45	1.6	0.34	0.16	N/A	0.1775	0.3472	312.49
9:00	1.7	0.36	0.16	N/A	0.2008	0.3928	353.49
9:15	1.9	0.40	0.15	N/A	0.2451	0.4794	431.49
9:30	2	0.42	0.15	N/A	0.2683	0.5249	472.42
9:45	2.1	0.44	0.15	N/A	0.2916	0.5703	513.31
10:00	2.2	0.46	0.15	N/A	0.3148	0.6157	554.16
10:15	1.5	0.32	0.15	N/A	0.1696	0.3318	298.64
10:30	1.5	0.32	0.14	N/A	0.1718	0.3360	302.38
10:45	2	0.42	0.14	N/A	0.2791	0.5459	491.28
11:00	2	0.42	0.14	N/A	0.2811	0.5499	494.94
11:15	1.9	0.40	0.14	N/A	0.2621	0.5128	461.52
11:30	1.9	0.40	0.14	N/A	0.2642	0.5168	465.10
11:45	1.7	0.36	0.13	N/A	0.2241	0.4384	394.56
12:00	1.8	0.38	0.13	N/A	0.2471	0.4835	435.11
12:15	2.5	0.53	0.13	N/A	0.3964	0.7754	697.87
12:30	2.6	0.55	0.13	N/A	0.4194	0.8204	738.33
12:45	2.8	0.59	0.13	N/A	0.4634	0.9064	815.80

13:00	2.9	0.61	0.12	N/A	0.4863	0.9513	856.18
13:15	3.4	0.72	0.12	N/A	0.5934	1.1608	1044.69
13:30	3.4	0.72	0.12	N/A	**0.5952**	1.1644	**1047.95**
13:45	2.3	0.48	0.12	N/A	0.3656	0.7152	643.70
14:00	2.3	0.48	0.12	N/A	0.3674	0.7188	646.88
14:15	2.7	0.57	0.11	N/A	0.4534	0.8869	798.17
14:30	2.6	0.55	0.11	N/A	0.4341	0.8491	764.22
14:45	2.6	0.55	0.11	N/A	0.4358	0.8525	767.26
15:00	2.5	0.53	0.11	N/A	0.4165	0.8147	733.21
15:15	2.4	0.50	0.11	N/A	0.3971	0.7768	699.12
15:30	2.3	0.48	0.11	N/A	0.3777	0.7389	664.99
15:45	1.9	0.40	0.10	N/A	0.2952	0.5774	519.68
16:00	1.9	0.40	0.10	N/A	0.2968	0.5805	522.49
16:15	0.4	0.08	0.10	0.08	0.0084	0.0165	14.82
16:30	0.4	0.08	0.10	0.08	0.0084	0.0165	14.82
16:45	0.3	0.06	0.10	0.06	0.0063	0.0123	11.11
17:00	0.3	0.06	0.10	0.06	0.0063	0.0123	11.11
17:15	0.5	0.11	0.10	0.09	0.0105	0.0206	18.52
17:30	0.5	0.11	0.09	N/A	0.0112	0.0219	19.73
17:45	0.5	0.11	0.09	N/A	0.0126	0.0247	22.19
18:00	0.4	0.08	0.09	0.08	0.0084	0.0165	14.82
18:15	0.4	0.08	0.09	0.08	0.0084	0.0165	14.82
18:30	0.4	0.08	0.09	0.08	0.0084	0.0165	14.82
18:45	0.3	0.06	0.09	0.06	0.0063	0.0123	11.11
19:00	0.2	0.04	0.09	0.04	0.0042	0.0082	7.41
19:15	0.3	0.06	0.08	0.06	0.0063	0.0123	11.11
19:30	0.4	0.08	0.08	0.08	0.0084	0.0165	14.82
19:45	0.3	0.06	0.08	0.06	0.0063	0.0123	11.11
20:00	0.2	0.04	0.08	0.04	0.0042	0.0082	7.41
20:15	0.3	0.06	0.08	0.06	0.0063	0.0123	11.11
20:30	0.3	0.06	0.08	0.06	0.0063	0.0123	11.11
20:45	0.3	0.06	0.08	0.06	0.0063	0.0123	11.11
21:00	0.2	0.04	0.08	0.04	0.0042	0.0082	7.41
21:15	0.3	0.06	0.08	0.06	0.0063	0.0123	11.11
21:30	0.2	0.04	0.08	0.04	0.0042	0.0082	7.41
21:45	0.3	0.06	0.07	0.06	0.0063	0.0123	11.11
22:00	0.2	0.04	0.07	0.04	0.0042	0.0082	7.41
22:15	0.3	0.06	0.07	0.06	0.0063	0.0123	11.11
22:30	0.2	0.04	0.07	0.04	0.0042	0.0082	7.41
22:45	0.2	0.04	0.07	0.04	0.0042	0.0082	7.41
23:00	0.2	0.04	0.07	0.04	0.0042	0.0082	7.41
23:15	0.2	0.04	0.07	0.04	0.0042	0.0082	7.41
23:30	0.2	0.04	0.07	0.04	0.0042	0.0082	7.41
23:45	0.2	0.04	0.07	0.04	0.0042	0.0082	7.41
24:00	0.2	0.04	0.07	0.04	0.0042	0.0082	7.41
	0	0.00	0.07	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**19984.70**

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method

Area Designations **Date Palm Apartments**
T4

Drainage Area (ac.)	**3.1900**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74 (AMC II)				
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**78.4**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.22 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))				
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2** (also used for drywell percolation rate)				

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **0.0001** s.f. **Bot. =** **0.0001** **s.f.** **Max. Depth (d)=** **0.0001** **Max. storage=** **0.00** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	3.7	0.8569	0.2179	N/A	0.6391	2.0556	616.68
0:10	4.8	1.1117	0.2179	N/A	0.8938	2.8751	862.52
0:15	5.1	1.1812	0.2179	N/A	0.9633	3.0985	929.56
0:20	4.9	1.1348	0.2179	N/A	0.9170	2.9496	884.87
0:25	6.6	1.5286	0.2179	N/A	1.3107	4.2160	1264.80
0:30	7.3	1.6907	0.2179	N/A	1.4728	4.7375	1421.24
0:35	8.4	1.9454	0.2179	N/A	1.7276	5.5569	1667.08
0:40	9	2.0844	0.2179	N/A	1.8665	6.0039	1801.17
0:45	12.3	2.8487	0.2179	N/A	2.6308	8.4623	2538.68
0:50	17.6	4.0762	0.2179	N/A	**3.8583**	**12.4106**	**3723.17**
0:55	16.1	3.7288	0.2179	N/A	3.5109	11.2931	3387.93
1:00	4.2	0.9727	0.2179	N/A	0.7549	2.4281	728.42
	0	0.0000	0.2179	0.00	0.0000	0.0000	0.00
	0	0.0000	0.2179	0.00	0.0000	0.0000	0.00
1:15	0	0.0000	0.2179	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**19826.11**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	1.3	0.42	0.22	N/A		0.2033	0.6541	196.22
0:10	1.3	0.42	0.22	N/A		0.2033	0.6541	196.22
0:15	1.1	0.36	0.22	N/A		0.1385	0.4456	133.69
0:20	1.5	0.49	0.22	N/A		0.2681	0.8625	258.75
0:25	1.5	0.49	0.22	N/A		0.2681	0.8625	258.75
0:30	1.8	0.58	0.22	N/A		0.3653	1.1752	352.55
0:35	1.5	0.49	0.22	N/A		0.2681	0.8625	258.75
0:40	1.8	0.58	0.22	N/A		0.3653	1.1752	352.55
0:45	1.8	0.58	0.22	N/A		0.3653	1.1752	352.55
0:50	1.5	0.49	0.22	N/A		0.2681	0.8625	258.75
0:55	1.6	0.52	0.22	N/A		0.3005	0.9667	290.02
1:00	1.8	0.58	0.22	N/A		0.3653	1.1752	352.55
1:05	2.2	0.71	0.22	N/A		0.4949	1.5920	477.61
1:10	2.2	0.71	0.22	N/A		0.4949	1.5920	477.61
1:15	2.2	0.71	0.22	N/A		0.4949	1.5920	477.61
1:20	2	0.65	0.22	N/A		0.4301	1.3836	415.08
1:25	2.6	0.84	0.22	N/A		0.6245	2.0089	602.67
1:30	2.7	0.87	0.22	N/A		0.6569	2.1131	633.93
1:35	2.4	0.78	0.22	N/A		0.5597	1.8005	540.14
1:40	2.7	0.87	0.22	N/A		0.6569	2.1131	633.93
1:45	3.3	1.07	0.22	N/A		0.8513	2.7384	821.53
1:50	3.1	1.00	0.22	N/A		0.7865	2.5300	759.00
1:55	2.9	0.94	0.22	N/A		0.7217	2.3215	696.46
2:00	3	0.97	0.22	N/A		0.7541	2.4258	727.73
2:05	3.1	1.00	0.22	N/A		0.7865	2.5300	759.00
2:10	4.2	1.36	0.22	N/A		1.1429	3.6764	1102.91
2:15	5	1.62	0.22	N/A		1.4021	4.5101	1353.03
2:20	3.5	1.13	0.22	N/A		0.9161	2.9469	884.06
2:25	6.8	2.20	0.22	N/A		1.9853	6.3860	1915.81
2:30	7.3	2.37	0.22	N/A		2.1473	6.9071	2072.13
2:35	8.2	2.66	0.22	N/A		**2.4389**	**7.8451**	**2353.52**
2:40	5.9	1.91	0.22	N/A		1.6937	5.4481	1634.42
2:45	2	0.65	0.22	N/A		0.4301	1.3836	415.08
2:50	1.8	0.58	0.22	N/A		0.3653	1.1752	352.55
2:55	1.8	0.58	0.22	N/A		0.3653	1.1752	352.55
3:00	0.6	0.19	0.22	0.17		0.0194	0.0625	18.76
	0	0.00	0.22	0.00		0.0000	0.0000	0.00
	0	0.00	0.22	0.00		0.0000	0.0000	0.00
3:15	0	0.00	0.22	0.00		0.0000	0.0000	0.00
	0	0.00	0.22	0.00		0.0000	0.0000	0.00
	0	0.00	0.22	0.00		0.0000	0.0000	0.00
3:30	0	0.00	0.22	0.00		0.0000	0.0000	0.00
	0	0.00	0.22	0.00		0.0000	0.0000	0.00
	0	0.00	0.22	0.00		0.0000	0.0000	0.00
					Total volume (cf)			**23738.46**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	0.5	0.21	0.22		0.19	0.0209	0.0674	20.21
0:10	0.6	0.25	0.22	N/A		0.0334	0.1075	32.25
0:15	0.6	0.25	0.22	N/A		0.0334	0.1075	32.25
0:20	0.6	0.25	0.22	N/A		0.0334	0.1075	32.25
0:25	0.6	0.25	0.22	N/A		0.0334	0.1075	32.25
0:30	0.7	0.29	0.22	N/A		0.0753	0.2422	72.67
0:35	0.7	0.29	0.22	N/A		0.0753	0.2422	72.67
0:40	0.7	0.29	0.22	N/A		0.0753	0.2422	72.67
0:45	0.7	0.29	0.22	N/A		0.0753	0.2422	72.67
0:50	0.7	0.29	0.22	N/A		0.0753	0.2422	72.67
0:55	0.7	0.29	0.22	N/A		0.0753	0.2422	72.67
1:00	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:05	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:10	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:15	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:20	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:25	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:30	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:35	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:40	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:45	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:50	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
1:55	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
2:00	0.9	0.38	0.22	N/A		0.1591	0.5116	153.49
2:05	0.8	0.34	0.22	N/A		0.1172	0.3769	113.08
2:10	0.9	0.38	0.22	N/A		0.1591	0.5116	153.49
2:15	0.9	0.38	0.22	N/A		0.1591	0.5116	153.49
2:20	0.9	0.38	0.22	N/A		0.1591	0.5116	153.49
2:25	0.9	0.38	0.22	N/A		0.1591	0.5116	153.49
2:30	0.9	0.38	0.22	N/A		0.1591	0.5116	153.49
2:35	0.9	0.38	0.22	N/A		0.1591	0.5116	153.49
2:40	0.9	0.38	0.22	N/A		0.1591	0.5116	153.49
2:45	1	0.42	0.22	N/A		0.2009	0.6464	193.91
2:50	1	0.42	0.22	N/A		0.2009	0.6464	193.91
2:55	1	0.42	0.22	N/A		0.2009	0.6464	193.91
3:00	1	0.42	0.22	N/A		0.2009	0.6464	193.91
3:05	1	0.42	0.22	N/A		0.2009	0.6464	193.91
3:10	1.1	0.46	0.22	N/A		0.2428	0.7811	234.32
3:15	1.1	0.46	0.22	N/A		0.2428	0.7811	234.32
3:20	1.1	0.46	0.22	N/A		0.2428	0.7811	234.32
3:25	1.2	0.50	0.22	N/A		0.2847	0.9158	274.73
3:30	1.3	0.54	0.22	N/A		0.3266	1.0505	315.15
3:35	1.4	0.59	0.22	N/A		0.3685	1.1852	355.56
3:40	1.4	0.59	0.22	N/A		0.3685	1.1852	355.56
3:45	1.5	0.63	0.22	N/A		0.4103	1.3199	395.97
3:50	1.5	0.63	0.22	N/A		0.4103	1.3199	395.97
3:55	1.6	0.67	0.22	N/A		0.4522	1.4546	436.38
4:00	1.6	0.67	0.22	N/A		0.4522	1.4546	436.38
4:05	1.7	0.71	0.22	N/A		0.4941	1.5893	476.80
4:10	1.8	0.75	0.22	N/A		0.5360	1.7240	517.21
4:15	1.9	0.80	0.22	N/A		0.5779	1.8587	557.62

4:20	2	0.84	0.22	N/A	0.6197	1.9935	598.04
4:25	2.1	0.88	0.22	N/A	0.6616	2.1282	638.45
4:30	2.1	0.88	0.22	N/A	0.6616	2.1282	638.45
4:35	2.2	0.92	0.22	N/A	0.7035	2.2629	678.86
4:40	2.3	0.96	0.22	N/A	0.7454	2.3976	719.28
4:45	2.4	1.01	0.22	N/A	0.7873	2.5323	759.69
4:50	2.4	1.01	0.22	N/A	0.7873	2.5323	759.69
4:55	2.5	1.05	0.22	N/A	0.8291	2.6670	800.10
5:00	2.6	1.09	0.22	N/A	0.8710	2.8017	840.52
5:05	3.1	1.30	0.22	N/A	1.0804	3.4753	1042.58
5:10	3.6	1.51	0.22	N/A	1.2898	4.1488	1244.65
5:15	3.9	1.63	0.22	N/A	1.4155	4.5530	1365.89
5:20	4.2	1.76	0.22	N/A	1.5411	4.9571	1487.13
5:25	4.7	1.97	0.22	N/A	1.7505	5.6306	1689.19
5:30	5.6	2.35	0.22	N/A	**2.1274**	**6.8430**	**2052.91**
5:35	1.9	0.80	0.22	N/A	0.5779	1.8587	557.62
5:40	0.9	0.38	0.22	N/A	0.1591	0.5116	153.49
5:45	0.6	0.25	0.22	N/A	0.0334	0.1075	32.25
5:50	0.5	0.21	0.22	0.19	0.0209	0.0674	20.21
5:55	0.3	0.13	0.22	0.11	0.0126	0.0404	12.12
6:00	0.2	0.08	0.22	0.08	0.0084	0.0269	8.08
	0	0.00	0.22	0.00	0.0000	0.0000	0.00
	0	0.00	0.22	0.00	0.0000	0.0000	0.00
6:15	0	0.00	0.22	0.00	0.0000	0.0000	0.00
	0	0.00	0.22	0.00	0.0000	0.0000	0.00
	0	0.00	0.22	0.00	0.0000	0.0000	0.00
6:30	0	0.00	0.22	0.00	0.0000	0.0000	0.00
	0	0.00	0.22	0.00	0.0000	0.0000	0.00
	0	0.00	0.22	0.00	0.0000	0.0000	0.00
6:45	0	0.00	0.22	0.00	0.0000	0.0000	0.00
	0	0.00	0.22	0.00	0.0000	0.0000	0.00
	0	0.00	0.22	0.00	0.0000	0.0000	0.00
7:00	0	0.00	0.22	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**25572.24**

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:15	0.2	0.04	0.38	0.04		0.0042	0.0135	12.18
0:30	0.3	0.06	0.38	0.06		0.0063	0.0203	18.27
0:45	0.3	0.06	0.37	0.06		0.0063	0.0203	18.27
1:00	0.4	0.08	0.37	0.08		0.0084	0.0271	24.36
1:15	0.3	0.06	0.36	0.06		0.0063	0.0203	18.27
1:30	0.3	0.06	0.36	0.06		0.0063	0.0203	18.27
1:45	0.3	0.06	0.36	0.06		0.0063	0.0203	18.27
2:00	0.4	0.08	0.35	0.08		0.0084	0.0271	24.36
2:15	0.4	0.08	0.35	0.08		0.0084	0.0271	24.36
2:30	0.4	0.08	0.34	0.08		0.0084	0.0271	24.36
2:45	0.5	0.11	0.34	0.09		0.0105	0.0338	30.45
3:00	0.5	0.11	0.33	0.09		0.0105	0.0338	30.45
3:15	0.5	0.11	0.33	0.09		0.0105	0.0338	30.45
3:30	0.5	0.11	0.33	0.09		0.0105	0.0338	30.45
3:45	0.5	0.11	0.32	0.09		0.0105	0.0338	30.45
4:00	0.6	0.13	0.32	0.11		0.0126	0.0406	36.55
4:15	0.6	0.13	0.31	0.11		0.0126	0.0406	36.55
4:30	0.7	0.15	0.31	0.13		0.0147	0.0474	42.64
4:45	0.7	0.15	0.31	0.13		0.0147	0.0474	42.64
5:00	0.8	0.17	0.30	0.15		0.0168	0.0541	48.73
5:15	0.6	0.13	0.30	0.11		0.0126	0.0406	36.55
5:30	0.7	0.15	0.29	0.13		0.0147	0.0474	42.64
5:45	0.8	0.17	0.29	0.15		0.0168	0.0541	48.73
6:00	0.8	0.17	0.29	0.15		0.0168	0.0541	48.73
6:15	0.9	0.19	0.28	0.17		0.0189	0.0609	54.82
6:30	0.9	0.19	0.28	0.17		0.0189	0.0609	54.82
6:45	1	0.21	0.28	0.19		0.0210	0.0677	60.91
7:00	1	0.21	0.27	0.19		0.0210	0.0677	60.91
7:15	1	0.21	0.27	0.19		0.0210	0.0677	60.91
7:30	1.1	0.23	0.26	0.21		0.0231	0.0744	67.00
7:45	1.2	0.25	0.26	0.23		0.0252	0.0812	73.09
8:00	1.3	0.27	0.26	0.25		0.0274	0.0880	79.18
8:15	1.5	0.32	0.25	N/A		0.0620	0.1993	179.34
8:30	1.5	0.32	0.25	N/A		0.0655	0.2107	189.61
8:45	1.6	0.34	0.25	N/A		0.0901	0.2897	260.69
9:00	1.7	0.36	0.24	N/A		0.1146	0.3685	331.68
9:15	1.9	0.40	0.24	N/A		0.1601	0.5150	463.48
9:30	2	0.42	0.24	N/A		0.1846	0.5937	534.29
9:45	2.1	0.44	0.23	N/A		0.2090	0.6722	605.00
10:00	2.2	0.46	0.23	N/A		0.2334	0.7507	675.62
10:15	1.5	0.32	0.23	N/A		0.0894	0.2876	258.87
10:30	1.5	0.32	0.22	N/A		0.0927	0.2982	268.39
10:45	2	0.42	0.22	N/A		0.2012	0.6471	582.35
11:00	2	0.42	0.22	N/A		0.2044	0.6574	591.68
11:15	1.9	0.40	0.21	N/A		0.1865	0.6000	539.99
11:30	1.9	0.40	0.21	N/A		0.1897	0.6101	549.12
11:45	1.7	0.36	0.21	N/A		0.1507	0.4848	436.33
12:00	1.8	0.38	0.20	N/A		0.1748	0.5624	506.17
12:15	2.5	0.53	0.20	N/A		0.3252	1.0460	941.36
12:30	2.6	0.55	0.20	N/A		0.3492	1.1233	1010.99
12:45	2.8	0.59	0.19	N/A		0.3943	1.2682	1141.42

13:00	2.9	0.61	0.19	N/A	0.4183	1.3454	1210.85
13:15	3.4	0.72	0.19	N/A	0.5264	1.6931	1523.80
13:30	3.4	0.72	0.19	N/A	**0.5292**	1.7023	**1532.10**
13:45	2.3	0.48	0.18	N/A	0.3006	0.9670	870.29
14:00	2.3	0.48	0.18	N/A	0.3034	0.9760	878.38
14:15	2.7	0.57	0.18	N/A	0.3903	1.2555	1129.99
14:30	2.6	0.55	0.18	N/A	0.3720	1.1966	1076.94
14:45	2.6	0.55	0.17	N/A	0.3747	1.2052	1084.69
15:00	2.5	0.53	0.17	N/A	0.3563	1.1460	1031.41
15:15	2.4	0.50	0.17	N/A	0.3378	1.0867	978.02
15:30	2.3	0.48	0.16	N/A	0.3194	1.0272	924.52
15:45	1.9	0.40	0.16	N/A	0.2377	0.7646	688.16
16:00	1.9	0.40	0.16	N/A	0.2402	0.7726	695.32
16:15	0.4	0.08	0.16	0.08	0.0084	0.0271	24.36
16:30	0.4	0.08	0.15	0.08	0.0084	0.0271	24.36
16:45	0.3	0.06	0.15	0.06	0.0063	0.0203	18.27
17:00	0.3	0.06	0.15	0.06	0.0063	0.0203	18.27
17:15	0.5	0.11	0.15	0.09	0.0105	0.0338	30.45
17:30	0.5	0.11	0.15	0.09	0.0105	0.0338	30.45
17:45	0.5	0.11	0.14	0.09	0.0105	0.0338	30.45
18:00	0.4	0.08	0.14	0.08	0.0084	0.0271	24.36
18:15	0.4	0.08	0.14	0.08	0.0084	0.0271	24.36
18:30	0.4	0.08	0.14	0.08	0.0084	0.0271	24.36
18:45	0.3	0.06	0.14	0.06	0.0063	0.0203	18.27
19:00	0.2	0.04	0.13	0.04	0.0042	0.0135	12.18
19:15	0.3	0.06	0.13	0.06	0.0063	0.0203	18.27
19:30	0.4	0.08	0.13	0.08	0.0084	0.0271	24.36
19:45	0.3	0.06	0.13	0.06	0.0063	0.0203	18.27
20:00	0.2	0.04	0.13	0.04	0.0042	0.0135	12.18
20:15	0.3	0.06	0.12	0.06	0.0063	0.0203	18.27
20:30	0.3	0.06	0.12	0.06	0.0063	0.0203	18.27
20:45	0.3	0.06	0.12	0.06	0.0063	0.0203	18.27
21:00	0.2	0.04	0.12	0.04	0.0042	0.0135	12.18
21:15	0.3	0.06	0.12	0.06	0.0063	0.0203	18.27
21:30	0.2	0.04	0.12	0.04	0.0042	0.0135	12.18
21:45	0.3	0.06	0.12	0.06	0.0063	0.0203	18.27
22:00	0.2	0.04	0.11	0.04	0.0042	0.0135	12.18
22:15	0.3	0.06	0.11	0.06	0.0063	0.0203	18.27
22:30	0.2	0.04	0.11	0.04	0.0042	0.0135	12.18
22:45	0.2	0.04	0.11	0.04	0.0042	0.0135	12.18
23:00	0.2	0.04	0.11	0.04	0.0042	0.0135	12.18
23:15	0.2	0.04	0.11	0.04	0.0042	0.0135	12.18
23:30	0.2	0.04	0.11	0.04	0.0042	0.0135	12.18
23:45	0.2	0.04	0.11	0.04	0.0042	0.0135	12.18
24:00	0.2	0.04	0.11	0.04	0.0042	0.0135	12.18
	0	0.00	0.11	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**25524.22**

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**
T5

Drainage Area (ac.)	**0.6000**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74 (AMC II)				
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**67.7**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.29 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))				
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2** (also used for drywell percolation rate)				

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **0.0001** s.f. **Bot. =** **0.0001** **s.f.** **Max. Depth (d)=** **0.0001** **Max. storage=** **0.00** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	3.7	0.8569	0.2891	N/A	0.5678	0.3435	103.06
0:10	4.8	1.1117	0.2891	N/A	0.8226	0.4977	149.30
0:15	5.1	1.1812	0.2891	N/A	0.8920	0.5397	161.91
0:20	4.9	1.1348	0.2891	N/A	0.8457	0.5117	153.50
0:25	6.6	1.5286	0.2891	N/A	1.2394	0.7499	224.96
0:30	7.3	1.6907	0.2891	N/A	1.4016	0.8479	254.38
0:35	8.4	1.9454	0.2891	N/A	1.6563	1.0021	300.62
0:40	9	2.0844	0.2891	N/A	1.7953	1.0861	325.84
0:45	12.3	2.8487	0.2891	N/A	2.5596	1.5485	464.56
0:50	17.6	4.0762	0.2891	N/A	**3.7870**	**2.2912**	**687.35**
0:55	16.1	3.7288	0.2891	N/A	3.4396	2.0810	624.30
1:00	4.2	0.9727	0.2891	N/A	0.6836	0.4136	124.07
	0	0.0000	0.2891	0.00	0.0000	0.0000	0.00
	0	0.0000	0.2891	0.00	0.0000	0.0000	0.00
1:15	0	0.0000	0.2891	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**3573.84**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	1.3	0.42	0.29	N/A		0.1321	0.0799	23.97
0:10	1.3	0.42	0.29	N/A		0.1321	0.0799	23.97
0:15	1.1	0.36	0.29	N/A		0.0673	0.0407	12.21
0:20	1.5	0.49	0.29	N/A		0.1969	0.1191	35.73
0:25	1.5	0.49	0.29	N/A		0.1969	0.1191	35.73
0:30	1.8	0.58	0.29	N/A		0.2941	0.1779	53.38
0:35	1.5	0.49	0.29	N/A		0.1969	0.1191	35.73
0:40	1.8	0.58	0.29	N/A		0.2941	0.1779	53.38
0:45	1.8	0.58	0.29	N/A		0.2941	0.1779	53.38
0:50	1.5	0.49	0.29	N/A		0.1969	0.1191	35.73
0:55	1.6	0.52	0.29	N/A		0.2293	0.1387	41.61
1:00	1.8	0.58	0.29	N/A		0.2941	0.1779	53.38
1:05	2.2	0.71	0.29	N/A		0.4237	0.2563	76.90
1:10	2.2	0.71	0.29	N/A		0.4237	0.2563	76.90
1:15	2.2	0.71	0.29	N/A		0.4237	0.2563	76.90
1:20	2	0.65	0.29	N/A		0.3589	0.2171	65.14
1:25	2.6	0.84	0.29	N/A		0.5533	0.3347	100.42
1:30	2.7	0.87	0.29	N/A		0.5857	0.3543	106.30
1:35	2.4	0.78	0.29	N/A		0.4885	0.2955	88.66
1:40	2.7	0.87	0.29	N/A		0.5857	0.3543	106.30
1:45	3.3	1.07	0.29	N/A		0.7801	0.4719	141.58
1:50	3.1	1.00	0.29	N/A		0.7153	0.4327	129.82
1:55	2.9	0.94	0.29	N/A		0.6505	0.3935	118.06
2:00	3	0.97	0.29	N/A		0.6829	0.4131	123.94
2:05	3.1	1.00	0.29	N/A		0.7153	0.4327	129.82
2:10	4.2	1.36	0.29	N/A		1.0717	0.6484	194.51
2:15	5	1.62	0.29	N/A		1.3309	0.8052	241.56
2:20	3.5	1.13	0.29	N/A		0.8449	0.5112	153.35
2:25	6.8	2.20	0.29	N/A		1.9141	1.1580	347.41
2:30	7.3	2.37	0.29	N/A		2.0761	1.2560	376.81
2:35	8.2	2.66	0.29	N/A		**2.3677**	**1.4324**	**429.73**
2:40	5.9	1.91	0.29	N/A		1.6225	0.9816	294.48
2:45	2	0.65	0.29	N/A		0.3589	0.2171	65.14
2:50	1.8	0.58	0.29	N/A		0.2941	0.1779	53.38
2:55	1.8	0.58	0.29	N/A		0.2941	0.1779	53.38
3:00	0.6	0.19	0.29	0.17		0.0194	0.0118	3.53
	0	0.00	0.29	0.00		0.0000	0.0000	0.00
	0	0.00	0.29	0.00		0.0000	0.0000	0.00
3:15	0	0.00	0.29	0.00		0.0000	0.0000	0.00
	0	0.00	0.29	0.00		0.0000	0.0000	0.00
	0	0.00	0.29	0.00		0.0000	0.0000	0.00
3:30	0	0.00	0.29	0.00		0.0000	0.0000	0.00
	0	0.00	0.29	0.00		0.0000	0.0000	0.00
	0	0.00	0.29	0.00		0.0000	0.0000	0.00
					Total volume (cf)			**4012.22**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	0.5	0.21	0.29	0.19		0.0209	0.0127	3.80
0:10	0.6	0.25	0.29	0.23		0.0251	0.0152	4.56
0:15	0.6	0.25	0.29	0.23		0.0251	0.0152	4.56
0:20	0.6	0.25	0.29	0.23		0.0251	0.0152	4.56
0:25	0.6	0.25	0.29	0.23		0.0251	0.0152	4.56
0:30	0.7	0.29	0.29	0.26		0.0293	0.0177	5.32
0:35	0.7	0.29	0.29	0.26		0.0293	0.0177	5.32
0:40	0.7	0.29	0.29	0.26		0.0293	0.0177	5.32
0:45	0.7	0.29	0.29	0.26		0.0293	0.0177	5.32
0:50	0.7	0.29	0.29	0.26		0.0293	0.0177	5.32
0:55	0.7	0.29	0.29	0.26		0.0293	0.0177	5.32
1:00	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:05	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:10	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:15	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:20	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:25	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:30	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:35	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:40	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:45	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:50	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
1:55	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
2:00	0.9	0.38	0.29	N/A		0.0878	0.0531	15.94
2:05	0.8	0.34	0.29	N/A		0.0459	0.0278	8.33
2:10	0.9	0.38	0.29	N/A		0.0878	0.0531	15.94
2:15	0.9	0.38	0.29	N/A		0.0878	0.0531	15.94
2:20	0.9	0.38	0.29	N/A		0.0878	0.0531	15.94
2:25	0.9	0.38	0.29	N/A		0.0878	0.0531	15.94
2:30	0.9	0.38	0.29	N/A		0.0878	0.0531	15.94
2:35	0.9	0.38	0.29	N/A		0.0878	0.0531	15.94
2:40	0.9	0.38	0.29	N/A		0.0878	0.0531	15.94
2:45	1	0.42	0.29	N/A		0.1297	0.0785	23.54
2:50	1	0.42	0.29	N/A		0.1297	0.0785	23.54
2:55	1	0.42	0.29	N/A		0.1297	0.0785	23.54
3:00	1	0.42	0.29	N/A		0.1297	0.0785	23.54
3:05	1	0.42	0.29	N/A		0.1297	0.0785	23.54
3:10	1.1	0.46	0.29	N/A		0.1716	0.1038	31.14
3:15	1.1	0.46	0.29	N/A		0.1716	0.1038	31.14
3:20	1.1	0.46	0.29	N/A		0.1716	0.1038	31.14
3:25	1.2	0.50	0.29	N/A		0.2134	0.1291	38.74
3:30	1.3	0.54	0.29	N/A		0.2553	0.1545	46.34
3:35	1.4	0.59	0.29	N/A		0.2972	0.1798	53.94
3:40	1.4	0.59	0.29	N/A		0.2972	0.1798	53.94
3:45	1.5	0.63	0.29	N/A		0.3391	0.2051	61.54
3:50	1.5	0.63	0.29	N/A		0.3391	0.2051	61.54
3:55	1.6	0.67	0.29	N/A		0.3810	0.2305	69.14
4:00	1.6	0.67	0.29	N/A		0.3810	0.2305	69.14
4:05	1.7	0.71	0.29	N/A		0.4228	0.2558	76.75
4:10	1.8	0.75	0.29	N/A		0.4647	0.2812	84.35
4:15	1.9	0.80	0.29	N/A		0.5066	0.3065	91.95

4:20	2	0.84	0.29	N/A	0.5485	0.3318	99.55
4:25	2.1	0.88	0.29	N/A	0.5904	0.3572	107.15
4:30	2.1	0.88	0.29	N/A	0.5904	0.3572	107.15
4:35	2.2	0.92	0.29	N/A	0.6322	0.3825	114.75
4:40	2.3	0.96	0.29	N/A	0.6741	0.4078	122.35
4:45	2.4	1.01	0.29	N/A	0.7160	0.4332	129.95
4:50	2.4	1.01	0.29	N/A	0.7160	0.4332	129.95
4:55	2.5	1.05	0.29	N/A	0.7579	0.4585	137.56
5:00	2.6	1.09	0.29	N/A	0.7998	0.4839	145.16
5:05	3.1	1.30	0.29	N/A	1.0092	0.6105	183.16
5:10	3.6	1.51	0.29	N/A	1.2186	0.7372	221.17
5:15	3.9	1.63	0.29	N/A	1.3442	0.8132	243.97
5:20	4.2	1.76	0.29	N/A	1.4698	0.8893	266.78
5:25	4.7	1.97	0.29	N/A	1.6792	1.0159	304.78
5:30	5.6	2.35	0.29	N/A	**2.0562**	**1.2440**	**373.19**
5:35	1.9	0.80	0.29	N/A	0.5066	0.3065	91.95
5:40	0.9	0.38	0.29	N/A	0.0878	0.0531	15.94
5:45	0.6	0.25	0.29	0.23	0.0251	0.0152	4.56
5:50	0.5	0.21	0.29	0.19	0.0209	0.0127	3.80
5:55	0.3	0.13	0.29	0.11	0.0126	0.0076	2.28
6:00	0.2	0.08	0.29	0.08	0.0084	0.0051	1.52
	0	0.00	0.29	0.00	0.0000	0.0000	0.00
	0	0.00	0.29	0.00	0.0000	0.0000	0.00
6:15	0	0.00	0.29	0.00	0.0000	0.0000	0.00
	0	0.00	0.29	0.00	0.0000	0.0000	0.00
	0	0.00	0.29	0.00	0.0000	0.0000	0.00
6:30	0	0.00	0.29	0.00	0.0000	0.0000	0.00
	0	0.00	0.29	0.00	0.0000	0.0000	0.00
	0	0.00	0.29	0.00	0.0000	0.0000	0.00
6:45	0	0.00	0.29	0.00	0.0000	0.0000	0.00
	0	0.00	0.29	0.00	0.0000	0.0000	0.00
	0	0.00	0.29	0.00	0.0000	0.0000	0.00
7:00	0	0.00	0.29	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**4014.97**

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:15	0.2	0.04	0.51	0.04		0.0042	0.0025	2.29
0:30	0.3	0.06	0.50	0.06		0.0063	0.0038	3.44
0:45	0.3	0.06	0.50	0.06		0.0063	0.0038	3.44
1:00	0.4	0.08	0.49	0.08		0.0084	0.0051	4.58
1:15	0.3	0.06	0.48	0.06		0.0063	0.0038	3.44
1:30	0.3	0.06	0.48	0.06		0.0063	0.0038	3.44
1:45	0.3	0.06	0.47	0.06		0.0063	0.0038	3.44
2:00	0.4	0.08	0.47	0.08		0.0084	0.0051	4.58
2:15	0.4	0.08	0.46	0.08		0.0084	0.0051	4.58
2:30	0.4	0.08	0.46	0.08		0.0084	0.0051	4.58
2:45	0.5	0.11	0.45	0.09		0.0105	0.0064	5.73
3:00	0.5	0.11	0.44	0.09		0.0105	0.0064	5.73
3:15	0.5	0.11	0.44	0.09		0.0105	0.0064	5.73
3:30	0.5	0.11	0.43	0.09		0.0105	0.0064	5.73
3:45	0.5	0.11	0.43	0.09		0.0105	0.0064	5.73
4:00	0.6	0.13	0.42	0.11		0.0126	0.0076	6.87
4:15	0.6	0.13	0.42	0.11		0.0126	0.0076	6.87
4:30	0.7	0.15	0.41	0.13		0.0147	0.0089	8.02
4:45	0.7	0.15	0.41	0.13		0.0147	0.0089	8.02
5:00	0.8	0.17	0.40	0.15		0.0168	0.0102	9.17
5:15	0.6	0.13	0.40	0.11		0.0126	0.0076	6.87
5:30	0.7	0.15	0.39	0.13		0.0147	0.0089	8.02
5:45	0.8	0.17	0.39	0.15		0.0168	0.0102	9.17
6:00	0.8	0.17	0.38	0.15		0.0168	0.0102	9.17
6:15	0.9	0.19	0.38	0.17		0.0189	0.0115	10.31
6:30	0.9	0.19	0.37	0.17		0.0189	0.0115	10.31
6:45	1	0.21	0.37	0.19		0.0210	0.0127	11.46
7:00	1	0.21	0.36	0.19		0.0210	0.0127	11.46
7:15	1	0.21	0.36	0.19		0.0210	0.0127	11.46
7:30	1.1	0.23	0.35	0.21		0.0231	0.0140	12.60
7:45	1.2	0.25	0.35	0.23		0.0252	0.0153	13.75
8:00	1.3	0.27	0.34	0.25		0.0274	0.0165	14.89
8:15	1.5	0.32	0.34	0.28		0.0316	0.0191	17.18
8:30	1.5	0.32	0.33	0.28		0.0316	0.0191	17.18
8:45	1.6	0.34	0.33	0.30		0.0337	0.0204	18.33
9:00	1.7	0.36	0.32	0.32		0.0358	0.0216	19.48
9:15	1.9	0.40	0.32	N/A		0.0817	0.0494	44.49
9:30	2	0.42	0.31	N/A		0.1073	0.0649	58.42
9:45	2.1	0.44	0.31	N/A		0.1328	0.0804	72.32
10:00	2.2	0.46	0.30	N/A		0.1583	0.0958	86.20
10:15	1.5	0.32	0.30	0.28		0.0316	0.0191	17.18
10:30	1.5	0.32	0.30	0.28		0.0316	0.0191	17.18
10:45	2	0.42	0.29	N/A		0.1293	0.0782	70.41
11:00	2	0.42	0.29	N/A		0.1336	0.0808	72.74
11:15	1.9	0.40	0.28	N/A		0.1168	0.0707	63.59
11:30	1.9	0.40	0.28	N/A		0.1210	0.0732	65.87
11:45	1.7	0.36	0.27	N/A		0.0830	0.0502	45.21
12:00	1.8	0.38	0.27	N/A		0.1082	0.0654	58.89
12:15	2.5	0.53	0.27	N/A		0.2595	0.1570	141.29
12:30	2.6	0.55	0.26	N/A		0.2845	0.1721	154.92
12:45	2.8	0.59	0.26	N/A		0.3306	0.2000	179.99

