Project Specific
Preliminary Water Quality Management Plan

For: **Coachella Airport Business Park**

City of Coachella

Airport Boulevard at State Highway 86 Expressway
Coachella, CA 92236

ASSESSORS PARCEL NUMBER: 763-330-013, 763-330-018, 763-330-029

Prepared for:

Haagen Company, LLC
12302 Exposition Boulevard
Los Angeles, CA 90064
Telephone: (310) 820-1200
Contact: Christopher Fahey, Chief Operations Officer

Prepared by:

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James R. Bazua — Date
RCE 58394 — Exp. 12/31/20

Original Date Prepared: June 11, 2020
Revision Date(s):

OWNER'S CERTIFICATION

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

> Haagen Company, LLC by The Altum Group for the project known as Coachella Airport Business Park

This Preliminary WQMP is intended to comply with the requirements of **The City of Coachella** which includes the requirement for the preparation and implementation of a Final project-specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of the Final WQMP and will ensure that the Final WQMP is amended as appropriate to reflect up-to-date conditions on the site. The Final 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 the Final WQMP. At least one copy of the Final WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of the Final WQMP. The undersigned is aware that implementation of the Final WQMP is enforceable under the City of Coachella Water Quality Ordinance (Municipal Code 13.16 Water Quality Control).

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

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

_____
Owner's Signature

Christopher Fahey
Owner's Printed Name

Chief Operating Officer
Owner's Title/Position

6/11/20
Date

Haagen Company, LLC
12302 Exposition Boulevard
Los Angeles, CA 90064
Telephone: (310) 820-1200
CFahey@Haagenco.com
Contact: Christopher Fahey

ATTEST

_____
Notary Signature

_____
Printed Name

_____
Title/Position

_____
Date

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

Contents

TABLES

APPENDICES

I. Project Description

Project Owner:	**Haagen Company, LLC** **12302 Exposition Boulevard** **Los Angeles, CA 90064** **Telephone: (310) 820-1200** **CFahey@Haagenco.com** **Contact: Christopher Fahey – Chief Operating Officer**
Preliminary WQMP Preparer:	James Bazua, P.E. 73-710 Fred Waring Drive, Suite 219 Palm Desert, CA 92260 Telephone: (760) 346.4750
Project Site Address:	**Northwest corner, Airport Boulevard @ State Highway 86 Expressway** **Thermal, CA 92274**
Planning Area/ Community Name/ Development Name:	Heavy Industrial City of Coachella **Coachella Airport Business Park**
APN Number(s):	**763-330-013, 763-330-018, 763-330-029**
Latitude & Longitude:	**33.643816, -116.136403**
Receiving Water:	**Coachella Valley Storm Channel**
Project Site Size:	**Total Site is 42.69 acres**

Standard Industrial Classification (SIC) Code: 1541 **– Industrial Buildings**

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☒
City of Coachella - Building Permit	Y ☒ N☐
City of Coachella - Grading Permit	Y ☒ N☐
South Coast Air Quality Management District-PM10 Approval to comply with Rule 403	Y ☒ N☐
State Water Recourses Control Board - Construction Stormwater General Permit (SWPPP and NOI)	Y ☒ N☐
Other *(please list in the space below as required)*	

Project Description:

Haagen Co., LLC is proposing to develop the Coachella Airport Business Park (proposed project), a mixed-use business park development which includes warehouse/commercial uses, self-storage, small business, drive thru coffee shop and service station/mini mart-related land uses in the City of Coachella, in Riverside County, California. The project site is located at the northwest corner of the intersection of State Route 86 and Airport Boulevard and is comprised of three parcels totaling approximately 42.69 acres. The proposed project will require a change of zone from M-H (Heavy Industrial) to MS-IP (Manufacturing Service – Industrial Park Overlay) to allow the proposed uses.

The project site is bordered by a vacant, undeveloped property owned by Coachella Valley Water District (CVWD) located immediately north. To the west, the project site is bordered by the Coachella Valley Stormwater Channel, to the east, bordered by SR-86 and beyond followed by agricultural land uses, and to the south, bordered by a mobile home park. A 3.44-acre right-of-way under California Department of Transportation (Caltrans) jurisdiction that is vacant and abuts the southeastern frontage of the project site.

Although the site is adjacent to the Coachella Valley Storm Channel it is currently in the flood plain Zone AE (Base Flood Elevations Provided) based on FEMA Map Number 06065C2270H, Panel 2270 of 3805, reflected in the map revised 3/6/18. Coachella Valley Water District (CVWD) maintains the existing Storm Water Channel and has proposed future channel lining improvements

that will remove the entirety of existing Coachella Airport Business Park from the flood plain. However, Coachella Airport Business Park intends to go forward with development in a manner that protects the site from off-site flows by establish elevated grades along affected portion of the project perimeter. CVWD will conduct a Flood Development Review of the project development on behalf of FEMA before Final Engineering drawings are submitted to City of Coachella for first review to confirm that the project design protects the development from off-site flows. Modeling of off-site flows affecting the site under existing and proposed conditions will be submitted to CVWD for review based on the Flood Development Review requirements listed in the CVWD Development Design Guidelines.

The proposed Coachella Airport Business Park Development will be required to collect and store 100% of the runoff generated during the 100 year storm event on-site per City of Coachella drainage standards. Retention facility design details and sizing calculations are included in Appendix F of this Preliminary WQMP report. The project can be separated into three main subareas and storm water collection system boundaries, 1.) the majority of the site is designed to surface flow to a series of drain inlets, gutters and swales where runoff can be collected and conveyed in an underground storm drain system toward retention basins located along the westerly side of the property 2.) a smaller portion of the project located at the northerly interior of the site will drain its surface runoff toward an interim retention basin location 3.) A portion of project located on the Easterly boundary will flow to a single retention basin adjacent to the project boundary. It is anticipated that future improvements to the adjacent Coachella Valley Storm Water Channel proposed by CVWD will lower the hydraulic grade line within the channel sufficiently to remove Coachella Airport Business Park from the flood plain and allow gravity flow of storm runoff from project site. CVWD has confirmed that this would be allowed as long as all State Water Quality Management requirements are met. The current project design is such that gravity flow to the Coachella Valley Storm Water Channel can be achieved with minor changes to the on-site storm drain system (including removal of the interim retention basin) should the Channel be improved.

The maximum depth of any on-site retention basin will be three (3) feet and will be sized to retain the entire storm volume generated on-site during the 10 year design storm. The project site will also provide sufficient capacity to contain the runoff volume generated during the 100 year design storm in combination with the retention basin and shallow ponding on surface streets and parking areas at a depth not to exceed 1.5’ in depth. In the event of an emergency flooding condition, flows exceeding the capacity of the on-site collection system will overflow the southeasterly end of project site toward State Highway 86 right of way and onto an adjacent undeveloped parcel of land. Flows ultimately would then proceed southerly via surface flow where make their way into the Coachella Valley Storm Water Channel. Flows then continue in the channel ultimately to its terminus at the Salton Sea.

On-site retention basins shall be designed in a manner that allows the stored volume generated from the 100 year design storm event to completely evacuate via percolation into the soil within a 72 hour period assuming the maximum percolation rate allowed by City of Coachella of 10 gallons/s.f./day (0.67in./hr). Several City of Coachella drywell infiltration chambers will be used in the design of the storm drain system in order to facilitate the conveyance of the underground

storm drain system into the shallow retention basin. However, any additional infiltration provided by these drywells will not be included in calculations to reduce the size of the retention basin or aid in showing that the 100 year storm volume can be evacuated within the allotted time period.

Appendix A of this project-specific Final WQMP excludes 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 Final WQMP.

II. Site Characterization

Land Use Designation or Zoning:	**Heavy Industrial (M-H)**
Current Property Use:	**Vacant**
Proposed Property Use:	**Commercial Retail and Industrial Buildings**
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	None	MUN, AGR, GWR, REC 1, REC 2, WARM, COLD, WILD, POW	Not designated as RARE (1.0 miles)
Coachella Valley Storm Water Channel	Fecal Indicator Bacteria, Toxaphene, Dieldrin, DDT, PCB, Nitrogen-ammonia and Toxicity	FRSH, REC 1, REC 2, WARM, WILD, RARE	Designated as RARE (0.4 miles)
Salton Sea	Arsenic, Chlorpyrifos, DDT, Enterococcus, Nutrients, Salinity, Chloride, Low Dissolved Oxygen, Nitrogen-ammonia and Toxicity	AQUA, IND, REC1, REC2, WARM, WILD RARE	Designated as RARE (12.5 miles)

Note: 1) The Salton Sea is the terminus for the Coachella Valley Storm Water Channel. However, note that the Salton Sea is not identified as a "Whitewater Region" receiving water as outlined in the Riverside County WQMP.

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 (pathogens[1])	Yes	Yes
Heavy Metals	Yes	No
Nutrients	Yes	Yes
Toxic Organic Compounds[2]	No	Yes
Toxaphene[3]	No	Yes
Dieldrin[3]	No	Yes
Dichlorodiphenyltrichloroethane[3]	No	Yes
Polychlorinated Biphenyls[3]	No	Yes
Sediment/Turbidity	Yes	No
Trash & Debris	Yes	No
Oil & Grease	Yes	No

Notes:

1) Pathogens are disease causing virus or bacteria. Pathogens are an impairment in the Coachella Valley Storm Water Channel from Dillon Road to the Salton Sea.
2) Petroleum hydrocarbons are one of the most common organic compounds associated with driveways and parking areas and are a potential pollutant for the site. See Section V.2 for a description of appropriate Source Control BMPs.
3) These synthetic organic compounds have been banned in the United States, but are listed as impairments on the approved US EPA approved 2008/2010 303-d List.