13:00	2.9	0.61	0.25	N/A	0.3555	0.2151	193.57
13:15	3.4	0.72	0.25	N/A	0.4645	0.2811	252.95
13:30	3.4	0.72	0.25	N/A	**0.4684**	0.2834	**255.02**
13:45	2.3	0.48	0.24	N/A	0.2407	0.1456	131.05
14:00	2.3	0.48	0.24	N/A	0.2444	0.1478	133.06
14:15	2.7	0.57	0.24	N/A	0.3322	0.2010	180.88
14:30	2.6	0.55	0.23	N/A	0.3148	0.1904	171.38
14:45	2.6	0.55	0.23	N/A	0.3183	0.1926	173.32
15:00	2.5	0.53	0.23	N/A	0.3008	0.1820	163.77
15:15	2.4	0.50	0.22	N/A	0.2832	0.1713	154.19
15:30	2.3	0.48	0.22	N/A	0.2655	0.1606	144.58
15:45	1.9	0.40	0.22	N/A	0.1847	0.1117	100.57
16:00	1.9	0.40	0.21	N/A	0.1880	0.1137	102.36
16:15	0.4	0.08	0.21	0.08	0.0084	0.0051	4.58
16:30	0.4	0.08	0.21	0.08	0.0084	0.0051	4.58
16:45	0.3	0.06	0.20	0.06	0.0063	0.0038	3.44
17:00	0.3	0.06	0.20	0.06	0.0063	0.0038	3.44
17:15	0.5	0.11	0.20	0.09	0.0105	0.0064	5.73
17:30	0.5	0.11	0.19	0.09	0.0105	0.0064	5.73
17:45	0.5	0.11	0.19	0.09	0.0105	0.0064	5.73
18:00	0.4	0.08	0.19	0.08	0.0084	0.0051	4.58
18:15	0.4	0.08	0.18	0.08	0.0084	0.0051	4.58
18:30	0.4	0.08	0.18	0.08	0.0084	0.0051	4.58
18:45	0.3	0.06	0.18	0.06	0.0063	0.0038	3.44
19:00	0.2	0.04	0.18	0.04	0.0042	0.0025	2.29
19:15	0.3	0.06	0.17	0.06	0.0063	0.0038	3.44
19:30	0.4	0.08	0.17	0.08	0.0084	0.0051	4.58
19:45	0.3	0.06	0.17	0.06	0.0063	0.0038	3.44
20:00	0.2	0.04	0.17	0.04	0.0042	0.0025	2.29
20:15	0.3	0.06	0.17	0.06	0.0063	0.0038	3.44
20:30	0.3	0.06	0.16	0.06	0.0063	0.0038	3.44
20:45	0.3	0.06	0.16	0.06	0.0063	0.0038	3.44
21:00	0.2	0.04	0.16	0.04	0.0042	0.0025	2.29
21:15	0.3	0.06	0.16	0.06	0.0063	0.0038	3.44
21:30	0.2	0.04	0.16	0.04	0.0042	0.0025	2.29
21:45	0.3	0.06	0.15	0.06	0.0063	0.0038	3.44
22:00	0.2	0.04	0.15	0.04	0.0042	0.0025	2.29
22:15	0.3	0.06	0.15	0.06	0.0063	0.0038	3.44
22:30	0.2	0.04	0.15	0.04	0.0042	0.0025	2.29
22:45	0.2	0.04	0.15	0.04	0.0042	0.0025	2.29
23:00	0.2	0.04	0.15	0.04	0.0042	0.0025	2.29
23:15	0.2	0.04	0.15	0.04	0.0042	0.0025	2.29
23:30	0.2	0.04	0.15	0.04	0.0042	0.0025	2.29
23:45	0.2	0.04	0.14	0.04	0.0042	0.0025	2.29
24:00	0.2	0.04	0.14	0.04	0.0042	0.0025	2.29
	0	0.00	0.14	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**3722.41**

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**
T6

Drainage Area (ac.)	**1.4500**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74	(AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**5**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.71	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2**	(also used for drywell percolation rate)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **24000** s.f. **Bot. =** **3700** **s.f.** **Max. Depth (d)=** **5** **Max. storage=** **61872.29** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol^3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Loss Rate Min.	Value	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:05	3.7	0.8569	0.7067	N/A		0.1502	0.2196	65.89	0.00	0.00	0.00	0.00	0.00	65.89	3700.00	51.39	14.50	0.00	0.00	0.00
0:10	4.8	1.1117	0.7067	N/A		0.4050	0.5921	177.63	0.00	0.00	0.00	0.00	0.00	177.63	3704.76	51.45	140.68	0.01	0.00	0.00
0:15	5.1	1.1812	0.7067	N/A		0.4745	0.6937	208.11	0.00	0.00	0.00	0.00	0.00	208.11	3746.16	52.03	296.76	0.02	0.00	0.00
0:20	4.9	1.1348	0.7067	N/A		0.4281	0.6260	187.79	0.00	0.00	0.00	0.00	0.00	187.79	3797.37	52.74	431.81	0.03	0.00	0.00
0:25	6.6	1.5286	0.7067	N/A		0.8219	1.2016	360.49	0.00	0.00	0.00	0.00	0.00	360.49	3841.68	53.36	738.94	0.06	0.00	0.00
0:30	7.3	1.6907	0.7067	N/A		0.9840	1.4387	431.60	0.00	0.00	0.00	0.00	0.00	431.60	3942.44	54.76	1115.79	0.09	0.00	0.00
0:35	8.4	1.9454	0.7067	N/A		1.2387	1.8111	543.34	0.00	0.00	0.00	0.00	0.00	543.34	4066.08	56.47	1602.66	0.13	0.00	0.00
0:40	9	2.0844	0.7067	N/A		1.3777	2.0143	604.29	0.00	0.00	0.00	0.00	0.00	604.29	4225.82	58.69	2148.26	0.17	0.00	0.00
0:45	12.3	2.8487	0.7067	N/A		2.1420	3.1318	939.53	0.00	0.00	0.00	0.00	0.00	939.53	4404.83	61.18	3026.60	0.24	0.00	0.00
0:50	17.6	4.0762	0.7067	N/A		**3.3695**	**4.9264**	**1477.93**	0.00	0.00	0.00	0.00	0.00	1477.93	4693.01	65.18	4439.35	0.36	0.00	0.00
0:55	16.1	3.7288	0.7067	N/A		3.0221	4.4185	1325.55	0.00	0.00	0.00	0.00	0.00	1325.55	5156.53	71.62	5693.29	0.46	0.00	0.00
1:00	4.2	0.9727	0.7067	N/A		0.2660	0.3889	116.68	0.00	0.00	0.00	0.00	0.00	116.68	5567.94	77.33	**5732.64**	**0.46**	0.00	0.00
	0	0.0000	0.7067	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5580.85	77.51	5655.12	0.46	0.00	0.00
	0	0.0000	0.7067	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5555.42	77.16	5577.97	0.45	0.00	0.00
1:15	0	0.0000	0.7067	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5530.10	76.81	5501.16	0.44	0.00	0.00
					Total volume (cf)			**6438.84**										**Total Overflow (cf)**	**0.00**	

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:05	1.3	0.42	0.71	0.38	0.0421	0.0616	18.47		0.00	0.00	0.00	0.00	0.00	18.47	3700.00	18.47	0.00	0.00	0.00	0.00
0:10	1.3	0.42	0.71	0.38	0.0421	0.0616	18.47		0.00	0.00	0.00	0.00	0.00	18.47	3700.00	18.47	0.00	0.00	0.00	0.00
0:15	1.1	0.36	0.71	0.32	0.0356	0.0521	15.63		0.00	0.00	0.00	0.00	0.00	15.63	3700.00	15.63	0.00	0.00	0.00	0.00
0:20	1.5	0.49	0.71	0.44	0.0486	0.0711	21.32		0.00	0.00	0.00	0.00	0.00	21.32	3700.00	21.32	0.00	0.00	0.00	0.00
0:25	1.5	0.49	0.71	0.44	0.0486	0.0711	21.32		0.00	0.00	0.00	0.00	0.00	21.32	3700.00	21.32	0.00	0.00	0.00	0.00
0:30	1.8	0.58	0.71	0.52	0.0583	0.0853	25.58		0.00	0.00	0.00	0.00	0.00	25.58	3700.00	25.58	0.00	0.00	0.00	0.00
0:35	1.5	0.49	0.71	0.44	0.0486	0.0711	21.32		0.00	0.00	0.00	0.00	0.00	21.32	3700.00	21.32	0.00	0.00	0.00	0.00
0:40	1.8	0.58	0.71	0.52	0.0583	0.0853	25.58		0.00	0.00	0.00	0.00	0.00	25.58	3700.00	25.58	0.00	0.00	0.00	0.00
0:45	1.8	0.58	0.71	0.52	0.0583	0.0853	25.58		0.00	0.00	0.00	0.00	0.00	25.58	3700.00	25.58	0.00	0.00	0.00	0.00
0:50	1.5	0.49	0.71	0.44	0.0486	0.0711	21.32		0.00	0.00	0.00	0.00	0.00	21.32	3700.00	21.32	0.00	0.00	0.00	0.00
0:55	1.6	0.52	0.71	0.47	0.0518	0.0758	22.74		0.00	0.00	0.00	0.00	0.00	22.74	3700.00	22.74	0.00	0.00	0.00	0.00
1:00	1.8	0.58	0.71	0.52	0.0583	0.0853	25.58		0.00	0.00	0.00	0.00	0.00	25.58	3700.00	25.58	0.00	0.00	0.00	0.00
1:05	2.2	0.71	0.71	0.64	0.0713	0.1042	31.27		0.00	0.00	0.00	0.00	0.00	31.27	3700.00	31.27	0.00	0.00	0.00	0.00
1:10	2.2	0.71	0.71	0.64	0.0713	0.1042	31.27		0.00	0.00	0.00	0.00	0.00	31.27	3700.00	31.27	0.00	0.00	0.00	0.00
1:15	2.2	0.71	0.71	0.64	0.0713	0.1042	31.27		0.00	0.00	0.00	0.00	0.00	31.27	3700.00	31.27	0.00	0.00	0.00	0.00
1:20	2	0.65	0.71	0.58	0.0648	0.0947	28.42		0.00	0.00	0.00	0.00	0.00	28.42	3700.00	28.42	0.00	0.00	0.00	0.00
1:25	2.6	0.84	0.71	N/A	0.1357	0.1984	59.52		0.00	0.00	0.00	0.00	0.00	59.52	3700.00	51.39	8.13	0.00	0.00	0.00
1:30	2.7	0.87	0.71	N/A	0.1681	0.2458	73.73		0.00	0.00	0.00	0.00	0.00	73.73	3702.67	51.43	30.44	0.00	0.00	0.00
1:35	2.4	0.78	0.71	0.70	0.0778	0.1137	34.11		0.00	0.00	0.00	0.00	0.00	34.11	3709.99	51.53	13.02	0.00	0.00	0.00
1:40	2.7	0.87	0.71	N/A	0.1681	0.2458	73.73		0.00	0.00	0.00	0.00	0.00	73.73	3704.27	51.45	35.30	0.00	0.00	0.00
1:45	3.3	1.07	0.71	N/A	0.3625	0.5300	159.00		0.00	0.00	0.00	0.00	0.00	159.00	3711.58	51.55	142.76	0.01	0.00	0.00
1:50	3.1	1.00	0.71	N/A	0.2977	0.4353	130.58		0.00	0.00	0.00	0.00	0.00	130.58	3746.84	52.04	221.30	0.02	0.00	0.00
1:55	2.9	0.94	0.71	N/A	0.2329	0.3405	102.16		0.00	0.00	0.00	0.00	0.00	102.16	3772.61	52.40	271.05	0.02	0.00	0.00
2:00	3	0.97	0.71	N/A	0.2653	0.3879	116.37		0.00	0.00	0.00	0.00	0.00	116.37	3788.93	52.62	334.80	0.03	0.00	0.00
2:05	3.1	1.00	0.71	N/A	0.2977	0.4353	130.58		0.00	0.00	0.00	0.00	0.00	130.58	3809.85	52.91	412.46	0.03	0.00	0.00
2:10	4.2	1.36	0.71	N/A	0.6541	0.9563	286.90		0.00	0.00	0.00	0.00	0.00	286.90	3835.33	53.27	646.10	0.05	0.00	0.00
2:15	5	1.62	0.71	N/A	0.9133	1.3353	400.60		0.00	0.00	0.00	0.00	0.00	400.60	3911.98	54.33	992.36	0.08	0.00	0.00
2:20	3.5	1.13	0.71	N/A	0.4273	0.6247	187.42		0.00	0.00	0.00	0.00	0.00	187.42	4025.59	55.91	1123.87	0.09	0.00	0.00
2:25	6.8	2.20	0.71	N/A	1.4965	2.1880	656.40		0.00	0.00	0.00	0.00	0.00	656.40	4068.74	56.51	1723.77	0.14	0.00	0.00
2:30	7.3	2.37	0.71	N/A	1.6585	2.4249	727.46		0.00	0.00	0.00	0.00	0.00	727.46	4265.56	59.24	2391.98	0.19	0.00	0.00
2:35	8.2	2.66	0.71	N/A	**1.9501**	**2.8512**	**855.36**		0.00	0.00	0.00	0.00	0.00	855.36	4484.80	62.29	3185.06	0.26	0.00	0.00
2:40	5.9	1.91	0.71	N/A	1.2049	1.7617	528.50		0.00	0.00	0.00	0.00	0.00	528.50	4745.00	65.90	**3647.65**	**0.29**	0.00	0.00
2:45	2	0.65	0.71	0.58	0.0648	0.0947	28.42		0.00	0.00	0.00	0.00	0.00	28.42	4896.78	68.01	3608.06	0.29	0.00	0.00
2:50	1.8	0.58	0.71	0.52	0.0583	0.0853	25.58		0.00	0.00	0.00	0.00	0.00	25.58	4883.79	67.83	3565.81	0.29	0.00	0.00
2:55	1.8	0.58	0.71	0.52	0.0583	0.0853	25.58		0.00	0.00	0.00	0.00	0.00	25.58	4869.93	67.64	3523.76	0.28	0.00	0.00
3:00	0.6	0.19	0.71	0.17	0.0194	0.0284	8.53		0.00	0.00	0.00	0.00	0.00	8.53	4856.13	67.45	3464.84	0.28	0.00	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	4836.80	67.18	3397.66	0.27	0.00	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	4814.76	66.87	3330.79	0.27	0.00	0.00
3:15	0	0.00	0.71	0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	4792.82	66.57	3264.22	0.26	0.00	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	4770.98	66.26	3197.96	0.26	0.00	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	4749.23	65.96	3132.00	0.25	0.00	0.00
3:30	0	0.00	0.71	0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	4727.59	65.66	3066.33	0.25	0.00	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	4706.05	65.36	3000.97	0.24	0.00	0.00
	0	0.00	0.71	0.00	0.0000	0.0000	0.00		0.00	0.00	0.00	0.00	0.00	0.00	4684.60	65.06	2935.91	0.24	0.00	0.00
					Total volume (cf)		**4995.67**									**Total Overflow (cf)**			**0.00**	

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:05	0.5	0.21	0.71	0.19	0.0209	0.0306	9.18	0.00	0.00	0.00	0.00	0.00	9.18	3700.00	9.18	0.00	0.00	0.00	0.00
0:10	0.6	0.25	0.71	0.23	0.0251	0.0367	11.02	0.00	0.00	0.00	0.00	0.00	11.02	3700.00	11.02	0.00	0.00	0.00	0.00
0:15	0.6	0.25	0.71	0.23	0.0251	0.0367	11.02	0.00	0.00	0.00	0.00	0.00	11.02	3700.00	11.02	0.00	0.00	0.00	0.00
0:20	0.6	0.25	0.71	0.23	0.0251	0.0367	11.02	0.00	0.00	0.00	0.00	0.00	11.02	3700.00	11.02	0.00	0.00	0.00	0.00
0:25	0.6	0.25	0.71	0.23	0.0251	0.0367	11.02	0.00	0.00	0.00	0.00	0.00	11.02	3700.00	11.02	0.00	0.00	0.00	0.00
0:30	0.7	0.29	0.71	0.26	0.0293	0.0429	12.86	0.00	0.00	0.00	0.00	0.00	12.86	3700.00	12.86	0.00	0.00	0.00	0.00
0:35	0.7	0.29	0.71	0.26	0.0293	0.0429	12.86	0.00	0.00	0.00	0.00	0.00	12.86	3700.00	12.86	0.00	0.00	0.00	0.00
0:40	0.7	0.29	0.71	0.26	0.0293	0.0429	12.86	0.00	0.00	0.00	0.00	0.00	12.86	3700.00	12.86	0.00	0.00	0.00	0.00
0:45	0.7	0.29	0.71	0.26	0.0293	0.0429	12.86	0.00	0.00	0.00	0.00	0.00	12.86	3700.00	12.86	0.00	0.00	0.00	0.00
0:50	0.7	0.29	0.71	0.26	0.0293	0.0429	12.86	0.00	0.00	0.00	0.00	0.00	12.86	3700.00	12.86	0.00	0.00	0.00	0.00
0:55	0.7	0.29	0.71	0.26	0.0293	0.0429	12.86	0.00	0.00	0.00	0.00	0.00	12.86	3700.00	12.86	0.00	0.00	0.00	0.00
1:00	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:05	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:10	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:15	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:20	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:25	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:30	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:35	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:40	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:45	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:50	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
1:55	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
2:00	0.9	0.38	0.71	0.34	0.0377	0.0551	16.53	0.00	0.00	0.00	0.00	0.00	16.53	3700.00	16.53	0.00	0.00	0.00	0.00
2:05	0.8	0.34	0.71	0.30	0.0335	0.0490	14.70	0.00	0.00	0.00	0.00	0.00	14.70	3700.00	14.70	0.00	0.00	0.00	0.00
2:10	0.9	0.38	0.71	0.34	0.0377	0.0551	16.53	0.00	0.00	0.00	0.00	0.00	16.53	3700.00	16.53	0.00	0.00	0.00	0.00
2:15	0.9	0.38	0.71	0.34	0.0377	0.0551	16.53	0.00	0.00	0.00	0.00	0.00	16.53	3700.00	16.53	0.00	0.00	0.00	0.00
2:20	0.9	0.38	0.71	0.34	0.0377	0.0551	16.53	0.00	0.00	0.00	0.00	0.00	16.53	3700.00	16.53	0.00	0.00	0.00	0.00
2:25	0.9	0.38	0.71	0.34	0.0377	0.0551	16.53	0.00	0.00	0.00	0.00	0.00	16.53	3700.00	16.53	0.00	0.00	0.00	0.00
2:30	0.9	0.38	0.71	0.34	0.0377	0.0551	16.53	0.00	0.00	0.00	0.00	0.00	16.53	3700.00	16.53	0.00	0.00	0.00	0.00
2:35	0.9	0.38	0.71	0.34	0.0377	0.0551	16.53	0.00	0.00	0.00	0.00	0.00	16.53	3700.00	16.53	0.00	0.00	0.00	0.00
2:40	0.9	0.38	0.71	0.34	0.0377	0.0551	16.53	0.00	0.00	0.00	0.00	0.00	16.53	3700.00	16.53	0.00	0.00	0.00	0.00
2:45	1	0.42	0.71	0.38	0.0419	0.0612	18.37	0.00	0.00	0.00	0.00	0.00	18.37	3700.00	18.37	0.00	0.00	0.00	0.00
2:50	1	0.42	0.71	0.38	0.0419	0.0612	18.37	0.00	0.00	0.00	0.00	0.00	18.37	3700.00	18.37	0.00	0.00	0.00	0.00
2:55	1	0.42	0.71	0.38	0.0419	0.0612	18.37	0.00	0.00	0.00	0.00	0.00	18.37	3700.00	18.37	0.00	0.00	0.00	0.00
3:00	1	0.42	0.71	0.38	0.0419	0.0612	18.37	0.00	0.00	0.00	0.00	0.00	18.37	3700.00	18.37	0.00	0.00	0.00	0.00
3:05	1	0.42	0.71	0.38	0.0419	0.0612	18.37	0.00	0.00	0.00	0.00	0.00	18.37	3700.00	18.37	0.00	0.00	0.00	0.00
3:10	1.1	0.46	0.71	0.41	0.0461	0.0674	20.21	0.00	0.00	0.00	0.00	0.00	20.21	3700.00	20.21	0.00	0.00	0.00	0.00
3:15	1.1	0.46	0.71	0.41	0.0461	0.0674	20.21	0.00	0.00	0.00	0.00	0.00	20.21	3700.00	20.21	0.00	0.00	0.00	0.00
3:20	1.1	0.46	0.71	0.41	0.0461	0.0674	20.21	0.00	0.00	0.00	0.00	0.00	20.21	3700.00	20.21	0.00	0.00	0.00	0.00
3:25	1.2	0.50	0.71	0.45	0.0503	0.0735	22.04	0.00	0.00	0.00	0.00	0.00	22.04	3700.00	22.04	0.00	0.00	0.00	0.00
3:30	1.3	0.54	0.71	0.49	0.0544	0.0796	23.88	0.00	0.00	0.00	0.00	0.00	23.88	3700.00	23.88	0.00	0.00	0.00	0.00
3:35	1.4	0.59	0.71	0.53	0.0586	0.0857	25.72	0.00	0.00	0.00	0.00	0.00	25.72	3700.00	25.72	0.00	0.00	0.00	0.00
3:40	1.4	0.59	0.71	0.53	0.0586	0.0857	25.72	0.00	0.00	0.00	0.00	0.00	25.72	3700.00	25.72	0.00	0.00	0.00	0.00
3:45	1.5	0.63	0.71	0.57	0.0628	0.0918	27.55	0.00	0.00	0.00	0.00	0.00	27.55	3700.00	27.55	0.00	0.00	0.00	0.00
3:50	1.5	0.63	0.71	0.57	0.0628	0.0918	27.55	0.00	0.00	0.00	0.00	0.00	27.55	3700.00	27.55	0.00	0.00	0.00	0.00
3:55	1.6	0.67	0.71	0.60	0.0670	0.0980	29.39	0.00	0.00	0.00	0.00	0.00	29.39	3700.00	29.39	0.00	0.00	0.00	0.00
4:00	1.6	0.67	0.71	0.60	0.0670	0.0980	29.39	0.00	0.00	0.00	0.00	0.00	29.39	3700.00	29.39	0.00	0.00	0.00	0.00
4:05	1.7	0.71	0.71	0.64	0.0712	0.1041	31.23	0.00	0.00	0.00	0.00	0.00	31.23	3700.00	31.23	0.00	0.00	0.00	0.00
4:10	1.8	0.75	0.71	0.68	0.0754	0.1102	33.07	0.00	0.00	0.00	0.00	0.00	33.07	3700.00	33.07	0.00	0.00	0.00	0.00
4:15	1.9	0.80	0.71	N/A	0.0890	0.1302	39.05	0.00	0.00	0.00	0.00	0.00	39.05	3700.00	39.05	0.00	0.00	0.00	0.00

4:20	2	0.84	0.71	N/A		0.1309	0.1914	57.42	0.00	0.00	0.00	0.00	0.00	57.42	3700.00	51.39	6.03	0.00	0.00	0.00
4:25	2.1	0.88	0.71	N/A		0.1728	0.2526	75.79	0.00	0.00	0.00	0.00	0.00	75.79	3701.98	51.42	30.40	0.00	0.00	0.00
4:30	2.1	0.88	0.71	N/A		0.1728	0.2526	75.79	0.00	0.00	0.00	0.00	0.00	75.79	3709.97	51.53	54.65	0.00	0.00	0.00
4:35	2.2	0.92	0.71	N/A		0.2147	0.3139	94.16	0.00	0.00	0.00	0.00	0.00	94.16	3717.93	51.64	97.17	0.01	0.00	0.00
4:40	2.3	0.96	0.71	N/A		0.2565	0.3751	112.52	0.00	0.00	0.00	0.00	0.00	112.52	3731.88	51.83	157.87	0.01	0.00	0.00
4:45	2.4	1.01	0.71	N/A		0.2984	0.4363	130.89	0.00	0.00	0.00	0.00	0.00	130.89	3751.79	52.11	236.65	0.02	0.00	0.00
4:50	2.4	1.01	0.71	N/A		0.2984	0.4363	130.89	0.00	0.00	0.00	0.00	0.00	130.89	3777.64	52.47	315.08	0.03	0.00	0.00
4:55	2.5	1.05	0.71	N/A		0.3403	0.4975	149.26	0.00	0.00	0.00	0.00	0.00	149.26	3803.38	52.82	411.52	0.03	0.00	0.00
5:00	2.6	1.09	0.71	N/A		0.3822	0.5588	167.63	0.00	0.00	0.00	0.00	0.00	167.63	3835.02	53.26	525.89	0.04	0.00	0.00
5:05	3.1	1.30	0.71	N/A		0.5916	0.8649	259.48	0.00	0.00	0.00	0.00	0.00	259.48	3872.54	53.79	731.58	0.06	0.00	0.00
5:10	3.6	1.51	0.71	N/A		0.8010	1.1711	351.33	0.00	0.00	0.00	0.00	0.00	351.33	3940.03	54.72	1028.19	0.08	0.00	0.00
5:15	3.9	1.63	0.71	N/A		0.9266	1.3548	406.44	0.00	0.00	0.00	0.00	0.00	406.44	4037.34	56.07	1378.56	0.11	0.00	0.00
5:20	4.2	1.76	0.71	N/A		1.0523	1.5385	461.55	0.00	0.00	0.00	0.00	0.00	461.55	4152.30	57.67	1782.43	0.14	0.00	0.00
5:25	4.7	1.97	0.71	N/A		1.2617	1.8447	553.40	0.00	0.00	0.00	0.00	0.00	553.40	4284.81	59.51	2276.32	0.18	0.00	0.00
5:30	5.6	2.35	0.71	N/A		**1.6386**	**2.3957**	**718.72**	0.00	0.00	0.00	0.00	0.00	718.72	4446.85	61.76	2933.28	0.24	0.00	0.00
5:35	1.9	0.80	0.71	N/A		0.0890	0.1302	39.05	0.00	0.00	0.00	0.00	0.00	39.05	4662.39	64.76	**2907.57**	**0.23**	0.00	0.00
5:40	0.9	0.38	0.71	0.34		0.0377	0.0551	16.53	0.00	0.00	0.00	0.00	0.00	16.53	4653.96	64.64	2859.46	0.23	0.00	0.00
5:45	0.6	0.25	0.71	0.23		0.0251	0.0367	11.02	0.00	0.00	0.00	0.00	0.00	11.02	4638.18	64.42	2806.07	0.23	0.00	0.00
5:50	0.5	0.21	0.71	0.19		0.0209	0.0306	9.18	0.00	0.00	0.00	0.00	0.00	9.18	4620.66	64.18	2751.07	0.22	0.00	0.00
5:55	0.3	0.13	0.71	0.11		0.0126	0.0184	5.51	0.00	0.00	0.00	0.00	0.00	5.51	4602.61	63.93	2692.66	0.22	0.00	0.00
6:00	0.2	0.08	0.71	0.08		0.0084	0.0122	3.67	0.00	0.00	0.00	0.00	0.00	3.67	4583.45	63.66	2632.67	0.21	0.00	0.00
	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4563.77	63.39	2569.29	0.21	0.00	0.00
	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4542.97	63.10	2506.19	0.20	0.00	0.00
6:15	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4522.27	62.81	2443.38	0.20	0.00	0.00
	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4501.66	62.52	2380.86	0.19	0.00	0.00
	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4481.15	62.24	2318.62	0.19	0.00	0.00
6:30	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4460.73	61.95	2256.67	0.18	0.00	0.00
	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4440.40	61.67	2194.99	0.18	0.00	0.00
	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4420.17	61.39	2133.60	0.17	0.00	0.00
6:45	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4400.03	61.11	2072.49	0.17	0.00	0.00
	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4379.97	60.83	2011.66	0.16	0.00	0.00
	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4360.02	60.56	1951.10	0.16	0.00	0.00
7:00	0	0.00	0.71	0.00		0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4340.15	60.28	1890.82	0.15	0.00	0.00
					Total volume (cf)			**4751.03**									**Total Overflow (cf)**		**0.00**	

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft)	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	0.2	0.04	1.24	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
0:30	0.3	0.06	1.23	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
0:45	0.3	0.06	1.21	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
1:00	0.4	0.08	1.20	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
1:15	0.3	0.06	1.18	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
1:30	0.3	0.06	1.17	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
1:45	0.3	0.06	1.16	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
2:00	0.4	0.08	1.14	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
2:15	0.4	0.08	1.13	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
2:30	0.4	0.08	1.11	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
2:45	0.5	0.11	1.10	0.09	0.0105	0.0154	13.84	0.00	0.00	0.00	0.00	0.00	13.84	3700.00	13.84	0.00	0.00	0.00	0.00
3:00	0.5	0.11	1.09	0.09	0.0105	0.0154	13.84	0.00	0.00	0.00	0.00	0.00	13.84	3700.00	13.84	0.00	0.00	0.00	0.00
3:15	0.5	0.11	1.07	0.09	0.0105	0.0154	13.84	0.00	0.00	0.00	0.00	0.00	13.84	3700.00	13.84	0.00	0.00	0.00	0.00
3:30	0.5	0.11	1.06	0.09	0.0105	0.0154	13.84	0.00	0.00	0.00	0.00	0.00	13.84	3700.00	13.84	0.00	0.00	0.00	0.00
3:45	0.5	0.11	1.05	0.09	0.0105	0.0154	13.84	0.00	0.00	0.00	0.00	0.00	13.84	3700.00	13.84	0.00	0.00	0.00	0.00
4:00	0.6	0.13	1.03	0.11	0.0126	0.0185	16.61	0.00	0.00	0.00	0.00	0.00	16.61	3700.00	16.61	0.00	0.00	0.00	0.00
4:15	0.6	0.13	1.02	0.11	0.0126	0.0185	16.61	0.00	0.00	0.00	0.00	0.00	16.61	3700.00	16.61	0.00	0.00	0.00	0.00
4:30	0.7	0.15	1.01	0.13	0.0147	0.0215	19.38	0.00	0.00	0.00	0.00	0.00	19.38	3700.00	19.38	0.00	0.00	0.00	0.00
4:45	0.7	0.15	0.99	0.13	0.0147	0.0215	19.38	0.00	0.00	0.00	0.00	0.00	19.38	3700.00	19.38	0.00	0.00	0.00	0.00
5:00	0.8	0.17	0.98	0.15	0.0168	0.0246	22.15	0.00	0.00	0.00	0.00	0.00	22.15	3700.00	22.15	0.00	0.00	0.00	0.00
5:15	0.6	0.13	0.97	0.11	0.0126	0.0185	16.61	0.00	0.00	0.00	0.00	0.00	16.61	3700.00	16.61	0.00	0.00	0.00	0.00
5:30	0.7	0.15	0.96	0.13	0.0147	0.0215	19.38	0.00	0.00	0.00	0.00	0.00	19.38	3700.00	19.38	0.00	0.00	0.00	0.00
5:45	0.8	0.17	0.94	0.15	0.0168	0.0246	22.15	0.00	0.00	0.00	0.00	0.00	22.15	3700.00	22.15	0.00	0.00	0.00	0.00
6:00	0.8	0.17	0.93	0.15	0.0168	0.0246	22.15	0.00	0.00	0.00	0.00	0.00	22.15	3700.00	22.15	0.00	0.00	0.00	0.00
6:15	0.9	0.19	0.92	0.17	0.0189	0.0277	24.92	0.00	0.00	0.00	0.00	0.00	24.92	3700.00	24.92	0.00	0.00	0.00	0.00
6:30	0.9	0.19	0.91	0.17	0.0189	0.0277	24.92	0.00	0.00	0.00	0.00	0.00	24.92	3700.00	24.92	0.00	0.00	0.00	0.00
6:45	1	0.21	0.89	0.19	0.0210	0.0308	27.69	0.00	0.00	0.00	0.00	0.00	27.69	3700.00	27.69	0.00	0.00	0.00	0.00
7:00	1	0.21	0.88	0.19	0.0210	0.0308	27.69	0.00	0.00	0.00	0.00	0.00	27.69	3700.00	27.69	0.00	0.00	0.00	0.00
7:15	1	0.21	0.87	0.19	0.0210	0.0308	27.69	0.00	0.00	0.00	0.00	0.00	27.69	3700.00	27.69	0.00	0.00	0.00	0.00
7:30	1.1	0.23	0.86	0.21	0.0231	0.0338	30.45	0.00	0.00	0.00	0.00	0.00	30.45	3700.00	30.45	0.00	0.00	0.00	0.00
7:45	1.2	0.25	0.85	0.23	0.0252	0.0369	33.22	0.00	0.00	0.00	0.00	0.00	33.22	3700.00	33.22	0.00	0.00	0.00	0.00
8:00	1.3	0.27	0.83	0.25	0.0274	0.0400	35.99	0.00	0.00	0.00	0.00	0.00	35.99	3700.00	35.99	0.00	0.00	0.00	0.00
8:15	1.5	0.32	0.82	0.28	0.0316	0.0461	41.53	0.00	0.00	0.00	0.00	0.00	41.53	3700.00	41.53	0.00	0.00	0.00	0.00
8:30	1.5	0.32	0.81	0.28	0.0316	0.0461	41.53	0.00	0.00	0.00	0.00	0.00	41.53	3700.00	41.53	0.00	0.00	0.00	0.00
8:45	1.6	0.34	0.80	0.30	0.0337	0.0492	44.30	0.00	0.00	0.00	0.00	0.00	44.30	3700.00	44.30	0.00	0.00	0.00	0.00
9:00	1.7	0.36	0.79	0.32	0.0358	0.0523	47.07	0.00	0.00	0.00	0.00	0.00	47.07	3700.00	47.07	0.00	0.00	0.00	0.00
9:15	1.9	0.40	0.78	0.36	0.0400	0.0584	52.60	0.00	0.00	0.00	0.00	0.00	52.60	3700.00	52.60	0.00	0.00	0.00	0.00
9:30	2	0.42	0.77	0.38	0.0421	0.0615	55.37	0.00	0.00	0.00	0.00	0.00	55.37	3700.00	55.37	0.00	0.00	0.00	0.00
9:45	2.1	0.44	0.76	0.40	0.0442	0.0646	58.14	0.00	0.00	0.00	0.00	0.00	58.14	3700.00	58.14	0.00	0.00	0.00	0.00
10:00	2.2	0.46	0.74	0.42	0.0463	0.0677	60.91	0.00	0.00	0.00	0.00	0.00	60.91	3700.00	60.91	0.00	0.00	0.00	0.00
10:15	1.5	0.32	0.73	0.28	0.0316	0.0461	41.53	0.00	0.00	0.00	0.00	0.00	41.53	3700.00	41.53	0.00	0.00	0.00	0.00
10:30	1.5	0.32	0.72	0.28	0.0316	0.0461	41.53	0.00	0.00	0.00	0.00	0.00	41.53	3700.00	41.53	0.00	0.00	0.00	0.00
10:45	2	0.42	0.71	0.38	0.0421	0.0615	55.37	0.00	0.00	0.00	0.00	0.00	55.37	3700.00	55.37	0.00	0.00	0.00	0.00
11:00	2	0.42	0.70	0.38	0.0421	0.0615	55.37	0.00	0.00	0.00	0.00	0.00	55.37	3700.00	55.37	0.00	0.00	0.00	0.00
11:15	1.9	0.40	0.69	0.36	0.0400	0.0584	52.60	0.00	0.00	0.00	0.00	0.00	52.60	3700.00	52.60	0.00	0.00	0.00	0.00
11:30	1.9	0.40	0.68	0.36	0.0400	0.0584	52.60	0.00	0.00	0.00	0.00	0.00	52.60	3700.00	52.60	0.00	0.00	0.00	0.00
11:45	1.7	0.36	0.67	0.32	0.0358	0.0523	47.07	0.00	0.00	0.00	0.00	0.00	47.07	3700.00	47.07	0.00	0.00	0.00	0.00
12:00	1.8	0.38	0.66	0.34	0.0379	0.0554	49.83	0.00	0.00	0.00	0.00	0.00	49.83	3700.00	49.83	0.00	0.00	0.00	0.00
12:15	2.5	0.53	0.65	0.47	0.0526	0.0769	69.22	0.00	0.00	0.00	0.00	0.00	69.22	3700.00	69.22	0.00	0.00	0.00	0.00
12:30	2.6	0.55	0.64	0.49	0.0547	0.0800	71.98	0.00	0.00	0.00	0.00	0.00	71.98	3700.00	71.98	0.00	0.00	0.00	0.00
12:45	2.8	0.59	0.63	0.53	0.0589	0.0861	77.52	0.00	0.00	0.00	0.00	0.00	77.52	3700.00	77.52	0.00	0.00	0.00	0.00

13:00	2.9	0.61	0.62	0.55	0.0610	0.0892	80.29	0.00	0.00	0.00	0.00	0.00	80.29	3700.00	80.29	0.00	0.00	0.00	0.00
13:15	3.4	0.72	0.61	N/A	0.1023	0.1496	134.61	0.00	0.00	0.00	0.00	0.00	134.61	3700.00	134.61	0.00	0.00	0.00	0.00
13:30	3.4	0.72	0.60	N/A	**0.1116**	0.1632	**146.85**	0.00	0.00	0.00	0.00	0.00	146.85	3700.00	146.85	0.00	0.00	0.00	0.00
13:45	2.3	0.48	0.59	0.44	0.0484	0.0708	63.68	0.00	0.00	0.00	0.00	0.00	63.68	3700.00	63.68	0.00	0.00	0.00	0.00
14:00	2.3	0.48	0.59	0.44	0.0484	0.0708	63.68	0.00	0.00	0.00	0.00	0.00	63.68	3700.00	63.68	0.00	0.00	0.00	0.00
14:15	2.7	0.57	0.58	0.51	0.0568	0.0831	74.75	0.00	0.00	0.00	0.00	0.00	74.75	3700.00	74.75	0.00	0.00	0.00	0.00
14:30	2.6	0.55	0.57	0.49	0.0547	0.0800	71.98	0.00	0.00	0.00	0.00	0.00	71.98	3700.00	71.98	0.00	0.00	0.00	0.00
14:45	2.6	0.55	0.56	0.49	0.0547	0.0800	71.98	0.00	0.00	0.00	0.00	0.00	71.98	3700.00	71.98	0.00	0.00	0.00	0.00
15:00	2.5	0.53	0.55	0.47	0.0526	0.0769	69.22	0.00	0.00	0.00	0.00	0.00	69.22	3700.00	69.22	0.00	0.00	0.00	0.00
15:15	2.4	0.50	0.54	0.45	0.0505	0.0738	66.45	0.00	0.00	0.00	0.00	0.00	66.45	3700.00	66.45	0.00	0.00	0.00	0.00
15:30	2.3	0.48	0.53	0.44	0.0484	0.0708	63.68	0.00	0.00	0.00	0.00	0.00	63.68	3700.00	63.68	0.00	0.00	0.00	0.00
15:45	1.9	0.40	0.53	0.36	0.0400	0.0584	52.60	0.00	0.00	0.00	0.00	0.00	52.60	3700.00	52.60	0.00	0.00	0.00	0.00
16:00	1.9	0.40	0.52	0.36	0.0400	0.0584	52.60	0.00	0.00	0.00	0.00	0.00	52.60	3700.00	52.60	0.00	0.00	0.00	0.00
16:15	0.4	0.08	0.51	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
16:30	0.4	0.08	0.50	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
16:45	0.3	0.06	0.49	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
17:00	0.3	0.06	0.49	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
17:15	0.5	0.11	0.48	0.09	0.0105	0.0154	13.84	0.00	0.00	0.00	0.00	0.00	13.84	3700.00	13.84	0.00	0.00	0.00	0.00
17:30	0.5	0.11	0.47	0.09	0.0105	0.0154	13.84	0.00	0.00	0.00	0.00	0.00	13.84	3700.00	13.84	0.00	0.00	0.00	0.00
17:45	0.5	0.11	0.47	0.09	0.0105	0.0154	13.84	0.00	0.00	0.00	0.00	0.00	13.84	3700.00	13.84	0.00	0.00	0.00	0.00
18:00	0.4	0.08	0.46	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
18:15	0.4	0.08	0.45	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
18:30	0.4	0.08	0.45	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
18:45	0.3	0.06	0.44	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
19:00	0.2	0.04	0.43	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
19:15	0.3	0.06	0.43	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
19:30	0.4	0.08	0.42	0.08	0.0084	0.0123	11.07	0.00	0.00	0.00	0.00	0.00	11.07	3700.00	11.07	0.00	0.00	0.00	0.00
19:45	0.3	0.06	0.41	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
20:00	0.2	0.04	0.41	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
20:15	0.3	0.06	0.40	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
20:30	0.3	0.06	0.40	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
20:45	0.3	0.06	0.39	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
21:00	0.2	0.04	0.39	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
21:15	0.3	0.06	0.38	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
21:30	0.2	0.04	0.38	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
21:45	0.3	0.06	0.38	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
22:00	0.2	0.04	0.37	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
22:15	0.3	0.06	0.37	0.06	0.0063	0.0092	8.31	0.00	0.00	0.00	0.00	0.00	8.31	3700.00	8.31	0.00	0.00	0.00	0.00
22:30	0.2	0.04	0.37	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
22:45	0.2	0.04	0.36	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
23:00	0.2	0.04	0.36	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
23:15	0.2	0.04	0.36	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
23:30	0.2	0.04	0.36	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
23:45	0.2	0.04	0.35	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
24:00	0.2	0.04	0.35	0.04	0.0042	0.0062	5.54	0.00	0.00	0.00	0.00	0.00	5.54	3700.00	5.54	0.00	0.00	0.00	0.00
	0	0.00	0.35	0.00	0.0000	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Total volume (cf)		**2861.79**								**Total Overflow (cf)**				**0.00**

HYDROLOGY CALCULATIONS -

Using the RCFC&WCD Short Cut Unit Hydrograph Method
Area Designations **Date Palm Apartments**
OFF2

Drainage Area (ac.)	**0.2100**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.93**	**2.70**	**3.49**	**5.26**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74 (AMC II)				
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**55.5**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.37 (used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))				
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2** (also used for drywell percolation rate)				

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell design factors **Upper sec. (ft.)=** **0.0001** **Lower sec. (ft.)=** **0.0001** **Ring diam. (ft.) =** **0.0001** **Drywell lower max. (cf)=** **0.00** **Upper max.(cf)=** **0.00**
Gravel bed width around drwyell= **0** **Drywell total(cf)=** **0.00**

Ret. Basin design (area, depth) **Top =** **0.0001** s.f. **Bot. =** **0.0001** **s.f.** **Max. Depth (d)=** **0.0001** **Max. storage=** **0.00** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol^3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	3.7	0.8569	0.3704	N/A	0.4866	0.1030	30.91
0:10	4.8	1.1117	0.3704	N/A	0.7413	0.1570	47.09
0:15	5.1	1.1812	0.3704	N/A	0.8108	0.1717	51.51
0:20	4.9	1.1348	0.3704	N/A	0.7645	0.1619	48.56
0:25	6.6	1.5286	0.3704	N/A	1.1582	0.2452	73.57
0:30	7.3	1.6907	0.3704	N/A	1.3203	0.2796	83.87
0:35	8.4	1.9454	0.3704	N/A	1.5751	0.3335	100.06
0:40	9	2.0844	0.3704	N/A	1.7140	0.3629	108.88
0:45	12.3	2.8487	0.3704	N/A	2.4783	0.5248	157.43
0:50	17.6	4.0762	0.3704	N/A	**3.7058**	**0.7847**	**235.41**
0:55	16.1	3.7288	0.3704	N/A	3.3584	0.7111	213.34
1:00	4.2	0.9727	0.3704	N/A	0.6024	0.1275	38.26
	0	0.0000	0.3704	0.00	0.0000	0.0000	0.00
	0	0.0000	0.3704	0.00	0.0000	0.0000	0.00
1:15	0	0.0000	0.3704	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**1188.91**

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	1.3	0.42	0.37	N/A		0.0508	0.0108	3.23
0:10	1.3	0.42	0.37	N/A		0.0508	0.0108	3.23
0:15	1.1	0.36	0.37		0.32	0.0356	0.0075	2.26
0:20	1.5	0.49	0.37	N/A		0.1156	0.0245	7.35
0:25	1.5	0.49	0.37	N/A		0.1156	0.0245	7.35
0:30	1.8	0.58	0.37	N/A		0.2128	0.0451	13.52
0:35	1.5	0.49	0.37	N/A		0.1156	0.0245	7.35
0:40	1.8	0.58	0.37	N/A		0.2128	0.0451	13.52
0:45	1.8	0.58	0.37	N/A		0.2128	0.0451	13.52
0:50	1.5	0.49	0.37	N/A		0.1156	0.0245	7.35
0:55	1.6	0.52	0.37	N/A		0.1480	0.0313	9.40
1:00	1.8	0.58	0.37	N/A		0.2128	0.0451	13.52
1:05	2.2	0.71	0.37	N/A		0.3424	0.0725	21.75
1:10	2.2	0.71	0.37	N/A		0.3424	0.0725	21.75
1:15	2.2	0.71	0.37	N/A		0.3424	0.0725	21.75
1:20	2	0.65	0.37	N/A		0.2776	0.0588	17.64
1:25	2.6	0.84	0.37	N/A		0.4720	0.1000	29.99
1:30	2.7	0.87	0.37	N/A		0.5044	0.1068	32.04
1:35	2.4	0.78	0.37	N/A		0.4072	0.0862	25.87
1:40	2.7	0.87	0.37	N/A		0.5044	0.1068	32.04
1:45	3.3	1.07	0.37	N/A		0.6988	0.1480	44.39
1:50	3.1	1.00	0.37	N/A		0.6340	0.1343	40.28
1:55	2.9	0.94	0.37	N/A		0.5692	0.1205	36.16
2:00	3	0.97	0.37	N/A		0.6016	0.1274	38.22
2:05	3.1	1.00	0.37	N/A		0.6340	0.1343	40.28
2:10	4.2	1.36	0.37	N/A		0.9904	0.2097	62.92
2:15	5	1.62	0.37	N/A		1.2496	0.2646	79.38
2:20	3.5	1.13	0.37	N/A		0.7636	0.1617	48.51
2:25	6.8	2.20	0.37	N/A		1.8328	0.3881	116.43
2:30	7.3	2.37	0.37	N/A		1.9948	0.4224	126.72
2:35	8.2	2.66	0.37	N/A		**2.2864**	**0.4842**	**145.25**
2:40	5.9	1.91	0.37	N/A		1.5412	0.3264	97.91
2:45	2	0.65	0.37	N/A		0.2776	0.0588	17.64
2:50	1.8	0.58	0.37	N/A		0.2128	0.0451	13.52
2:55	1.8	0.58	0.37	N/A		0.2128	0.0451	13.52
3:00	0.6	0.19	0.37		0.17	0.0194	0.0041	1.23
	0	0.00	0.37		0.00	0.0000	0.0000	0.00
	0	0.00	0.37		0.00	0.0000	0.0000	0.00
3:15	0	0.00	0.37		0.00	0.0000	0.0000	0.00
	0	0.00	0.37		0.00	0.0000	0.0000	0.00
	0	0.00	0.37		0.00	0.0000	0.0000	0.00
3:30	0	0.00	0.37		0.00	0.0000	0.0000	0.00
	0	0.00	0.37		0.00	0.0000	0.0000	0.00
	0	0.00	0.37		0.00	0.0000	0.0000	0.00
						Total volume (cf)		**1226.78**

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:05	0.5	0.21	0.37	0.19	0.0209	0.0044	1.33
0:10	0.6	0.25	0.37	0.23	0.0251	0.0053	1.60
0:15	0.6	0.25	0.37	0.23	0.0251	0.0053	1.60
0:20	0.6	0.25	0.37	0.23	0.0251	0.0053	1.60
0:25	0.6	0.25	0.37	0.23	0.0251	0.0053	1.60
0:30	0.7	0.29	0.37	0.26	0.0293	0.0062	1.86
0:35	0.7	0.29	0.37	0.26	0.0293	0.0062	1.86
0:40	0.7	0.29	0.37	0.26	0.0293	0.0062	1.86
0:45	0.7	0.29	0.37	0.26	0.0293	0.0062	1.86
0:50	0.7	0.29	0.37	0.26	0.0293	0.0062	1.86
0:55	0.7	0.29	0.37	0.26	0.0293	0.0062	1.86
1:00	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:05	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:10	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:15	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:20	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:25	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:30	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:35	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:40	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:45	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:50	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
1:55	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
2:00	0.9	0.38	0.37	0.34	0.0377	0.0080	2.39
2:05	0.8	0.34	0.37	0.30	0.0335	0.0071	2.13
2:10	0.9	0.38	0.37	0.34	0.0377	0.0080	2.39
2:15	0.9	0.38	0.37	0.34	0.0377	0.0080	2.39
2:20	0.9	0.38	0.37	0.34	0.0377	0.0080	2.39
2:25	0.9	0.38	0.37	0.34	0.0377	0.0080	2.39
2:30	0.9	0.38	0.37	0.34	0.0377	0.0080	2.39
2:35	0.9	0.38	0.37	0.34	0.0377	0.0080	2.39
2:40	0.9	0.38	0.37	0.34	0.0377	0.0080	2.39
2:45	1	0.42	0.37	N/A	0.0484	0.0103	3.08
2:50	1	0.42	0.37	N/A	0.0484	0.0103	3.08
2:55	1	0.42	0.37	N/A	0.0484	0.0103	3.08
3:00	1	0.42	0.37	N/A	0.0484	0.0103	3.08
3:05	1	0.42	0.37	N/A	0.0484	0.0103	3.08
3:10	1.1	0.46	0.37	N/A	0.0903	0.0191	5.74
3:15	1.1	0.46	0.37	N/A	0.0903	0.0191	5.74
3:20	1.1	0.46	0.37	N/A	0.0903	0.0191	5.74
3:25	1.2	0.50	0.37	N/A	0.1322	0.0280	8.40
3:30	1.3	0.54	0.37	N/A	0.1741	0.0369	11.06
3:35	1.4	0.59	0.37	N/A	0.2160	0.0457	13.72
3:40	1.4	0.59	0.37	N/A	0.2160	0.0457	13.72
3:45	1.5	0.63	0.37	N/A	0.2578	0.0546	16.38
3:50	1.5	0.63	0.37	N/A	0.2578	0.0546	16.38
3:55	1.6	0.67	0.37	N/A	0.2997	0.0635	19.04
4:00	1.6	0.67	0.37	N/A	0.2997	0.0635	19.04
4:05	1.7	0.71	0.37	N/A	0.3416	0.0723	21.70
4:10	1.8	0.75	0.37	N/A	0.3835	0.0812	24.36
4:15	1.9	0.80	0.37	N/A	0.4254	0.0901	27.02

4:20	2	0.84	0.37	N/A	0.4672	0.0989	29.68
4:25	2.1	0.88	0.37	N/A	0.5091	0.1078	32.34
4:30	2.1	0.88	0.37	N/A	0.5091	0.1078	32.34
4:35	2.2	0.92	0.37	N/A	0.5510	0.1167	35.00
4:40	2.3	0.96	0.37	N/A	0.5929	0.1255	37.66
4:45	2.4	1.01	0.37	N/A	0.6348	0.1344	40.32
4:50	2.4	1.01	0.37	N/A	0.6348	0.1344	40.32
4:55	2.5	1.05	0.37	N/A	0.6766	0.1433	42.98
5:00	2.6	1.09	0.37	N/A	0.7185	0.1521	45.64
5:05	3.1	1.30	0.37	N/A	0.9279	0.1965	58.95
5:10	3.6	1.51	0.37	N/A	1.1373	0.2408	72.25
5:15	3.9	1.63	0.37	N/A	1.2630	0.2674	80.23
5:20	4.2	1.76	0.37	N/A	1.3886	0.2940	88.21
5:25	4.7	1.97	0.37	N/A	1.5980	0.3384	101.51
5:30	5.6	2.35	0.37	N/A	**1.9749**	**0.4182**	**125.46**
5:35	1.9	0.80	0.37	N/A	0.4254	0.0901	27.02
5:40	0.9	0.38	0.37	0.34	0.0377	0.0080	2.39
5:45	0.6	0.25	0.37	0.23	0.0251	0.0053	1.60
5:50	0.5	0.21	0.37	0.19	0.0209	0.0044	1.33
5:55	0.3	0.13	0.37	0.11	0.0126	0.0027	0.80
6:00	0.2	0.08	0.37	0.08	0.0084	0.0018	0.53
	0	0.00	0.37	0.00	0.0000	0.0000	0.00
	0	0.00	0.37	0.00	0.0000	0.0000	0.00
6:15	0	0.00	0.37	0.00	0.0000	0.0000	0.00
	0	0.00	0.37	0.00	0.0000	0.0000	0.00
	0	0.00	0.37	0.00	0.0000	0.0000	0.00
6:30	0	0.00	0.37	0.00	0.0000	0.0000	0.00
	0	0.00	0.37	0.00	0.0000	0.0000	0.00
	0	0.00	0.37	0.00	0.0000	0.0000	0.00
6:45	0	0.00	0.37	0.00	0.0000	0.0000	0.00
	0	0.00	0.37	0.00	0.0000	0.0000	0.00
	0	0.00	0.37	0.00	0.0000	0.0000	0.00
7:00	0	0.00	0.37	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**1185.68**

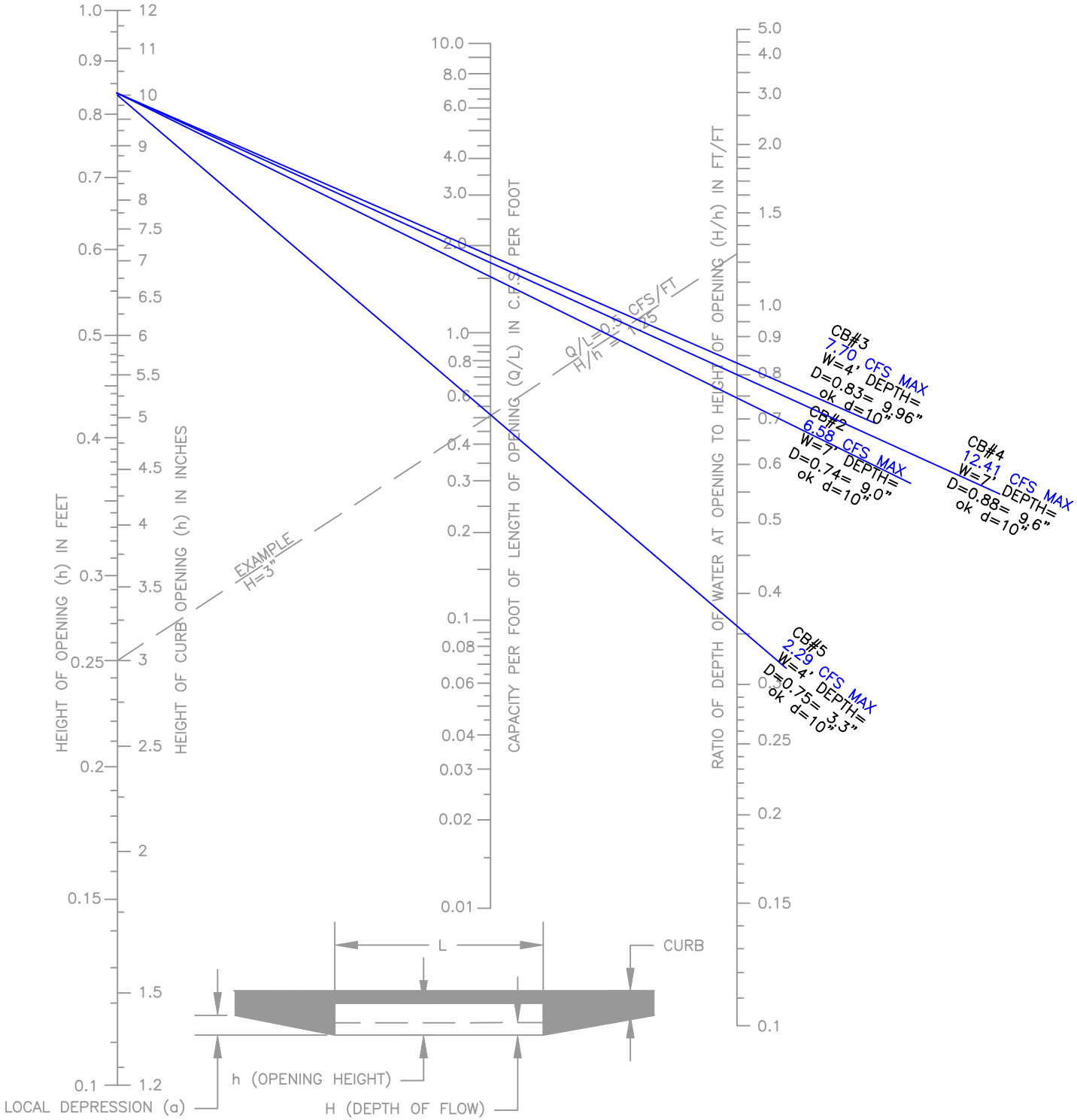
24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)
0:15	0.2	0.04	0.65	0.04		0.0042	0.0009	0.80
0:30	0.3	0.06	0.64	0.06		0.0063	0.0013	1.20
0:45	0.3	0.06	0.64	0.06		0.0063	0.0013	1.20
1:00	0.4	0.08	0.63	0.08		0.0084	0.0018	1.60
1:15	0.3	0.06	0.62	0.06		0.0063	0.0013	1.20
1:30	0.3	0.06	0.61	0.06		0.0063	0.0013	1.20
1:45	0.3	0.06	0.61	0.06		0.0063	0.0013	1.20
2:00	0.4	0.08	0.60	0.08		0.0084	0.0018	1.60
2:15	0.4	0.08	0.59	0.08		0.0084	0.0018	1.60
2:30	0.4	0.08	0.58	0.08		0.0084	0.0018	1.60
2:45	0.5	0.11	0.58	0.09		0.0105	0.0022	2.00
3:00	0.5	0.11	0.57	0.09		0.0105	0.0022	2.00
3:15	0.5	0.11	0.56	0.09		0.0105	0.0022	2.00
3:30	0.5	0.11	0.56	0.09		0.0105	0.0022	2.00
3:45	0.5	0.11	0.55	0.09		0.0105	0.0022	2.00
4:00	0.6	0.13	0.54	0.11		0.0126	0.0027	2.41
4:15	0.6	0.13	0.53	0.11		0.0126	0.0027	2.41
4:30	0.7	0.15	0.53	0.13		0.0147	0.0031	2.81
4:45	0.7	0.15	0.52	0.13		0.0147	0.0031	2.81
5:00	0.8	0.17	0.51	0.15		0.0168	0.0036	3.21
5:15	0.6	0.13	0.51	0.11		0.0126	0.0027	2.41
5:30	0.7	0.15	0.50	0.13		0.0147	0.0031	2.81
5:45	0.8	0.17	0.49	0.15		0.0168	0.0036	3.21
6:00	0.8	0.17	0.49	0.15		0.0168	0.0036	3.21
6:15	0.9	0.19	0.48	0.17		0.0189	0.0040	3.61
6:30	0.9	0.19	0.47	0.17		0.0189	0.0040	3.61
6:45	1	0.21	0.47	0.19		0.0210	0.0045	4.01
7:00	1	0.21	0.46	0.19		0.0210	0.0045	4.01
7:15	1	0.21	0.46	0.19		0.0210	0.0045	4.01
7:30	1.1	0.23	0.45	0.21		0.0231	0.0049	4.41
7:45	1.2	0.25	0.44	0.23		0.0252	0.0053	4.81
8:00	1.3	0.27	0.44	0.25		0.0274	0.0058	5.21
8:15	1.5	0.32	0.43	0.28		0.0316	0.0067	6.01
8:30	1.5	0.32	0.43	0.28		0.0316	0.0067	6.01
8:45	1.6	0.34	0.42	0.30		0.0337	0.0071	6.42
9:00	1.7	0.36	0.41	0.32		0.0358	0.0076	6.82
9:15	1.9	0.40	0.41	0.36		0.0400	0.0085	7.62
9:30	2	0.42	0.40	0.38		0.0421	0.0089	8.02
9:45	2.1	0.44	0.40	N/A		0.0460	0.0097	8.76
10:00	2.2	0.46	0.39	N/A		0.0727	0.0154	13.86
10:15	1.5	0.32	0.38	0.28		0.0316	0.0067	6.01
10:30	1.5	0.32	0.38	0.28		0.0316	0.0067	6.01
10:45	2	0.42	0.37	N/A		0.0474	0.0100	9.03
11:00	2	0.42	0.37	N/A		0.0529	0.0112	10.08
11:15	1.9	0.40	0.36	0.36		0.0400	0.0085	7.62
11:30	1.9	0.40	0.36	N/A		0.0426	0.0090	8.12
11:45	1.7	0.36	0.35	0.32		0.0358	0.0076	6.82
12:00	1.8	0.38	0.35	0.34		0.0379	0.0080	7.22
12:15	2.5	0.53	0.34	N/A		0.1846	0.0391	35.18
12:30	2.6	0.55	0.34	N/A		0.2107	0.0446	40.16
12:45	2.8	0.59	0.33	N/A		0.2579	0.0546	49.15

13:00	2.9	0.61	0.33	N/A	0.2839	0.0601	54.11
13:15	3.4	0.72	0.32	N/A	0.3941	0.0834	75.10
13:30	3.4	0.72	0.32	N/A	**0.3989**	0.0845	**76.03**
13:45	2.3	0.48	0.31	N/A	0.1723	0.0365	32.84
14:00	2.3	0.48	0.31	N/A	0.1771	0.0375	33.74
14:15	2.7	0.57	0.30	N/A	0.2659	0.0563	50.67
14:30	2.6	0.55	0.30	N/A	0.2495	0.0528	47.54
14:45	2.6	0.55	0.29	N/A	0.2540	0.0538	48.41
15:00	2.5	0.53	0.29	N/A	0.2375	0.0503	45.26
15:15	2.4	0.50	0.28	N/A	0.2208	0.0468	42.09
15:30	2.3	0.48	0.28	N/A	0.2042	0.0432	38.91
15:45	1.9	0.40	0.28	N/A	0.1243	0.0263	23.68
16:00	1.9	0.40	0.27	N/A	0.1285	0.0272	24.48
16:15	0.4	0.08	0.27	0.08	0.0084	0.0018	1.60
16:30	0.4	0.08	0.26	0.08	0.0084	0.0018	1.60
16:45	0.3	0.06	0.26	0.06	0.0063	0.0013	1.20
17:00	0.3	0.06	0.26	0.06	0.0063	0.0013	1.20
17:15	0.5	0.11	0.25	0.09	0.0105	0.0022	2.00
17:30	0.5	0.11	0.25	0.09	0.0105	0.0022	2.00
17:45	0.5	0.11	0.24	0.09	0.0105	0.0022	2.00
18:00	0.4	0.08	0.24	0.08	0.0084	0.0018	1.60
18:15	0.4	0.08	0.24	0.08	0.0084	0.0018	1.60
18:30	0.4	0.08	0.23	0.08	0.0084	0.0018	1.60
18:45	0.3	0.06	0.23	0.06	0.0063	0.0013	1.20
19:00	0.2	0.04	0.23	0.04	0.0042	0.0009	0.80
19:15	0.3	0.06	0.22	0.06	0.0063	0.0013	1.20
19:30	0.4	0.08	0.22	0.08	0.0084	0.0018	1.60
19:45	0.3	0.06	0.22	0.06	0.0063	0.0013	1.20
20:00	0.2	0.04	0.21	0.04	0.0042	0.0009	0.80
20:15	0.3	0.06	0.21	0.06	0.0063	0.0013	1.20
20:30	0.3	0.06	0.21	0.06	0.0063	0.0013	1.20
20:45	0.3	0.06	0.21	0.06	0.0063	0.0013	1.20
21:00	0.2	0.04	0.20	0.04	0.0042	0.0009	0.80
21:15	0.3	0.06	0.20	0.06	0.0063	0.0013	1.20
21:30	0.2	0.04	0.20	0.04	0.0042	0.0009	0.80
21:45	0.3	0.06	0.20	0.06	0.0063	0.0013	1.20
22:00	0.2	0.04	0.20	0.04	0.0042	0.0009	0.80
22:15	0.3	0.06	0.19	0.06	0.0063	0.0013	1.20
22:30	0.2	0.04	0.19	0.04	0.0042	0.0009	0.80
22:45	0.2	0.04	0.19	0.04	0.0042	0.0009	0.80
23:00	0.2	0.04	0.19	0.04	0.0042	0.0009	0.80
23:15	0.2	0.04	0.19	0.04	0.0042	0.0009	0.80
23:30	0.2	0.04	0.19	0.04	0.0042	0.0009	0.80
23:45	0.2	0.04	0.19	0.04	0.0042	0.0009	0.80
24:00	0.2	0.04	0.19	0.04	0.0042	0.0009	0.80
	0	0.00	0.19	0.00	0.0000	0.0000	0.00
					Total volume (cf)		**962.47**

CATCH BASIN SIZING

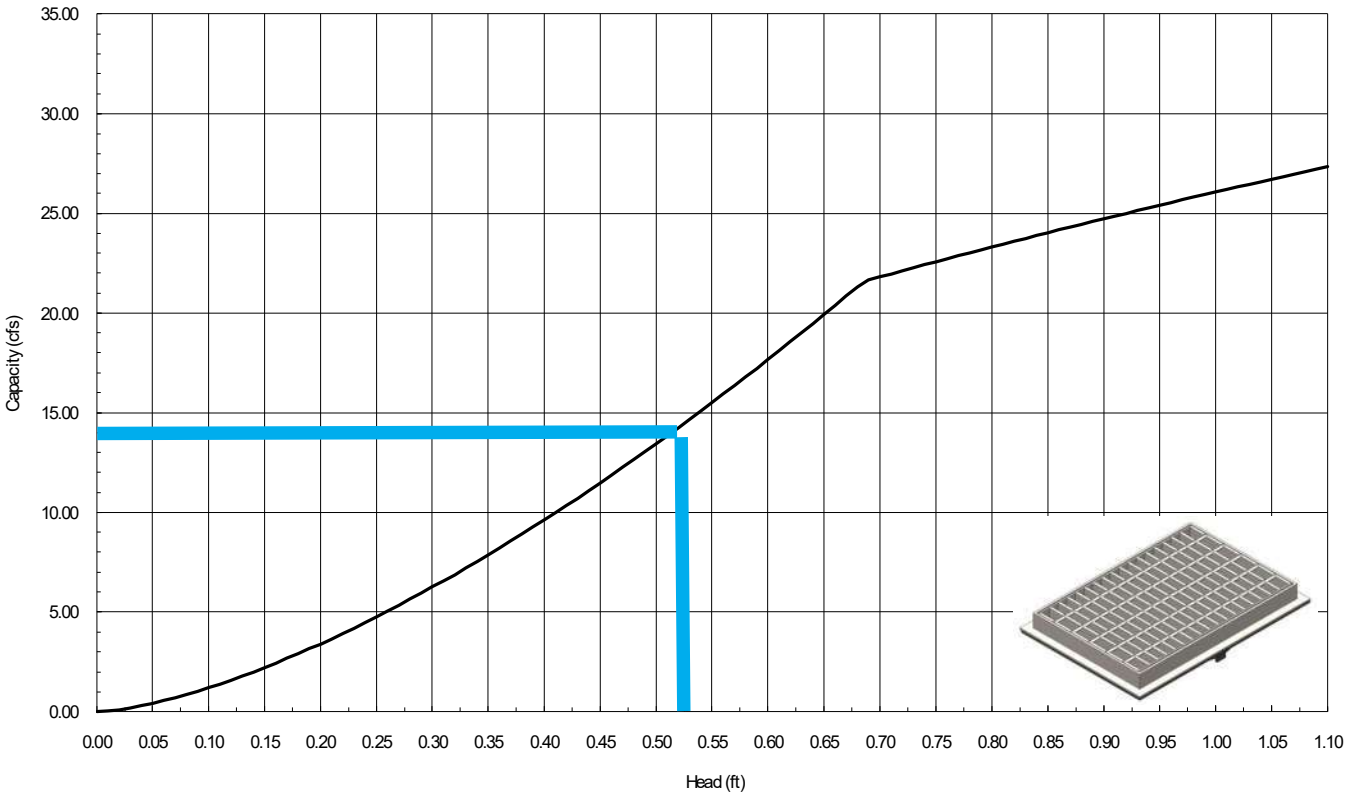
1073.03



BASED ON THE BUREAU OF PUBLIC ROADS
DIVISION TWO , WASH., D.C.

NOMOGRAPH FOR CAPACITY OF CURB
OPENING INLETS AT LOW POINTS

Nyloplast 2' x 3' Steel Bar / MAG Grate Inlet Capacity Chart



Nyloplast
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WQMP WORKSHEETS

Whitewater Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

Company Name	Christiansen & Company	Date	10/11/2023
Designed by	Keith Christiansen	County/City Case No	
Company Project Number/Name	Date Palm Apartments		
Drainage Area Number/Name	DMA1		

Enter the Area Tributary to this Feature A_T = 10.48 acres

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.63

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$

C = 0.43

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = 0.40 \times C$

V_u = 0.17 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 6,467 ft^3

Notes:

Infiltration Basin - Design Procedure (Rev. 06-2014)	BMP ID: Ret 1	Legend:	Required Entries / Calculated Cells

Company Name: Christiansen & Company — Date:

Designed by: Keith A. Christiansen — County/City Case No.:

Design Volume

a) Tributary Drainage Area (BMP subarea)	A_{TRIB} =	10.48	acres
b) Enter V_{BMP} determined from Section 4.3 of this Handbook	V_{BMP} =	6,467	ft^3

Maximum Depth

a) Infiltration rate	I =	2	in/hr
b) Factor of Safety (See Table 1, Appendix B: "Infiltration Testing" from this BMP Handbook)	FS =	3	
c) Calculate D_1 $D_1 = \frac{I\ (in/hr) \times 48\ hrs}{12\ (in/ft) \times FS}$	D_1 =	2.7	ft
d) Enter the depth of freeboard (at least 1 ft)		1	ft
e) Enter depth to historic high ground water (measured from **top** of basin)		50	ft
f) Enter depth to top of bedrock or impermeable layer (measured from **top** of basin)		10	ft
g) D_2 is the smaller of: Depth to groundwater - (10 ft + freeboard) and Depth to impermeable layer - (5 ft + freeboard)	D_2 =	4.0	ft
h) D_{MAX} is the smaller value of D_1 and D_2 but shall not exceed 5 feet	D_{MAX} =	2.7	ft

Basin Geometry

a) Basin side slopes (no steeper than 4:1)	z =	4	:1
b) Proposed basin depth (excluding freeboard)	d_B =	2.5	ft
c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$)	A_S =	2587	ft^2
d) Proposed Design Surface Area	A_D =	45000	ft^2

Forebay

a) Forebay volume (minimum 0.5% V_{BMP})	Volume =	32	ft^3
b) Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =	1	ft
c) Forebay surface area (minimum)	Area =	32	ft^2
d) Full height notch-type weir	Width (W) =	12.0	in

Notes:

INFILTRATION TEST

Sladden Engineering

45090 Golf Center Parkway, Suite F, Indio, CA. 92201 (760) 863-0713 Fax (760) 863-0847
6782 Stanton Avenue, Suite C, Buena Park, CA. 90621 (714) 523-0952 Fax (714) 523-1369
450 Egan Avenue, Beaumont, CA. 92223 (951) 845-7743 Fax (951) 845-8863
www.SladdenEngineering.com

October 10, 2023

Project No. 544-23272
23-10-496

Coachella Valley Community Development Group
36101 Bob Hope Drive, Suite E5
Rancho Mirage, California 92270

Project: Proposed Apartment Complex
APN 670-110-043
30260 Date Palm Drive
Palm Springs, California

Subject: Percolation/Infiltration Testing for On-Site Stormwater Management

In accordance with your request, we have performed percolation testing on the subject site to evaluate the infiltration potential of the near surface soil to assist in storm water management system design. It is our understanding that on-site stormwater retention including infiltration is planned for the proposed project.

Percolation testing was performed within two (2) shallow test holes excavated on the site. Testing was performed at depths of approximately 10 & 5 feet below existing grade for P-1 & P-2, respectively. The approximate locations of the test holes are presented on the attached Test Location Plan (Figure 2). Testing was performed by placing water within the test bores and recording the drop in the water surface with time. Testing was performed in general accordance with the *United States Bureau of Reclamation (BOR) Procedure 7300-89 (1999).* Test results are summarized in the following table.

PERCOLATION TEST RESULTS

Test No.	Depth (Ft)	USCS	Percolation Rate (in/hr)	Infiltration Rate (in/hr)
P-1	10.00	SM	99.00	14.40
P-2	5.00	SM	109.50	17.01

The percolation rates determined represent the ultimate field rates that do not include a safety factor. The corresponding infiltration rates were calculated using the Porchet Method. An appropriate safety factor should be incorporated into design.

Groundwater was not encountered within our exploratory boreholes. Based upon our review of groundwater levels within the vicinity of the site[1], it is our opinion that groundwater should not be a controlling factor in stormwater retention/infiltration system design.

If you have any questions regarding this memo or the referenced reports, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

James W. Minor III
Senior Geologist

Copies: PDF/Addressee

[1] California Department of Water Resources, 2023, Water Data Library; available at: http://wdl.water.ca.gov/waterdatalibrary/

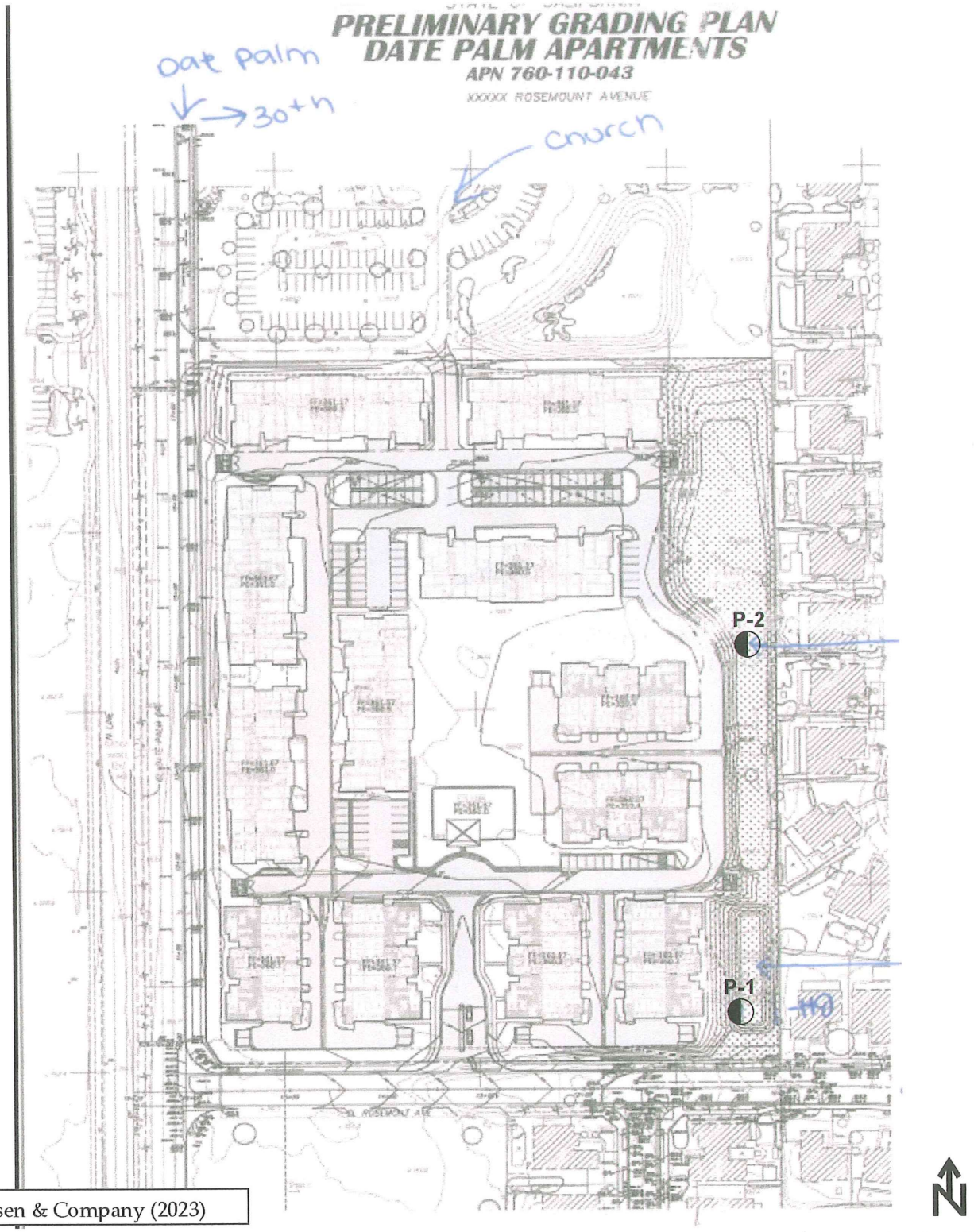
SITE LOCATION MAP
TEST LOCATION PLAN

USGS (2018)

	SITE LOCATION MAP		FIGURE
Sladden Engineering	Project Number:	544-23272	1
	Report Number:	23-10-496	
	Date:	October 10, 2023	

EXPLANATION OF MAP SYMBOLS

P-2 Percolation/ Infiltration Test Location



Christansen & Company (2023)

TEST LOCATION PLAN

FIGURE 2

Project Number:	544-23272
Report Number:	23-10-496
Date:	October 10, 2023

Sladden Engineering

BORELOGS

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	8/31/2023
Elevation:	370 Ft (MSL)	Boring No:	P-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0–8		Silty Sand (SM); yellowish brown, dry, fine-grained.
							8–10		Silty Sand/Sandy Silt (SM/ML); yellowish brown, dry, , fine-grained.
							10		Terminated at ~ 10.0 Feet bgs. No Bedrock encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.