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.	☐	☒	☐	Industrial Site layout covers the full parcel.
		Conserve natural areas by incorporating the goals of the Multi-Species Habitat Conservation Plan or other natural resource plans.	☐	☐	☒	Will pay MSHCP fees and/or follow guidelines as required.
		Preserve natural drainage features and natural depressional storage areas on the site.	☐	☐	☒	No natural depressional areas exists onsite. Industrial Site layout covers the full parcel
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☒	☐	☐	The existing site is vacant. The site will be planted with native, drought tolerant trees and shrubs.
		Use natural drainage systems.	☐	☐	☒	No natural drainage system exists. The site is currently in the flood plain and will be protected by site grading.
		Increase the building floor to area ratio (i.e., number of stories above or below ground).	☐	☒	☐	The site development is consistent with warehouse development and multi-story development is not feasible.
		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.	☐	☐	☒	Opportunities for off-site parking do not exist.
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	☒	☐	☐	
		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).	☒	☐	☐	City standard drywells are placed at locations where runoff enters the proposed infiltration BMPs (Retention Basins) to assist in elevation differences.

Table 3. Site Design BMP Concepts (continued)

Design Concept	Technique	Specific BMP	Included: Yes	Included: No	Included: N/A	Brief Reason for Each BMP Indicated as No or 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.	☒	☐	☐	Runoff is directed to proposed retention basin Infiltration BMP.
		Drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	☒	☐	☐	Runoff is directed to proposed retention basin Infiltration BMP.
		Incorporate landscaped buffer areas between sidewalks and streets.	☒	☐	☐	Landscape buffers are provide where sidewalks are proposed on-site. Although, landscaping is typically provided behind sidewalk and not in between sidewalk and streets.
		Use natural or landscaped drainage swales in lieu of underground piping or imperviously lined swales.	☐	☒	☐	Runoff is directed to basin via surface flow over concrete valley gutter. The site layout does not allow for naturally lines swales on interior streets.
		Where soil conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.	☒	☐	☐	City standard drywells are placed at most locations where runoff enters the proposed infiltration BMPs (Retention Basins). The soils report states that the site is not conducive to high infiltration.
		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.	☐	☒	☐	Permeable pavers are not practical for this site given heavy blowsand in the desert. However, hardscape surfaces are used only where needed to provide functionality.
		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.	☐	☒	☐	The site layout proposes industrial development and several separate lots. Runoff is directed to permeable infiltration BMPs but only via impermeable gutters. The site is not conducive to high infiltration rates.
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to landscaped swale or biofilter.	☐	☒	☐	City standard drywells are placed at most locations where runoff enters the proposed infiltration BMPs (Retention Basins).

Design Concept	Technique	Specific BMP	Included			Brief Reason for Each BMP Indicated as No or N/A
			Yes	No	N/A	
		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.	☐	☒	☐	First flush flows will be captured entirely
		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 on-site runoff is directed to on-site retention 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).	☒	☐	☐	Shared access will be used.
		Uncovered temporary or guest parking on residential lots paved with a permeable surface, or designed to drain into landscaping.	☒	☐	☐	Parking areas drain to on-site retention basins.

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).	☒	☐	☐	City standard drywells are placed at most locations where runoff enters the proposed infiltration BMPs (Retention Basins).
		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.	☒	☒	☐	Landscaped and paved areas drain to the same retention basin common point through City standard drywell infiltration systems.
		Overflow parking (parking stalls provided in excess of the Permittee's minimum parking requirements) may be constructed with permeable pavement.	☐	☒	☐	Permeable pavement is not practical given heavy blowsand and industrial use.
		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).	☐	☒	☐	Only the on-site retention system and drywell infiltration chambers are proposed.

Project Site Design BMP Concepts:

A system retention basins designed to capture and retain the 10 year storm event completely as well as the 100 year storm event with shallow ponding on-site is the primary BMP for the proposed development. City standard drywells will also be placed at locations where runoff enters the proposed infiltration BMPs (Retention Basins). These drywell system will be introduced into the on-site drainage system and will aid in capturing pollutants.

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)
ALL	INFILTRATION	BACTERIA, NUTRIENTS	BACTERIA, NUTRIENTS	H/M, H/M	V_{BMP}	42.69
TOTAL PROJECT AREA TREATED WITH LID/SITE DESIGN BMPs (NEAREST 0.1 ACRE)						**42.69**

*** 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

Pollutants of concern are all addressed by the retention basin.

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)					0.0

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 <u>LID/Site Design</u> BMPs** **(Last row of Table 4)**	(2) **Total Area Treated with <u>Treatment Control</u> BMPs** **(Last row of Table 5)**	(3) **% of Treatment Control BMP Requirement addressed with LID/Site Design BMPs**
42.69	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	☐	☒	Slopes are proposed in retention basins only at 3:1 slope max..
Provide Community Car Wash Racks	☐	☒	Not applicable based on proposed design.
Properly Design*:			
Fueling Areas	☒	☐	
Air/Water Supply Area Drainage	☐	☒	No facilities.
Trash Storage Areas	☒	☐	
Loading Docks	☒	☐	
Maintenance Bays	☐	☒	No facilities.
Vehicle and Equipment Wash Areas	☐	☒	No facilities.
Outdoor Material Storage Areas	☐	☒	No facilities.
Outdoor Work Areas or Processing Areas	☐	☒	No facilities.
Provide Wash Water Controls for Food Preparation Areas	☐	☒	No facilities.

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

5.2.1 Non-Structural Source Control BMPs

5.2.1.1 Education

Yes

The owner, as responsible party for implementing the WQMP, will ensure that owner's employees, operators and managers and others as required are made aware of and provided with educational material. Owner is responsible for periodically updating these materials.

5.2.1.2 Activity Restrictions

Yes

Certain activities within the project area may be restricted to enable the owner/operator to meet the City's water quality requirements. For example, to eliminate storm water contamination by oil and grease, service or repair of all vehicles will be restricted to designated areas only.

Similarly, washing of vehicles and equipment shall be restricted to designated areas only which include properly designed wash racks or other areas which meet the intent of the best management practices.

5.2.1.3 Irrigation System and Landscape Maintenance

Yes

Owner shall ensure that the irrigation systems within the project site are operating properly. Owner shall also ensure that the ground's landscaping is maintained regularly so that the project site is in compliance with all City and Coachella Valley Water District water quality requirements.

5.2.1.4 Common Area Litter Control

Yes

Owner shall ensure that employees regularly patrol the site in an effort to keep it free of litter so that the project site is in compliance with all City water quality requirements.

5.2.1.5 Street Sweeping

Yes

Owner shall ensure that the driveways and parking lots within the project are regularly swept so that the project site is in compliance with all City water quality requirements. Streets/driveways and parking lots shall be swept at least quarterly, including just prior to start of the rainy season (October 1st). The frequency shall be no less than the frequency of street sweeping by the Co-Permittee on public streets.

5.2.1.6 Drainage Facility Inspection and Maintenance

Yes

Owner shall ensure that drainage facilities within the project area are regularly inspected (at least annually) and maintained properly so that the project site is in compliance with all City water quality requirements. At a minimum, routine maintenance of drainage facilities should take place in the late summer or early fall prior to the start of the rainy season (October 1st). Drainage facilities must be cleaned if accumulated sediment/debris fills 25% or more of the storage capacity of the facility.

5.2.2 Structural Source Control BMPs

5.2.2.1 MS4 Stenciling and Signage

Yes

Stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language (such as: "NO DUMPING ONLY RAIN IN THE DRAIN") and/or graphical icons to discourage illegal dumping will be provided. Signs and prohibitive language and/or

graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area will be posted.

5.2.2.2 Landscape and Irrigation System Design

Yes

The project will be designed to include a variety of plants within the landscape areas available, including native, drought tolerant plants. These types of plants use less water, and help reduce the use of fertilizers and pesticides. The irrigation system will be programmable and utilize drip emitters, limiting excess irrigation runoff. The landscape and irrigation system will be designed in accordance with the City of Coachella's water quality and irrigation requirements.

5.2.2.3 Protect Slopes and Channels

No

The project site does not contain any proposed slopes and channels.

5.2.2.4 Provide Community Car Wash Racks

No

The project site will not include community car wash racks as part of the design.

5.2.2.5 Fueling Areas

Yes

Fuel dispensing areas shall include the following design features:

- At a minimum, the fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.
- The fuel dispensing area shall be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete is prohibited.
- The fuel dispensing area shall have an appropriate slope (2% - 4%) to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of stormwater and to eliminate stormwater flow through the concrete fueling area.
- An overhanging roof structure or canopy shall be provided. The cover's minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area. The cover must not drain onto the fuel dispensing area and facility downspouts (roof drains) must be routed to prevent drainage across the fueling area. The fueling area shall drain to an appropriate Treatment Control BMP prior to discharging to the MS4.
- The fuel dispensing area must be designed to prohibit spills from draining to the street, MS4, or offsite. The project site will not include fueling areas.

5.2.2.6 Air/Water Supply Area Drainage

No

The project site will not include air/water supply areas.

5.2.2.7 Trash Storage Areas

Yes

The project site will include trash storage areas. Trash storage (or trash enclosure) trash dumpsters will have attached covers and shall be leak proof. The entire trash storage surface area will be concrete.

5.2.2.8 Loading Docks

Yes

Loading docks will not include a depressed area for truck loading, but rather be flush with the building Finish Floor elevation. Loading docks are designed in a way that does not collect debris or automotive fluids.

5.2.2.9 Maintenance Bays

No

The project site will not include maintenance bays.

5.2.2.10 Vehicle and Equipment Wash Areas

No

The project site will not include vehicle and equipment wash areas.

5.2.2.11 Outdoor Material Storage Areas

No

The project site will not include outdoor material storage areas.

5.2.2.12 Outdoor Work Areas or Processing Areas

No

The project site will not include outdoor work areas or processing areas.

5.2.2.13 Wash Water Areas for Food Preparation Areas

No

The project site will not include wash water areas for preparation.

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

This project will not include any other treatment control alternatives.

V.4 REGIONALLY-BASED BMPS

This project will not include any regionally-based treatment control BMPs.

VI. Operation and Maintenance Responsibility for BMPs

Appendix G of the project-specific Final WQMP will include 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.

Operations and maintenance (O&M) will be performed, as necessary, by Haagen Company, LLC The BMPs for the project are a proposed Retention Basins and drywell infiltration systems. Maintenance of the site and infiltration systems consists primarily of the removal of trash and debris, repair and removal/reinstallation of the system if damaged or saturated by native material (due to wind and water erosion). Any removed material must be hauled away to an approved disposal facility. See Appendix G for a recommended "Infiltration System Maintenance Plan".

O&M staff should inspect the site regularly (suggested monthly/quarterly) to ensure that the site is clear of trash and debris. This can be accomplished when staff is performing other routine maintenance onsite. At the same time, infiltration systems and drainage facilities can be inspected to see if any minor repairs are required. These facilities should be inspected quarterly (at a minimum) and prior to the beginning of the rainy season (October 1st). See Appendix G for a recommended "Infiltration System Maintenance and Inspection Checklist".

Routine inspection and required maintenance of all BMPs and the site should begin immediately upon completion of construction and continue throughout the life of the project. Records of all inspection and repair/modifications shall be kept by Haagen Company, LLC. and its affiliated Companies. The following person shall be responsible for all O&M and inspections, until such time as another staff member is designated:

Haagen Company, LLC
12302 Exposition Boulevard
Los Angeles, CA 90064
Telephone: (310) 820-1200
CFahey@Haagenco.com
Contact: Christopher Fahey, Chief Operating Officer

VII. Funding

Source funding and long term funding will be provided by owner or owner's agent, Haagen Company, LLC. Operations and maintenance of the project BMP is limited in frequency and funding due to the simple nature of the BMP. Funding will be addressed in an agreement which will be included with the Final WQMP.

Appendix A

Conditions of Approval

N/A

Appendix B

Vicinity Map, WQMP Site Plan, and Receiving Waters Map

1 IN = 0.25 MI

The Altum Group

Project Vicinity

Coachella Airport Business Park

The Altum Group

THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCEL MAY NOT COMPLY WITH LOCAL LOT-SPLIT OR BUILDING SITE ORDINANCES.

SEC. 15 T.6S, R.8E

CITY OF COACHELLA

TRA 012-048
012-049

763-33

25-39-1

N89-51-15E 2614.29

15

478.04

634.78

L=742.81

L=947.16

L=861.76

645.60

456.05

186.05

310.17

132.38

219.84

451.47

771.92

59.30

30

1324.96

S89-52-00S

383.01

871.00

1583.27

1828.61

1318.98

306.17

740.38

185.63

415.84

215.12

421.46

L=259.48

300.83

399.01

EX

EX

717.02

311.81

L=530.43

L=496.15

1474.76

315.86

80.76

53.13

144.75

220.10

259.92

434.80

30

C.V.C.W.D. STORMWATER CHANNEL

STATE HWY 86

FILLMORE ST

56TH AVE (AIRPORT BLVD)

TRA 012-049

TRA 012-048

13
21.56 AC ML

25
68.00 AC ML

26
15.00 AC ML

28
23.89 AC ML

29
11.18 AC ML

18
9.62 AC ML

30
3.14 AC ML

06
3.57 AC ML

14

22

23

N
W E
S

1 " = 400 '

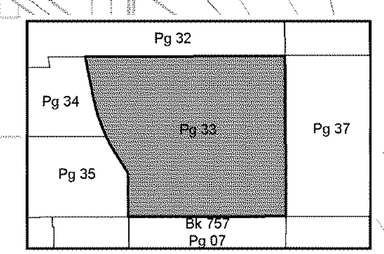
Legend

- Lot Lines
- Right-Of-Way
- Old Lot Lines
- Reference R.O.W
- Other Easements
- Lease Area
- Subdivision Tic Mark

Date	Old Number	New Number
4/1/1987	350-8	7
4/1/1987	3	8
4/1/1987	7, 8	9
4/1/1987	9	10, 11
3/1/1991	1	12, 13, ST
3/1/1991	4	14, ST
3/1/1991	5	15, ST
3/1/1991	11	16, 17, ST
8/1/1991	10	18, ST
2/1/2005	14	19, 20
2/1/2005	15	21, 22
2/1/2005	16	23, 24
12/1/2005	2, 12	25
12/1/2005	19, 21, 23	26
12/1/2005	20, 22, 24	27
12/1/2009	27	28, ST
5/1/2018	17	29, 30

Data

RS 15/56, 16,56, 17/18, MB 4/53
MB 22/20-21, RS 5/18, CVCWD R/W
R/W XI-RIV-187-F
60' RDS. PER INST. 32692 4/59
RS 11/30, MB 4/69, 4/78, 9/21
LLA 2390, RS 78/46



ASSESSOR'S MAP BK763 PG. 33
Riverside County, Calif.

jasantos

May 2018

Appendix C

Supporting Detail Related to Hydrologic Conditions of Concern

N/A

Appendix D

Educational Materials

After the Storm

What is stormwater runoff?

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

The effects of pollution

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.
- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

For more information contact:

or visit
www.epa.gov/npdes/stormwater
www.epa.gov/nps

EPA United States Environmental Protection Agency

EPA 833-B-03-002

January 2003

Internet Address (URL) • HTTP://www.epa.gov
Recycled/Recyclable • Printed With Vegetable Oil Based Inks on 100% Postconsumer, Process Chlorine Free Recycled Paper

THE YEAR OF CLEAN WATER
Celebrate the Environment

A Citizen's Guide to Understanding Stormwater

Stormwater Pollution Solutions

Residential

Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Septic systems

Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Auto care

Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Pet waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.

Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.

Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

Commercial

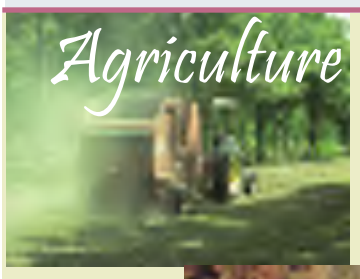
Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

Construction

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.



Agriculture

Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.

Forestry

Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.

Automotive Facilities

Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

RIVERSIDE COUNTY
ANIMAL SERVICES LOCATIONS:

www.rcdas.org

BLYTHE
16450 West Hobson Way
Blythe, CA 92225
760-921-7857

COACHELLA VALLEY ANIMAL CAMPUS
72-050 Petland Place
Thousand Palms, CA 92276
760-343-3644

RIVERSIDE COUNTY ANIMAL SERVICES
6851 Van Buren Blvd.
Riverside, CA 92509
951-688-4340

OTHER ANIMAL SHELTERS:

ANIMAL CARE CENTER OF INDIO
45-355 Van Buren
Indio, CA 92201
760-391-4138

ANIMAL FRIENDS OF THE VALLEYS
29001 Bastron Avenue
Lake Elsinore, CA 92530
951-674-0618
(Serving incorporated Temecula, Wildomar, Lake Elsinore, Murrieta and Canyon Lake)

MARY S. ROBERTS PET ADOPTION CENTER
6185 Industrial Avenue
Riverside, CA 92504
951-688-4340

RAMONA HUMANE SOCIETY
690 Humane Way
San Jacinto 92586
951-654-8002
(Serving Sun City, Menifee, Romoland and Homeland)

Looking to adopt a pet?
This website is linked to many animal shelters.
www.petfinder.com

To report illegal storm drain disposal, call
1-800-506-2555

Or visit our website at www.rcflood.org

E-mail fcnpdes@rcflood.org

What's the Scoop?

Tips for a Healthy Pet and a Healthier Environment

CREATE A HEALTHY ENVIRONMENT in and around your home by following these simple pet practices. Your pet, family and neighbors will appreciate their clean comfortable surroundings.

HOUSEHOLD PETS

We all love our pets, but pet waste is a subject everyone likes to avoid. Pet waste left on trails, sidewalks, streets and grassy areas can be washed into the nearest waterway when it rains. Even if you can't see streams or lakes near you, rainfall (stormwater) or sprinkler runoff can wash pet waste into the storm drains that carry runoff to the nearest streams or lakes untreated. The risk of stormwater contamination increases if pet waste is allowed to accumulate in outdoor animal pen areas or left on sidewalks, streets or driveways.

Pet waste contains nutrients and bacteria. Nutrients can promote the growth of algae in streams and lakes. Algae can cause fish kills and other environmental damage if it is fed too many nutrients. Pet Waste also contains e. Coli and fecal bacteria, which can cause disease in other animals and humans that come in contact with it when swimming or splashing in streams and lakes. Dogs also carry salmonella and giardia, which can make people sick.

Pet waste that is not picked up and properly disposed can also increase vector problems. Flies and other insects are not only attracted to and feed on pet waste, but can also be infected with diseases and spread those diseases to humans and other animals.

WHAT CAN YOU DO?

- SCOOP up pet waste and flush it down the toilet or place in trash can.
- NEVER DUMP pet waste into a storm drain or catch basin.
- USE the complimentary bags or mutt mitts offered in dispensers at local parks.
- CARRY EXTRA BAGS when walking your dog and make them available to other pet owners who are without.
- TEACH CHILDREN how to properly clean up after a pet.
- TELL FRIENDS AND NEIGHBORS about the ill effects of animal waste on the environment. Encourage them to clean up after pets.

Call 1-800-506-2555 TOLL FREE to report illegal dumping to the storm drain, find the dates and times of local Household Hazardous Waste Collection Events, obtain additional information on stormwater problems and solutions, request presentations about stormwater pollution in your child's classroom, or learn about free grasscycling and composting workshops.

SCOOP THE POOP

Many communities have "Scoop the Poop" laws that govern pet waste cleanup. Some of these laws specifically require anyone who walks an animal off their property to carry a bag, shovel, or scooper. Any waste left by the animal must be cleaned up immediately. CALL YOUR LOCAL CODE ENFORCEMENT OFFICE to find out more about pet waste regulations.