Completion Notes:

PROPOSED APARTMENT COMPLEX
30260 DATE PALM DRIVE, CATHEDRAL CITY

Project No: 544-23272
Report No: 23-10-496

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	8/31/2023
Elevation:	370 Ft (MSL)	Boring No:	P-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); yellowish brown, dry, fine-grained.
							4		
							6		Terminated at ~ 5.0 Feet bgs. No Bedrock encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED APARTMENT COMPLEX
30260 DATE PALM DRIVE, CATHEDRAL CITY

Project No: 544-23272
Report No: 23-10-496

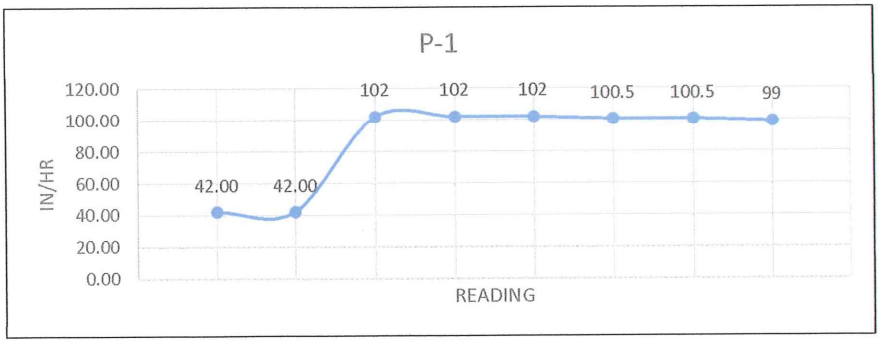
STORMWATER TESTING DATA SHEETS

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	30260 Date Palm Drive, Cathedral City	Depth (ft):	10.00
Job No. :	544-23272	USCS Soil Class:	SM
Date:	9/13/13	Sandy Soil:	R.F.
Test Hole #:	P-1	Tested By:	R.F.

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	10.00	20	2.50	17 4/8	42.00
B	25.00	10.00	20	2.50	17 4/8	42.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	10.00	10.00	20	3.00	17	102
2	10.00	10.00	20	3.00	17	102
3	10.00	10.00	20	3.00	17	102
4	10.00	10.00	20	3.25	16 6/8	100.5
5	10.00	10.00	20	3.25	16 6/8	100.5
6	10.00	10.00	20	3.50	16 4/8	99



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	10.00
D_f =	116.50
r =	4.00
D_0 =	100
D_t =	120.00
H_0 =	20
H_f =	3.5
ΔH =	16.50
H_{avg} =	11.75

Δt (minutes)
D_f (Final Depth to water)
r (hole radius in inches)
D_0 (Initial Depth to water)
D_t (Total Depth of test hole)
H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

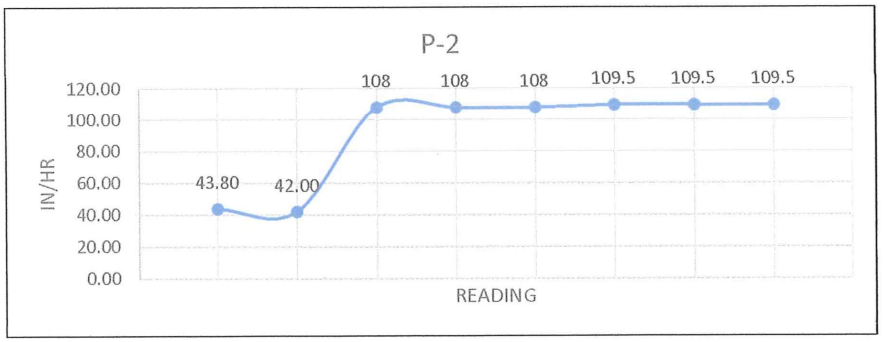
Field Rate: 99 in/hr
Infiltration Rate: 14.40 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	30260 Date Palm Drive, Cathedral City	Depth (ft):	5.00
Job No. :	544-23272	USCS Soil Class:	SM
Date:	9/13/13	Sandy Soil:	R.F.
Test Hole #:	P-2	Tested By:	R.F.

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	5.00	20	1.75	18 2/8	43.80
B	25.00	5.00	20	2.50	17 4/8	42.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	10.00	5.00	20	2.00	18	108
2	10.00	5.00	20	2.00	18	108
3	10.00	5.00	20	2.00	18	108
4	10.00	5.00	20	1.75	18 2/8	109.5
5	10.00	5.00	20	1.75	18 2/8	109.5
6	10.00	5.00	20	1.75	18 2/8	109.5



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	10.00
D_f =	58.25
r =	4.00
D_0 =	40
D_t =	60.00
H_0 =	20
H_f =	1.75
ΔH =	18.25
H_{avg} =	10.88

Δt (minutes)

D_f (Final Depth to water)

r (hole radius in inches)

D_0 (Initial Depth to water)

D_t (Total Depth of test hole)

H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

Field Rate: 109.5 in/hr

Infiltration Rate: 17.01 in/hr

HYDROLOGY MAP

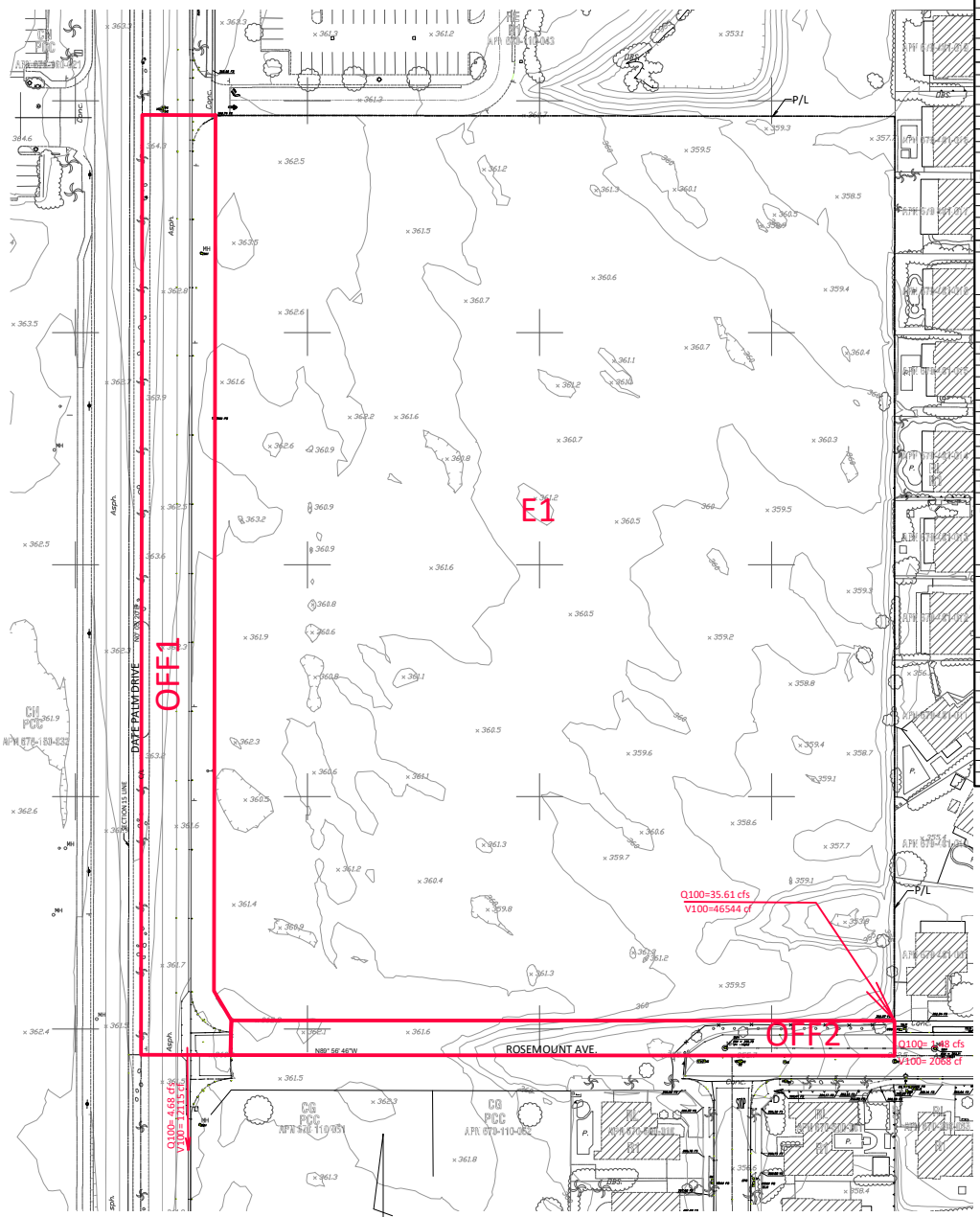
PRE-DEVELOPMENT

IN THE CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

PRELIMINARY PRE HYDROLOGY MAP
THE WREN
APN 670-110-043

XXXXX ROSEMOUNT AVENUE

BEING A PORTION OF THE NORTHWEST QUARTER OF SECTION 15, TOWNSHIP 4, SOUTH, RANGE 5, EAST, S.B.B.M.



IN THE CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

PRELIMINARY PRE HYDROLOGY MAP
THE WREN
EXHIBIT DATE: OCTOBER 6, 2023

DATA TABLE

APPLICANT:	COACHELLA VALLEY COMMUNITY DEELOPMENT GROUP, INC		
ADDRESS:	36101 BOB HOPE DRIVE, SUITE E5 RANCHO MIRAGE, CA 92270		
CONTACT:	STEFAN VOGEL	TELEPHONE:	(626) 277-6782
	email: stefan@buildbyz2.com		
LAND OWNER:	DESERT CARE, LLC		
ADDRESS:	31190 CALLE CAYUGA CATHEDRAL CITY, CA 92234		
CONTACT:	STEFAN VOGEL	TELEPHONE:	(626) 277-6782
	email: stefan@buildbyz2.com		
EXHIBIT PREPARER:	CHRISTIANSEN & COMPANY		
ADDRESS:	5225 CANYON CREST DRIVE, SUITE 251 RIVERSIDE, CA 92507		
CONTACT:	KEITH CHRISTIANSEN	TELEPHONE:	(951)323-4713
	email: keith@ccocivil.com		
ARCHITECT:	HUMPHREYS & PARTNERS ARCHITECTS, LP		
ADDRESS:	2350 BRISTOL STREET COSTA MESA, CA 92626		
CONTACT:	VELY ZAJEC	TELEPHONE:	(949)955-4500
	email: vely@humphreys.com		
LANDSCAPE ARCHITECT:	JSA LANDSCAPE ARCHITECT		
ADDRESS:	19846 COVENTRY LANE HUNTINGTON BEACH, CA 92646		
CONTACT:	JIM SHROPE	TELEPHONE:	(760)610-9873
	email: jjhrope@outlook.com		
GEOTECHNICAL:	LANDMARK CONSULTANTS, INC.		
ADDRESS:	77-948 WILDCAT DRIVE PALM DESERT, CA 92211		
CONTACT:	GREG M. CHANDRA	TELEPHONE:	(760)360-0665
	email: gchandra@landmark-ca.com		
GEO/INFILTRATION:	SLADDEN ENGINEERING		
ADDRESS:	45090 GOLF CENTER PARKWAY INDIO, CA 92201		
CONTACT:	BRETT ANDERSON	TELEPHONE:	(760)863-0713
	email: banderson@sladdenengineering.com		
SOURCE OF TOPOGRAPHY:	INLAND AERIAL SURVEYS, INC.		
ADDRESS:	7117 ARLINGTON AVENUE, SUITE "A" RIVERSIDE, CA 92503		
DATE OF TOPOGRAPHY:	JULY 11, 2023	TELEPHONE:	(951) 687-4252

ASSESSOR'S PARCEL NUMBER: 670-110-043

PROPOSED IMPROVEMENT SCHEDULE: SCHEDULE "A"

LEGAL DESCRIPTION: PARCEL 1 OF PARCEL MAP NO. 27302, IN THE CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ON FILE IN BOOK 174, PAGES 30 AND 58 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA. EXCEPTING THEREFROM THAT PORTION WHICH LIES WITHIN THE BOUNDARIES OF PARCEL MAP NO. 34063 IN BOOK 218, PAGES 43-44, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA. SAID LAND BEING SHOWN AS DESIGNATED REMAINDER ON SAID PARCEL MAP NO. 34063.

EXISTING ZONING:	PCC (PLANNED COMMUNITY COMMERCIAL)
PROPOSED ZONING:	R3 (MULTIPLE FAMILY RESIDENTIAL)
EXISTING GENERAL PLAN LAND USE:	CG (GENERAL COMMERCIAL)
PROPOSED GENERAL PLAN LAND USE:	RM (MEDIUM DENSITY RESIDENTIAL)

AREAS:

	ACREAGE:	OWNER / MAINTENANCE ENTITY:
EXISTING GROSS ACREAGE:	10.48 ACRES	
PROPOSED NET ACREAGE:	10.48 ACRES	PRIVATE
BUILDINGS (138724 SF)	3.18 ACRES	PRIVATE
ASPHALT (111774 SF)	2.57 ACRES	PRIVATE
CONCRETE (34951 SF)	0.80 ACRES	PRIVATE
LANDSCAPE (125947 SF)	2.89 ACRES	PRIVATE
RETENTION BASIN (45113 SF)	1.04 ACRES	PRIVATE

EXISTING EASEMENT NOTES:
1. AN EASEMENT FOR STREET PURPOSES IN FAVOR OF THE COUNTY OF SAN BERNARDINO AS RECORDED IN BOOK 2825 AT PAGE 265, DATED 1/1/61, REC. OF RIVERSIDE COUNTY, CA.
2. AN EASEMENT FOR PUBLIC HIGHWAY AND PUBLIC UTILITY PURPOSED IN FAVOR OF THE CITY OF CATHEDRAL CITY AS RECORDED PER INST. NO. 188899 , DATED 6/6/91, REC. OF RIVERSIDE COUNTY, CA.

UTILITY PURVEYORS:

WATER -	COACHELLA VALLEY WATER DISTRICT	PH: 760-398-2651
SEWER -	COACHELLA VALLEY WATER DISTRICT	PH: 760-398-2651
ELECTRIC -	SOUTHERN CALIFORNIA EDISON	PH: 760-202-4252
GAS -	SOUTHERN CALIFORNIA GAS COMPANY	PH: 800-427-2200
TELEPHONE -	FRONTIER	PH: 760-864-1726
CABLE -	SPECTRUM	PH: 760-346-3714

LIQUEFACTION: NO LIQUEFACTION AREA

FEMA FLOOD ZONE DESIGNATION: ZONE X (FLOOD HAZARD IS UNDETERMINED, BUT POSSIBLE) PER FIRM MAP NO. 06065C1379G / DATED: AUGUST 28, 2008

NOTE:
1. THIS MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
2. THERE ARE NO KNOWN WELLS ON PROPERTY OR WITHIN 200 FEET OF PROPERTY.
3. THERE ARE NO EXISTING DWELLINGS, BUILDINGS, OR OTHER STRUCTURES KNOWN ON THIS PROPERTY.
4. SUBDIVISION WILL SHOW COMPLIANCE WITH CITY/COUNTY WATER QUALITY MANAGEMENT PER A SEPARATE WQMP REPORT.

REVISIONS:	NO.	DATE	DESCRIPTION:

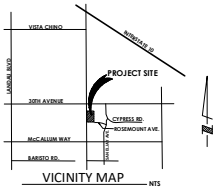
HYDRAULIC DATA

TRIBUTARY	AREA (AC.)	IMP%	Q100 (cfs)	V100 (cf)
E1	10.48	5.0%	35.61	46544
OFF1	1.18	90.0%	4.68	12155
OFF2	0.42	25.0%	1.48	2068

SCALE: 1"= 40'

LEGEND

BTM INDICATES BOTTOM
L.F. INDICATE LINEAR FEET
FL INDICATES FLOWLINE
TC INDICATES TOP OF CURB
TP INDICATES TOP OF PAVEMENT
INV. INDICATES INVERT ELEVATION
TG INDICATES TOP OF GRATE
EG INDICATES EXISTING GRADE
FS INDICATES FINISHED HARD SURFACE
FG INDICATES FINISHED DIRT
P/L INDICATES PROPERTY LINE
TF INDICATES TOP OF FOOTING
TW INDICATES TOP OF WALL
P INDICATES PLANTER
INDICATES BLOCK WALL
INDICATES DECORATIVE CONCRETE PER LANDSCAPE PLAN
INDICATES PROPOSED ASPHALT
450 INDICATES EXISTING CONTOUR
50 INDICATES PROPOSED CONTOUR



DIG ALERT — DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG — TOLL FREE 811 — A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

PRIVATE ENGINEERING NOTE: CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICE, CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

UNAUTHORIZED CHANGES & USES: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

"AS BUILT"

REVISION	CORRECTED BY	APPROVED BY	DATE APPROVED	DATE

REGISTERED PROFESSIONAL ENGINEER — KEITH A. CHRISTIANSEN — No. 50083 — Exp. 12/31/2024 — STATE OF CALIFORNIA

BENCHMARK: DATE PALM/RAMON 1.16 — ELEV. 363.23

LOCATION: BENCHMARK: FD. CATHEDRAL CITY BRONZE DISC. IN CONCRETE MONUMENT AT THE NE COR. OF DATE PALM DR. & RAMON RD. APPROX. 20 FEET FROM EDGES OF PAVEMENT.

PREPARED UNDER THE DIRECT SUPERVISION OF:
KEITH A. CHRISTIANSEN — R.C.E. 50083 — DATE

Christiansen & Company — Land Development · Design · Engineering — Est. 2007 — 5225 Canyon Crest Drive, Ste. 251, Riverside, CA 92507 — (951) 323-4713 — www.ccocivil.com

DESIGN BY: K.A.C.
DRAWN BY: C.A.C.
CHECKED BY: K.A.C.

CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
PRELIMINARY PRE HYDROLOGY MAP
THE WREN
APN 670-110-043
XXXXX ROSEMOUNT AVENUE
BEING A PORTION OF THE NORTHWEST QUARTER OF SECTION 15, TOWNSHIP 4, SOUTH, RANGE 5, EAST, S.B.B.M.

FILE NO.
DWG. NO.
SHEET 1 OF 1 SHEETS

POST-DEVELOPMENT

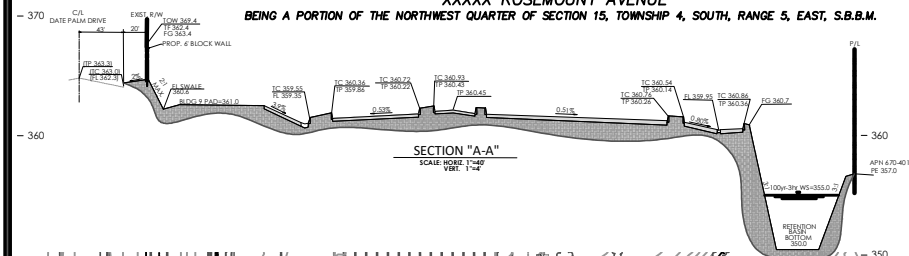
IN THE CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE,
STATE OF CALIFORNIA

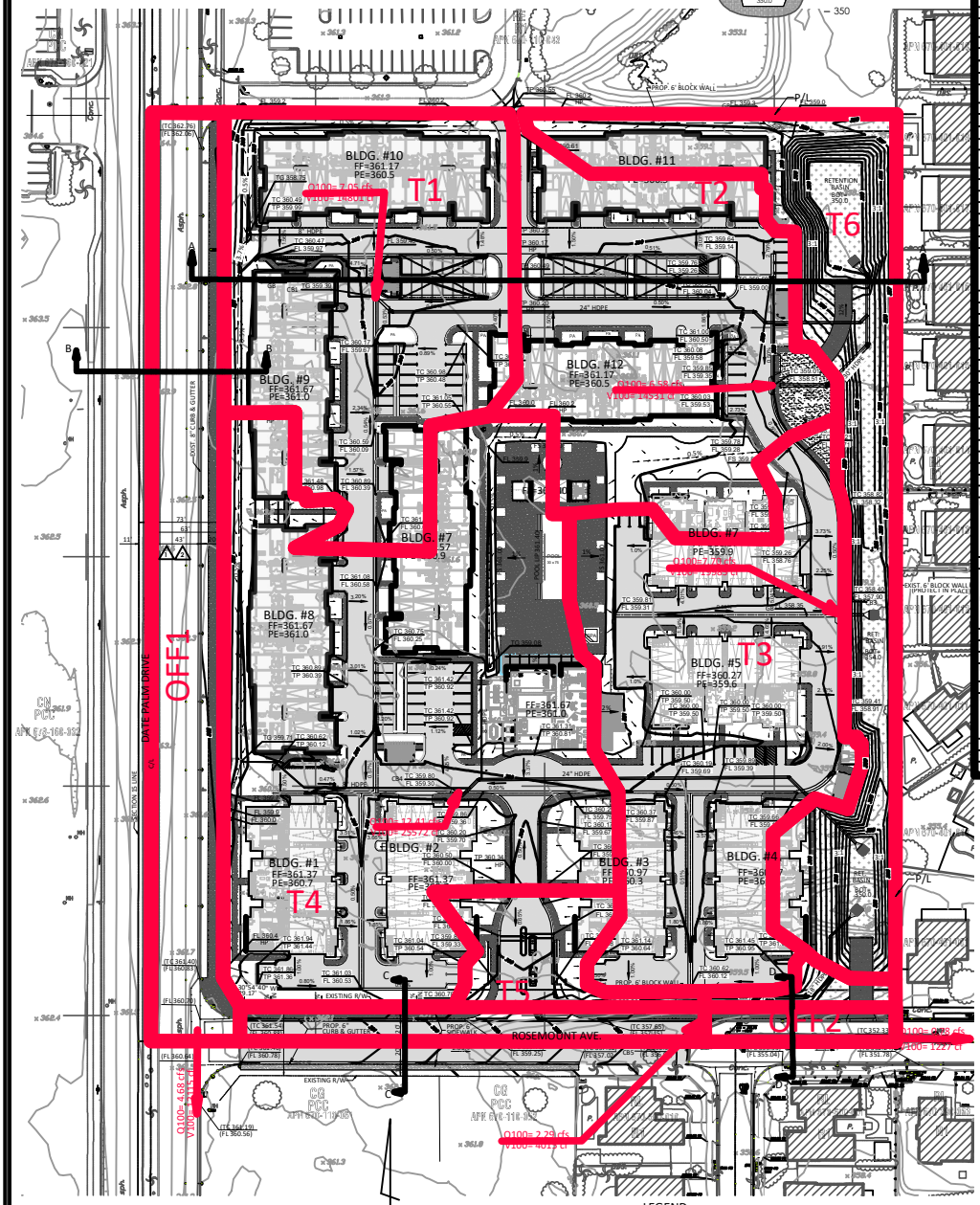
PRELIMINARY POST HYDROLOGY MAP
THE WREN

APN 670-110-043

XXXXX ROSEMOUNT AVENUE

BEING A PORTION OF THE NORTHWEST QUARTER OF SECTION 15, TOWNSHIP 4, SOUTH, RANGE 5, EAST, S.B.B.M.





DATA TABLE

APPLICANT:	COACHELLA VALLEY COMMUNITY DEELOPMENT GROUP, INC		
ADDRESS:	36101 BOB HOPE DRIVE, SUITE E5 RANCHO MIRAGE, CA 92270		
CONTACT:	STEFAN VOGEL	TELEPHONE:	(424) 277-6782
	email: stefan@builddsy2.com		
LAND OWNER:	DESERT CARE, LLC		
ADDRESS:	31190 CALLE CAYUGA CATHEDRAL CITY, CA 92234		
CONTACT:	STEFAN VOGEL	TELEPHONE:	(424) 277-6782
	email: stefan@builddsy2.com		
EXHIBIT PREPARER:	CHRISTIANSEN & COMPANY		
ADDRESS:	5225 CANYON CREST DRIVE, SUITE 251 RIVERSIDE, CA 92507		
CONTACT:	KEITH CHRISTIANSEN	TELEPHONE:	(951)323-4713
	email: keith@cc-civil.com		
ARCHITECT:	HUMPHREYS & PARTNERS ARCHITECTS, LP		
ADDRESS:	2350 BRISTOL STREET COSTA MESA, CA 92626		
CONTACT:	VELY ZAJEC	TELEPHONE:	(949)955-4500
	email: vely@humphreys.com		
LANDSCAPE ARCHITECT:	JSA LANDSCAPE ARCHITECT		
ADDRESS:	19846 COVENTRY LANE HUNTINGTON BEACH, CA 92646		
CONTACT:	JIM SHROPE	TELEPHONE:	(760)610-9873
	email: jimrope@outlook.com		
GEOTECHNICAL:	LANDMARK CONSULTANTS, INC.		
ADDRESS:	77-948 WILDCAT DRIVE PALM DESERT, CA 92211		
CONTACT:	GREG M. CHANDRA	TELEPHONE:	(760)360-0665
	email: gchandra@landmark-ca.com		
GEO/INFILTRATION:	SLADDEN ENGINEERING		
ADDRESS:	43090 GOLF CENTER PARKWAY INDIO, CA 92201		
CONTACT:	BRETT ANDERSON	TELEPHONE:	(760)863-0713
	email: banderson@sladdenengineering.com		
SOURCE OF TOPOGRAPHY:	INLAND AERIAL SURVEYS, INC.		
ADDRESS:	7117 ARLINGTON AVENUE, SUITE "A" RIVERSIDE, CA 92503		
DATE OF TOPOGRAPHY:	JULY 11, 2023	TELEPHONE:	(951) 687-4252

ASSESSOR'S PARCEL NUMBER: 670-110-043

PROPOSED IMPROVEMENT SCHEDULE: SCHEDULE "A"

LEGAL DESCRIPTION: PARCEL 1 OF PARCEL MAP NO. 37302, IN THE CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ON FILE IN BOOK 174, PAGES 88 AND 89 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA. EXCEPTING THEREFROM THAT PORTION WHICH LIES WITHIN THE BOUNDARIES OF PARCEL MAP NO. 24063 IN BOOK 218, PAGES 43–44, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, SAID LAND BEING SHOWN AS DESIGNATED REMAINDER ON SAID PARCEL MAP NO. 24063.

EXISTING ZONING:	PCC (PLANNED COMMUNITY COMMERCIAL)
PROPOSED ZONING:	R3 (MULTIPLE FAMILY RESIDENTIAL)
EXISTING GENERAL PLAN LAND USE:	CG (GENERAL COMMERCIAL)
PROPOSED GENERAL PLAN LAND USE:	RM (MEDIUM DENSITY RESIDENTIAL)

AREAS:

	ACREAGE:	OWNER / MAINTENANCE ENTITY:
EXISTING GROSS ACREAGE:	10.48 ACRES	
PROPOSED NET ACREAGE:	10.48 ACRES	PRIVATE
BUILDINGS (138724 SF)	3.18 ACRES	PRIVATE
ASPHALT (511774 SF)	2.57 ACRES	PRIVATE
CONCRETE (34951 SF)	0.80 ACRES	PRIVATE
LANDSCAPE (125947 SF)	2.89 ACRES	PRIVATE
RETENTION BASIN (45113 SF)	1.04 ACRES	PRIVATE

EXISTING EASEMENT NOTES:

1. AN EASEMENT FOR STREET PURPOSES IN FAVOR OF THE COUNTY OF SAN BERNARDINO AS RECORDED IN BOOK 2825 AT PAGE 265, DATED 11/6/41, REC. OF RIVERSIDE COUNTY, CA.
2. AN EASEMENT FOR PUBLIC HIGHWAY AND PUBLIC UTILITY PURPOSES IN FAVOR OF THE CITY OF CATHEDRAL CITY AS RECORDED PER INST. NO. 188899 , DATED 6/6/91, REC. OF RIVERSIDE COUNTY, CA.

UTILITY PURVEYORS:

WATER -	COACHELLA VALLEY WATER DISTRICT	PH: 760-398-2651
SEWER -	COACHELLA VALLEY WATER DISTRICT	PH: 760-398-2651
ELECTRIC -	SOUTHERN CALIFORNIA EDISON	PH: 760-202-4252
GAS -	SOUTHERN CALIFORNIA GAS COMPANY	PH: 800-427-2200
TELEPHONE -	FRONTIER	PH: 760-864-1726
CABLE -	SPECTRUM	PH: 760-346-3714

LIQUEFACTION: NO LIQUEFACTION AREA

FEMA FLOOD ZONE DESIGNATION: ZONE X (FLOOD HAZARD IS UNDETERMINED, BUT POSSIBLE) PER FIRM MAP NO. 06065C1579G / DATED: AUGUST 28, 2008

NOTE:
1. THIS MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DIVIDER.
2. THERE ARE NO KNOWN WELLS ON PROPERTY OR WITHIN 200 FEET OF PROPERTY.
3. THERE ARE NO EXISTING DWELLINGS, BUILDINGS, OR OTHER STRUCTURES KNOWN ON THIS PROPERTY.
4. SUBDIVISION WILL SHOW COMPLIANCE WITH CITY/COUNTY WATER QUALITY MANAGEMENT PER A SEPARATE WQMP REPORT.

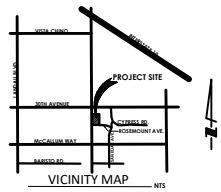
REVISIONS:	NO.	DATE:	DESCRIPTION:

HYDRAULIC DATA

TRIBUTARY	AREA (AC.)	IMP%	Q100 (cfs)	V100 (cf)
T1(CB#1)	1.81	79.4%	7.05	14810
T2(CB#2)	1.68	81.9%	6.58	14531
T3(CB#3)	1.94	90.0%	7.70	19985
T4(CB#4)	3.19	78.4%	12.41	25572
T5(CB#5)	0.60	67.7%	2.29	4015
T6	1.45	5.0%	4.93	6439
ENTIRE PROJECT	10.48	62.5%	39.66	66256
OFF1	1.18	90.0%	4.68	12155
OFF2	0.21	55.5%	0.78	1227

LEGEND

BTM INDICATES BOTTOM
L.F. INDICATE LINEAR FEET
FL INDICATES FLOWLINE
TC INDICATES TOP OF CURB
TP INDICATES TOP OF PAVEMENT
INV. INDICATES INVERT ELEVATION
TG INDICATES TOP OF GRATE
EG INDICATES EXISTING GRADE
FS INDICATES FINISHED HARD SURFACE
FG INDICATES FINISHED DIRT
P/L INDICATES PROPERTY LINE
TF INDICATES TOP OF FOOTING
TW INDICATES TOP OF WALL
P INDICATES PLANTER
INDICATES BLOCK WALL
INDICATES DECORATIVE CONCRETE PER LANDSCAPE PLAN
INDICATES PROPOSED ASPHALT
INDICATES EXISTING CONTOUR
INDICATES PROPOSED CONTOUR



SCALE: 1"= 40'

DIGALERT — DIAL 811 TOLL FREE — A PUBLIC SERVICE OF UNDERGROUND SERVICE ALERT

PRIVATE ENGINEERING NOTE:
IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

UNAUTHORIZED CHANGES & USES:
THE ENGINEER PERFORMING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

AS BUILT

REVISION	BY	DATE

BENCHMARK: DATE PALM/RAMON 116 — ELEV.: 363.23

LOCATION: BENCHMARK: FD. CATHEDRAL CITY BRONZE DISC. IN CONCRETE MONUMENT AT THE NE COR. OF DATE PALM DR. & RAMON RD. APPROX. 20 FEET FROM EDGES OF PAVEMENT

KEITH A. CHRISTIANSEN — R.C.E. 50083 — DATE

Christiansen & Company — 5225 Canyon Crest Drive, Ste. 251, Riverside, CA 92507, Ph. (951) 323-4713, Fax. (951) 400-6410, www.cc-civil.com

DESIGN BY: K.A.C.
DRAWN BY: C.A.C.
CHECKED BY: K.A.C.

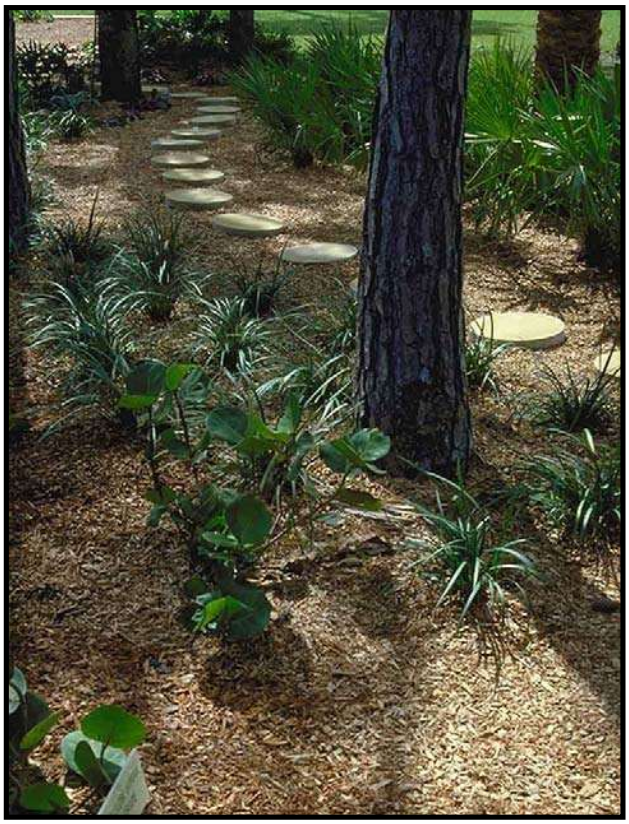
CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
PRELIMINARY POST HYDROLOGY MAP
THE WREN
APN 670-110-043
XXXXX ROSEMOUNT AVENUE
BEING A PORTION OF THE NORTHWEST QUARTER OF SECTION 15, T4S, R5E, S.B.B.M.

TRACT NO.: DWG. NO.:
SHEET 1 OF 1 SHEETS

Appendix D

Educational Materials

Site Design & Landscape Planning SD-10



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “ redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

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barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ✓ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING –

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DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Trash Storage Areas SD-32

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

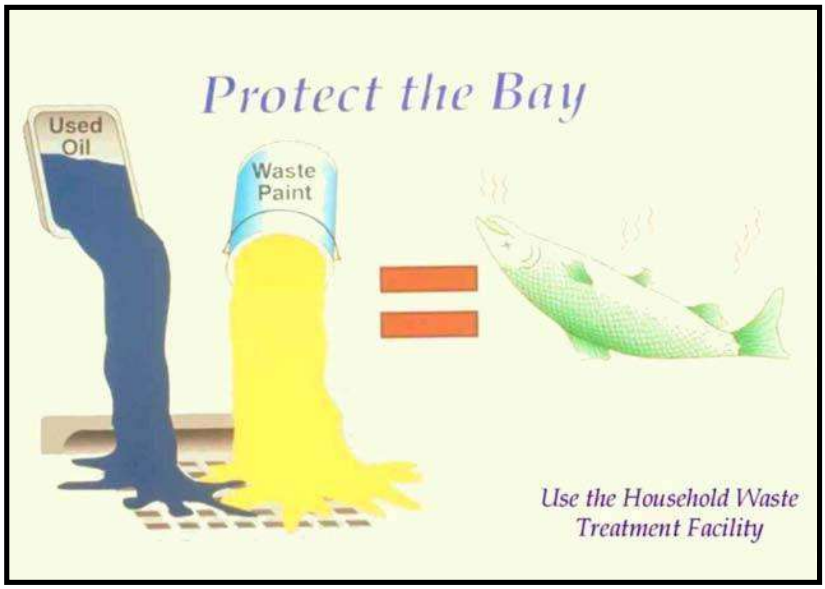
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Non-Stormwater Discharges SC-10



Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Non-stormwater discharges are those flows that do not consist entirely of stormwater. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include: process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Approach

Initially the industry must make an assessment of non-stormwater discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-stormwater discharges.

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Pollution Prevention

- Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented. Encourage litter control.

Suggested Protocols

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
  - Educational materials

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially those that are not classified as hazardous. These are often not responded to as effectively as they need to be.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled or demarcated next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC44 Stormwater Drainage System Maintenance for additional information.

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate all discharges to the industrial storm drain system.

Visual Inspection and Inventory

- Inventory and inspect each discharge point during dry weather.
- Keep in mind that drainage from a storm event can continue for a day or two following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

Review Infield Piping

- A review of the "as-built" piping schematic is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

Dye Testing

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

TV Inspection of Drainage System

- TV Cameras can be employed to visually identify illicit connections to the industrial storm drainage system.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.

Once a site has been cleaned:

- Post "No Dumping" signs with a phone number for reporting dumping and disposal.
- Landscaping and beautification efforts of hot spots may also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.
- See fact sheet SC11 Spill Prevention, Control, and Cleanup.

Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Conduct field investigations of the industrial storm drain system for potential sources of non-stormwater discharges.
- Pro-actively conduct investigations of high priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for pro-active investigations.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- Document and report annually the results of the program.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Training

- Training of technical staff in identifying and documenting illegal dumping incidents is required.
- Consider posting the quick reference table near storm drains to reinforce training.
- Train employees to identify non-stormwater discharges and report discharges to the appropriate departments.

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Determine and implement appropriate outreach efforts to reduce non-permissible non-stormwater discharges.
- Conduct spill response drills annually (if no events occurred to evaluate your plan) in cooperation with other industries.
- When a responsible party is identified, educate the party on the impacts of his or her actions.

Spill Response and Prevention

- See SC11 Spill Prevention Control and Cleanup.

Other Considerations

- Many facilities do not have accurate, up-to-date schematic drawings.

Requirements

Costs (including capital and operation & maintenance)

- The primary cost is for staff time and depends on how aggressively a program is implemented.
- Cost for containment and disposal is borne by the discharger.
- Illicit connections can be difficult to locate especially if there is groundwater infiltration.
- Indoor floor drains may require re-plumbing if cross-connections to storm drains are detected.

Maintenance (including administrative and staffing)

- Illegal dumping and illicit connection violations requires technical staff to detect and investigate them.

Supplemental Information

Further Detail of the BMP

Illegal Dumping

- Substances illegally dumped on streets and into the storm drain systems and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes cause stormwater and receiving water quality problems as well as clog the storm drain system itself.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots

- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

What constitutes a "non-stormwater" discharge?

- Non-stormwater discharges to the stormwater collection system may include any water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Facilities subject to stormwater permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The State's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Performance Evaluation

- Review annually internal investigation results; assess whether goals were met and what changes or improvements are necessary.
- Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Vehicle and Equipment Cleaning SC-21

Description

Wash water from vehicle and equipment cleaning activities performed outdoors or in areas where wash water flows onto the ground can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, phosphates, heavy metals, and suspended solids to stormwater runoff. Use of the procedures outlined below can prevent or reduce the discharge of pollutants to stormwater during vehicle and equipment cleaning.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives

General Pollution Prevention Protocols

- If possible, use properly maintained off-site commercial washing and steam cleaning businesses whenever possible. These businesses are better equipped to handle and properly dispose of the wash waters.
- Use dry cleaning methods to remove debris and sweep area; avoid washing with water when possible.
- Good housekeeping practices can minimize the risk of contamination from wash water discharges.
- Use biodegradable, phosphate-free detergents for washing vehicles as appropriate
- Emphasize the connection between the storm drain system and runoff, help reinforce that vehicle and equipment washing activities affect local water quality through storm drain stenciling programs.

Objectives
■ *Cover*
■ *Contain*
■ *Educate*
■ *Reduce/Minimize*
■ *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Addressed	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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Vehicle and Equipment Cleaning SC-21

- Map on-site storm drain locations to avoid discharges to the storm drain system.
- Designate specific wash area with clarifier or place wash areas away from storm drain connections.