OTHER WAYS TO PROTECT YOUR PETS AND THE ENVIRONMENT

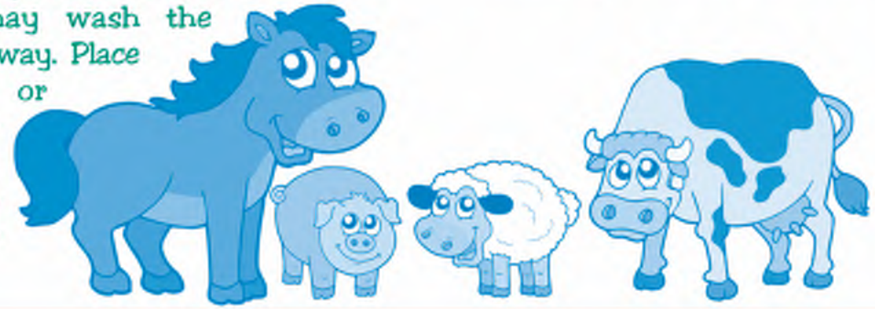
Pets are only one of many sources that contribute to water pollution. However, these other sources of water pollution cannot only harm the environment but also harm your pet. Improperly used or stored lawn fertilizers, pesticides, soaps, grease and vehicle fluids cannot only be washed into local streams and lakes, these chemicals can also harm your pet if they ingest or touch these chemicals. Call 1-800-506-2555 for information regarding how to properly dispose of household hazardous wastes such as these. You can also keep your pets and our environment healthy by properly maintaining your vehicles, and limiting use of pesticides and fertilizers to only the amount that is absolutely needed.

Make sure to not only protect your pets, but to also protect your neighbors pets. NEVER HOSE VEHICLE FLUIDS into the street or gutter. USE ABSORBENT MATERIALS such as cat litter to clean-up spills. SWEEP UP used absorbent materials and place it in the trash.

HORSES AND LIVESTOCK

Fortunate enough to own a horse or livestock? You, too, can play a part in protecting and cleaning up our water resources. The following are a few simple Best Management Practices (BMPs) specifically designed for horses and livestock.

- STORE your manure properly. Do not store unprotected piles of manure in places where stormwater runoff may wash the manure away. Place a cover or tarp over the pile to keep rainwater out.



- BUILD a manure storage facility to protect your pets, property and the environment. These structures usually consist of a concrete pad to protect groundwater and a short wall on one or two sides to make manure handling easier.
- READ the Only Rain Down the Storm Drain brochure titled "Tips for Horse Care" for additional guidance and recommendations. This brochure should be available from your local city office or for download at www.rcflood.org/stormwater.
- KEEP animals out of streams - Horses and livestock can deficate in streams causing stormwater pollution. Livestock and horses in streams can also disturb sensitive habitat and vegetation, causing additional environmental damage. Keep livestock and horses away from streams and use designated stream crossings whenever possible.
- MATERIAL STORAGE SAFETY TIPS Many of the chemicals found in barns require careful handling and proper disposal. When using these chemicals, be certain to follow these common sense guidelines:
  - Buy only what you need.
  - Treat spills of hoof oils like a fuel spill. Use kitty litter to soak up the oil and dispose of it in a tightly sealed plastic bag.
  - Store pesticides in a locked, dry, well-ventilated area.
  - Protect stored fertilizer and pesticides from rain and surface water.

RESOURCE CONSERVATION DISTRICTS CAN HELP

Call 1-800-506-2555 for assistance with locating a local conservation district that can help you properly manage your manure, re-establish healthy pastures, control weeds, or identify appropriate grasses for your soils.

Thank you for doing your part to protect your watershed, the environment, your pets and your community!

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org

Online resources include:

- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.waterboards.ca.gov
- Power Washers of North America
  www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers

Storm drain pollution prevention information for:

- Car Washing / Mobile Detailers
- Window and Carpet Cleaners
- Power Washers
- Waterproofers / Street Sweepers
- Equipment cleaners or degreasers and all mobile service providers

Do you know where street flows actually go?

Storm drains are NOT connected to sanitary sewer systems and treatment plants!

The primary purpose of storm drains is to carry *rain* water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills. Only emergency **Mechanical** repairs should be done in City streets, using drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Remember, storm drains are for receiving rain water runoff only.

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555

Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is *PROHIBITED* by law and can result in stiff penalties?

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. ***Each of us*** can do our part to keep stormwater clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water away from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose of ***small amounts*** of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do...check to see if local ordinances prevent certain activities.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.

Report illegal storm drain disposal
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them with being toxic free. Soapy water entering the storm drain system can impact the delicate aquatic environment.

When cleaning surfaces with a ***high-pressure washer*** or ***steam cleaner***, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks ***with loose paint***, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.

Appendix E

Soils Report

GEOTECHNICAL PROFESSIONALS INC.

GEOTECHNICAL INVESTIGATION
PROPOSED COACHELLA AIRPORT BUSINESS PARK
NWC STATE HIGHWAY 86 AND AIRPORT BOULEVARD
COACHELLA, CALIFORNIA

Prepared for:
Haagen Co., LLC
12302 Exposition Boulevard
Los Angeles, California 90064

Prepared by:
Geotechnical Professionals Inc.
5736 Corporate Avenue
Cypress, California 90630
(714) 220-2211

Project No. 2884.I

September 25, 2018

GEOTECHNICAL PROFESSIONALS INC.

September 25, 2018

Haagen Co., LLC
12302 Exposition Boulevard
Los Angeles, California 90064

Attention: Mr. Chris Fahey

Subject: Report of Geotechnical Investigation
Proposed Coachella Airport Business Park
NWC State Highway 86 and Airport Boulevard
Coachella, California
GPI Project No. 2884.I

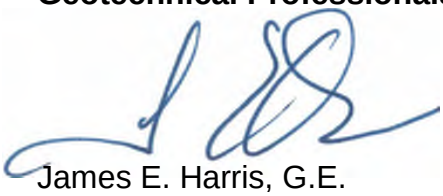
Dear Mr. Fahey:

Transmitted herewith is our report of geotechnical investigation for the subject project. The report presents our evaluation of the foundation conditions at the site and recommendations for design and construction.

We are providing this report in an electronic format. Further copies of the report can be provided if required for City submittal upon request.

We appreciate the opportunity of offering our services on this project and look forward to seeing the project through its successful completion. Feel free to call us if you have any questions regarding our report or need further assistance.

Very truly yours,
Geotechnical Professionals Inc.



James E. Harris, G.E.
Principal

5736 Corporate Avenue • Cypress, CA 90630 • (714) 220-2211 , FAX (714) 220-2122

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1.0 INTRODUCTION

1.1 GENERAL

This report presents the results of the geotechnical investigation performed by Geotechnical Professionals Inc. (GPI) for the proposed business park in Coachella, California. The geographical site location is shown on the Site Location Map, Figure 1.

1.2 PROJECT DESCRIPTION

We understand that the proposed improvements at the site will consist of a new business park with single-story buildings of various sizes on a 43-acre parcel. The buildings will include large warehouses, small warehouses, small business, self-storage buildings, a service station, and a drive-thru coffee shop. Preliminary plans indicate the footprint of the buildings will range from approximately 103,300 square feet (sf) for the large warehouse to 4,000 sf for the coffee shop. Currently, thirty-two buildings are planned for the site plus 14 self-storage buildings. The proposed buildings will cover a footprint of approximately 677,000 sf. Additional improvements will include paved vehicular drives and parking as well as landscaping. The preliminary layout of the proposed development is shown on Figure 2.

We have assumed that the buildings will be tilt-up, masonry block, or wood construction. Based on our experience with similar projects, we expect that the structures will have maximum column and wall loads on the order of 30 to 100 kips and 2 to 5 kips per lineal foot, respectively.

Information regarding proposed finish grades for the development is not known at this time. We assume that finish grades will be found at or near existing grades and no changes of grade not more than 3 to 4 feet from existing grades.

Since structural loads or grades can significantly impact the performance of the proposed development, we should perform additional evaluations if the final grades and/or loads vary significantly from those discussed herein.

1.3 PURPOSE OF INVESTIGATION

The primary purpose of this investigation and report is to provide an evaluation of the existing geotechnical conditions at the site as they relate to the design and construction of the proposed development. More specifically, this investigation was aimed at providing geotechnical recommendations for planning earthwork, and design of foundations, floor slabs, and pavements.

2.0 SCOPE OF WORK

Our scope of work for this investigation consisted of review and use of existing geotechnical data, field exploration, laboratory testing, engineering analysis, and the preparation of this report.

The field exploration program consisted of 23 Cone Penetration Tests (CPT's) and 11 exploratory borings. The locations of the explorations are shown on the Site Plan, Figure 2.

The CPT's were advanced to depths ranging from 50 to 80 feet below existing site grades. Detailed logs of the CPT's and a summary of the equipment used are presented in Appendix A. The borings were drilled using hollow-stem auger equipment to depths of 6 to 81½ feet below existing site grades. Details of the drilling and Logs of Borings are presented in Appendix B.

Laboratory soil tests were performed on selected representative samples as an aid in soil classification and to evaluate the engineering properties of the soils. The geotechnical laboratory testing program included determinations of moisture content and dry density, Atterberg Limits, grain size, compressibility (consolidation), shear strength (direct shear), collapse, R-value, and corrosion. Laboratory testing procedures and results are summarized in Appendix C.

Soil corrosivity testing was performed by HDR under subcontract to GPI. R-value testing was performed by Geologic Associates under subcontract to GPI. Their test results are presented in Appendix C.

Engineering evaluations were performed provide geotechnical and foundation recommendations. The results of our evaluations are presented in the remainder of this report.

3.0 SITE CONDITIONS

3.1 SURFACE CONDITIONS

The site is located on an undeveloped parcel located directly between State Route 86 and an unlined storm water channel (Whitewater River). We observed no evidence of previous development at the site. Historic aerials (historicaerials.com) indicate the land has been undeveloped since prior the 1950's. Minor grading may have been performed along the property lines associated with the channelization of Whitewater River and the roadway construction.

The site is bounded by Airport Road to the south, State Route 86 to the east, undeveloped land to the north, and the storm water channel to the west.

The site is relatively flat sloping very gently to the south. In general, the north side of the site is approximately 8 feet higher than the southern side over a distance of approximately 3,000 feet. Existing ground surface elevations ranged from about -112 to -120 feet MSL based on a topographic map. The Civil Engineer is using a project datum that is 500 feet greater than actual MSL elevations to avoid negative elevations. The elevations on our exploration logs reflect the project datum.

Along the property limits, there are minor slopes adjacent to the site. State Route 86 is, in general, a few feet higher than the site with a minor descending slope. Directly adjacent to the western side of the site, an unpaved maintenance road is located at the top of the storm channel on a berm, which is approximately 2 to 3 feet higher than the project site at the southern end of the site and approximately 8 to 10 feet higher than the project site at the northern end of the site. The berm appears to have been constructed as a levee for the storm water channel. The bottom of the storm channel appears to be on the order of 6 to 8 feet lower than project site.

3.2 SUBSURFACE SOILS

Our field investigation disclosed a subsurface profile consisting of native soils. Detailed descriptions of the conditions encountered are shown on the Logs of CPT's and Borings in Appendices A and B, respectively.

Though significant fill soils were not encountered, some fills are expected at the top of the slope immediately adjacent to the storm water channel.

The natural soils consist of interbedded layers of sands, silts, and clays and their mixtures. The consistencies of the sandy soils ranged typically from loose to medium dense in the upper 30 feet and medium dense to dense at greater depths. The sandy soils in the upper 30 feet exhibit moderate strength and moderate to low compressibility characteristics. Very dense sand layers were encountered at depths greater than approximately 55 to 60 feet.

The fine grained soils (silts and clays) are generally firm to stiff with some very stiff to hard layers in the upper 20 feet. In general, the fine-grained soils within the upper 20 to

30 feet varied from firm to stiff and moderately compressible. The underlying fine-grained soils become predominantly stiffer with depth, exhibiting moderate strength and moderate to low compressibility characteristics.

Clay soils were not observed in the near surface soils. The near surface soils can be anticipated to have very low expansion characteristics.

3.3 GROUNDWATER AND CAVING

In the borings, groundwater was measured at depths of 14 to 20 feet immediately after drilling. Due to the method of drilling, accurate depths to groundwater and the potential for caving were very difficult to determine. Groundwater may rise from the deeper measured levels if allow to stabilize with time. Based on the moisture content of the soil samples, we anticipate a stabilized groundwater level at a depth of 10 to 15 feet below existing grade. The historical high groundwater has not been determined in the area by the State of California. We recommend a design groundwater depth of 10 feet for the project

The sandy soils are expected to cave in dry loose soils in the upper 10 feet of the soil profile and severely cave below the groundwater.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 GENERAL

Based on the results of our investigation, it is our opinion that from a geotechnical engineering viewpoint it is feasible to develop the site as proposed. The most significant geotechnical issues that will affect the design and construction of the proposed structures are as follows:

- The site is located in an area mapped by the City of Coachella as having a potential for soil liquefaction. Some of the sandy soils underlying the site at depths from 10 to 55 feet below existing grade exhibit a potential for liquefaction in the event of a design earthquake. We estimate that the maximum settlements at the site in the event of a design earthquake would range from approximately 2½ to 3 inches. See Section 4.2 for methods to mitigate settlement.

- To help limit total and differential settlements of the proposed buildings to the magnitudes described above either mat foundations, pile foundations and pile supported structural floor slabs, or ground improvement will be required. If ground improvement is performed to limit settlements to an acceptable magnitude, the buildings can be supported on conventional spread footings.

- Prior to construction of the building foundations (conventional or mat), disturbed soils and a portion of dry, compressible soils should be removed and replaced as properly compacted fill. Deeper removals will be required if conventional footings tied together with grade beams are used for buildings. The depth of removals and details regarding grading are provided in the “Earthwork” section of this report.

- Removals are also recommended in the pavement for drives and parking and under minor structures, in order to provide a consistent, moist layer of soils for uniform support. The depth of removals and details regarding grading are provided in “Earthwork” section of this report.

- The near surface soils exhibit soluble sulfate contents that are detrimental to concrete. The foundation concrete should conform to the requirements for severe sulfate exposure as outlined in ACI 318, Section 4.3.

- The on-site soils should be considered severely corrosive to buried metals. If buried metal elements are required, a corrosion engineer should be consulted.

Our recommendations related to the geotechnical aspects of the development of the site are presented in the subsequent sections of this report.

4.2 MITIGATION OF SETTLEMENT

The maximum allowable total and differential settlements for shallow foundations and slabs on grade, from all sources, is typically on the order of 1½ inches and ¾-inch, respectively in Southern California. For mat foundations, the maximum allowable total and differential settlements, from all sources, is typically on the order of 4 inches and 2 inches, respectively. Sources include static (gravity) and seismic causes.

The site soil profile includes compressible and potentially liquefiable soils in the upper 55 feet. The potential building settlement under both static and earthquake loads could be mitigated by specially designed spread footings, mat foundations, pile foundations, or in-place ground modification methods (ground improvement) supporting conventional shallow foundations.

Structural mitigation measures for the impacts of the seismic settlements of shallow foundations could be implemented by the Structural Engineer. The risk associated with not mitigating seismic settlement by the methods in the above paragraph should be fully understood. With proper structural mitigation measures, the risk would include the building not being fully functional after a design seismic event causing the predicted seismic settlement. The floor slab and footings of the building may need to be re-leveled by compaction grouting or underpinning following a seismic event. The utility connections may also need to be repaired. The structural mitigation must be designed such that the structure would not collapse during a design seismic event causing a life and safety issue. On past, similar projects the footings were tied together with grade beams to help mitigate the impacts of seismic settlement and supported on a relatively thick layer of properly compacted soil. The details of the structural mitigation should be determined by the Project Structural Engineer.

Other potential structural mitigation methods are also provided in “Foundation Type” section of this report.

Pile foundations should be designed to resist both static loads and downdrag loads caused from seismic settlement by embedding the pile to sufficient depths below the liquefiable soil layers.

We reviewed typical methods used in Southern California such as vibro-replacement (stone columns), deep soil mixing (soil-cement columns), and rammed aggregate piers.

Vibro-replacement utilizes a large vibrating probe (mandrel) to create a cavity which is filled with gravel or crushed stone, and compacted as the mandrel is removed. The result is a stone column with the stone pushed laterally into the soil. Based on past discussions with a geotechnical specialty contractor, stone columns would not be effective to reduce the total settlements (static and seismic) due high silt or clay content of liquefiable soils, and relatively thin layers of liquefiable soils at the site. Stone columns are effective for densifying thicker, clean, loose sand layers, which are not prevalent at the site.

Rammed aggregate piers consist of drilled holes that are filled with aggregate base that is mechanically compacted as it is placed and were considered. Rammed aggregate piers are not effective in densifying surrounding soils and typically do not extend to the depth of soils exhibiting a potential for liquefaction.

Deep soil mixing involves the creation of soil/cement mixed columns extending through the soft compressible soil deposits and portion of the liquefiable soils. The resultant is similar to that of stone columns in that the method results in lower compressibility and increased shear strengths of soils below slabs and foundations. Deep soil mixing can reduce both anticipated static and seismic settlement in both the siltier sands and the significant layers of cohesive soils at the site. The soil mixing would have to reduce the static and seismic settlements to a magnitude acceptable to the Structural Engineer (typically 1½ inches or less) in order to utilize conventional spread foundations.

The proposed structures can be supported on deep foundations. Because of the anticipated seismic settlement, a pile supported structural slab would also be needed, if the previously described settlements are not tolerable and risk of floor slab damage is not acceptable. In order to limit settlement to an acceptable value, pile foundations would need to resist the downdrag of soils from liquefaction occurring above a depth of 45 feet. The total length of the piles to support this downdrag load as well as the building loads would likely be on the order of 65 to 75 feet. For the single story buildings proposed at the site, pile foundations are not likely to be economically feasible. If pile foundations were to be selected for the project, it is our opinion that the most feasible type of deep foundation would be an Augercast Pile. This type of foundation consists of a pressure-grouted pile constructed in a hollow-stem auger. The pile is especially suited for construction below groundwater. If desired, supplemental recommendations can be provided.

If mat foundations or shallow foundations with structural mitigation are not acceptable for any of the buildings, an evaluation should be made if pile foundations or deep soil mixing are economically feasible for the single story buildings planned for the site. Our report can be provided to specialty design-build contractors experienced in deep soil mixing and/or augercast piles to determine which of these methods appear to be the most cost effective to sufficiently reduce settlement of the buildings.

4.3 SEISMIC CONSIDERATIONS

4.3.1 General

The site is located in a seismically active area and is likely to be subjected to strong ground shaking due to earthquakes on nearby faults.

We assume the seismic design of the proposed development will be in accordance with the California Building Code, 2016 edition. For the 2016 CBC, a Soil Class D may be used. The seismic code values can be obtained directly from the tables in the building code using the above values and appropriate United States Geological Survey web site (earthquake.usgs.gov). The Project Structural Engineer should determine the seismic design method.

4.3.2 Strong Ground Motion Potential

Based on published information (earthquake.usgs.gov), the most significant fault in the proximity of the site is the San Andreas Fault, which is located about 2½ miles from the site.

During the life of the project, the site will likely be subject to strong ground motions due to earthquakes on nearby faults. Based on the USGS website (earthquake.usgs.gov), we computed that the site could be subjected to a peak ground acceleration (PGA_M) of 0.80g for a magnitude 6.9 earthquake. This acceleration has been computed using the mapped Maximum Considered Geometric Mean peak ground acceleration from ASCE 7-10 (ASCE, 2010) and a site coefficient (F_{PGA}) based on site class. The predominant earthquake magnitude was determined using a 2-percent probability of exceedance in a 50-year period, or an average return period of 2,475 years. The structural design will need to incorporate measures to mitigate the effects of strong ground motion.

4.3.3 Potential for Ground Rupture

There are no known active faults crossing or projecting through the site. The site is not located in an Alquist-Priolo Earthquake Fault Zone. Therefore, ground rupture due to faulting is considered unlikely at this site.

4.3.4 Liquefaction

Liquefaction is a phenomenon in which saturated cohesionless soils undergo a temporary loss of strength during severe ground shaking and acquire a degree of mobility sufficient to permit ground deformation. In extreme cases, the soil particles can become suspended in groundwater, resulting in the soil deposit becoming mobile and fluid-like. Liquefaction is generally considered to occur primarily in loose to medium dense deposits of saturated sandy soils. Thus, three conditions are required for liquefaction to occur: (1) a sandy soil of loose to medium density; (2) saturated conditions; and (3) rapid, large strain, cyclic loading, normally provided by earthquake motions.