Good Housekeeping

- Mark the area clearly as a wash area by:
  - ✓ Posting signs stating that only washing is allowed in wash area; and
  - ✓ Providing information on how washing is to be done.
- Provide trash containers in wash area.
- Have all vehicle and equipment washing done in areas designed to collect and hold the wash and rinse water or effluent generated. Recycle, collect or treat wash water effluent prior to discharge to the sanitary sewer system.
- If washing/cleaning must occur on-site, consider washing vehicles and equipment inside the building or on an impervious surface to control the targeted constituents by directing them to the sanitary sewer.
- If washing must occur on-site and outdoor:
  - ✓ Use designated paved wash areas. This area must be covered or bermed to collect the wash water and graded to direct the wash water to a treatment or disposal facility.
  - ✓ Do not conduct oil changes and other engine maintenance in the designated washing area. Perform these activities in a place designated for oil change and maintenance activities.
  - ✓ Cover the wash area when not in use to prevent contact with rain water.
- Do not permit steam cleaning wash water to enter the storm drain system.
- If possible, conduct pressure and steam cleaning at appropriate off-site areas to avoid generating runoff with high pollutant concentrations.

Preventative Maintenance

- Install sumps or drain lines to collect wash water for treatment.
- Use hoses with nozzles that automatically turn off when left unattended.
- Perform routine inspections of drain lines, holding tanks, and hoses and repair leaks immediately.

Vehicle and Equipment Cleaning SC-21

- Perform routine inspection and maintenance of wash water recycling and treatment systems.

Spill Response and Prevention Procedures

- Keep the spill prevention and control plan up-to-date.
- Have an emergency plan, equipment, and trained personnel ready at all times to deal immediately with major spills.
- Collect all spilled liquids and properly dispose of them.
- Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.

Material Handling and Waste Management

- Collect all wash water from vehicle and equipment cleaning operations. Consider treating and reusing or discharging wash waters to a sanitary sewer system.
- Large quantities of wash waters may require treatment at the facility. Treatment using a process treatment system (e.g., holding tank, filtration system, and related appurtenances) will require engineering and capital expenditures.
- Collect and treat small amounts of wash water at the facility and either recycle or discharge to the sanitary sewer system or collect and dispose of as an industrial waste.
- Discharge wash waters into sanitary sewer only after contacting local sewer authority to find out if pretreatment is required.

Employee Training Program

- Train employees on proper cleaning and wash water disposal procedures and conduct “refresher” courses on a regular basis.
- Train staff on proper maintenance measures for the wash area.
- Train employees and contractors on proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- Use a training log or similar method to document training.

Quality Assurance and Record Keeping

- Keep accurate maintenance/inspection logs that document the minimum BMP activities performed for vehicle and equipment cleaning activities and improvement actions.

- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.

- Establish procedures to complete logs and file them in the central office.

Other Facility-Specific Considerations

- Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer.

- Steam cleaning can generate significant pollutant concentrations requiring that careful consideration be given to the environmental impacts and compliance issues related to the condensate wastewater generated.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing and time limitations that may preclude implementation of certain BMPs. Provided below are typical limitations and recommended "work-arounds":

- Most car washing best management practices are inexpensive, and rely more on good housekeeping practices (where vehicles are washed, planning for the collection of wash water) than on expensive technology. However, the construction of a specialized area for vehicle washing can be expensive. Also, for facilities that cannot recycle their wash water, the cost of pre-treating wash water through either structural practices or planning for collection and hauling of contaminated water to sewage treatment plants can be cost-prohibitive.

- A potential work-around is to use properly maintained off-site commercial washing and steam cleaning businesses whenever possible.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Many facilities will already have indoor covered areas where vehicle and equipment cleaning takes place and will require no additional capital expenditures for providing cover.

- Capital investments will be required at some sites if systems to collect and recycle/treat and properly discharge wash water are not in place. The cost associated with these investments will vary depending on the size of the washing facility and local regulations regarding effluent wash water.

Maintenance

- Perform wash and collection system inspections and repair.

- Sweep washing areas frequently to remove solid debris.

- Repair berms and dikes as necessary.
- Inspect and maintain sumps, oil/water separators, and on-site treatment/recycling units.

Supplemental Information

Designated Cleaning Areas

- Washing operations outside should be conducted in a designated wash area having the following characteristics:
  - ✓ Paved with Portland cement concrete
  - ✓ Covered and bermed to prevent contact with stormwater and contain wash water
  - ✓ Sloped for wash water collections
  - ✓ Drainage system for wash water to the sanitary or recycle treatment process waste sewer, or to a dead-end sump equipped with an oil/water separator if necessary.

References and Resources

Orange County Stormwater Program, Best Management Practices for Industrial/Commercial Business Activities. Available online at: http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities.

Oregon Department of Environmental Quality, 2013. *Industrial Stormwater Best Management Practices Manual- BMP 8 Vehicle, Pavement and Building Washing*. Available online at: http://www.deq.state.or.us/wq/wqpermit/docs/IndBMP021413.pdf.

Sacramento Stormwater Management Program. *Best Management Practices for Industrial Storm Water Pollution Control.* Available online at: http://www.msa.saccounty.net/sactostormwater/documents/guides/industrial-BMP-manual.pdf.

Sacramento County Environmental Management Stormwater Program: Best Management Practices –Vehicle Washing. Available online at: http://www.emd.saccounty.net/EnvHealth/Stormwater/Stormwater-BMPs.html.

Santa Clara Valley Urban Runoff Pollution Prevention Program. http://www.scvurppp-w2k.com/.

US EPA. National Pollutant Discharge Elimination System – Stormwater Menu of BMPs - Municipal Vehicle and Equipment Washing. Available online at: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=132.

Vehicle and Equipment Cleaning SC-21

Washington State Department of Ecology, 2012 .*Vehicle and Equipment Washwater Discharges Best Management Practices Manual.* Publication no. WQ-R-95-056. Available online at: https://fortress.wa.gov/ecy/publications/publications/95056.pdf.

Building & Grounds Maintenance SC-41

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.

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- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.
- Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures when soils are exposed.
- Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.
- Use hand weeding where practical.

Fertilizer and Pesticide Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Do not use pesticides if rain is expected.
- Do not mix or prepare pesticides for application near storm drains.
- Use the minimum amount needed for the job.
- Calibrate fertilizer distributors to avoid excessive application.
- Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- Apply pesticides only when wind speeds are low.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.

- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Training

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Other Considerations

Alternative pest/weed controls may not be available, suitable, or effective in many cases.

Requirements

Costs

- Cost will vary depending on the type and size of facility.
- Overall costs should be low in comparison to other BMPs.

Maintenance

Sweep paved areas regularly to collect loose particles. Wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

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- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).

- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:

  - Purchase and installation of signs.

  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.

  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.

  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

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Infiltration Basin TC-11

Design Considerations

- Soil for Infiltration
- Slope
- Aesthetics

Description

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

Targeted Constituents

☑	Sediment	■
☑	Nutrients	■
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

- ● Low
- ▲ Medium
- ■ High

California Experience

Infiltration basins have a long history of use in California, especially in the Central Valley. Basins located in Fresno were among those initially evaluated in the National Urban Runoff Program and were found to be effective at reducing the volume of runoff, while posing little long-term threat to groundwater quality (EPA, 1983; Schroeder, 1995). Proper siting of these devices is crucial as underscored by the experience of Caltrans in siting two basins in Southern California. The basin with marginal separation from groundwater and soil permeability failed immediately and could never be rehabilitated.

Advantages

- Provides 100% reduction in the load discharged to surface waters.
- The principal benefit of infiltration basins is the approximation of pre-development hydrology during which a

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significant portion of the average annual rainfall runoff is infiltrated and evaporated rather than flushed directly to creeks.

- If the water quality volume is adequately sized, infiltration basins can be useful for providing control of channel forming (erosion) and high frequency (generally less than the 2-year) flood events.

Limitations

- May not be appropriate for industrial sites or locations where spills may occur.
- Infiltration basins require a minimum soil infiltration rate of 0.5 inches/hour, not appropriate at sites with Hydrologic Soil Types C and D.
- If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully treated prior to infiltration to protect groundwater quality.
- Not suitable on fill sites or steep slopes.
- Risk of groundwater contamination in very coarse soils.
- Upstream drainage area must be completely stabilized before construction.
- Difficult to restore functioning of infiltration basins once clogged.

Design and Sizing Guidelines

- Water quality volume determined by local requirements or sized so that 85% of the annual runoff volume is captured.
- Basin sized so that the entire water quality volume is infiltrated within 48 hours.
- Vegetation establishment on the basin floor may help reduce the clogging rate.

Construction/Inspection Considerations

- Before construction begins, stabilize the entire area draining to the facility. If impossible, place a diversion berm around the perimeter of the infiltration site to prevent sediment entrance during construction or remove the top 2 inches of soil after the site is stabililized. Stabilize the entire contributing drainage area, including the side slopes, before allowing any runoff to enter once construction is complete.
- Place excavated material such that it can not be washed back into the basin if a storm occurs during construction of the facility.
- Build the basin without driving heavy equipment over the infiltration surface. Any equipment driven on the surface should have extra-wide (“low pressure”) tires. Prior to any construction, rope off the infiltration area to stop entrance by unwanted equipment.
- After final grading, till the infiltration surface deeply.
- Use appropriate erosion control seed mix for the specific project and location.

Performance

As water migrates through porous soil and rock, pollutant attenuation mechanisms include precipitation, sorption, physical filtration, and bacterial degradation. If functioning properly, this approach is presumed to have high removal efficiencies for particulate pollutants and moderate removal of soluble pollutants. Actual pollutant removal in the subsurface would be expected to vary depending upon site-specific soil types. This technology eliminates discharge to surface waters except for the very largest storms; consequently, complete removal of all stormwater constituents can be assumed.

There remain some concerns about the potential for groundwater contamination despite the findings of the NURP and Nightingale (1975; 1987a,b,c; 1989). For instance, a report by Pitt et al. (1994) highlighted the potential for groundwater contamination from intentional and unintentional stormwater infiltration. That report recommends that infiltration facilities not be sited in areas where high concentrations are present or where there is a potential for spills of toxic material. Conversely, Schroeder (1995) reported that there was no evidence of groundwater impacts from an infiltration basin serving a large industrial catchment in Fresno, CA.

Siting Criteria

The key element in siting infiltration basins is identifying sites with appropriate soil and hydrogeologic properties, which is critical for long term performance. In one study conducted in Prince George's County, Maryland (Galli, 1992), all of the infiltration basins investigated clogged within 2 years. It is believed that these failures were for the most part due to allowing infiltration at sites with rates of less than 0.5 in/hr, basing siting on soil type rather than field infiltration tests, and poor construction practices that resulted in soil compaction of the basin invert.

A study of 23 infiltration basins in the Pacific Northwest showed better long-term performance in an area with highly permeable soils (Hilding, 1996). In this study, few of the infiltration basins had failed after 10 years. Consequently, the following guidelines for identifying appropriate soil and subsurface conditions should be rigorously adhered to.

- Determine soil type (consider RCS soil type 'A, B or C' only) from mapping and consult USDA soil survey tables to review other parameters such as the amount of silt and clay, presence of a restrictive layer or seasonal high water table, and estimated permeability. The soil should not have more than 30% clay or more than 40% of clay and silt combined. Eliminate sites that are clearly unsuitable for infiltration.

- Groundwater separation should be at least 3 m from the basin invert to the measured ground water elevation. There is concern at the state and regional levels of the impact on groundwater quality from infiltrated runoff, especially when the separation between groundwater and the surface is small.

- Location away from buildings, slopes and highway pavement (greater than 6 m) and wells and bridge structures (greater than 30 m). Sites constructed of fill, having a base flow or with a slope greater than 15% should not be considered.

- Ensure that adequate head is available to operate flow splitter structures (to allow the basin to be offline) without ponding in the splitter structure or creating backwater upstream of the splitter.

- Base flow should not be present in the tributary watershed.

Secondary Screening Based on Site Geotechnical Investigation

- At least three in-hole conductivity tests shall be performed using USBR 7300-89 or Bouwer-Rice procedures (the latter if groundwater is encountered within the boring), two tests at different locations within the proposed basin and the third down gradient by no more than approximately 10 m. The tests shall measure permeability in the side slopes and the bed within a depth of 3 m of the invert.

- The minimum acceptable hydraulic conductivity as measured in any of the three required test holes is 13 mm/hr. If any test hole shows less than the minimum value, the site should be disqualified from further consideration.

- Exclude from consideration sites constructed in fill or partially in fill unless no silts or clays are present in the soil boring. Fill tends to be compacted, with clays in a dispersed rather than flocculated state, greatly reducing permeability.

- The geotechnical investigation should be such that a good understanding is gained as to how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water.

Additional Design Guidelines

(1) Basin Sizing - The required water quality volume is determined by local regulations or sufficient to capture 85% of the annual runoff.

(2) Provide pretreatment if sediment loading is a maintenance concern for the basin.

(3) Include energy dissipation in the inlet design for the basins. Avoid designs that include a permanent pool to reduce opportunity for standing water and associated vector problems.

(4) Basin invert area should be determined by the equation:

$$A = \frac{WQV}{kt}$$

where A = Basin invert area (m^2)

WQV = water quality volume (m^3)

k = 0.5 times the lowest field-measured hydraulic conductivity (m/hr)

t = drawdown time (48 hr)

(5) The use of vertical piping, either for distribution or infiltration enhancement shall not be allowed to avoid device classification as a Class V injection well per 40 CFR146.5(e)(4).

Maintenance

Regular maintenance is critical to the successful operation of infiltration basins. Recommended operation and maintenance guidelines include:

- Inspections and maintenance to ensure that water infiltrates into the subsurface completely (recommended infiltration rate of 72 hours or less) and that vegetation is carefully managed to prevent creating mosquito and other vector habitats.
- Observe drain time for the design storm after completion or modification of the facility to confirm that the desired drain time has been obtained.
- Schedule semiannual inspections for beginning and end of the wet season to identify potential problems such as erosion of the basin side slopes and invert, standing water, trash and debris, and sediment accumulation.
- Remove accumulated trash and debris in the basin at the start and end of the wet season.
- Inspect for standing water at the end of the wet season.
- Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and regrade when the accumulated sediment volume exceeds 10% of the basin.
- If erosion is occurring within the basin, revegetate immediately and stabilize with an erosion control mulch or mat until vegetation cover is established.
- To avoid reversing soil development, scarification or other disturbance should only be performed when there are actual signs of clogging, rather than on a routine basis. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller, if possible, or a disc harrow pulled by a very light tractor.

Cost

Infiltration basins are relatively cost-effective practices because little infrastructure is needed when constructing them. One study estimated the total construction cost at about $2 per ft (adjusted for inflation) of storage for a 0.25-acre basin (SWRPC, 1991). As with other BMPs, these published cost estimates may deviate greatly from what might be incurred at a specific site. For instance, Caltrans spent about $18/ft^3 for the two infiltration basins constructed in southern California, each of which had a water quality volume of about 0.34 ac.-ft. Much of the higher cost can be attributed to changes in the storm drain system necessary to route the runoff to the basin locations.

Infiltration basins typically consume about 2 to 3% of the site draining to them, which is relatively small. Additional space may be required for buffer, landscaping, access road, and fencing. Maintenance costs are estimated at 5 to 10% of construction costs.

One cost concern associated with infiltration practices is the maintenance burden and longevity. If improperly maintained, infiltration basins have a high failure rate. Thus, it may be necessary to replace the basin with a different technology after a relatively short period of time.

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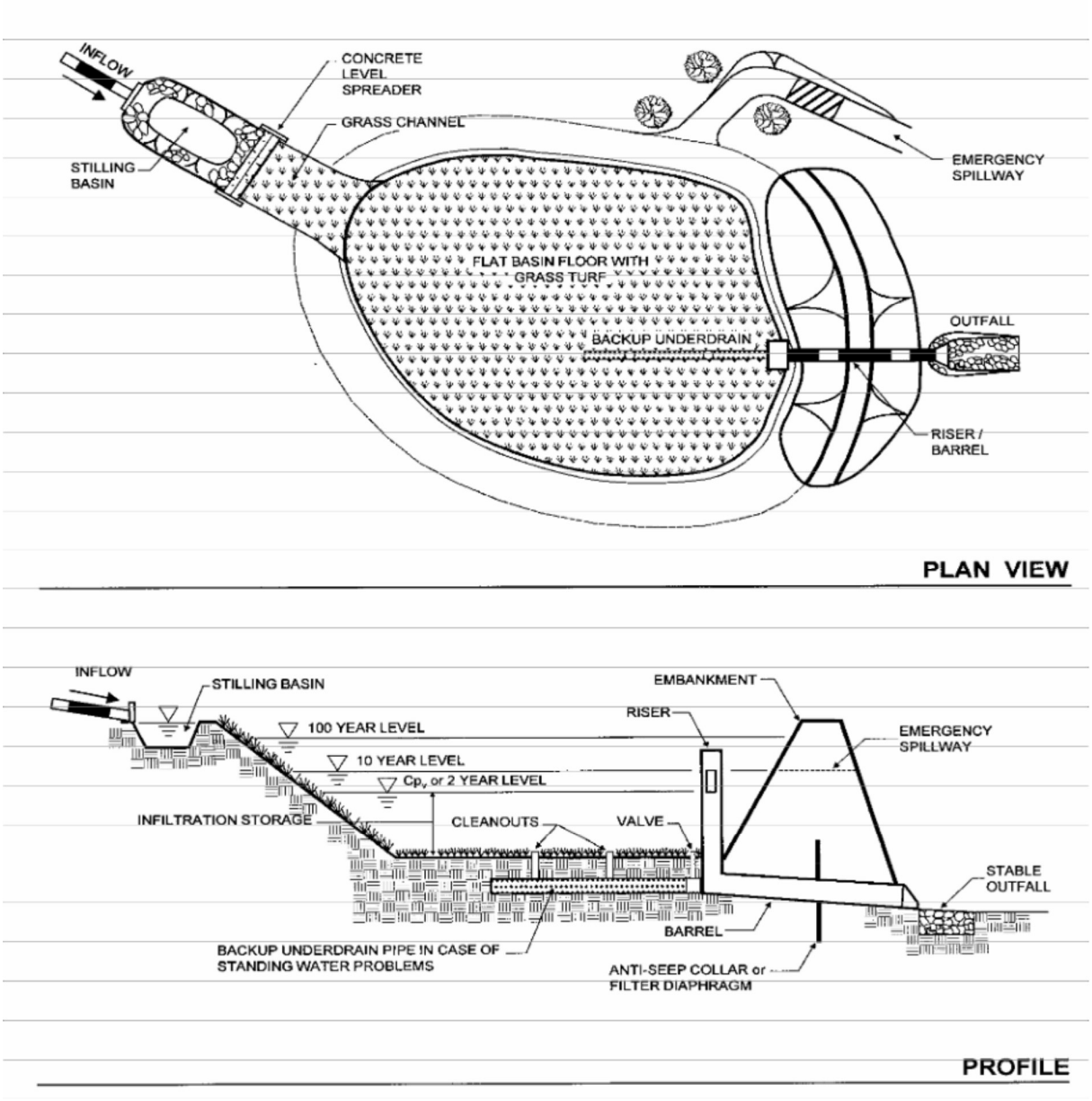
INFLOW
CONCRETE LEVEL SPREADER
GRASS CHANNEL
STILLING BASIN
EMERGENCY SPILLWAY
FLAT BASIN FLOOR WITH GRASS TURF
OUTFALL
BACKUP UNDERDRAIN
RISER / BARREL
PLAN VIEW
INFLOW
STILLING BASIN
EMBANKMENT
RISER
100 YEAR LEVEL
EMERGENCY SPILLWAY
10 YEAR LEVEL
Cpv or 2 YEAR LEVEL
INFILTRATION STORAGE
CLEANOUTS
VALVE
STABLE OUTFALL
BARREL
BACKUP UNDERDRAIN PIPE IN CASE OF STANDING WATER PROBLEMS
ANTI-SEEP COLLAR or FILTER DIAPHRAGM
PROFILE

BG-30 Food Service Facilities

Photo Credit: Geoff Brosseau

Description

This category includes:

- Restaurants
- Food truck commissaries
- Institutional cafeterias
- Grocery stores, bakeries, and delicatessens
- Any facility requiring a Health Department permit for food preparation

Pollutant Sources

The following are sources of pollutants:

- Cleaning of equipment
- Grease handling and disposal
- Spills
- Surface cleaning
- Cooling and refrigeration equipment maintenance
- Landscaping and grounds maintenance
- Dumpster and loading dock area
- Parking lots
- Illicit connections to storm drain system

Pollutants can include:

- Organic materials (food wastes)

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- Oil and grease
- Toxic chemicals in cleaning products, disinfectants, and pesticides

Approach

Minimize exposure of rain and runoff to outdoor cleaning and storage areas by using cover and containment. In and around these areas, use good housekeeping to minimize the generation of pollutants. Make stormwater pollution prevention BMPs a part of standard operating procedures and the employee training program. Provide employee education materials in the first language of employees.

Source Control BMPs

The best management practices are listed by activity or area in the following table.

Dumpster and Loading Dock Areas	☐ Store and transfer all solid and liquid wastes, such as tallow, in watertight covered containers. ☐ Keep litter from accumulating around loading docks by providing trash receptacles and encouraging employees to use them. ☐ Bag and seal food waste before putting it in the dumpster. Do not place uncontained liquids, or leaking containers or garbage bags into a dumpster. ☐ Keep dumpster lids closed to keep out rainwater and to prevent trash from spilling out. ☐ If the dumpster regularly overflows, get a bigger one or arrange for more frequent collection. If the dumpster is shared with other tenants, speak with the property/lease manager about scheduling more frequent trash pickups or a larger dumpster. ☐ Don't hose out dumpsters. Apply absorbent over any fluids spilled in dumpster. Absorbent will usually be knocked out when the dumpster is emptied. ☐ Have the dumpster leasing company repair or replace leaky dumpsters and compactors, and have them clean out dirty dumpsters. ☐ Install a spill cleanup kit near the dumpster and loading dock areas. ☐ Post employee reminder signs such as "Keep lid closed" near tallow bins and dumpsters. ☐ Consider enclosing the dumpster in a roofed and bermed area to prevent exposure to rainwater, and draining the area to the sanitary sewer. Contact the local wastewater treatment plant or the county environmental health department for guidance. ☐ Keep dumpsters or the dumpster enclosure locked to prevent illegal dumping. ☐ For more information on cleaning dumpster areas see the Mobile Cleaning - Food Service Business-related business guide sheet in this series.

BG-30 Food Service Facilities

Equipment and Outdoor Cleaning	☐ Make sure all discharges from cooling equipment go to the sanitary sewer and not the street, gutter, or storm drain. ☐ Clean floor mats, filters, and garbage cans in a mop sink, floor drain, or proper outside area connected to the sanitary sewer with an oil and water separator. Don't wash them in a parking lot, alley, sidewalk, or street. ☐ Consider installing anti-slip floors when you remodel. ☐ Consider cleaning filters in the dishwasher. Contact the local wastewater treatment plant or the county environmental health department for guidance. ☐ Pour wash water into a janitorial or mop sink. Don't pour it out onto a parking lot, alley, sidewalk, or street. ☐ For outdoor cleaning, have employees or contractors follow the instructions in the following business guide sheet in this series: ✓ Mobile Cleaning - Food Service Business-related ✓ Mobile Cleaning – Surface cleaning ☐ For more information in general on cleaning floor mats, equipment, exhaust filters, and outdoor surfaces see the Mobile Cleaning - Food Service Business-related business guide sheet in this series.
Spill Cleanup	☐ Prepare a spill cleanup plan that includes: ✓ Procedures for different types of spills ✓ Schedule for initial and annual training of employees ✓ Cleanup kits in well-marked, accessible areas ✓ Designation of key employee who monitors cleanup ✓ Posting the plan in the work area ☐ If a spill occurs, immediately stop the spill at its source. ☐ Keep the spill from entering the street, gutter, or storm drain. ☐ Use dry methods for spill cleanup (sweeping, cat litter, etc.). Don't hose down spills. ☐ If wet cleaning (including high-temperature or high pressure washing) is required, dry clean first and then mop (or if it is absolutely necessary, wash) and collect the water. Dispose of water in sink or other indoor drain, not in the street, gutter, or storm drain. ☐ If a final rinse is necessary for health reasons, collect the rinsewater and dispose it to the sink or indoor floor drain. If outdoors, block the storm drain before applying water. Mop up or wet-vacuum water, and dispose it to a sink or indoor drain. ☐ Do not use bleach or disinfectants if there is a possibility that rinsewater could flow to a street, gutter, or storm drain.

	☐ For more information on cleaning outdoor surfaces see the Mobile Cleaning - Surface Cleaning business guide sheet in this series.
Recycling and Disposal	☐ Separate wastes. Keep your recyclable wastes in separate containers according to the type of material. They are easier to recycle if separated. ☐ Recycle the following materials: ✓ Food waste (non-greasy, non-animal food waste can be composted). Donate leftover, edible food whenever possible to local food banks. ✓ Paper and cardboard ✓ Container glass, aluminum, and tin ✓ Pallets and drums ☐ Dispose of toxic waste properly. Toxic waste includes used cleaners, and rags (soaked with solvents, floor cleaners, and detergents).
Grease Handling and Disposal	☐ Never pour oil, grease, or large quantities of oily liquids such as sauces or salad dressings or waste grease down a sink, floor drain, storm drain, or into a dumpster. ☐ Install screens and solid traps in sink and floor drains to catch larger solids. Clean these screens and traps frequently. ☐ Don't try to "dissolve" grease by adding hot water or emulsifying chemicals – it will only move the grease further down the building's sewer line and make it harder to remove later. ☐ Recycle grease and oil. Don't pour it into sinks, floor drains, or onto a parking lot or street. Look in the phone book for "Renderers" or call the local recycling or household hazardous waste information line. ☐ Use tallow bins or sealed containers with tamper-proof lids. Keep the exterior of the container clean. Check for leaks. Ask the recycler for a leak-free tallow bin and replace any leaky grease containers. If grease is stored outside, keep it under a roof, if possible. ☐ Do not contaminate the recyclable oils and grease in the tallow bin with the waste grease from the grease trap or grease interceptor. ☐ Inspect and clean all waste grease removal devices (grease trap or grease interceptor) often enough to keep them functioning properly and efficiently. ☐ For disposal of waste grease from the grease trap or grease interceptor, see "Grease Traps" or "Septic Tanks" in the phone book.

BG-30 Food Service Facilities

Land-scaping and Grounds Maintenance	☐ Never dispose of leftover pesticides in the gutter, street, or storm drain. Leftover pesticides must be either used up or disposed of as hazardous waste. ☐ Do not blow or rake leaves, grass, or garden clippings into the street, gutter, or storm drain. ☐ If pesticides are used, do not over apply or apply when rain is forecast. ☐ Do not use copper-based algaecides in pools or fountains. Control algae with chlorine or other alternatives to copper-based products.
Pest Control	Food Sources ☐ Keep the kitchen free of food scraps. ☐ Take out garbage each night in a closed container. ☐ Refrigerate all food or store in pest-proof containers each night. ☐ Keep ventilation system working properly to keep greasy residue off walls. Appliances ☐ Keep dishwasher area clean. Check the trap nightly. ☐ Where possible, elevate appliances at least 6 inches off the floor. ☐ Clean under appliances nightly. ☐ Steam clean or wash appliances weekly. ☐ Remember to clean under the counter, under the sink, and the refrigerator vent. Drains and Trash Cans ☐ Steam clean or scrub floor drains with a brush to help eliminate fruit flies. ☐ Keep dumpster area clean – inside and out. ☐ Wash garbage cans regularly. Supplies and Entry Points ☐ Check for pests before bringing supplies in to the kitchen. Roaches like corrugated boxes. ☐ Don't store boxes in the kitchen – take boxes away or store in a refrigerated area. ☐ Seal any gaps below doors. Reduce Habitat ☐ Inspect the entire establishment – inside and out. ☐ Suggest physical modifications that may help to eliminate pest behavior.

	☐ Suggest changes in food storage or cleanup practices to eliminate food sources for pests. ☐ Place boric acid powder in wall voids. ☐ Seal cracks and crevices. Monitor for Pests ☐ Use sticky traps to monitor how well the pest control program is working. Pests caught in the traps warn of a possible problem. ☐ When hiring a pest control service, look for a company that provides Integrated Pest Management (IPM) services. Use Baits First ☐ Use baits for controlling pests. Remove bait when pests are gone, or else the bait may attract more pests. ☐ Use chemicals only as a last resort. If absolutely necessary, choose less-toxic chemicals, and ask the pest service to provide label information. ☐ Apply pesticides only if necessary, not on a regular schedule. Follow label directions. Do not apply pesticides around floor drains, sinks, or food. Purchasing ☐ Use non-disposable products. Serve food on ceramic dishware rather than paper, plastic or Styrofoam, and use cloth napkins rather than paper ones. If you must use disposable products, use paper instead of Styrofoam. ☐ Buy the least toxic products available: ✓ Look for "non-toxic," "non-petroleum based," "free of ammonia, phosphates, dye, or perfume," or "readily biodegradable" on the label. Don't assume biodegradable products are safe. Biodegradable means the product will eventually break down, but it may harm the environment in the meantime. ✓ Avoid chlorinated compounds, petroleum distillates, phenols, formaldehyde, and caustic or acidic products. ✓ Use water-based products. ✓ Look for and purchase "recycled" and "recyclable" containers. By doing so, you help ensure a use for the recyclable materials that people collect and recycle.
Education and Training	☐ Employees can help prevent pollution when urban runoff training is included in employee orientations and reviews. ☐ Train all employees upon hiring and annually thereafter. ☐ Use a training log to document employee training.

	☐ Post information about or labels for BMPs where employees and customers can see them. ☐ Remember the facility is liable for the behavior of contractors. Be sure all contractors hired to clean inside or outside are aware of and implement these BMPs. ☐ Explain BMPs to other food businesses through your business associations or chambers of commerce.

Treatment Control BMPs

If treatment controls are installed at the facility, see Section 4 of this Handbook for information on inspecting and maintaining the BMPs.

For information on designing treatment controls, see Section 5 of the Development and Redevelopment Handbook.

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Appendix E

Soils Report

Geotechnical Report

Loving Care Assisted Living

Cathedral City, California

Prepared for:

Desert Care, LLC
31-190 Calle Cayuga
Cathedral City, CA 92234

LANDMARK
Geo-Engineers and Geologists

Prepared by:

LandMark Consultants, Inc.
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October 2017

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October 12, 2016

Mr. Skip Goodell
Desert Care, LLC
31-190 Calle Cayuga
Cathedral City, CA 92234

Geotechnical Report
Living Care Assisted Living
Cathedral City, California
LCI Report No. LP17122

Dear Mr. Goodell:

This geotechnical report is provided for design and construction of the proposed commercial complex located at 30260 Date Palm Drive in Cathedral City, California. Our geotechnical investigation was conducted in response to your request for our services. The enclosed report describes our soil engineering investigation and presents our professional opinions regarding geotechnical conditions at the site to be considered in the design and construction of the project.

The findings of this study indicate the site is underlain by sands to maximum depth penetrated. The near surface soils at the project site are expected to be non-expansive. The subsurface soils are medium dense to dense in nature. Groundwater was not encountered in the borings during the time of field exploration. Historic groundwater levels ranged from 130 to 170 feet within the past 65 years in the vicinity of the project site.

Elevated sulfate and chloride levels were not encountered in the soil samples tested for this study. The soil is low corrosive to metal. We recommend a minimum of 2,500 psi concrete of Type II Portland Cement with a maximum water/cement ratio of 0.60 (by weight) should be used for concrete placed in contact with native soils of this project.

We did not encounter soil conditions that would preclude implementation of the proposed project provided the professional opinions contained in this report are implemented in the design and construction of this project. Our findings, professional opinions, and application options are related ***only through reading the full report***, and are best evaluated with the active participation of the engineer of record who developed them.

We appreciate the opportunity to provide our findings and professional opinions regarding geotechnical conditions at the site. If you have any questions or comments regarding our findings, please call our office at (760) 360-0665.

Respectfully Submitted,
LandMark Consultants, Inc.

Greg M. Chandra, P.E., M.ASCE
Principal Engineer

TABLE OF CONTENTS

Section 1
INTRODUCTION

1.1 Project Description

This report presents the findings of our geotechnical exploration for the proposed commercial and residential complex located at 30260 Date Palm Drive in the city of Cathedral City, California (See Vicinity Map, Plate A-1). The proposed development will consist of urgent care, senior housing, hotel, restaurant, and administration building on 11 acres of vacant desert land. A site plan for the proposed development was provided by Self Reliance, Inc., dated May 3, 2017.

The structures are planned to consist of continuous wall and column concrete footings, concrete slabs-on-grade and wood-frame construction. Footing loads at exterior bearing walls are estimated at 1 to 10 kips per lineal foot. Column loads are estimated to range from 5 to 80 kips. If structural loads exceed those stated above, we should be notified so we may evaluate their impact on foundation settlement and bearing capacity. Site development will include building pad preparation, underground utilities installation, on-site and off-site street construction, concrete driveway and sidewalk placement.

1.2 Purpose and Scope of Work

The purpose of this geotechnical study was to investigate the upper 51.5 feet of subsurface soil at selected locations within the site for evaluation of physical/engineering properties. From the subsequent field and laboratory data, professional opinions were developed and are provided in this report regarding geotechnical conditions at this site and the effect on design and construction. The scope of our services consisted of the following:

- Field exploration and in-situ testing of the site soils at selected locations and depths.
- Laboratory testing for physical and/or chemical properties of selected samples.
- Review of the available literature and publications pertaining to local geology, faulting, and seismicity.
- Engineering analysis and evaluation of the data collected.
- Preparation of this report presenting our findings and, professional opinions, regarding the geotechnical aspects of project design and construction.

This report addresses the following geotechnical parameters:

- Subsurface soil and groundwater conditions
- Site geology, regional faulting and seismicity, near source factors, and site seismic accelerations
- Liquefaction potential and its mitigation
- Expansive soil and methods of mitigation
- Aggressive soil conditions to metals and concrete

Professional opinions with regard to the above parameters are presented for the following:

- Site grading and earthwork
- Building pad and foundation subgrade preparation
- Allowable soil bearing pressures and expected settlements
- Concrete slabs-on-grade
- Lateral earth pressures
- Excavation conditions and buried utility installations
- Mitigation of the potential effects of salt concentrations in native soil to concrete mixes and steel reinforcement
- Seismic design parameters
- Preliminary Pavement structural sections

Our scope of work for this report did not include an evaluation of the site for the presence of environmentally hazardous materials or conditions.

1.3 Authorization

Ms. Geri Doodell of Desert Care, LLC provided authorization by written agreement to proceed with our work on August 15, 2017. We conducted our work according to our written proposal dated August 11, 2017.

Section 2
METHODS OF INVESTIGATION

2.1 Field Exploration

Subsurface exploration was performed on August 31, 2017 using 2R Drilling of Ontario California to advance five (5) borings to depths of 21.5 to 51.5 feet below existing ground surface. The borings were advanced with a truck-mounted, CME 75 drill rig using 8-inch diameter, hollow-stem, continuous-flight augers. The approximate boring locations were established in the field and plotted on the site map by sighting to discernable site features. The boring locations are shown on the Site and Exploration Plan (Plate A-2).

Additional subsurface exploration was performed on September 14, 2017 by using a backhoe to excavate six (6) test pits to an approximate depth of 15 feet below the existing ground surface. The test pit locations are shown on the Site and Exploration Plan (Plate A-2). Bulk samples driven into undisturbed soil were obtained at selected depths in the test pits. A nuclear densometer (ASTM D6938) was used to evaluate in-situ densities and natural moisture content at selected depths in the upper 5 feet of the backhoe pits. The test pits were located by taped or paced measurements and should be considered approximate.

After logging and sampling the soil, the exploratory boring and test pits were backfilled with the excavated material. The backfill was loosely placed and was not compacted to the requirements specified for engineered fill. The backhoe pits shall be located during rough grading of the site to properly re-compact the backfill.

Our senior engineer maintained logs of the borings and test pits during exploration. The logs were edited in final form after a review of retrieved samples and the field and laboratory data. The boring and test pit logs are presented on Plates B-1 through B-11 in Appendix B. Soils encountered have been classified according to the Unified Soil Classification System. A key to the boring and test pit logs is presented on Plate B-12. The stratification lines shown on the subsurface logs represent the approximate boundaries between the various strata. However, the transition from one stratum to another may be gradual over some range of depth.

2.2 Laboratory Testing

Laboratory tests were conducted on selected bulk and relatively undisturbed soil samples to aid in classification and evaluation of selected engineering properties of the site soils. The tests were conducted in general conformance to the procedures of the American Society for Testing and Materials (ASTM) or other standardized methods as referenced below. The laboratory testing program consisted of the following tests:

- Particle Size Analyses (ASTM D422) – used for soil classification and liquefaction evaluation.
- Collapse Potential (ASTM D5333) – used for hydro-consolidation potential evaluation.
- Unit Dry Densities (ASTM D2937) – used for insitu soil parameters
- Moisture Contents (ASTM D2216) – used for insitu soil parameters
- Moisture-Density Relationship (ASTM D1557) – used for soil compaction determinations.
- Chemical Analyses (soluble sulfates & chlorides, pH, and resistivity) (Caltrans Methods) – used for concrete mix evaluations and corrosion protection requirements.

The laboratory test results are presented on the subsurface logs and on Plates C-1 through C-7 in Appendix C.

Engineering parameters of soil strength, compressibility and relative density utilized for developing design criteria provided within this report were either extrapolated from correlations with the data obtained from the field and laboratory testing program.

Section 3
DISCUSSION

3.1 Site Conditions

The project site is rectangular shaped in plain view, is relatively flat-lying and consists of approximately 11 acres of vacant land. The site is bounded by Rosemount Road to the south and Date Palm Drive to the west, residential homes to the east, and the Northgate Community Church to the north. Adjacent properties are flat-lying and are approximately at the same elevation with this site.

The project site lies at an elevation of approximately 360 to 370 feet above mean sea level (MSL) in the Coachella Valley region of the California low desert. Annual rainfall in this arid region is less than 4 inches per year with four months of average summertime temperatures above 100 ^{o}F. Winter temperatures are mild, seldom reaching freezing.

3.2 Geologic Setting

The project site is located in the Coachella Valley portion of the Salton Trough physiographic province. The Salton Trough is a geologic structural depression resulting from large scale regional faulting. The trough is bounded on the northeast by the San Andreas Fault and Chocolate Mountains and the southwest by the Peninsular Range and faults of the San Jacinto Fault Zone. The Salton Trough represents the northward extension of the Gulf of California, containing both marine and non-marine sediments since the Miocene Epoch. Tectonic activity that formed the trough continues at a high rate as evidenced by deformed young sedimentary deposits and high levels of seismicity. Figure 1 shows the location of the site in relation to regional faults and physiographic features.

The surrounding regional geology includes the Peninsular Ranges (Santa Rosa and San Jacinto Mountains) to the south and west, the Salton Basin to the southeast, and the Transverse Ranges (Little San Bernardino and Orocopia Mountains) to the north and east. Hundreds of feet to several thousand feet of Quaternary fluvial, lacustrine, and aeolian soil deposits underlie the Coachella Valley.

The southeastern part of the Coachella Valley lies below sea level. In the geologic past, the ancient Lake Cahuilla submerged the area. Calcareous tufa deposits may be observed along the ancient shoreline as high as elevation 45 to 50 feet MSL along the Santa Rosa Mountains from La Quinta southward. Lacustrine (lake bed) deposits comprise the subsurface soils over much of the eastern Coachella Valley with alluvial outwash along the flanks of the valley.

3.3 Faulting

The project site is located in the seismically active Coachella Valley of southern California with numerous mapped faults of the San Andreas Fault System traversing the region. We have performed a computer-aided search of known faults or seismic zones that lie within a 62-mile (100 kilometer) radius of the project site (Table 1).

A fault map illustrating known active faults relative to the site is presented on Figure 1, *Regional Fault Map*. Figure 2 shows the project site in relation to local faults. The criterion for fault classification adopted by the California Geological Survey defines Earthquake Fault Zones along active or potentially active faults. An active fault is one that has ruptured during Holocene time (roughly within the last 11,000 years). A fault that has ruptured during the last 1.8 million years (Quaternary time), but has not been proven by direct evidence to have not moved within Holocene time is considered to be potentially active. A fault that has not moved during Quaternary time is considered to be inactive.

Review of the current Alquist-Priolo Earthquake Fault Zone maps (CGS, 2000a) indicates that the nearest mapped Earthquake Fault Zone is the San Andreas Fault located approximately 3.7 miles northeast of the project site.

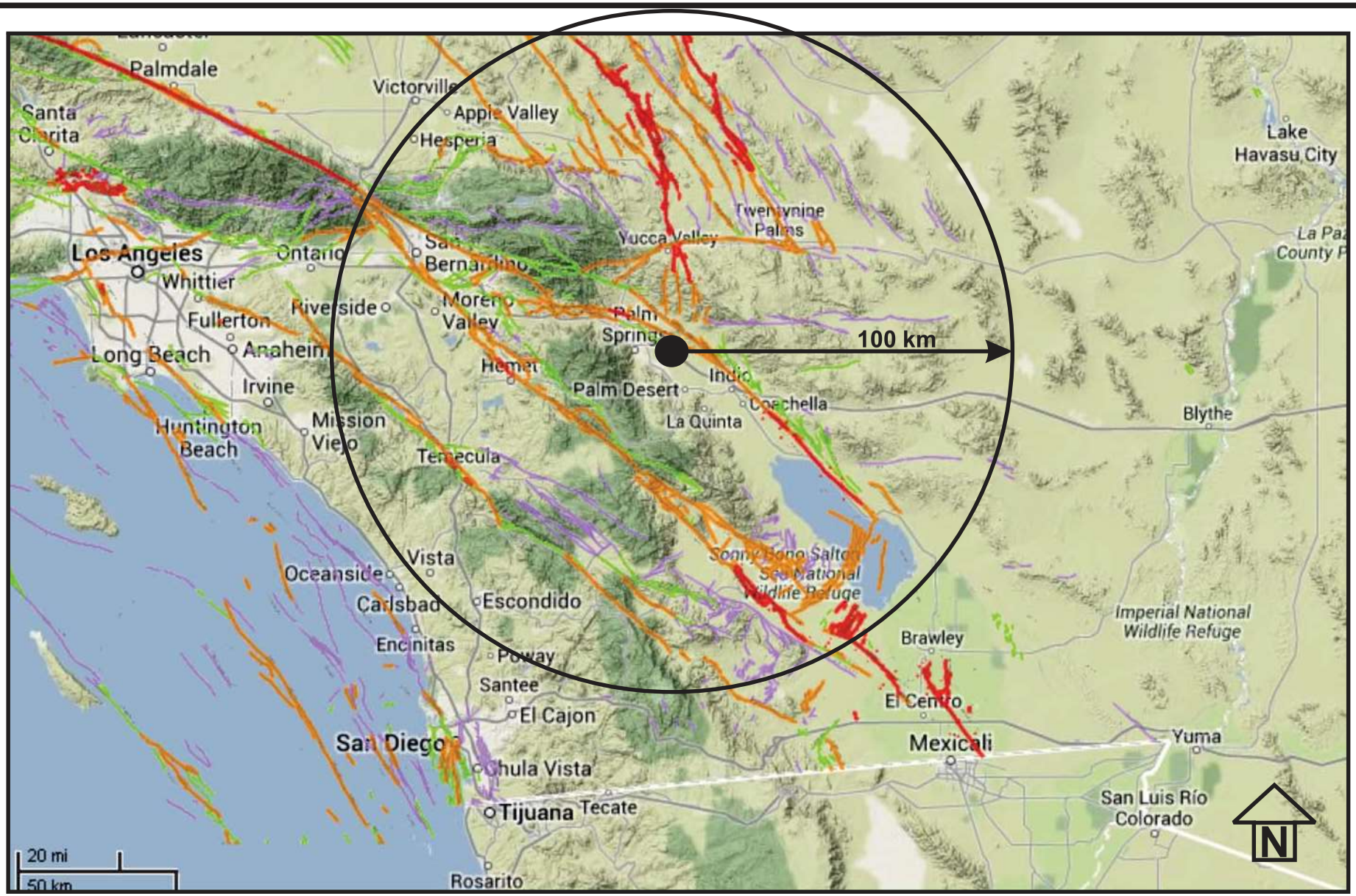
3.4 General Ground Motion Analysis

The project site is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region. Ground motions are dependent primarily on the earthquake magnitude and distance to the seismogenic (rupture) zone.

Table 1
Summary of Characteristics of Closest Known Active Faults

Fault Name	Approximate Distance (miles)	Approximate Distance (km)	Maximum Moment Magnitude (Mw)	Fault Length (km)	Slip Rate (mm/yr)
Garnet Hill *	1.0	1.6			
San Andreas - San Bernardino (South)	3.7	6.0	7.4	103 ± 10	30 ± 7
San Andreas - San Bernardino (North)	5.6	9.0	7.5	103 ± 10	24 ± 6
Eureka Peak	12.0	19.2	6.4	19 ± 2	0.6 ± 0.4
Indio Hills *	12.7	20.3			
Blue Cut *	12.9	20.6			
San Andreas - Coachella	13.3	21.2	7.2	96 ± 10	25 ± 5
Burnt Mtn.	16.0	25.6	6.5	21 ± 2	0.6 ± 0.4
Morongo *	16.3	26.1			
Pinto Mtn.	18.6	29.8	7.2	74 ± 7	2.5 ± 2
San Jacinto - Anza	20.8	33.3	7.2	91 ± 9	12 ± 6
Landers	23.3	37.2	7.3	83 ± 8	0.6 ± 0.4
San Jacinto - Coyote Creek	25.6	41.0	6.8	41 ± 4	4 ± 2
San Jacinto - San Jacinto Valley	27.7	44.3	6.9	43 ± 4	12 ± 6
Johnson Valley (northern)	32.5	52.0	6.7	35 ± 4	0.6 ± 0.4
Pisgah Mtn. - Mesquite Lake	33.0	52.8	7.3	89 ± 9	0.6 ± 0.4
North Frontal Fault Zone - Eastern	33.2	53.2	6.7	27 ± 3	0.5 ± 0.3
S. Emerson - Copper Mtn.	33.6	53.8	7	54 ± 5	0.6 ± 0.4
Lenwood - Lockhart - Old Woman Springs	37.5	60.1	7.5	145 ± 15	0.6 ± 0.4
North Frontal Fault Zone - Western	40.0	63.9	7.2	51 ± 5	1 ± 0.5
Calico-Hidalgo	40.1	64.2	7.3	95 ± 10	0.6 ± 0.4
Helendale - S. Lockhart	44.0	70.3	7.3	97 ± 10	0.6 ± 0.4

* Note: Faults not included in CGS database.



Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

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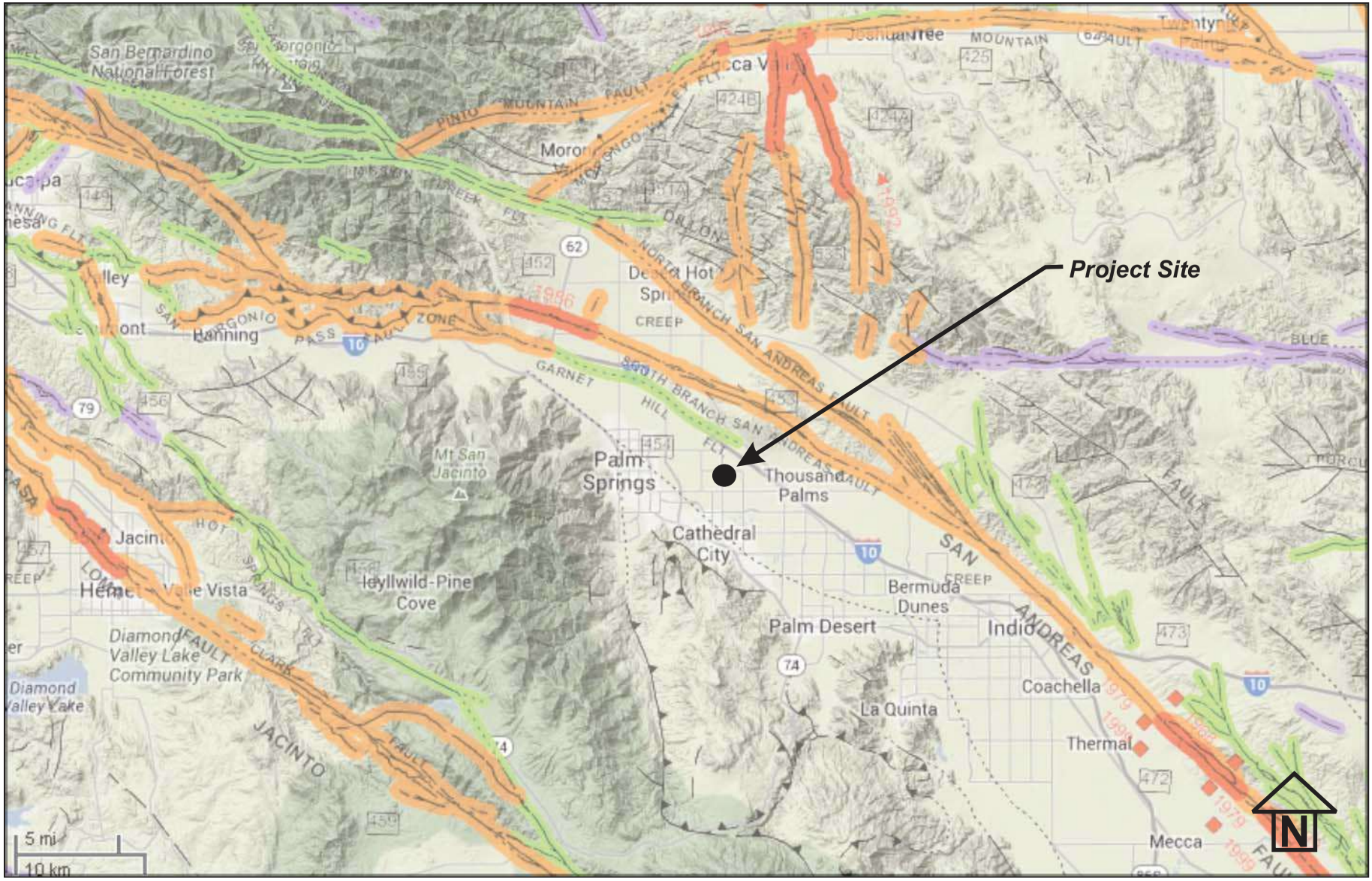
Regional Fault Map

Figure 1



Source: California Geological Survey 2010 Fault Activity Map of California
http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html#

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Map of Local Faults

Figure 2

EXPLANATION

Fault traces on land are indicated by solid lines where well located, by dashed lines where approximately located or inferred, and by dotted lines where concealed by younger rocks or by lakes or bays. Fault traces are queried where continuation or existence is uncertain. Concealed faults in the Great Valley are based on maps of selected subsurface horizons, so locations shown are approximate and may indicate structural trend only. All offshore faults based on seismic reflection profile records are shown as solid lines where well defined, dashed where inferred, queried where uncertain.

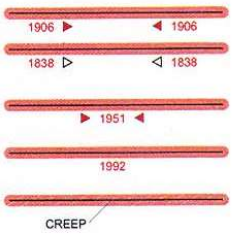
FAULT CLASSIFICATION COLOR CODE
(Indicating Recency of Movement)

Fault along which historic (last 200 years) displacement has occurred and is associated with one or more of the following:

(a) a recorded earthquake with surface rupture. (Also included are some well-defined surface breaks caused by ground shaking during earthquakes, e.g. extensive ground breakage, not on the White Wolf fault, caused by the Arvin-Tehachapi earthquake of 1952). The date of the associated earthquake is indicated. Where repeated surface ruptures on the same fault have occurred, only the date of the latest movement may be indicated, especially if earlier reports are not well documented as to location of ground breaks.

(b) fault creep slippage - slow ground displacement usually without accompanying earthquakes.

(c) displaced survey lines.



A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.

Date bracketed by triangles indicates local fault break.

No triangle by date indicates an intermediate point along fault break.

Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.

Square on fault indicates where fault creep slippage has occured that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).

Holocene fault displacement (during past 11,700 years) without historic record. Geomorphic evidence for Holocene faulting includes sag ponds, scarps showing little erosion, or the following features in Holocene age deposits: offset stream courses, linear scarps, shutter ridges, and triangular faceted spurs. Recency of faulting offshore is based on the interpreted age of the youngest strata displaced by faulting.

Late Quaternary fault displacement (during past 700,000 years). Geomorphic evidence similar to that described for Holocene faults except features are less distinct. Faulting may be younger, but lack of younger overlying deposits precludes more accurate age classification.

Quaternary fault (age undifferentiated). Most faults of this category show evidence of displacement sometime during the past 1.6 million years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age. Unnumbered Quaternary faults were based on Fault Map of California, 1975. See Bulletin 201, Appendix D for source data.

Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissnce nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.

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Fault Map Legend

Figure 3a

ADDITIONAL FAULT SYMBOLS

Bar and ball on downthrown side (relative or apparent).

Arrows along fault indicate relative or apparent direction of lateral movement.

Arrow on fault indicates direction of dip.

Low angle fault (barbs on upper plate). Fault surface generally dips less than 45° but locally may have been subsequently steepened. On offshore faults, barbs simply indicate a reverse fault regardless of steepness of dip.

OTHER SYMBOLS

Numbers refer to annotations listed in the appendices of the accompanying report. Annotations include fault name, age of fault displacement, and pertinent references including Earthquake Fault Zone maps where a fault has been zoned by the Alquist-Priolo Earthquake Fault Zoning Act. This Act requires the State Geologist to delineate zones to encompass faults with Holocene displacement.

Structural discontinuity (offshore) separating differing Neogene structural domains. May indicate discontinuities between basement rocks.

Brawley Seismic Zone, a linear zone of seismicity locally up to 10 km wide associated with the releasing step between the Imperial and San Andreas faults.

Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION	
						ON LAND	OFFSHORE
Quaternary	Late Quaternary	Historic				Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
		Holocene	200		? ? ?	Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
		Pleistocene	11,700		? ?	Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
	Early Quaternary		700,000		?	Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
Pre-Quaternary			1,600,000*			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.
			4.5 billion (Age of Earth)				

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.

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Fault Map Legend

Figure 3b

Acceleration magnitudes also are dependent upon attenuation by rock and soil deposits, direction of rupture and type of fault; therefore, ground motions may vary considerably in the same general area.

CBC General Ground Motion Parameters: The 2016 CBC general ground motion parameters are based on the Risk-Targeted Maximum Considered Earthquake (MCE_R). The U.S. Geological Survey "U.S. Seismic Design Maps Web Application" (USGS, 2017) was used to obtain the site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters. The site soils have been classified as Site Class D (stiff soil profile). Design spectral response acceleration parameters are defined as the earthquake ground motions that are two-thirds (2/3) of the corresponding MCE_R ground motions. Design earthquake ground motion parameters are provided in Table 2. A Risk Category II was determined using Table 1604.5 and the Seismic Design Category is E since S_1 is greater than 0.75.

The Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration (PGA_M) value was determined from the "U.S. Seismic Design Maps Web Application" (USGS, 2017) for liquefaction and seismic settlement analysis in accordance with 2016 CBC Section 1803.5.12 and CGS Note 48 ($PGA_M = F_{PGA}*PGA$). A PGA_M value of 0.85g is used for liquefaction settlement analysis.

3.5 Seismic and Other Hazards

► **Groundshaking.** The primary seismic hazard at the project site is the potential for strong groundshaking during earthquakes along the San Andreas Fault. A further discussion of groundshaking follows in Section 3.4.

► **Surface Rupture.** The project site does not lie within a State of California, Alquist-Priolo Earthquake Fault Zone. Surface fault rupture is considered to be unlikely at the project site because of the well-delineated fault lines through the Coachella Valley as shown on USGS and CDMG maps. However, because of the high tectonic activity and deep alluvium of the region, we cannot preclude the potential for surface rupture on undiscovered or new faults that may underlie the site.

► **Liquefaction.** Liquefaction is unlikely to be a potential hazard at the site, since the groundwater is believed to be deeper than 50 feet (the maximum depth that liquefaction is known to occur).

Table 2
2016 California Building Code (CBC) and ASCE 7-10 Seismic Parameters

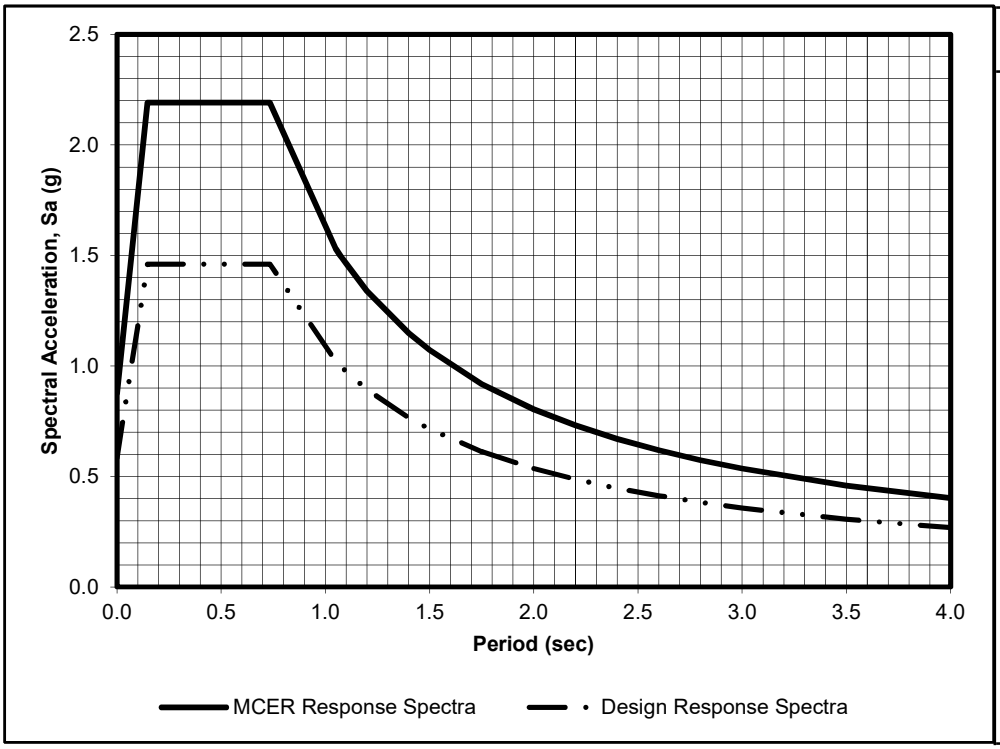
			CBC Reference
Soil Site Class:	**D**		Table 20.3-1
Latitude:	33.8283	N	
Longitude:	-116.4569	W	
Risk Category:	II		
Seismic Design Category:	E		

Maximum Considered Earthquake (MCE) Ground Motion

Mapped MCE_R Short Period Spectral Response	S_s	2.191 g	Figure 1613.3.1(1)	
Mapped MCE_R 1 second Spectral Response	S_1	1.072 g	Figure 1613.3.1(2)	
Short Period (0.2 s) Site Coefficient	F_a	1.00	Table 1613.3.3(1)	
Long Period (1.0 s) Site Coefficient	F_v	1.50	Table 1613.3.3(2)	
MCE_R Spectral Response Acceleration Parameter (0.2 s)	S_{MS}	2.191 g	$= F_a * S_s$	Equation 16-37
MCE_R Spectral Response Acceleration Parameter (1.0 s)	S_{M1}	1.608 g	$= F_v * S_1$	Equation 16-38

Design Earthquake Ground Motion

Design Spectral Response Acceleration Parameter (0.2 s)	S_{DS}	1.461 g	$= 2/3*S_{MS}$	Equation 16-39
Design Spectral Response Acceleration Parameter (1.0 s)	S_{D1}	1.072 g	$= 2/3*S_{M1}$	Equation 16-40
Risk Coefficient at Short Periods (less than 0.2 s)	C_{RS}	0.963		ASCE Figure 22-17
Risk Coefficient at Long Periods (greater than 1.0 s)	C_{R1}	0.914		ASCE Figure 22-18
	T_L	8.00 sec		ASCE Figure 22-12
	T_O	0.15 sec	$=0.2*S_{D1}/S_{DS}$	
	T_S	0.73 sec	$=S_{D1}/S_{DS}$	
Peak Ground Acceleration	PGA_M	0.85 g		ASCE Equation 11.8-1



Period T (sec)	Sa (g)	MCE_R Sa (g)
0.00	0.58	0.88
0.15	1.46	2.19
0.73	1.46	2.19
1.05	1.02	1.53
1.06	1.01	1.52
1.07	1.00	1.50
1.08	0.99	1.49
1.10	0.97	1.46
1.20	0.89	1.34
1.20	0.89	1.34
1.40	0.77	1.15
1.50	0.71	1.07
1.75	0.61	0.92
2.00	0.54	0.80
2.20	0.49	0.73
2.40	0.45	0.67
2.60	0.41	0.62
2.80	0.38	0.57
3.00	0.36	0.54
3.50	0.31	0.46
4.00	0.27	0.40

Other Potential Geologic Hazards.

► **Landsliding.** The hazard of landsliding is unlikely due to the regional planar topography. No ancient landslides are shown on geologic maps of the region and no indications of landslides were observed during our site investigation.

► **Volcanic hazards.** The site is not located in proximity to any known volcanically active area and the risk of volcanic hazards is considered very low.

► **Tsunamis, sieches, and flooding.** The site does not lie near any large bodies of water, so the threat of tsunami, sieches, or other seismically-induced flooding is unlikely. The project site is located within a Federal Emergency Management Agency (FEMA) Other Flood Areas Zone X (as shown on Plate A-6).

► **Expansive soil.** The near surface soils at the project site consist of sands which are non-expansive in nature.

3.6 Subsurface Soil

Subsurface soils encountered during the field exploration conducted on August 31 and September 14, 2017 consist of medium dense to dense sands to maximum depth penetrated. The near surface soils are non-expansive in nature. The subsurface logs (Plates B-1 through B-11) depict the stratigraphic relationships of the various soil types.

3.7 Groundwater

Groundwater was not encountered in the test pits during the time of exploration. According to Coachella Valley Water District (CVWD) readings of groundwater levels from nearby wells, groundwater is located at a depth of approximately 230 feet below the ground surface in the vicinity of the project site.

There is uncertainty in the accuracy of short-term water level measurements, particularly in fine-grained soil. Groundwater levels may fluctuate with precipitation, irrigation of adjacent properties, drainage, and site grading. The groundwater level noted should not be interpreted to represent an accurate or permanent condition.

Based on the general topography, groundwater flow directions are estimated to be toward the southeast within the subject site area. Flow directions may also vary locally in the vicinity of the site.

Historic groundwater records in the vicinity of the project site indicate that groundwater has fluctuated between 130 to 170 feet below the ground surface over the last 65 years according to the Coachella Valley Water District and to a report "Coachella Valley Investigation" conducted by the Department of Water Resources, published July 1964.

3.8 Hydro-consolidation

In arid climatic regions, granular soils have a potential to collapse upon wetting. This collapse (hydro-consolidation) phenomena is the result of the lubrication of soluble cements (carbonates) in the soil matrix causing the soil to densify from its loose configuration during deposition.

Collapse potential tests (Plates C-7) performed on a remolded sample from the site indicated a slight risk of collapse upon saturation. Therefore, development of building foundation is not required to include provisions for mitigating the hydro-consolidation caused by soil saturation from landscape irrigation or broken utility lines.

3.9 Regional Subsidence

The project is located in the Coachella Valley which has experienced up to 12 inches of regional subsidence between 1996 and 2005 (USGS, 2007). The risk of regional subsidence at the project site is considered low.

Section 4
DESIGN CRITERIA

4.1 Site Preparation

Pre-grade Meeting: Prior to site preparation, a meeting should be held at the site with as a minimum, the owner's representative, grading contractor and geotechnical engineer in attendance.

Clearing and Grubbing: All surface improvements, debris and/or vegetation including grass, trees, and weeds on the site at the time of construction should be removed from the construction area. Root balls should be completely excavated. Organic stripping should be hauled from the site and not used as fill. ***Any trash, construction debris, concrete slabs, old pavement, and buried obstructions such as old foundations and utility lines exposed during rough grading should be traced to the limits of the foreign materials and removed***. Any excavations resulting from site clearing and grubbing should be dish-shaped to the lowest depth of disturbance and backfilled with engineered fill.

Building Pad Preparation: The existing surface soil within the building pad areas should be removed to 24 inches below the lowest foundation grade or 48 inches below the original grade (whichever is deeper), extending five feet beyond all exterior wall/column lines (including adjacent concreted areas). The exposed sub-grade should be scarified to a depth of 8 inches, uniformly moisture conditioned to at least 2% over optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density

The on-site soils are suitable for use as compacted fill and utility trench backfill. Imported fill soil (if required) should similar to onsite soil or non-expansive, granular soil meeting the USCS classifications of SM, SP-SM, or SW-SM with a maximum rock size of 3 inches. ***The geotechnical engineer should approve imported fill soil sources before hauling material to the site***. Native, stock pile and imported materials should be placed in lifts no greater than 8 inches in loose thickness, uniformly moisture conditioned to at least 2% over optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

In areas other than the building pad which are to receive concrete slabs and asphalt concrete pavement, the ground surface should be over-excavated to a depth of 12 inches, uniformly moisture conditioned to at least 2% over optimum moisture, and re-compacted to at least 90% of ASTM D1557 maximum density.

Trench Backfill: On-site soil free of debris, vegetation, and other deleterious matter may be suitable for use as utility trench backfill. Backfill within roadways should be placed in layers not more that 6 inches in thickness, uniformly moisture conditioned to at least 2% over optimum moisture and mechanically compacted to a minimum of 90% of the ASTM D1557 maximum dry density except for the top 12 inches of the trench which shall be compacted to at least 95%. Native backfill should only be placed and compacted after encapsulating buried pipes with suitable bedding and pipe envelope material.

Pipe envelope/bedding should either be clean sand (Sand Equivalent SE>30) or crushed rock when encountering groundwater. A geotextile filter fabric (Mirafi 140N or equivalent) should be used to encapsulate the crushed rock to reduce the potential for in-washing of fines into the gravel void space. Precautions should be taken in the compaction of the backfill to avoid damage to the pipes and structures.

Moisture Control and Drainage: The moisture condition of the building pad should be maintained during trenching and utility installation until concrete is placed or should be rewetted before initiating delayed construction. If soil drying is noted, a 2 to 3 inches depth of water may be used in the bottom of footings to restore footing subgrade moisture and reduce potential edge lift.

Adequate site drainage is essential to future performance of the project. Infiltration of excess irrigation water and stormwaters can adversely affect the performance of the subsurface soil at the site. Positive drainage should be maintained away from all structures (5% for 5 feet minimum across unpaved areas) to prevent ponding and subsequent saturation of the native soil. Gutters and downspouts may be considered as a means to convey water away from foundations. If landscape irrigation is allowed next to the building, drip irrigation systems or lined planter boxes should be used. The subgrade soil should be maintained in a moist, but not saturated state, and not allowed to dry out. Drainage should be maintained without ponding.

Observation and Density Testing: All site preparation and fill placement should be continuously observed and tested by a representative of a qualified geotechnical engineering firm. Full-time observation services during the excavation and scarification process is necessary to detect undesirable materials or conditions and soft areas that may be encountered in the construction area. The geotechnical firm that provides observation and testing during construction shall assume the responsibility of "***geotechnical engineer of record***" and, as such, shall perform additional tests and investigation as necessary to satisfy themselves as to the site conditions and the recommendations for site development.

Auxiliary Structures Foundation Preparation: Auxiliary structures such as free standing or retaining walls should have the existing soil beneath the structure foundation prepared in the manner recommended for the building pad except the preparation needed only to extend 18 inches below and beyond the footing.

4.2 Foundations and Settlements

Shallow column footings and continuous wall footings are suitable to support the structures provided they are founded on a layer of properly prepared and compacted soil as described in Section 4.1. The foundations may be designed using an allowable soil bearing pressure of 1,800 psf. The allowable soil pressure may be increased by 20% for each foot of embedment depth in excess of 18 inches and by one-third for short term loads induced by winds or seismic events. The maximum allowable soil pressure at increased embedment depths shall not exceed 2,800 psf.

All exterior and interior foundations should be embedded a minimum of 18 inches below the building support pad or lowest adjacent final grade, whichever is deeper. Continuous wall footings should have a minimum width of 12 inches. Column footings should have a minimum width of 24 inches and should not be structurally isolated. ***Recommended concrete reinforcement and sizing for all footings should be provided by the structural engineer.***

Resistance to horizontal loads will be developed by passive earth pressure on the sides of footings and frictional resistance developed along the bases of footings and concrete slabs. Passive resistance to lateral earth pressure may be calculated using an equivalent fluid pressure of 300 pcf to resist lateral loadings.

The top one foot of embedment should not be considered in computing passive resistance unless the adjacent area is confined by a slab or pavement. An allowable friction coefficient of 0.4 may also be used at the base of the footings to resist lateral loading.

Foundation movement under the estimated static (non-seismic) loadings and static site conditions are estimated to not exceed ¾ inch with differential movement of about two-thirds of total movement for the loading assumptions stated above when the subgrade preparation guidelines given above are followed.

4.3 Slabs-On-Grade

Concrete slabs and flatwork should be a minimum of 4 inches thick. Concrete slabs and flatworks should be determined by the design engineer. Concrete floor slabs may either be monolithically placed with the foundation or dowelled after footing placement. The concrete slabs may be placed on granular subgrade that has been compacted at least 90% relative compaction (ASTM D1557).

American Concrete Institute (ACI) guidelines (ACI 302.1R-04 Chapter 3, Section 3.2.3) provide recommendations regarding the use of moisture barriers beneath concrete slabs. The concrete floor slabs should be underlain by a 10-mil polyethylene vapor retarder that works as a capillary break to reduce moisture migration into the slab section. All laps and seams should be overlapped 6-inches or as recommended by the manufacturer. The vapor retarder should be protected from puncture. The joints and penetrations should be sealed with the manufacturer's recommended adhesive, pressure-sensitive tape, or both. The vapor retarder should extend a minimum of 12 inches into the footing excavations. The vapor retarder should be covered by 4 inches of clean sand (Sand Equivalent SE>30) unless placed on 2.5 feet of granular fill, in which case, the vapor retarder may lie directly on the granular fill with 2 inches of clean sand cover.

Placing sand over the vapor retarder may increase moisture transmission through the slab, because it provides a reservoir for bleed water from the concrete to collect. The sand placed over the vapor retarder may also move and mound prior to concrete placement, resulting in an irregular slab thickness.

For areas with moisture sensitive flooring materials, ACI recommends that concrete slabs be placed without a sand cover directly over the vapor retarder, provided that the concrete mix uses a low-water cement ratio and concrete curing methods are employed to compensate for release of bleed water through the top of the slab. The vapor retarder should have a minimum thickness of 15-mil (Stego-Wrap or equivalent).

Control joints should be provided in all concrete slabs-on-grade at a maximum spacing (in feet) of 2 to 3 times the slab thickness (in inches) as recommended by American Concrete Institute (ACI) guidelines. All joints should form approximately square patterns to reduce randomly oriented contraction cracks. Contraction joints in the slabs should be tooled at the time of the pour or sawcut (¼ of slab depth) within 6 to 8 hours of concrete placement. Construction (cold) joints in foundations and area flatwork should either be thickened butt-joints with dowels or a thickened keyed-joint designed to resist vertical deflection at the joint. All joints in flatwork should be sealed to prevent moisture, vermin, or foreign material intrusion. Precautions should be taken to prevent curling of slabs in this arid desert region (refer to ACI guidelines).

All independent concrete flatworks should be underlain by 12 inches of moisture conditioned and compacted soils. All flatwork should be jointed in square patterns and at irregularities in shape at a maximum spacing of 10 feet or the least width of the sidewalk.

4.4 Concrete Mixes and Corrosivity

Selected chemical analyses for corrosivity were conducted on bulk samples of the near surface soil from the project site (Plate C-5). The native soils tested were shown to have low levels of sulfate and chloride ion concentrations. Resistivity determinations on the soil indicate low potential for metal loss because of electrochemical corrosion processes.

A minimum of 2,500 psi concrete of Type II Portland Cement with a maximum water/cement ratio of 0.60 (by weight) should be used for concrete placed in contact with native soil on this project (sitework including streets, sidewalks, driveways, patios, and foundations).

A minimum concrete cover of three (3) inches is recommended around steel reinforcing or embedded components (anchor bolts, hold-downs, etc.) exposed to native soil or landscape water (to 18 inches above grade). The concrete should also be thoroughly vibrated during placement.

Landmark does not practice corrosion engineering. We recommend that a qualified corrosion engineer evaluate the corrosion potential on metal construction materials and concrete at the site.

4.5 Excavations

All trench excavations should conform to CalOSHA requirements for Type C soil. The contractor is solely responsible for the safety of workers entering trenches. Temporary excavations with depths of 4 feet or less may be cut nearly vertical for short duration. Temporary slopes should be no steeper than 1.5:1 (horizontal: vertical). Sandy soil slopes should be kept moist, but not saturated, to reduce the potential of raveling or sloughing.

Trench excavations deeper than 4 feet will require shoring or slope inclinations in conformance to CAL/OSHA regulations for Type C soil. Surcharge loads of stockpiled soil or construction materials should be set back from the top of the slope a minimum distance equal to the height of the slope. All permanent slopes should not be steeper than 3:1 to reduce wind and rain erosion. Protected slopes with ground cover may be as steep as 2:1. However, maintenance with motorized equipment may not be possible at this inclination.

4.6 Lateral Earth Pressures

Earth retaining structures, such as retaining walls, should be designed to resist the soil pressure imposed by the retained soil mass. Walls with granular drained backfill may be designed for an assumed static earth pressure equivalent to that exerted by a fluid weighing 35 pcf for unrestrained (active) conditions (able to rotate 0.1% of wall height), and 50 pcf for restrained (at-rest) conditions. These values should be verified at the actual wall locations during construction.

4.7 Seismic Design

This site is located in the seismically active southern California area and the site structures are subject to strong ground shaking due to potential fault movements along the San Andreas fault. Engineered design and earthquake-resistant construction are the common solutions to increase safety and development of seismic areas. Designs should comply with the latest edition of the CBC for Site Class D using the seismic coefficients given in Section 3.4 of this report.

4.8 Permanent Slopes

Cut and Fill slopes should be constructed generally no steeper than 3 (H):1(V) to permit easy landscape maintenance and provide erosional stability form wind or rain while unprotected without landscape cover. Slope with a 2(H):1(V) gradient are permitted provided, it is recognized that such slopes are more prone to erosion and so not permit landscape maintenance by motorized riding equipment, and require landscape cover to retard erosion.

4.9 Pavements

Pavements should be designed according to CALTRANS or other acceptable methods. Traffic indices were not provided by the project engineer or owner; therefore, we have provided structural sections for several traffic indices for comparative evaluation. The public agency or design engineer should decide the appropriate traffic index for the site. Maintenance of proper drainage is necessary to prolong the service life of the pavements.

Based on the current State of California CALTRANS method, an estimated R-value of 60 for the subgrade soil and assumed traffic indices, the following table provides our estimates for asphaltic concrete (AC) pavement sections.

RECOMMENDED PAVEMENTS SECTIONS

R-Value of Subgrade Soil - 60 (estimated) Design Method - CALTRANS 2012

Traffic Index (assumed)	Flexible Pavements	
	Asphaltic Concrete Thickness (in.)	Aggregate Base Thickness (in.)
5.0	3.0	4.0
6.0	3.5	4.0
7.0	4.5	4.0
8.0	5.0	5.5

Notes:

1) Asphaltic concrete shall be Caltrans, Type B, ¾ inch maximum medium grading, (½ inch for parking areas) compacted to a minimum of 95% of the 50-blow Marshall density (ASTM D1559).
2) Aggregate base shall conform to Caltrans Class 2 (¾ in. maximum), compacted to a minimum of 95% of ASTM D1557 maximum dry density.
3) Place pavements on 8 inches of moisture conditioned (at least 2% of over optimum) native soil compacted to a minimum of 90% of the maximum dry density determined by ASTM D1557, or the governing agency requirements.

Final recommended pavement sections may need to be based on sampling and R-Value testing during grading operations when actual subgrade soils will be exposed.

Section 5
LIMITATIONS AND ADDITIONAL SERVICES

5.1 Limitations

The findings and professional opinions within this report are based on current information regarding the proposed commercial complex, located at 30260 Date Palm Drive in the city of Cathedral City, California. The conclusions and professional opinions of this report are invalid if:

- Proposed building(s) location and size are changed from those shown in this report
- Structural loads change from those stated or the structures are relocated.
- The Additional Services section of this report is not followed.
- This report is used for adjacent or other property.
- Changes of grade or groundwater occur between the issuance of this report and construction other than those anticipated in this report.
- Any other change that materially alters the project from that proposed at the time this report was prepared.

Findings and professional opinions in this report are based on selected points of field exploration, geologic literature, laboratory testing, and our understanding of the proposed project. Our analysis of data and professional opinions presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil conditions can exist between and beyond the exploration points or groundwater elevations may change. If detected, these conditions may require additional studies, consultation, and possible design revisions.

This report contains information that may be useful in the preparation of contract specifications. However, the report is not worded is such a manner that we recommend its use as a construction specification document without proper modification. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

This report was prepared according to the generally accepted *geotechnical engineering standards of practice* that existed in Riverside County at the time the report was prepared. No express or implied warranties are made in connection with our services.

This report should be considered invalid for periods after two years from the report date without a review of the validity of the findings and professional opinions by our firm, because of potential changes in the Geotechnical Engineering Standards of Practice.