The site is located within an area mapped by the City of Coachella as having a potential for soil liquefaction (City of Coachella, 2014). The State of California has not determined a historical high groundwater depth in the project area. Groundwater was encountered at depths of 14 to 20 feet below existing grades immediately after drilling in our recent explorations.

Revisions to the 2016 California Building Code, ASCE 7-10, and Special Publication 117A (CGS, 2008) require that the ground motion used for this evaluation be based on the Peak Ground Acceleration (PGA_M) adjusted for site class effects. This value is computed using the mapped Maximum Considered Geometric Mean (MCE_G) peak ground acceleration for a Site Class B and a site coefficient, F_{PGA}. In accordance with the 2016 CBC, we considered a ground acceleration of 0.80g for a magnitude 6.9 earthquake for our analyses, which corresponds to the PGA_M obtained using the methods described above.

The potential for liquefaction was evaluated using the methods presented by the NCEER and updated by Robertson (Robertson, 2009) and modifications provided in Special Publication 117A. Criterion for liquefaction susceptibility of the fine-grained soils was based on methods presented in Bray and Sancio (2006). We used a groundwater depth of 10 feet for our evaluations.

The soils encountered in our CPT's below the groundwater level are predominantly layers of medium dense to dense silty sands interbedded with layers of firm to very stiff layers of silts and clays. At depths of approximately 35 to 45 feet, the layers of silty sands generally become dense to very dense and silts and clays become very stiff to hard.

In general, the clays below foundation and groundwater level are resistant to liquefaction based on criteria in Bray and Sancio (2006). This conclusion is based upon the plasticity indices of soils below design water level being greater than 12. A portion of the clays have plasticity indices between 12 and 18, which are more resistant to liquefaction but susceptible to cyclic mobility.

Based on our evaluation of the field data, generally isolated and thin layers of silty sands occurring at depths of approximately 10 to 55 feet exhibit a potential for liquefaction. Based on our analyses, we computed an overall potential seismic-induced liquefaction settlement of 2½ to 3 inches. Differential seismic settlement is estimated to be 1¼- to 2-inches across a span of 40 feet.

4.3.5 Lateral Spreading

A potential result of soil liquefaction at the site is lateral spreading. Lateral spreading is defined as the horizontal movement of soils resulting from the loss of shear strength during liquefaction combined with either a sloping ground surface or a nearby free face condition. Conditions contributing to the potential for lateral spreading include the extent and severity of liquefaction, grain size of liquefiable materials, distance to the causative fault, and extent of surficial grade changes.

The unlined storm water channel on the east side of the site is an open face excavation (free face condition) with an estimated depth on the order of approximately 6 to 8 feet. The slope to the storm water channel is approximately 100 to 150 feet from the western property line at the site. The project site is essentially flat with a very minor ground slope of about 0.3 percent towards the southeast paralleling the storm water channel.

These conditions along with the liquefaction potential of underlying soils are consistent with areas that may be subject to lateral spreading.

We evaluated the potential for lateral spreading towards the open face excavation of the storm water channel. A lateral displacement was determined using the calculated Lateral Displacement Index (LDI) as described by Zhang et. al. (2004) for the site geometry. The analyses evaluate the topographic and subsurface information to determine the potential lateral displacement induced by the movement of the site towards the free face caused by severe liquefaction of a continuous layer beneath the site.

The LDI was calculated for soil layers having the potential for liquefaction utilizing the CPT data for the site, we calculated LDI for the CPT's within the western boundary of the project site. Utilizing this geometry and the analytical method described above, we determined the potential total lateral-spreading induced displacement from approximately 3 to 12 inches could occur at the western portion of the site.

As the discussed above, lateral spreading requires continuous liquefiable layers across the site in a westerly direction to the drainage channel. We reviewed 9 cross sections of CPT data toward the channel. Evidence of distinct and consistent liquefiable layers across the site toward the channel could only be identified in a few of the cross sections. Based on this data, lateral spreading has a moderate potential to adversely impact the site in limited areas of the site with displacements on the order discussed above.

Other empirical methods (Youd,1997) indicate that for lateral spreading to occur, the layers subject to liquefaction should be continuous across the site and have an overburden-normalized standard penetration test blowcount (sandy soils) of less than 15. Our data did not indicate continuous layers across the site with these blowcounts.

If mat foundations or footings tied together with grades beams are used to support the buildings, minor amounts of lateral spreading as discussed above is not expected to adversely impact the building from a life and safety standpoint. Some minor displacement of the buildings, utility connections, and parking lot along the west side of the site due to lateral spreading in the event of a design earthquake may occur but repairing the structures, pavements and other site improvements would likely be more cost-effective than ground improvement methods. Ground improvement required to resist the potential impacts of lateral spreading would likely consist of a deep barrier wall with multiple rows of soil-cement columns along the entire western boundary of the property.

4.4 EARTHWORK

The earthwork anticipated at the project site will consist of clearing, overexcavation of disturbed and natural soils, subgrade preparation, and placement and compaction of fill.

4.4.1 Clearing

Prior to grading, the areas to be developed should be stripped of vegetation, pavements, foundations, and cleared of all debris. Buried obstructions, such as utilities and tree roots, should be removed. Although none were encountered, any cesspools or septic systems exposed during construction should be removed in their entirety. The resulting excavation should be backfilled as recommended in the "Subgrade Preparation" and "Placement and Compaction of Fill" sections of this report. As an alternative, cesspools can be backfilled with a lean sand-cement slurry. Deleterious materials generated during the clearing operations should be removed from the site. At the conclusion of the clearing operations, a representative of GPI should observe and accept the site prior to any further grading.

4.4.2 Excavations

Excavations at the site will include removal of unsuitable soils, foundation excavations and trenching for utility lines.

Prior to placement of fills or construction of the buildings, existing disturbed soils and a portion of the dry, compressible natural soils within the building areas should be removed and replaced as properly compacted fill. These materials require densification to provide uniform and adequate support of foundations, slab-on-grade floors, and pavements.

For planning purposes, we recommend that removals within footprints of buildings supported on spread footings extend to 7 feet below existing grades or 5 feet below footings, whichever is deeper. We recommend that removals within the footprints of buildings supported on mat foundations extend to 4 feet below existing grades or 2 feet below foundations, whichever is deeper. The purpose of these removals is to remove and recompact the dry, low-density natural soils near the ground surface and disturbed soils, if encountered. If undocumented fills are encountered within the building footprints, we also recommend removal and replacement as properly compacted fill.

In proposed pavement areas, removals should extend to 2-feet below existing grades. Existing grade refers to elevations at locations of explorations.

The actual depths of removal will need to be confirmed in the field during grading by a representative of GPI.

The depth of removals may be reduced by 2-feet if the exposed subgrade soils in the building and parking areas are moisture conditioned and densified in-place using heavy vibratory equipment as discussed in “Subgrade Preparation”. The contractor will need to demonstrate that the recommended compaction has been achieved by provided test pits for access for density testing.

The removals should extend laterally beyond the edge of footing a minimum distance equal to the depth of overexcavation/compaction below finish grade (i.e. a 1:1 projection below the edge of footings).

Where not removed by the aforementioned excavations, existing utility trench backfill should be removed and replaced as properly compacted fill. This is especially important for deeper fills such as existing sewers and storm drains. For planning purposes, removals over the utilities should extend to within 1-foot of the top of the pipe. For utilities, which are 5 feet or shallower, the removal should extend laterally 1-foot beyond both sides of the pipe. For deeper utilities, the removals should include a zone defined by a 1:1 projection upward (and away from the pipe) from each side of the pipe. The actual limits of removal will be confirmed in the field. We recommend that all known utilities be shown on the grading plan.

Temporary construction excavations may be made vertically without shoring to a depth of 4 feet below adjacent grade. For deeper cuts up to 10 feet, the slopes should be properly shored or sloped back to at least 1:1 or flatter. Caving should be anticipated in excavations attempted in dry sands or below the groundwater level. As such, dewatering, shoring, excavation, and backfill methods should be developed by the contractor for structures or utilities that are anticipated to extend below the groundwater. Surcharge loads should not be permitted within a horizontal distance equal to the height of cut from the top of the excavation or 5 feet from the top of the slopes, whichever is greater, unless the cut is properly shored. Excavations that extend below an imaginary plane, inclined at 45 degrees below the edge of any adjacent existing site facilities, should be properly shored to maintain support of adjacent elements. All excavations and shoring systems should meet the minimum requirements given in the most current State of California Occupational Safety and Health Standards.

4.4.3 Subgrade Preparation

After the recommended cuts and removals are performed and prior to placing fills or construction of the proposed improvements, the subgrade soils should be scarified to a depth of 12 inches, moisture conditioned, and compacted to at least 95 percent (90 percent cohesive soils) of the maximum dry density, determined in accordance with ASTM D1557. Moistening of the dry sandy soils anticipated at the site can usually be accomplished by deep ripping and liberal watering (including “rainbirds” or flooding) prior to compaction.

If the removals are reduced by 2-feet, as provided as an option in “Excavations” section of this report, the exposed subgrade soils in building and parking areas should be moisture-conditioned and proofrolled a minimum of six passes with a heavy vibratory pad-foot-roller (minimum 40,000 pounds dynamic force) until the soils have been compacted to at least 95 percent (90 percent cohesive soils) of maximum dry density. Proofrolling should continue until the required compaction has been achieved to a depth of at least 2 feet below the exposed subgrade, as measured by in-place density testing.

The fill soils within the upper 12 inches below building floor slabs and the pavement base should be compacted to dry densities equal to at least 95 percent (90 percent cohesive soils) of maximum dry density (ASTM D-1557).