The client has responsibility to see that all parties to the project including, designer, contractor, and subcontractor are made aware of this entire report. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

5.2 Additional Services

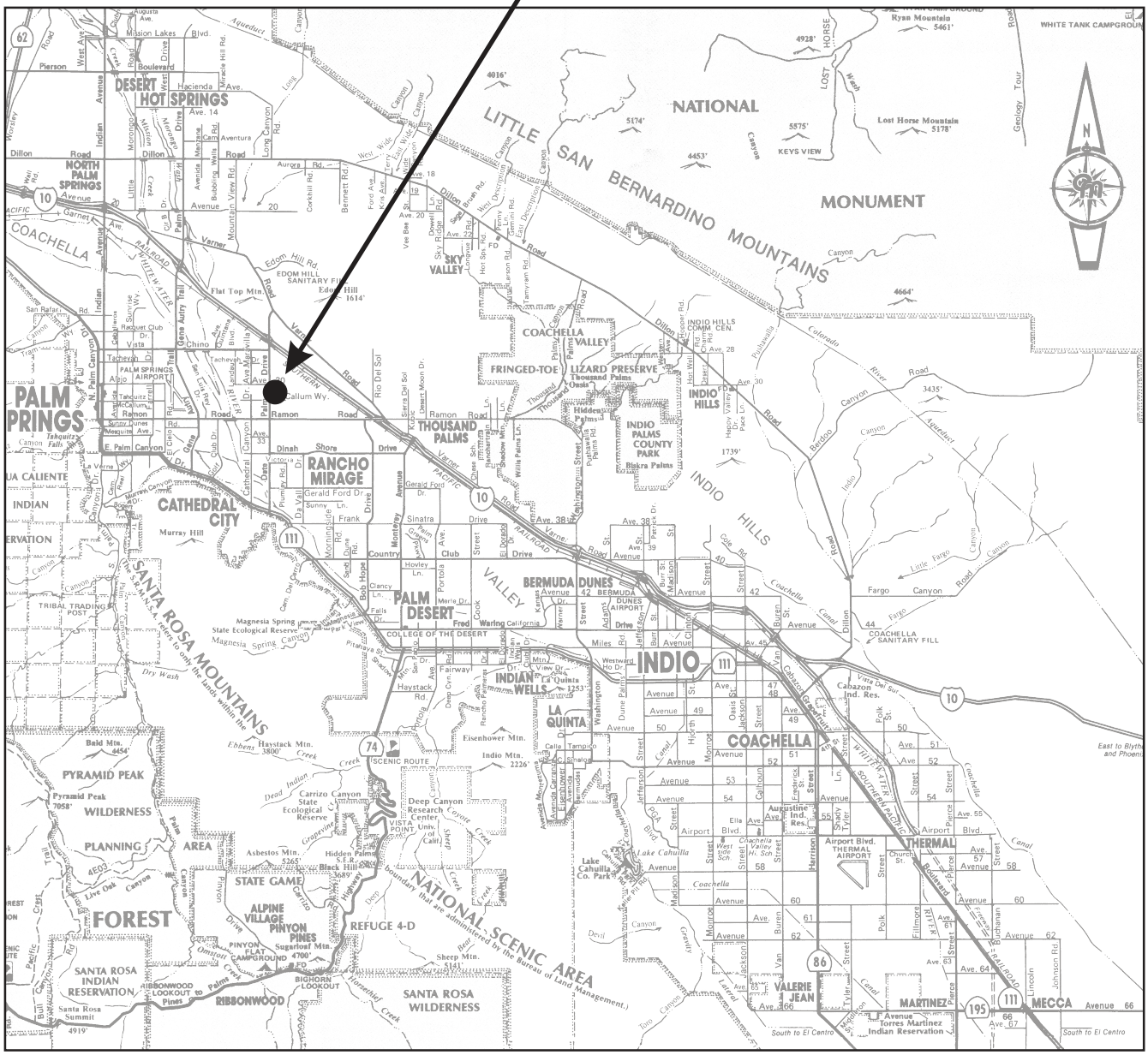
We recommend that a qualified geotechnical consultant be retained to provide the tests and observations services during construction. *The geotechnical engineering firm providing such tests and observations shall become the geotechnical engineer of record and assume responsibility for the project.*

The professional opinions presented in this report are based on the assumption that:

- Consultation during development of design and construction documents to check that the geotechnical professional opinions are appropriate for the proposed project and that the geotechnical professional opinions are properly interpreted and incorporated into the documents.
- ***LandMark Consultants, Inc.*** will have the opportunity to review and comment on the plans and specifications for the project prior to the issuance of such for bidding.
- Continuous observation, inspection, and testing by the geotechnical consultant of record during site clearing, grading, excavation, placement of fills, building pad and subgrade preparation, and backfilling of utility trenches.
- Observation of foundation excavations and reinforcing steel before concrete placement.
- Other consultation as necessary during design and construction.

We emphasize our review of the project plans and specifications to check for compatibility with our professional opinions and conclusions. Additional information concerning the scope and cost of these services can be obtained from our office.

APPENDIX A

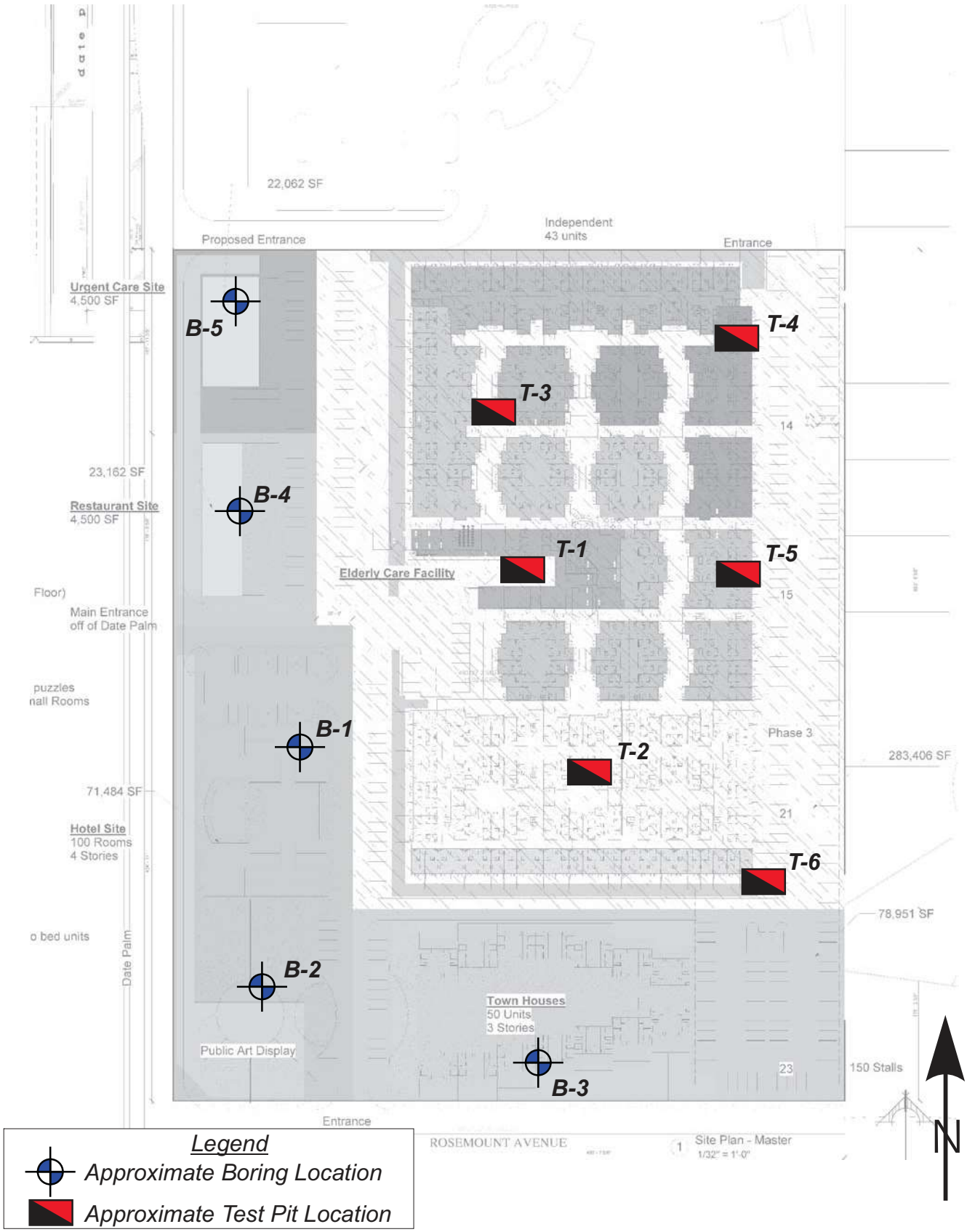


LANDMARK
Geo-Engineers and Geologists

Project No.: LP17122

Vicinity Map

Plate A-1



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Geo-Engineers and Geologists

Project No.: LP17122

Site and Exploration Plan

Plate A-2

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

9/27/2017
Page 1 of 3

LANDMARK
Geo-Engineers and Geologists

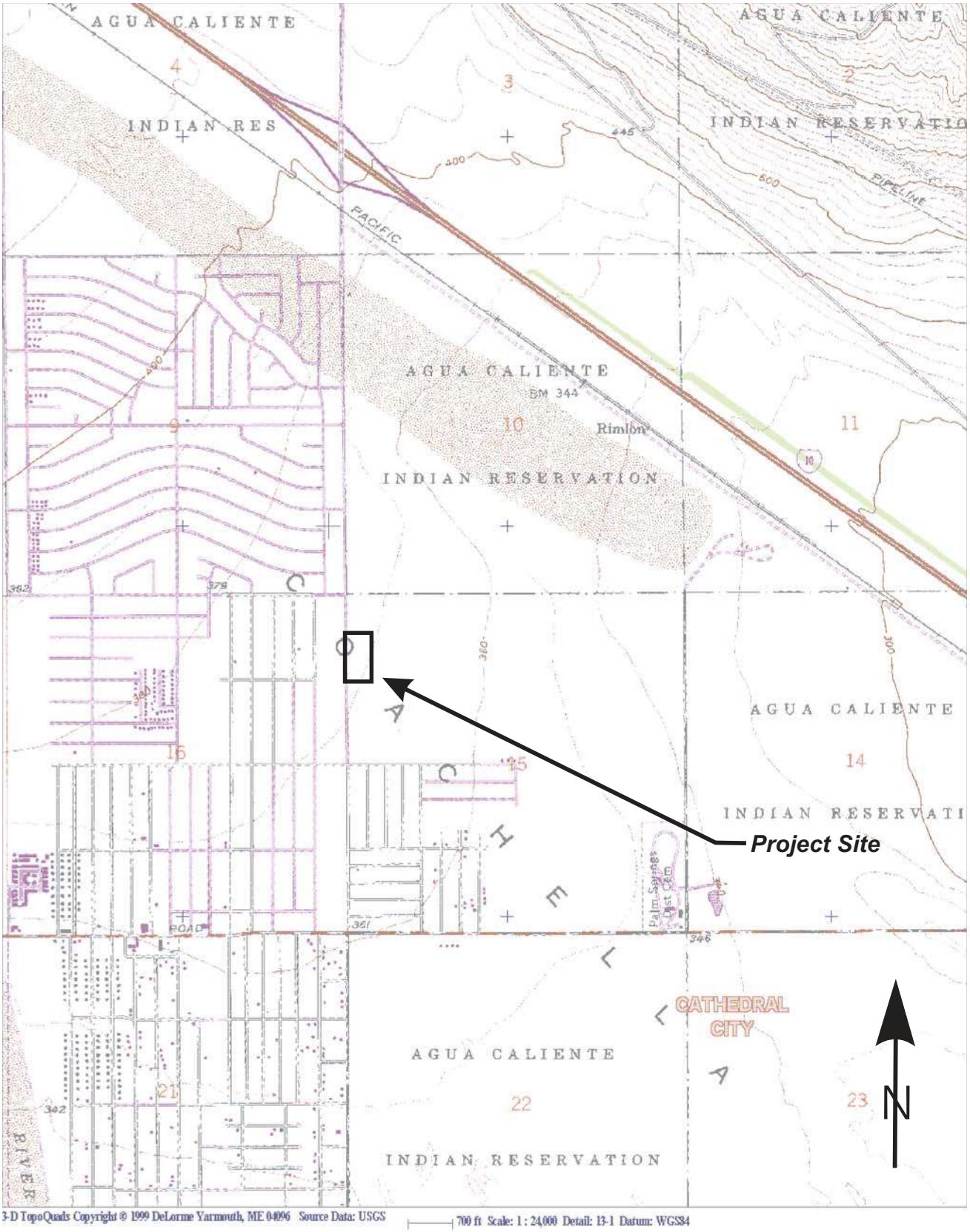
Project No.: LP17122

USDA Soil Conservation Soil Service Map

Plate A-3

Map Unit Legend

Riverside County, Coachella Valley Area, California (CA680)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
MaB	Myoma fine sand, 0 to 5 percent slopes	88.6	100.0%
Totals for Area of Interest		**88.6**	**100.0%**



LANDMARK
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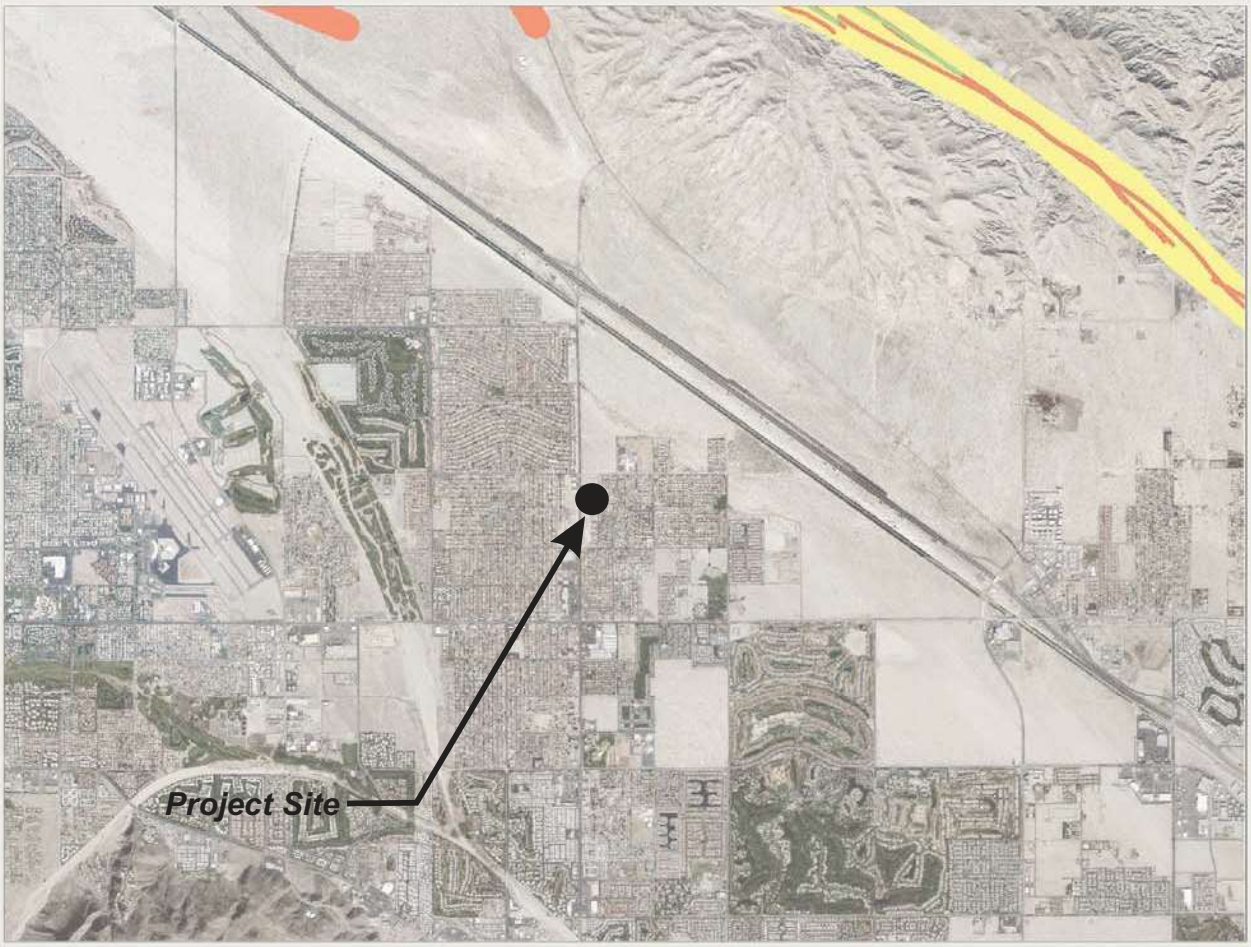
Project No.: LP17122

Topographic Map

Plate A-4

Fault Map



Legend

Faults
- <all other values>
- ALQUIST-PRIOLO
- RIVERSIDE COUNTY

Fault Zones
- <all other values>
- COUNTY FAULT ZONE
- ELSINORE FAULT ZONE
- SAN ANDREAS FAULT ZONE
- SAN JACINTO FAULT ZONE

Notes

RCIT

0 6,788 13,576 Feet

IMPORTANT Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. The County of Riverside makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

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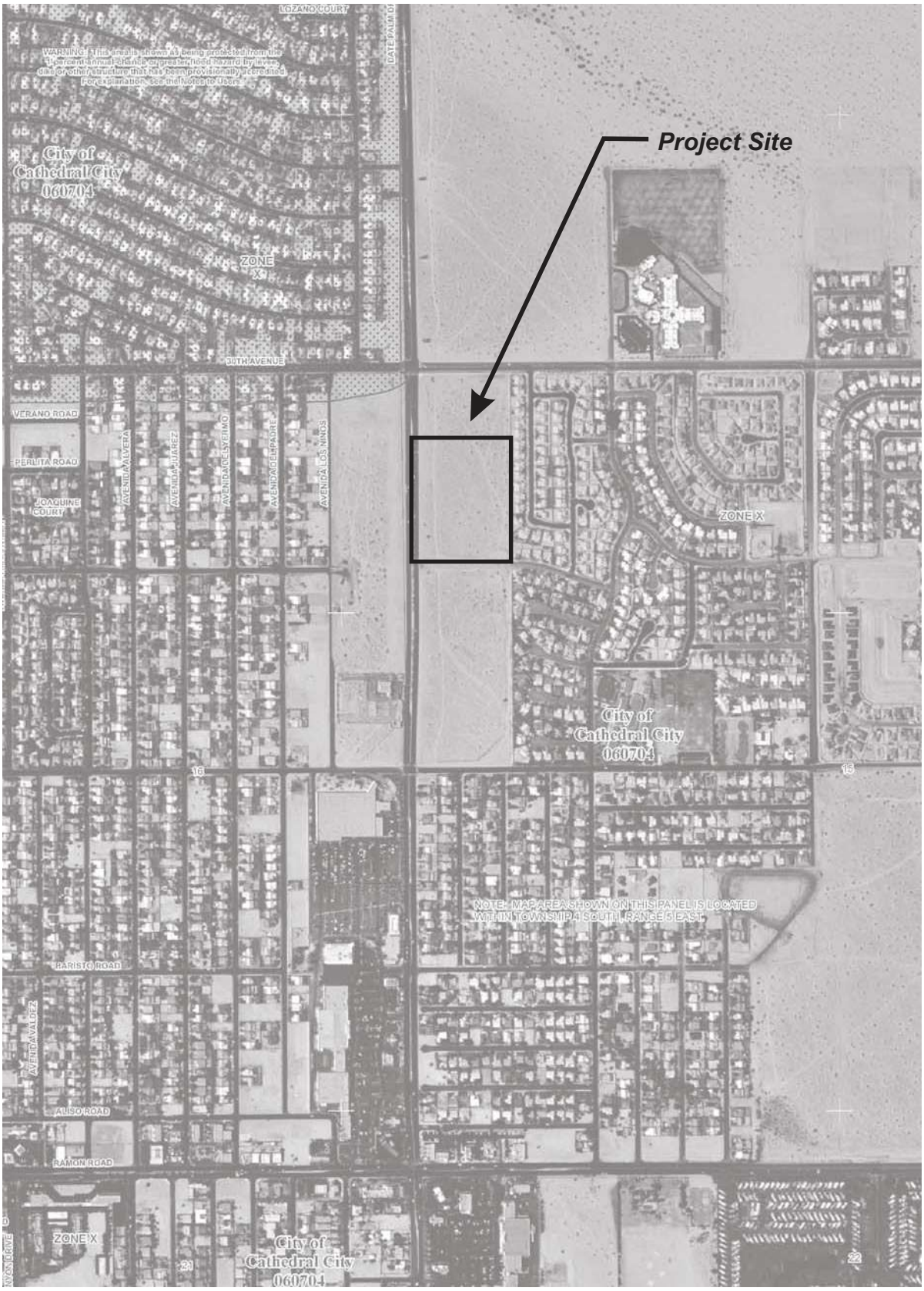
LANDMARK
Geo-Engineers and Geologists

Project No.: LP17122

Riverside County
Geographic Information System (GIS)
Fault Map

Plate
A-5



LANDMARK
Geo-Engineers and Geologists

Project No.: LP17122

FEMA Flood Zones

Plate
A-6

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

23 — 23 — Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

$^{24}76^{000m}$N — 1000-meter Universal Transverse Mercator grid values, zone 11N

600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection

DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)

● M1.5 — River Mile

APPENDIX B

LOG OF BORING No. B-1

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
0					SAND (SP-SM): Grayish brown, dry, fine grained, medium dense to dense			Passing #200 = 7.1%
5			21			107.3	1.9	
10			18				0.3	Passing #200 = 9.2%
15			27			115.0	1.0	
20			19				0.6	
25			30				0.3	Passing #200 = 7.2%
30			18				1.4	Passing #200 = 8.1%
35			31				1.4	
40			41		SILTY SAND (SM): Grayish brown, dry, fine grained, very dense		3.0	Passing #200 = 18.1%
45			50/6"		SAND (SP-SM): Grayish brown, dry, fine grained, very dense, some gravel		0.6	Passing #200 = 5.6%
50			44					
55					Total Depth = 51.5' Groundwater not encountered at time of drilling Backfilled with excavated soil			
60								

DATE DRILLED: 8/31/17 | TOTAL DEPTH: 51.5 Feet | DEPTH TO WATER: NA

LOGGED BY: G. Chandra | TYPE OF BIT: Hollow Stem Auger | DIAMETER: 8 in.

SURFACE ELEVATION: Approximately 370' | HAMMER WT.: 140 lbs. | DROP: 30 in.

PROJECT NO. LP17122

LANDMARK Geo-Engineers and Geologists

PLATE B-1

LOG OF BORING No. B-2

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
5			24		SAND (SP-SM): Grayish brown, dry, fine grained, medium dense to dense	107.8	0.6	Passing #200 = 10.3%
10			12				1.7	
15			42			106.0	8.5	
20			33		SILTY SAND (SM): Grayish brown, dry, fine grained, dense		0.9	Passing #200 = 15.5%
25			26		SAND (SP-SM): Grayish brown, dry, fine grained, medium dense to dense			
30								
35								
40								
45								
50								
55					Total Depth = 26.5' Groundwater not encountered at time of drilling Backfilled with excavated soil			
60								

DATE DRILLED: 8/31/17

LOGGED BY: G. Chandra

SURFACE ELEVATION: Approximately 370'

TOTAL DEPTH: 26.5 Feet

TYPE OF BIT: Hollow Stem Auger

HAMMER WT.: 140 lbs.

DEPTH TO WATER: NA

DIAMETER: 8 in.

DROP: 30 in.

PROJECT NO. LP17122

LANDMARK
Geo-Engineers and Geologists

PLATE B-2

LOG OF BORING No. B-3

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
5			22		SAND (SP-SM): Grayish brown, dry, fine grained, medium dense	96.5	1.5	
10			9		SILTY SAND (SM): Grayish brown, dry, fine grained, loose		2.1	Passing #200 = 15.3%
15			26		SAND (SP-SM): Grayish brown, dry, fine grained, medium dense to dense	85.5	0.6	
20			22				0.7	Passing #200 = 7.1%
25			18				0.5	
30			22				0.4	Passing #200 = 4.1%
35			19				0.8	
40			64		trace gravel		0.2	Passing #200 = 7.0%
45								
50								
55					Total Depth = 41.5' Groundwater not encountered at time of drilling Backfilled with excavated soil			
60								

DATE DRILLED: 8/31/17

LOGGED BY: G. Chandra

SURFACE ELEVATION: Approximately 370'

TOTAL DEPTH: 41.5 Feet

TYPE OF BIT: Hollow Stem Auger

HAMMER WT.: 140 lbs.

DEPTH TO WATER: NA

DIAMETER: 8 in.

DROP: 30 in.

PROJECT NO. LP17122

LANDMARK Geo-Engineers and Geologists

PLATE B-3

LOG OF BORING No. B-4

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
5			22		SAND (SP-SM): Grayish brown, dry, fine grained, medium dense	114.8	0.6	Passing #200 = 7.5%
10			10				1.9	
15			32		SILTY SAND (SM): Grayish brown, dry, fine grained, dense	111.1	3.8	Passing #200 = 26.0%
20			25		SAND (SP-SM): Grayish brown, dry, fine grained, medium dense		0.6	
25								
30								
35								
40								
45								
50								
55					Total Depth = 21.5' Groundwater not encountered at time of drilling Backfilled with excavated soil			
60								

DATE DRILLED: 8/31/17

LOGGED BY: G. Chandra

SURFACE ELEVATION: Approximately 370'

TOTAL DEPTH: 21.5 Feet

TYPE OF BIT: Hollow Stem Auger

HAMMER WT.: 140 lbs.

DEPTH TO WATER: NA

DIAMETER: 8 in.

DROP: 30 in.

PROJECT NO. LP17122

LANDMARK
Geo-Engineers and Geologists

PLATE B-4

LOG OF BORING No. B-5

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
5			22		SAND (SP-SM): Grayish brown, dry, fine grained, medium dense to dense	104.7	2.2	
10			13		SILTY SAND (SM): Grayish brown, dry, fine grained, dense		4.2	Passing #200 = 32.0%
15			27		SAND (SP-SM): Grayish brown, dry, fine grained, medium dense to dense	105.5	1.1	
20			29				0.4	Passing #200 = 6.9%
25								
30								
35								
40								
45								
50								
55					Total Depth = 21.5' Groundwater not encountered at time of drilling Backfilled with excavated soil			
60								

DATE DRILLED: 8/31/17

LOGGED BY: G. Chandra

SURFACE ELEVATION: Approximately 370'

TOTAL DEPTH: 21.5 Feet

TYPE OF BIT: Hollow Stem Auger

HAMMER WT.: 140 lbs.

DEPTH TO WATER: NA

DIAMETER: 8 in.

DROP: 30 in.

PROJECT NO. LP17122

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PLATE B-5

LOG OF TEST PIT NO. T-1

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
0					SAND (SP-SM): Grayish brown, dry, fine grained	104.4	1.8	
5					increase in silt content			
10								
15					Total Depth = 15.0' Moisture and density values by Nuclear Densometer (ASTM 6938) Backfilled with excavated soil			
20								
25								
30								

DATE EXCAVATED: 5/14/17 TOTAL DEPTH: 15 Feet DEPTH TO WATER: N/A

LOGGED BY: J. Lorenzana TYPE OF BIT: Backhoe DIAMETER: N/A

SURFACE ELEVATION: Approximately 370' HAMMER WT.: N/A DROP: N/A

PROJECT NO. LP17122

LANDMARK Geo-Engineers and Geologists

PLATE B-6

LOG OF TEST PIT NO. T-2

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SAND (SP-SM): Grayish brown, dry, fine grained	105.4	2.5	
						104.0	2.8	
5					increase in silt content			
10								
15					Total Depth = 15.0' Moisture and density values by Nuclear Densometer (ASTM 6938) Backfilled with excavated soil			
20								
25								
30								

DATE EXCAVATED: 5/14/17 TOTAL DEPTH: 15 Feet DEPTH TO WATER: N/A

LOGGED BY: J. Lorenzana TYPE OF BIT: Backhoe DIAMETER: N/A

SURFACE ELEVATION: Approximately 370' HAMMER WT.: N/A DROP: N/A

PROJECT NO. LP17122

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PLATE B-7

LOG OF TEST PIT NO. T-3

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SAND (SP-SM): Grayish brown, dry, fine grained	105.3	2.3	
						105.1	3.0	
5					increase in silt content			
10								
15					Total Depth = 15.0' Moisture and density values by Nuclear Densometer (ASTM 6938) Backfilled with excavated soil			
20								
25								
30								

DATE EXCAVATED: 5/14/17 TOTAL DEPTH: 15 Feet DEPTH TO WATER: N/A

LOGGED BY: J. Lorenzana TYPE OF BIT: Backhoe DIAMETER: N/A

SURFACE ELEVATION: Approximately 370' HAMMER WT.: N/A DROP: N/A

PROJECT NO. LP17122

LANDMARK Geo-Engineers and Geologists

PLATE B-8

LOG OF TEST PIT NO. T-4

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SAND (SP-SM): Grayish brown, dry, fine grained	98.9	2.0	
						100.0	2.6	
5					increase in silt content			
10								
15					Total Depth = 15.0' Moisture and density values by Nuclear Densometer (ASTM 6938) Backfilled with excavated soil			
20								
25								
30								

DATE EXCAVATED: 5/14/17 TOTAL DEPTH: 15 Feet DEPTH TO WATER: N/A

LOGGED BY: J. Lorenzana TYPE OF BIT: Backhoe DIAMETER: N/A

SURFACE ELEVATION: Approximately 370' HAMMER WT.: N/A DROP: N/A

PROJECT NO. LP17122

LANDMARK Geo-Engineers and Geologists

PLATE B-9

LOG OF TEST PIT NO. T-5

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
					SAND (SP-SM): Grayish brown, dry, fine grained	109.0	1.6	
						103.0	2.3	
5					increase in silt content			
10								
15					Total Depth = 15.0' Moisture and density values by Nuclear Densometer (ASTM 6938) Backfilled with excavated soil			
20								
25								
30								

DATE EXCAVATED: 5/14/17 TOTAL DEPTH: 15 Feet DEPTH TO WATER: N/A

LOGGED BY: J. Lorenzana TYPE OF BIT: Backhoe DIAMETER: N/A

SURFACE ELEVATION: Approximately 370' HAMMER WT.: N/A DROP: N/A

PROJECT NO. LP17122

LANDMARK Geo-Engineers and Geologists

PLATE B-10

LOG OF TEST PIT NO. T-6

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
0					SAND (SP-SM): Grayish brown, dry, fine grained	104.0	1.8	
						105.9	1.9	
5					increase in silt content			
10								
15					Total Depth = 15.0' Moisture and density values by Nuclear Densometer (ASTM 6938) Backfilled with excavated soil			
20								
25								
30								

DATE EXCAVATED: 5/14/17 TOTAL DEPTH: 15 Feet DEPTH TO WATER: N/A

LOGGED BY: J. Lorenzana TYPE OF BIT: Backhoe DIAMETER: N/A

SURFACE ELEVATION: Approximately 370' HAMMER WT.: N/A DROP: N/A

PROJECT NO. LP17122

LANDMARK Geo-Engineers and Geologists

PLATE B-11

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
Coarse grained soils More than half of material is larger that No. 200 sieve	**Gravels** More than half of coarse fraction is larger than No. 4 sieve	Clean gravels (less than 5% fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, or gravel-sand mixtures, little or no fines
		Gravel with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	Sands More than half of coarse fraction is smaller than No. 4 sieve	Clean sands (less than 5% fines)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
Fine grained soils More than half of material is smaller than No. 200 sieve	**Silts and clays** Liquid limit is less than 50%		ML	Inorganic silts, clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravely, sandy, or lean clays
			OL	Organic silts and organic clays of low plasticity
	Silts and clays Liquid limit is more than 50%		MH	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
Highly organic soils			PT	Peat and other highly organic soils

GRAIN SIZES

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		
200	40	10	4	3/4"	3"	12"	

US Standard Series Sieve — Clear Square Openings

Sands, Gravels, etc.	Blows/ft. *
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Clays & Plastic Silts	Strength **	Blows/ft. *
Very Soft	0-0.25	0-2
Soft	0.25-0.5	2-4
Firm	0.5-1.0	4-8
Stiff	1.0-2.0	8-16
Very Stiff	2.0-4.0	16-32
Hard	Over 4.0	Over 32

* Number of blows of 140 lb. hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 in. I.D.) split spoon (ASTM D1586).

** Unconfined compressive strength in tons/s.f. as determined by laboratory testing or approximated by the Standard Penetration Test (ASTM D1586), Pocket Penetrometer, Torvane, or visual observation.

Type of Samples:

Ring Sample — Standard Penetration Test — Shelby Tube — Bulk (Bag) Sample

Drilling Notes:

1. Sampling and Blow Counts
   - Ring Sampler - Number of blows per foot of a 140 lb. hammer falling 30 inches.
   - Standard Penetration Test - Number of blows per foot.
   - Shelby Tube - Three (3) inch nominal diameter tube hydraulically pushed.
2. P. P. = Pocket Penetrometer (tons/s.f.).
3. NR = No recovery.
4. GWT = Ground Water Table observed @ specified time.

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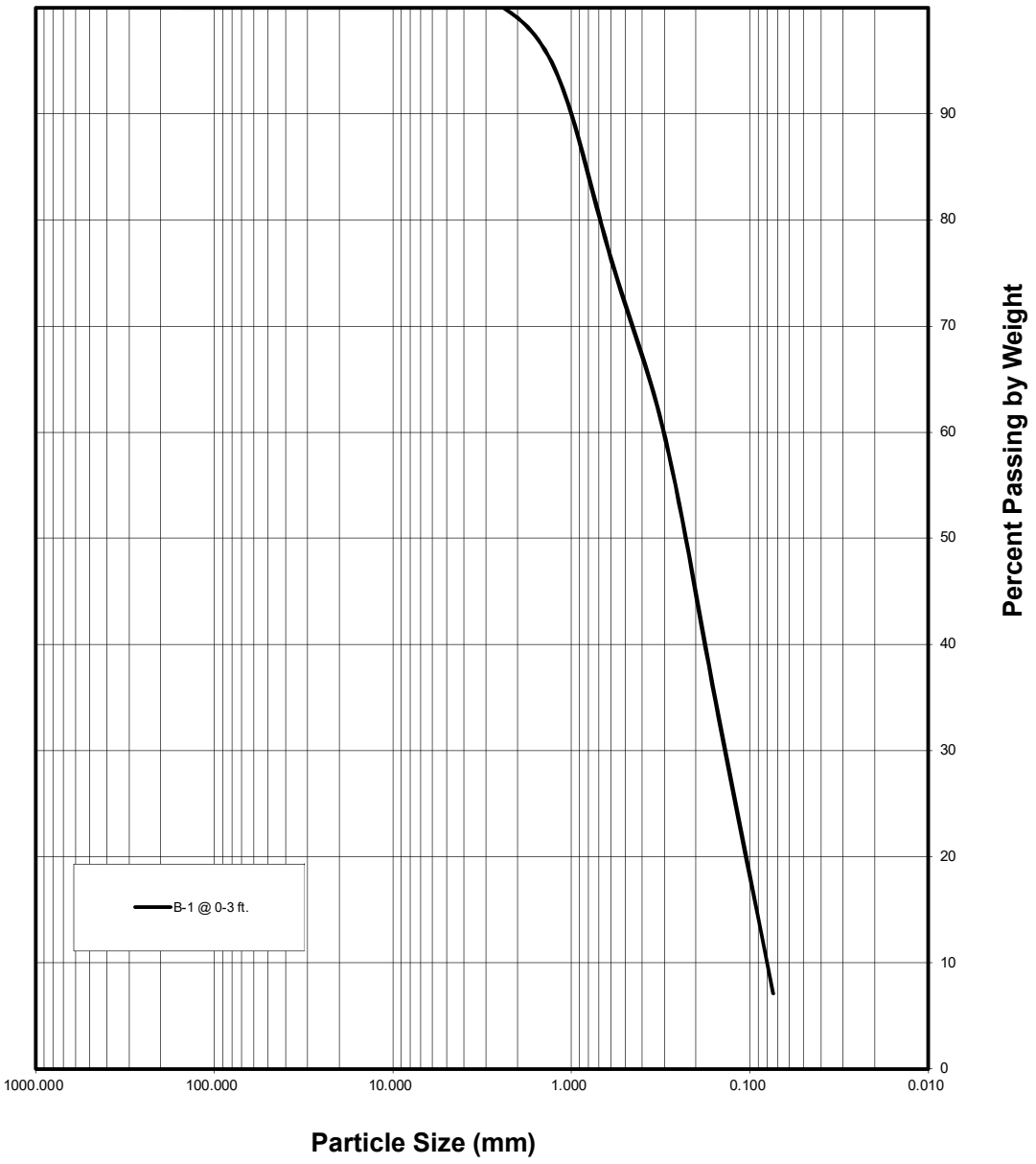
Project No. LP17122

Key to Logs

Plate B-12

APPENDIX C

SIEVE ANALYSIS						
Cobbles and Boulders	Gravel		Sand			Silt and Clay
	Coarse	Fine	Coarse	Medium	Fine	



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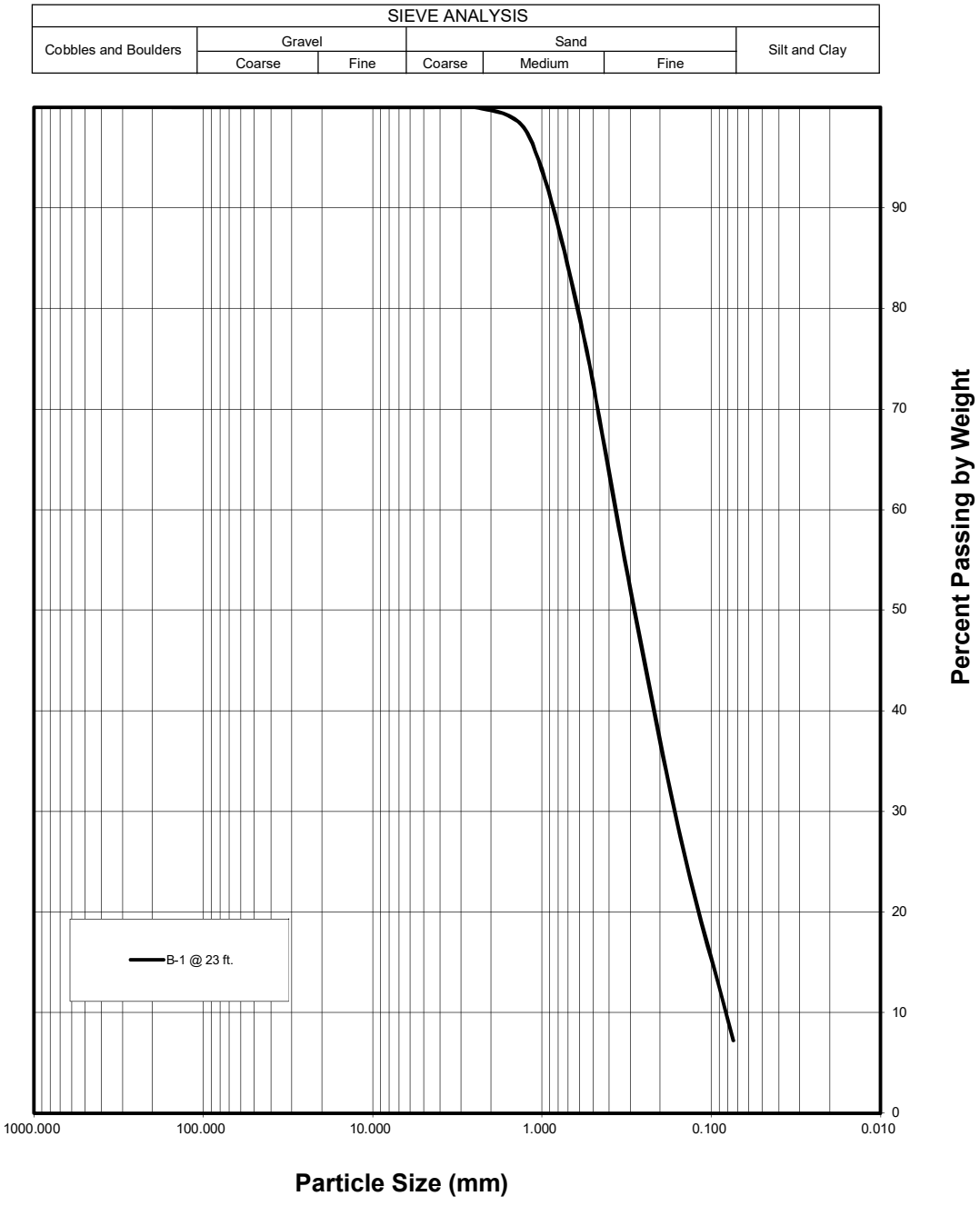
Project No.: LP17122

Grain Size Analysis

Plate C-1



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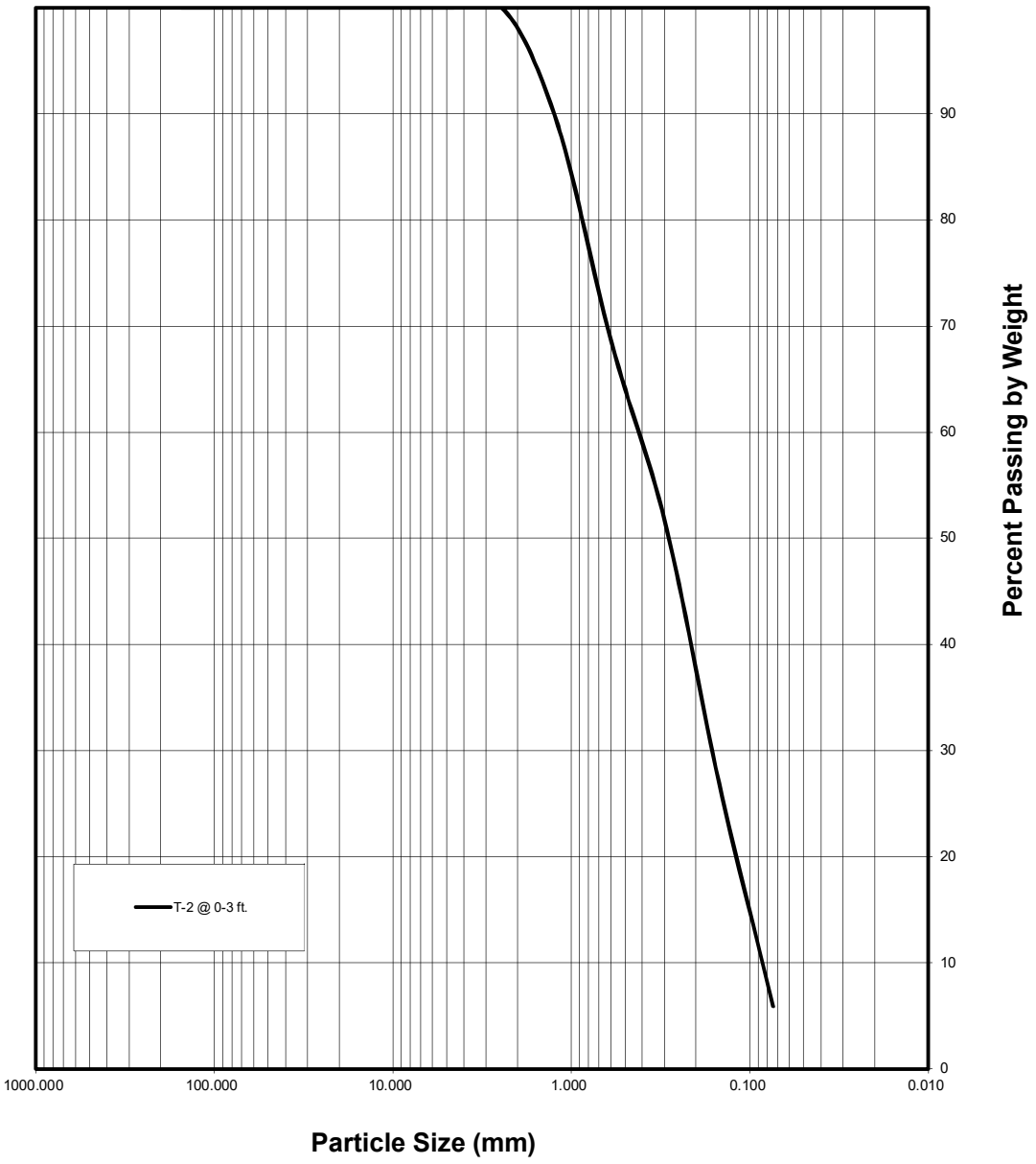
Project No.: LP17122

Grain Size Analysis

Plate C-2

SIEVE ANALYSIS						
Cobbles and Boulders	Gravel		Sand			Silt and Clay
	Coarse	Fine	Coarse	Medium	Fine	



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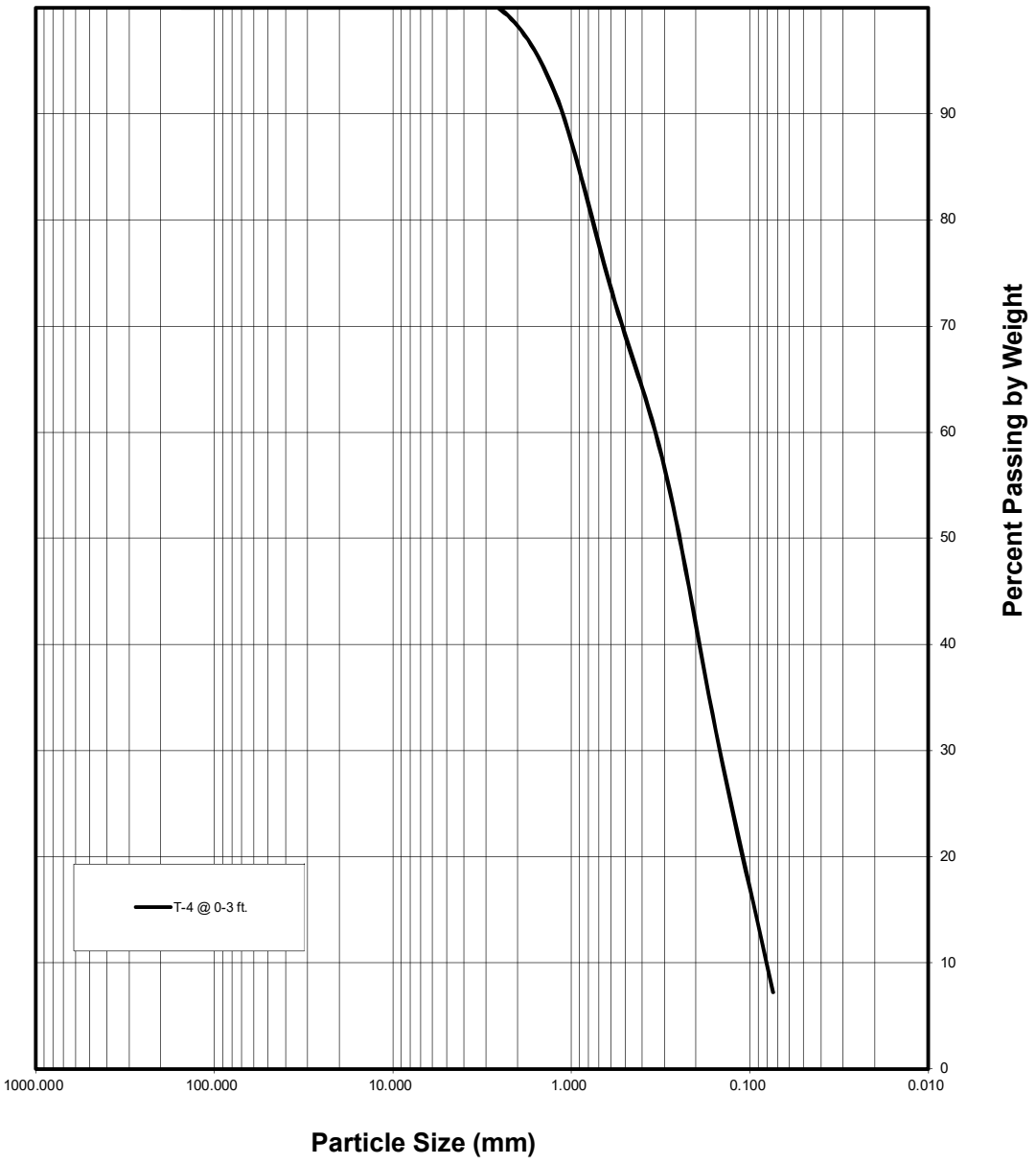
Project No.: LP17122

Grain Size Analysis

Plate C-3

SIEVE ANALYSIS						
Cobbles and Boulders	Gravel		Sand			Silt and Clay
	Coarse	Fine	Coarse	Medium	Fine	



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Project No.: LP17122

Grain Size Analysis

Plate C-4

LANDMARK CONSULTANTS, INC.

CLIENT: Desert Care LLC
PROJECT: Living Care Assisted Living
JOB No.: LP17122
DATE: 10/09/17

CHEMICAL ANALYSIS

Boring:	B-1	**Caltrans**
Sample Depth, ft:	0-3	**Method**
pH:	8.7	**643**
Electrical Conductivity (mmhos):	--	**424**
Resistivity (ohm-cm):	11,000	**643**
Chloride (Cl), ppm:	40	**422**
Sulfate (SO4), ppm:	0	**417**

General Guidelines for Soil Corrosivity

Material Affected	Chemical Agent	Range of Values	Degree of Corrosivity
Concrete	Soluble Sulfates (ppm)	0 - 1,000	Low
		1,000 - 2,000	Moderate
		2,000 - 20,000	Severe
		> 20,000	Very Severe
Normal Grade Steel	Soluble Chlorides (ppm)	0 - 200	Low
		200 - 700	Moderate
		700 - 1,500	Severe
		> 1,500	Very Severe
Normal Grade Steel	Resistivity (ohm-cm)	1 - 1,000	Very Severe
		1,000 - 2,000	Severe
		2,000 - 10,000	Moderate
		> 10,000	Low

LANDMARK
Geo-Engineers and Geologists

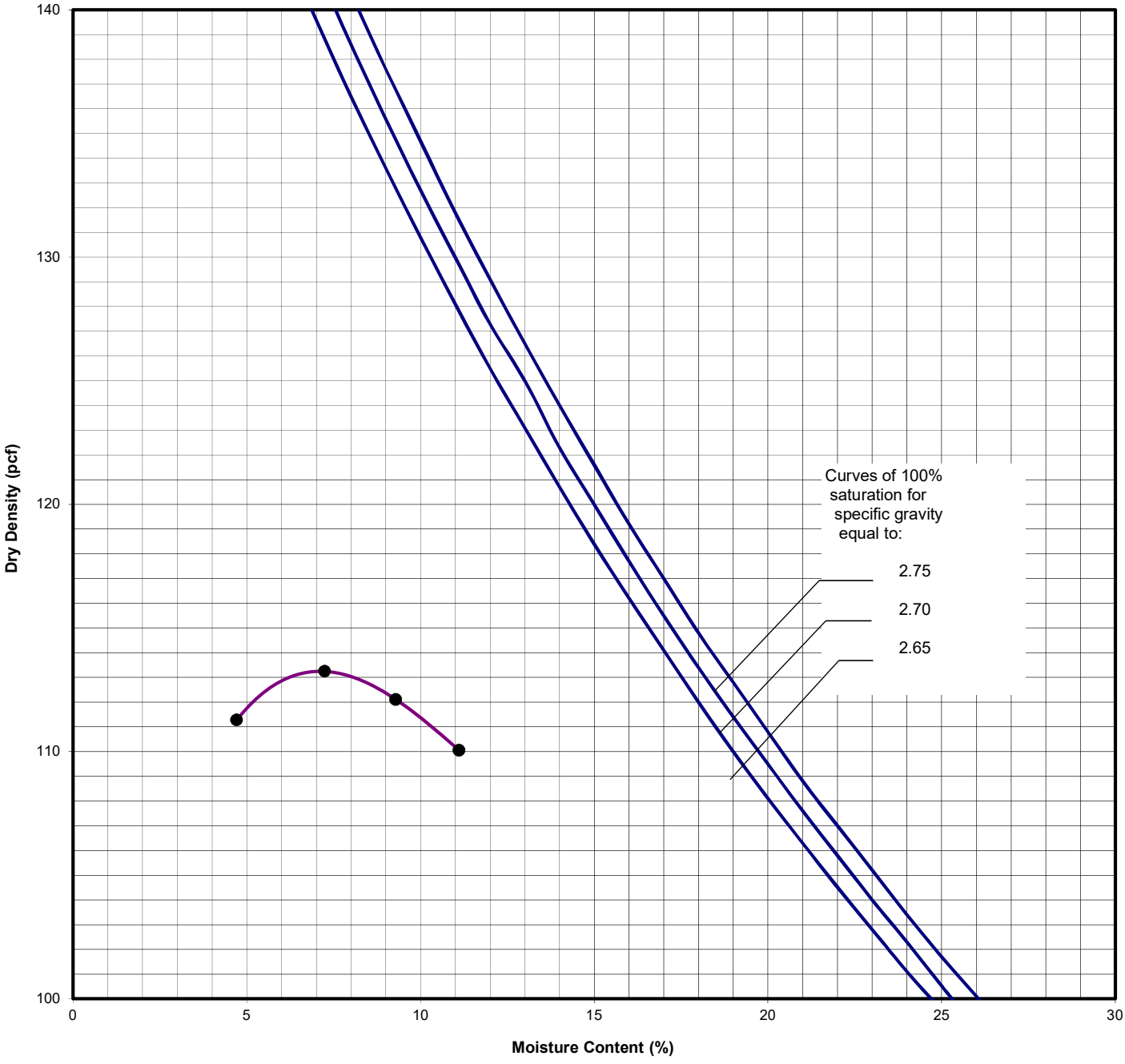
Project No.: LP17122

Selected Chemical Test Results

Plate C-5

Client: Desert Care LLC
Project: Living Care Assisted Living
Project No.: LP17122
Date: 9/5/2017
Lab. No.: N/A

Soil Description: Gray Find Sand
Sample Location: B-1 @ 0-3'
Test Method: ASTM D-1557 A
Maximum Dry Density (pcf): **113.0**
Optimum Moisture Content (%): **7.2**



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Project No.: LP17122

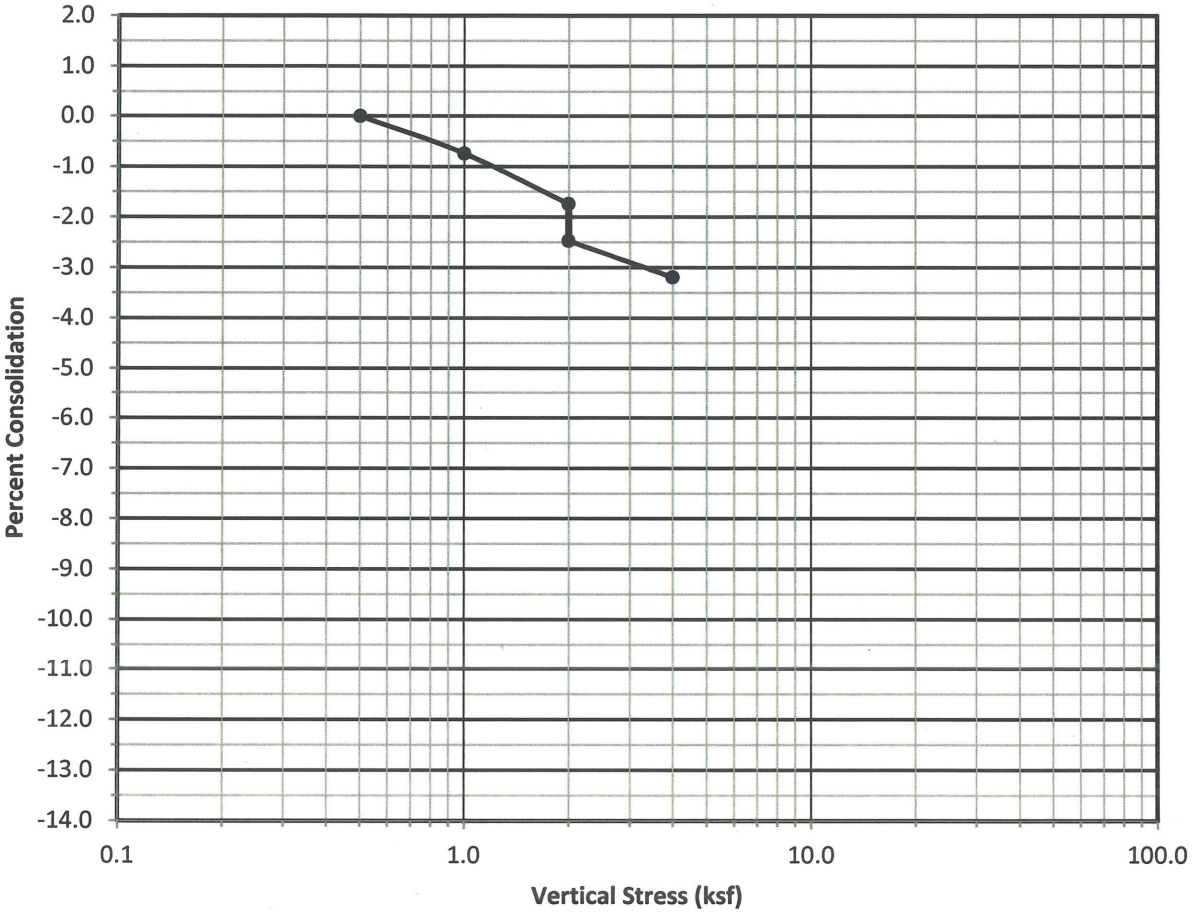
Moisture Density Relationship

Plate
C-6

LANDMARK CONSULTANTS, INC.

CLIENT: Desert Care LLC
PROJECT: Living Care Assisted Living
JOB NO: LP17122
DATE: 9/15/2017

COLAPSE POTENTIAL TEST (ASTM D5333)



Collapse Potential: **0.7 %** **(Slight)**

Results of Test

Sample Location: B-3 @ 15 ft.
Soil Type: Sand (SP-SM)
Overburden Pressure, Po: 1.34 ksf

	Initial	Final
Dry Density (pcf):	85.7	92.7
Water Content (%):	3.9	29.8
Void Ratio (e):	0.930	0.785
Saturation (%):	11.1	100.7

LANDMARK Geo-Engineers and Geologists **Project No.: LP17122**	**Colapse Potential Test Results**	**Plate C-7**

APPENDIX D

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Sladden Engineering

45090 Golf Center Parkway, Suite F, Indio, CA. 92201 (760) 863-0713 Fax (760) 863-0847
6782 Stanton Avenue, Suite C, Buena Park, CA. 90621 (714) 523-0952 Fax (714) 523-1369
450 Egan Avenue, Beaumont, CA. 92223 (951) 845-7743 Fax (951) 845-8863
www.SladdenEngineering.com

October 10, 2023

Project No. 544-23272
23-10-496

Coachella Valley Community Development Group
36101 Bob Hope Drive, Suite E5
Rancho Mirage, California 92270

Project: Proposed Apartment Complex
APN 670-110-043
30260 Date Palm Drive
Palm Springs, California

Subject: Percolation/Infiltration Testing for On-Site Stormwater Management

In accordance with your request, we have performed percolation testing on the subject site to evaluate the infiltration potential of the near surface soil to assist in storm water management system design. It is our understanding that on-site stormwater retention including infiltration is planned for the proposed project.

Percolation testing was performed within two (2) shallow test holes excavated on the site. Testing was performed at depths of approximately 10 & 5 feet below existing grade for P-1 & P-2, respectively. The approximate locations of the test holes are presented on the attached Test Location Plan (Figure 2). Testing was performed by placing water within the test bores and recording the drop in the water surface with time. Testing was performed in general accordance with the *United States Bureau of Reclamation (BOR) Procedure 7300-89 (1999).* Test results are summarized in the following table.

PERCOLATION TEST RESULTS

Test No.	Depth (Ft)	USCS	Percolation Rate (in/hr)	Infiltration Rate (in/hr)
P-1	10.00	SM	99.00	14.40
P-2	5.00	SM	109.50	17.01

The percolation rates determined represent the ultimate field rates that do not include a safety factor. The corresponding infiltration rates were calculated using the Porchet Method. An appropriate safety factor should be incorporated into design.

Groundwater was not encountered within our exploratory boreholes. Based upon our review of groundwater levels within the vicinity of the site[1], it is our opinion that groundwater should not be a controlling factor in stormwater retention/infiltration system design.

If you have any questions regarding this memo or the referenced reports, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

James W. Minor III
Senior Geologist

Copies: PDF/Addressee

[1] California Department of Water Resources, 2023, Water Data Library; available at: http://wdl.water.ca.gov/waterdatalibrary/

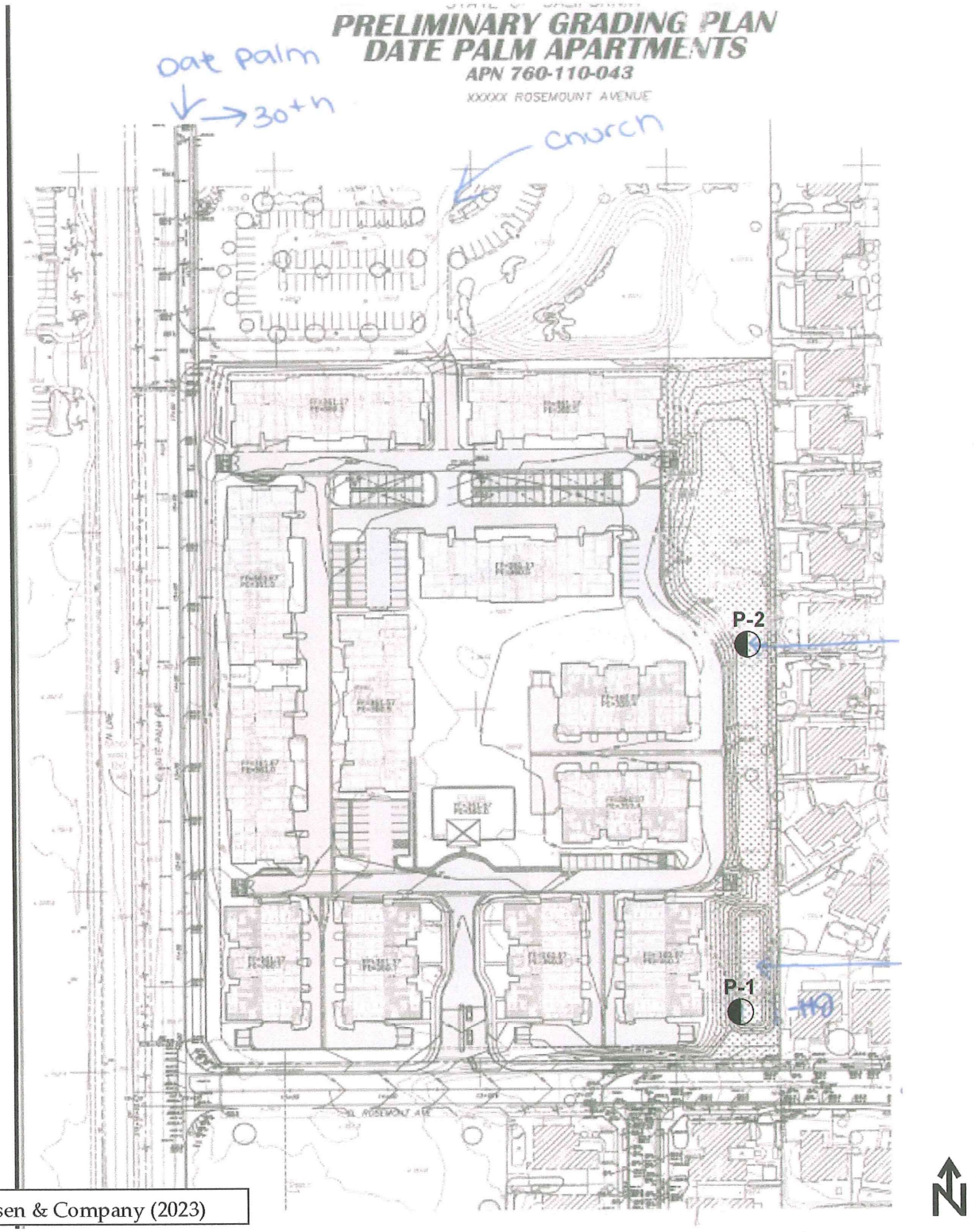
SITE LOCATION MAP
TEST LOCATION PLAN

USGS (2018)

	SITE LOCATION MAP		FIGURE
Sladden Engineering	Project Number:	544-23272	1
	Report Number:	23-10-496	
	Date:	October 10, 2023	

EXPLANATION OF MAP SYMBOLS

P-2 Percolation/ Infiltration Test Location



Christansen & Company (2023)

TEST LOCATION PLAN

FIGURE 2

Project Number:	544-23272
Report Number:	23-10-496
Date:	October 10, 2023

Sladden Engineering

BORELOGS

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	8/31/2023
Elevation:	370 Ft (MSL)	Boring No:	P-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0–8		Silty Sand (SM); yellowish brown, dry, fine-grained.
							8–10		Silty Sand/Sandy Silt (SM/ML); yellowish brown, dry, , fine-grained.
							10		Terminated at ~ 10.0 Feet bgs. No Bedrock encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.

Completion Notes:

PROPOSED APARTMENT COMPLEX
30260 DATE PALM DRIVE, CATHEDRAL CITY

Project No: 544-23272
Report No: 23-10-496

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	8/31/2023
Elevation:	370 Ft (MSL)	Boring No:	P-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); yellowish brown, dry, fine-grained.
							4		
							6		Terminated at ~ 5.0 Feet bgs. No Bedrock encountered. No Groundwater or Seepage Encountered. Borehole Cased with Perforated Pipe for Percolation Testing.
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED APARTMENT COMPLEX
30260 DATE PALM DRIVE, CATHEDRAL CITY

Project No: 544-23272
Report No: 23-10-496

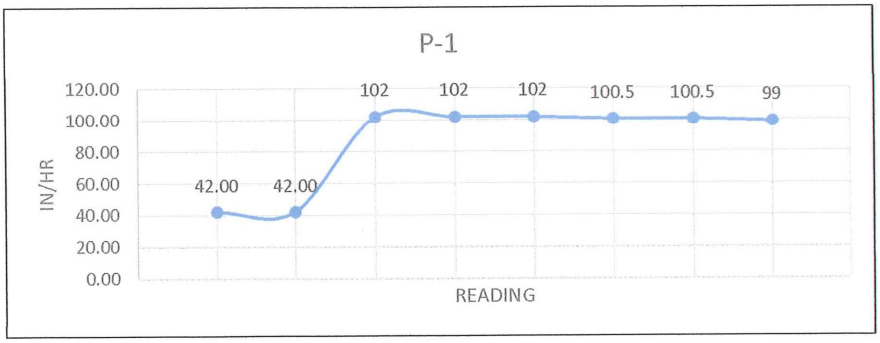
STORMWATER TESTING DATA SHEETS

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	30260 Date Palm Drive, Cathedral City	Depth (ft):	10.00
Job No. :	544-23272	USCS Soil Class:	SM
Date:	9/13/13	Sandy Soil:	R.F.
Test Hole #:	P-1	Tested By:	R.F.

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	10.00	20	2.50	17 4/8	42.00
B	25.00	10.00	20	2.50	17 4/8	42.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	10.00	10.00	20	3.00	17	102
2	10.00	10.00	20	3.00	17	102
3	10.00	10.00	20	3.00	17	102
4	10.00	10.00	20	3.25	16 6/8	100.5
5	10.00	10.00	20	3.25	16 6/8	100.5
6	10.00	10.00	20	3.50	16 4/8	99



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	10.00
D_f =	116.50
r =	4.00
D_0 =	100
D_t =	120.00
H_0 =	20
H_f =	3.5
ΔH =	16.50
H_{avg} =	11.75

Δt (minutes)
D_f (Final Depth to water)
r (hole radius in inches)
D_0 (Initial Depth to water)
D_t (Total Depth of test hole)
H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

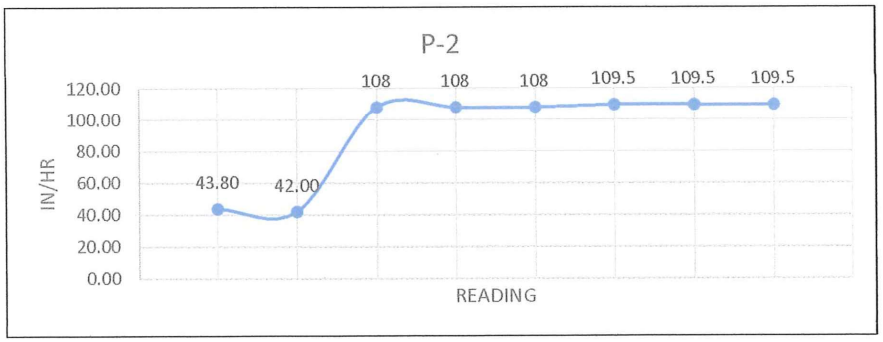
Field Rate: 99 in/hr
Infiltration Rate: 14.40 in/hr

STORMWATER PERCOLATION SHEET (LESS THAN 10 FT)

Project:	30260 Date Palm Drive, Cathedral City	Depth (ft):	5.00
Job No. :	544-23272	USCS Soil Class:	SM
Date:	9/13/13	Sandy Soil:	R.F.
Test Hole #:	P-2	Tested By:	R.F.

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
A	25.00	5.00	20	1.75	18 2/8	43.80
B	25.00	5.00	20	2.50	17 4/8	42.00

READING	TIME (min)	DEPTH (ft)	INITIAL W (in)	FINAL W (in)	ΔW (in)	IN/HR
1	10.00	5.00	20	2.00	18	108
2	10.00	5.00	20	2.00	18	108
3	10.00	5.00	20	2.00	18	108
4	10.00	5.00	20	1.75	18 2/8	109.5
5	10.00	5.00	20	1.75	18 2/8	109.5
6	10.00	5.00	20	1.75	18 2/8	109.5



PERCOLATION RATE CONVERSION (PORCHET METHOD)

$$I_{t=} \quad \frac{\Delta H\ 60\ R}{\Delta t(r+2H_{avg})}$$

Δt =	10.00
D_f =	58.25
r =	4.00
D_0 =	40
D_t =	60.00
H_0 =	20
H_f =	1.75
ΔH =	18.25
H_{avg} =	10.88

Δt (minutes)

D_f (Final Depth to water)

r (hole radius in inches)

D_0 (Initial Depth to water)

D_t (Total Depth of test hole)

H_0 (initial height of water at selected time interval)

$$H_0 = D_t - D_0$$

H_f (final height of water at the selected time interval)

$$H_f = D_t - D_f$$

ΔH (change in head over the time interval)

$$\Delta H = H_0 - H_f$$

H_{avg} (average head height over the time interval)

$$H_{avg} = (H_0 + H_f)/2$$

Field Rate: 109.5 in/hr

Infiltration Rate: 17.01 in/hr

Appendix F

Structural BMP and/or Retention Facility Sizing Calculations and Design Details

Whitewater Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

Company Name	Christiansen & Company	Date	10/11/2023
Designed by	Keith Christiansen	County/City Case No	
Company Project Number/Name	Date Palm Apartments		
Drainage Area Number/Name	DMA1		

Enter the Area Tributary to this Feature A_T = 10.48 acres

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.63

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$

C = 0.43

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = 0.40 \times C$

V_u = 0.17 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 6,467 ft^3

Notes:

Appendix G

AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS, BMP MAINTENANCE AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS PROJECT-SPECIFIC WQMP

Covenant and Agreement

Water Quality Management Plan and Urban Runoff BMP Transfer, Access and Maintenance Agreement (Adapted from documents from the Ventura County Stormwater Management Program)

Recorded at the request of:

City of Cathedral City

After recording, return to:

City of Cathedral City

City Clerk _____

Water Quality Management Plan and Urban Runoff BMP Transfer, Access and Maintenance Agreement

OWNER: Stefan Vogel

PROPERTY ADDRESS: Date Palm Drive and Rosemount Avenue

_____

APN: 670-110-043

THIS AGREEMENT is made and entered into in

Cathedral City, California, this_____day of

_____ , by and between

_____, herein after

referred to as "Owner" and the CITY OF Cathedral City, a municipal corporation, located in the County of Riverside, State of California hereinafter referred to as "CITY";

WHEREAS, the Owner owns real property ("Property") in the City of

Cathedral City, County of Riverside, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference;

WHEREAS, at the time of initial approval of development project known as

Cathedral Cove Center within the Property described herein, the City required the project to employ Best Management Practices, hereinafter referred to as "BMPs", to minimize pollutants in urban runoff;

WHEREAS, the Owner has chosen to install and/or implement BMPs as described in the Water Quality Management Plan, on file with the City, hereinafter referred to as "WQMP", to minimize pollutants in urban runoff and to minimize other adverse impacts of urban runoff;

WHEREAS, said WQMP has been certified by the Owner and reviewed and approved by the City;

WHEREAS, said BMPs, with installation and/or implementation on private property and draining only private property, are part of a private facility with all maintenance or replacement, therefore, the sole responsibility of the Owner in accordance with the terms of this Agreement;

WHEREAS, the Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is required to assure peak performance of all BMPs in the WQMP and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs;

NOW THEREFORE, it is mutually stipulated and agreed as follows:

1. Owner hereby provides the City of City's designee complete access, of any duration, to the BMPs and their immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by City's Director of Public Works no advance notice, for the purpose of inspection, sampling, testing of the Device, and in case of emergency, to undertake all necessary repairs or other preventative measures at owner's expense as provided in paragraph 3 below. City shall make every effort at all times to minimize or avoid interference with Owner's use of the Property.

2. Owner shall use its best efforts diligently to maintain all BMPs in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the City, the Owner shall provide the City with documentation identifying the material(s) removed, the quantity, and disposal destination.

3. In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) days of being given written notice by the City, the City is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense to the Owner or Owner's successors or assigns, including administrative costs,

attorney's fees and interest thereon at the maximum rate authorized by the Civil Code from the date of the notice of expense until paid in full.

4. The City may require the owner to post security in form and for a time period satisfactory to the city to guarantee the performance of the obligations state herein. Should the Owner fail to perform the obligations under the Agreement, the City may, in the case of a cash bond, act for the Owner using the proceeds from it, or in the case of a surety bond, require the sureties to perform the obligations of the Agreement. As an additional remedy, the Director may withdraw any previous Urban Runoff-related approval with respect to the property on which BMPs have been installed and/or implemented until such time as Owner repays to City its reasonable costs incurred in accordance with paragraph 3 above.

5. This agreement shall be recorded in the Office of the Recorder of Riverside County, California, at the expense of the Owner and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth, and also a lien in such amount as will fully reimburse the City, including interest as herein above set forth, subject to foreclosure in event of default in payment.

6. In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, then the Owner and its successors or assigns agree(s) to pay all costs incurred by the City in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

7. It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien there against.

8. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an interest in all or part of the Property. Owner shall provide a copy of such notice to the City at the same time such notice is provided to the successor.

9. Time is of the essence in the performance of this Agreement.

10. Any notice to a party required or called for in this Agreement shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two (72) hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice thereof to the other party.

IF TO CITY:

_____

_____

_____

_____

IF TO OWNER:

_____

_____

_____

_____

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

APPROVED AS TO FORM:

_____
City Attorney

Cathedral City

_____
CITY OF

_____
Name

_____
Title

ATTEST:

_____
City Clerk Date

OWNER:

Stefan Vogel

_____
Name

Manager

_____
Title

OWNER:

_____
Name

_____
Title

NOTARIES ON FOLLOWING PAGE

EXHIBIT A
(Legal Description)

THE LAND REFERRED TO IN THIS COMMITMENT IS SITUATED IN THECITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

Parcel 1:

PARCEL 1 OF PARCEL MAP NO. 27302, IN THE CITY OF CATHEDRAL CITY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ON FILE IN BOOK 174, PAGES 95 AND 96 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA. EXCEPTING THEREFROM THAT PORTION WHICH LIES WITHIN THE BOUNDARIES OF PARCEL MAP NO. 34063 IN BOOK 218, PAGES 43-44, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA. SAID LAND BEING SHOWN AS DESIGNATED REMAINDER ON SAID PARCEL MAP NO. 34063.

APN: 670-110-043

Appendix H

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

N/A

Appendix I

PROJECT-SPECIFIC WQMP SUMMARY DATA FORM

Project-Specific WQMP Summary Data Form

Applicant Information	
Name and Title	Stefan Vogel
Company	Coachella Valley Community Development Group, Inc.
Phone	626-277-6782
Email	

Project Information	
Project Name (as shown on project application/project-specific WQMP)	The Wren
Street Address	
Nearest Cross Streets	Date Palm Drive and Rosemount Avenue
Municipality (City or Unincorporated County)	City of Cathedral City
Zip Code	92234
Tract Number(s) and/or Assessor Parcel Number(s)	APN 670-110-043
Other (other information to help identify location of project)	

Indicate type of project.	**Priority Development Projects (Use an "X" in cell preceding project type):**	
		SF hillside residence; impervious area ≥ 10,000 sq. ft.; Slope ≥ 25%
		SF hillside residence; impervious area ≥ 10,000 sq. ft.; Slope ≥ 10% & erosive soils
		Commercial or Industrial ≥ 100,000 sq. ft.
		Automotive repair shop
		Retail Gasoline Outlet disturbing > 5,000 sq. ft.
		Restaurant disturbing > 5,000 sq. ft.
	X	Home subdivision ≥ 10 housing units
		Parking lot ≥ 5,000 sq. ft. or ≥ 25 parking spaces

Date Project-Specific WQMP Submitted	October, 2023
Size of Project Area (nearest 0.1 acre)	10.48 acres
Will the project replace more than 50% of the impervious surfaces on an existing developed site?	No
Project Area managed with LID/Site Design BMPs (nearest 0.1 acre)	10.5 acres
Are Treatment Control BMPs required?	No
Is the project subject to onsite retention by ordinance or policy?	Yes
Did the project meet the 100% LID/Site Design Measurable Goal?	Yes
Name of the entity that will implement, operate, and maintain the post-construction BMPs	Coachella Valley Community Development Group, Inc.
Contact Name	
Street or Mailing Address	36101 Bob Hope Drive, Ste. E5
City	Rancho Mirage, CA
Zip Code	92270
Phone	626-277-6782

Space Below for Use by City/County Staff Only	
Preceding Information Verified by (consistent with information in project-specific WQMP)	**Name:** **Date:**
Date Project-Specific WQMP Approved:	
Data Entered by	**Name:** **Date:**
Other Comments	