4.4.4 Material for Fill

The surficial on-site soils are, in general, suitable for use as compacted fill. On-site clays, if encountered, should not be used where non-expansive fill is specified or recommended. Imported fill material should be predominately granular (containing no more than 40 percent fines - portion passing No. 200 sieve) and non-expansive (Expansion Index of 20 or less). The import should also exhibit a minimum R-value of 40, consistent with the existing near surface soils. GPI should be provided with a sample (at least 50 pounds) and notified of the location of soils proposed for import at least 72 hours in advance of importing. Each proposed import source should be sampled, tested and accepted for use prior to delivery of the soils to the site. Soils imported prior to acceptance by GPI may be rejected if not suitable.

Soils used for compacted fills should not contain particles greater than 6 inches in size.

While not anticipated at the site, on-site inert demolition debris, such as concrete and asphalt, may be reused in the compacted fills provided approval is provided by the reviewing regulatory agency and the owner. The material should be crushed to the consistency of aggregate base and blended with the on-site or imported soils.

4.4.5 Placement and Compaction of Fills

Fill soils should be placed in horizontal lifts, moisture-conditioned, and mechanically compacted to at least 95 percent (90 percent cohesive) for of the maximum dry density in building and pavement areas, in accordance with ASTM D-1557. In pavement areas, including the parking structure pavements on grade, the upper 12 inches should be compacted to 95 percent (90 percent for cohesive soils). The optimum lift thickness will depend on the compaction equipment used and can best be determined in the field. The following uncompacted lift thickness can be used as preliminary guidelines.

Plate Compactors	4-6 inches
Track Equipment, Small Vibratory or Static Rollers (5-ton±)	6-8 inches
Scrapers and Heavy Loaders	8-12 inches

The maximum lift thickness should not be greater than 12 inches.

Fills consisting of the on-site clays and silts should be placed at a moisture content of 1 to 3 percent over the optimum moisture content in order to achieve the required compaction. Granular fills should be placed at a moisture content of 0 to 2 percent over the optimum moisture content. The moisture content of the soils encountered in the upper 5 to 10 feet of the explorations was generally well below the optimum moisture content. As such, significant moisture conditioning (wetting) may be required prior to replacing the soils as properly compacted fill. The contractors should allow for moistening of these materials in their bids.

Once moisture conditioned and properly compacted, the exposed soils should not be allowed to dry out prior to covering. A representative of GPI should confirm the moisture content of the subgrade soils immediately prior to placement of concrete or additional fill.

During backfill of excavations, the fill should be properly benched into the construction slopes as it is placed in lifts.

4.4.6 Shrinkage and Subsidence

Shrinkage is the loss of soil volume caused by compaction of fills to a higher density than before grading. Subsidence is the settlement of in-place subgrade soils caused by loads generated by large earthmoving equipment. For earthwork volume estimating purposes, an average shrinkage value of about 15 to 20 percent and subsidence of 0.1 to 0.2 feet may be assumed for the surficial soils. These values are estimates only and exclude losses due to removal of vegetation or debris. Actual shrinkage and

subsidence will depend on the types of earthmoving equipment used and should be determined during grading.

4.4.7 Trench/Wall Backfill

Utility trench and wall backfill consisting of the on-site material or imported sand should be mechanically compacted in lifts. Letting or flooding should not be permitted. The on-site silts (or clays if encountered) should not be used in retaining wall backfill. Moistening of the on-site soils should be anticipated prior to backfill. Lift thickness should not exceed those values given in the "Compacted Fill" section of this report. GPI should observe and test trench and wall backfills as they are placed.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. The slurry should contain one sack of cement per cubic yard and have a maximum slump of 5 inches. Within the building area, the slurry should contain two sacks of cement per cubic yard. When set, such a mix typically has the consistency of compacted soil.

4.4.8 Observation and Testing

A representative of GPI should observe excavations, subgrade preparation, and fill placement activities. Sufficient in-place field density tests should be performed during fill placement and in-place compaction to evaluate the overall compaction of the soils. Soils that do not meet minimum compaction requirements should be reworked and tested prior to placement of any additional fill.

4.5 SHALLOW FOUNDATIONS

4.5.1 General

On similar projects, proposed buildings have been supported on spread footings tied together laterally with grade beams provided the static and seismic settlements as designed by the Project Structural Engineer.

In order to help mitigate the seismic settlements (total and differential) at the site after remedial grading, the Structural Engineer should also consider additional structural mitigation beyond connecting the footings with grade beams. The actual method of structural mitigation should be determined by the Project Structural Engineer.

As discussed in Section 4.2 “Mitigation of Settlement” of the report, mat foundations, pile foundations, or ground improvement may also be used to mitigate the potential liquefaction settlements. Recommendations for a mat foundation are provided in Section 4.5 of this report. GPI can provide recommendations for the other mitigation methods, if the static and seismic settlements (total and differential) are beyond the structural mitigation methods provided above and mat foundations are not feasible for the building type.

The subsurface soils should be prepared in accordance with the recommendations given in this report.

4.5.2 Allowable Bearing Pressures – Spread Footings

Based on the shear strength and elastic settlement characteristics of the natural and recompacted on-site soils, static allowable net bearing pressures of up to 3,000 pounds per square foot (psf) may be used for both continuous footings and isolated column footings for the proposed building addition or other lightly-loaded structures. These bearing pressures are for dead-load-plus-live-load, any may be increased one-third for short-term, transient, wind and seismic loading. The actual bearing pressure used may be less than the value presented above and can be based on economics and structural loads to determine the minimum width for footings as discussed below. The maximum edge pressures induced by eccentric loading or overturning moments should not be allowed to exceed these recommended values.

The following minimum footing widths and embedments are recommended for the corresponding allowable bearing pressure.

STATIC BEARING PRESSURE (psf)	MINIMUM FOOTING WIDTH (inches)	MINIMUM FOOTING* EMBEDMENT (inches)
3,000	48	24
2,500	24	24
2,000	18	18
1,500	15	15

* Refers to minimum depth below lowest adjacent grade at the time of foundation construction.

A minimum footing width of 15 inches should be used even if the actual bearing pressure is less than 1,500 psf.

Total static settlement of the column footings (100 kips maximum load) is expected to be on the order of 1-inch or less. Total static settlement of the wall footings (2 to 4 kips per lineal foot maximum load) is expected to be on the order of ¾-inch or less. Maximum differential settlements between similarly loaded adjacent footings or along a 40-foot span are expected to be on the order of ½-inch or less. Similar settlements are anticipated for lightly loaded structures supported on 2 feet of properly compacted fill.

The above settlements should be included with the anticipated seismic settlement caused by liquefaction when evaluating the total settlement of the building or other lightly loaded structures.

The above estimates are based on the assumption that the recommended earthwork will be performed and that the footings will be sized in accordance with our recommendations.

4.5.3 Lateral Load Resistance

Soil resistance to lateral loads will be provided by a combination of frictional resistance between the bottom of foundations and underlying soils, and by passive soil pressures

acting against the embedded sides of the foundations. For frictional resistance, a coefficient of friction of 0.35 may be used for design. In addition, an allowable lateral bearing pressure equal to an equivalent fluid weight of 300 pounds per cubic foot may be used, provided the foundations are poured tight against the compacted fill. These values may be used in combination without reduction.

4.5.4 Footing Excavation Observation

Prior to placement of concrete and steel, a representative of GPI should observe and approve all footing and grade beam excavations.

4.6 MAT FOUNDATIONS

The sizes and foundation pressures for mat foundations may vary significantly for the different buildings planned for the project. We evaluated mat foundations for a warehouse building with a footprint of 160 feet by 400 feet and for an office building with a footprint of 300 feet by 75 feet. We assumed that the mat pressure for the warehouse building may be on the order of 300 psf and 150 psf for the office building. Other building sizes and mat pressure can be evaluated as the project develops.

The bearing pressure near the center of a mat (approximately 400 feet length and 160 feet width in dimension) is assumed to be on the order of 300 psf for the warehouse building. We estimate the ground surface under the center portions of the loaded area having the above dimensions and the aforementioned applied pressure will settle approximately ¾-inch. The outside edge of this area under the same loading conditions is expected to settle approximately $^{3}/_{8}$-inch. The outside corner of this area under the same loading conditions is expected to settle less than ¼-inch.

The bearing pressure near the center of a mat (approximately 300 feet length and 75 feet width in dimension) is assumed to be on the order of 150 psf for the office building. We estimate the ground surface under the center portions of the loaded area having the above dimensions and the aforementioned applied pressure will settle approximately ½-inch. The outside edge of this area under the same loading conditions is expected to settle approximately ¼-inch. The outside corner of this area under the same loading conditions is expected to settle less than ¼-inch.

The static settlements assume a uniformly applied pressure and do not include the effects (stiffness) of the mat. The actual settlement of the mat will depend on the stiffness of the mat, its ability to distribute the loads and should be determined by the Structural Engineer.

The above settlements should be included with the anticipated seismic settlement caused by liquefaction when evaluating the total settlement of the building.

For the structural analysis of the mat foundation, we recommend using an uncorrected modulus of subgrade reaction of 180 pci. This value is based on a 1-foot square bearing area and medium dense sands and stiff clays. We recommend this modulus be reduced by 75 percent to a value of 45 pci to account for the size of the mat foundation.

The allowable soil bearing pressure will be significantly greater than the average bearing pressures required for the mat foundation as discussed above. At localized thickened areas of the mat, such as columns and point of load applications, a static allowable net bearing pressure of 2,000 pounds per square foot may be used subject to the dimensions provided for spread footings. These allowable bearing pressures are for dead-plus-live loads, and may be increased one-third for short-term, transient, wind and seismic loading.

We should review the final mat design to confirm the estimated values.

4.7 FOUNDATION CONCRETE

Laboratory testing by HDR (Appendix C) indicates that the near surface soils exhibit a soluble sulfate content of 137 to 4,080 mg/kg (0.01 to 0.44 percent by weight). For the 2016 CBC, foundation concrete should conform to the requirements for severe sulfate exposure as outlined in ACI 318, Section 4.3.

4.8 BUILDING FLOOR SLABS

Slab-on-grade floors should be supported on non-expansive, granular compacted soils (Expansion Index less than 20) as discussed in the “Placement and Compaction of Fill” section. On-site clayey soils, if encountered, should not be placed within 2 feet of the finished grade in building floor slab area.

Settlement of the slab-on-grade floors should be anticipated in the event of liquefaction from a seismic event. Distress to the floor slabs may need to be repaired and/or the floor slabs may need to be releveled.

A vapor/moisture retarder should be placed under slabs that are to be covered with moisture-sensitive floor coverings (wood, vinyl, tile, etc.). Currently, common practice is to use a 10 or 15 mil polyethylene product or a 15-mil polyolefin product such as Stego Wrap for this purpose. Whether the concrete slab is placed directly on the vapor barrier or on a clean sand layer between the slab and vapor retarder is a decision for the Project Architect and General Contractor, as it is not a geotechnical issue. If covered by sand, the sand layer should be about 2 inches thick and contain less than 5 percent by weight passing the No. 200 sieve. Based on our explorations and laboratory testing, the near-surface soils at the site are not suitable for this purpose. The sand layer should be nominally compacted using light equipment. The sand placed over the vapor retarder should only be slightly moist. If the sand gets wet (for example as a result of rainfall or excessive moistening) it must be allowed to dry prior to placing concrete. Care should be taken to avoid infiltration of water into the sand layer after placement of the concrete slab, such as at slab cut-outs and other exposures. A sand layer is not required beneath the vapor retarder, but we take no exception if one is provided.

It should be noted that the material used as a vapor retarder is only one of several factors affecting the prevention of moisture accumulation under floor coverings. Other factors include maintaining a low water-cement ratio for the concrete used for the floor slab, effective sealing of joints and edges (particularly at pipe penetrations) as well as

excess moisture in the concrete. The manufacturer of the floor coverings should be consulted for establishing acceptable criteria for the condition of the floor surface prior to placing moisture-sensitive floor coverings.

For lateral resistance design, a coefficient of friction value of 0.35 between aggregate base or select fill and concrete may be used. For a slab on a visqueen moisture barrier, a coefficient of 0.1 should be used. For a concrete slab on Stego Wrap, a coefficient of 0.3 may be used, which is consistent with recommendations provided by the American Concrete Institute (ACI).

For elastic design of slabs-on-grade supporting sustained concentrated loads, a modulus of subgrade reaction (k) of 180 pounds per cubic inch (pounds per square inch per inch of deflection) may be used. This value is for a 1-foot by 1-foot square loaded area and should be adjusted by the structural designer for the area of the proposed building slab using appropriate elastic theory.

Although not tested, the upper silty sands and sandy silts are anticipated to have a low potential for expansion. As such, there are no geotechnical requirements for minimum floor slab thickness or reinforcing.

4.9 LATERAL EARTH PRESSURES

Based on information available to us at the time this report was prepared, no major retaining walls or basements were planned on the site. The following recommendations are provided for walls less than 8 feet in height. We recommend that non-expansive, granular soils be used as wall backfill.

Active earth pressures can be used for designing walls that can yield at least ½-inch laterally in 10 feet of wall height under the imposed loads. For level backfill comprised of on-site granular soils, the magnitude of active pressures are equivalent to the pressures imposed by a fluid weighing 35 pounds per cubic foot (pcf). This pressure may also be used for the design of temporary excavation support.

At-rest pressures should be used for restrained walls that remain rigid enough to be essentially non-yielding. At-rest pressures imposed by a fluid weighing 52 pounds per cubic foot should be used for granular backfill.

If the design of retaining walls requires seismic earth pressures to be included, a lateral pressure equivalent to a fluid with a unit weight of 25 pcf may be used. This pressure should be combined with the active earth pressure presented above for a total lateral earth pressure (active plus seismic) equal to a fluid weighing 60 pcf. If walls are designed using at-rest pressures, a total lateral earth pressure may be limited to 60 pcf.

Walls subject to surcharge loads should be designed for an additional uniform lateral pressure equal to one-third and one-half the anticipated surcharge pressure for unrestrained and restrained walls, respectively.

The wall backfill should be well-drained to relieve possible hydrostatic pressure or designed to withstand these pressures. A drain consisting of perforated pipe and gravel wrapped in filter fabric should be used. One cubic foot of rock should be used for each lineal foot of pipe. The fabric (non-woven filter fabric, Mirafi 140N or equivalent) should be lapped at the top.

Wall footings should be designed as discussed in the "Foundations" section.

4.10 CORROSIVITY

Resistivity testing of representative samples of the on-site surficial soils by HDR indicate that the soils are severely corrosive to ferrous metals (resistivity measurements of 160 to 1,040 ohm-cm). GPI does not practice corrosion engineering. Should the use of buried metal pipe be proposed, a corrosion engineer, such as HDR, should be consulted.

4.11 DRAINAGE

Positive surface gradients should be provided adjacent to all structures so as to direct surface water run-off and roof drainage away from foundations and slabs toward suitable discharge facilities. The introduction of water into the existing fill soils can result in subsidence. Long-term ponding of surface water should not be allowed on pavements or adjacent to buildings.

4.12 EXTERIOR CONCRETE AND MASONRY FLATWORK

Exterior concrete and masonry flatwork should be supported on non-expansive, compacted fill. The use of the clayey soils, if encountered, within 2 feet of the slab subgrade should not be permitted unless differential heave is tolerable. This includes exterior sidewalks, stamped concrete, non-traffic pavement, pavers, etc. Prior to placement of concrete, the subgrade should be prepared as recommended in the "Subgrade Preparation" section of this report.

4.13 STORM WATER INFILTRATION

Current regulations require that storm water be infiltrated in the site soils of new developments when possible. The soil types present at the site control the ability of water to infiltrate into the subgrade. Based on our subsurface investigation, groundwater was encountered within 14 feet of the existing ground surface at portions of the site and the upper 15 feet of the soil profile consists predominantly of loose to medium dense silty sands and firm to stiff sandy silts.

Our analysis indicate that the silty sands and sandy silts in the upper 15 feet of the soil profile exhibit a potential for settlement from liquefaction upon saturation. Storm water infiltration into the underlying soils may adversely impact the proposed buildings and improvements as well as the adjacent public roadways. We do not recommend storm water infiltration for the subject site unless the risk is acceptable for potential liquefaction settlement of soils underlying infiltration areas.

If on-site infiltration of storm water is used, we recommend that infiltration areas adjacent to the building and property lines should be avoided. We recommend any infiltration device be located at least 40 feet from the proposed building and property lines. Storm water infiltration should also not be allowed within 10 feet vertically from the current groundwater level which excludes most buried chamber systems.

If infiltration devices are proposed for the project, the rate of infiltration should be determined by on-site percolation tests at the location and depth of the proposed infiltration devise. Infiltration tests should be performed in accordance to Riverside County guidelines (Riverside, 2011).

4.14 PAVED AREAS

Preliminary pavement design has been based on an assumed R-value of 40. The California Division of Highways Design Method was used for design of the recommended preliminary pavement sections. Final pavement design should be based on R-value testing performed near the conclusion of rough grading. The following pavement sections are recommended for planning purposes only.

PAVEMENT SUBGRADE

PAVEMENT AREA	TRAFFIC INDEX	SECTION THICKNESS (inches)	
		Asphalt Concrete	**Aggregate Base Course**
Auto Parking	4	3	4
Circulation Drives	5	3	4
Truck Drives	6	3	7
		Portland Cement Concrete	**Aggregate Base Course**
Auto Parking	4	6	---
Circulation Drives	5	6	---
Truck Drives	6	6.5	---

The pavement subgrade underlying the aggregate base or concrete should be properly prepared and compacted in accordance with the recommendations outlined under "Subgrade Preparation".

The Portland cement concrete used for paving should have a modulus of rupture of at least 550 psi (equivalent to an approximate compressive strength of 3,700 psi) at the time the pavement is subjected to truck traffic.

The pavement base course (as well as the top 12 inches of the subgrade soils) should be compacted to at least 95 percent of the maximum dry density (ASTM D-1557). Aggregate base should conform to the requirements of Section 26 of the California Department of Transportation Standard Specifications for Class II aggregate base (three-quarter inch maximum) or Section 200-2 of the Standard Specifications for Public Works Construction (Green Book) for untreated base materials, excluding processed miscellaneous base.

The above recommendations are based on the assumption that the base course and compacted subgrade will be properly drained. The design of paved areas should incorporate measures to prevent moisture build-up within the base course which can otherwise lead to premature pavement failure. For example, curbing adjacent to landscaped areas should be deep enough to act as a barrier to infiltration of irrigation water into the adjacent base course.

4.15 GEOTECHNICAL OBSERVATION AND TESTING

We recommend that a representative of GPI observe earthwork during construction to confirm that the recommendations provided in our report are applicable during construction. The earthwork activities include grading, compaction of fills, subgrade preparation, pavement construction and foundation excavations. If conditions are different than expected, we should be afforded the opportunity to provide an alternate recommendation based on the actual conditions encountered.

5.0 LIMITATIONS

The report, exploration logs, and other materials resulting from GPI's efforts were prepared exclusively for use by Haagen Co., LLC and their consultants in designing the proposed development. The report is not intended to be suitable for reuse on extensions or modifications of the project or for use on any project other than the currently proposed development as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report are provided to contractors or included in specifications, it should be understood that they are provided for information only.

Soil deposits may vary in type, strength, and many other important properties between points of exploration due to non-uniformity of the geologic formations or to man-made cut and fill operations. While we cannot evaluate the consistency of the properties of materials in areas not explored, the conclusions drawn in this report are based on the assumption that the data obtained in the field and laboratory are reasonably representative of field conditions and are conducive to interpolation and extrapolation.

Furthermore, our recommendations were developed with the assumption that a proper level of field observation and construction review will be provided during grading, excavation, and foundation construction by GPI. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations. If construction phase services are performed by others they must accept full responsibility for all geotechnical aspects of the project including this report.

Our investigation and evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable Geotechnical Engineers practicing in this area. No other representation, either expressed or implied, is included or intended in our report.

Respectfully submitted,
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BASE MAP REPRODUCED FROM GOOGLE MAPS © 2018

GEOTECHNICAL PROFESSIONALS, INC.

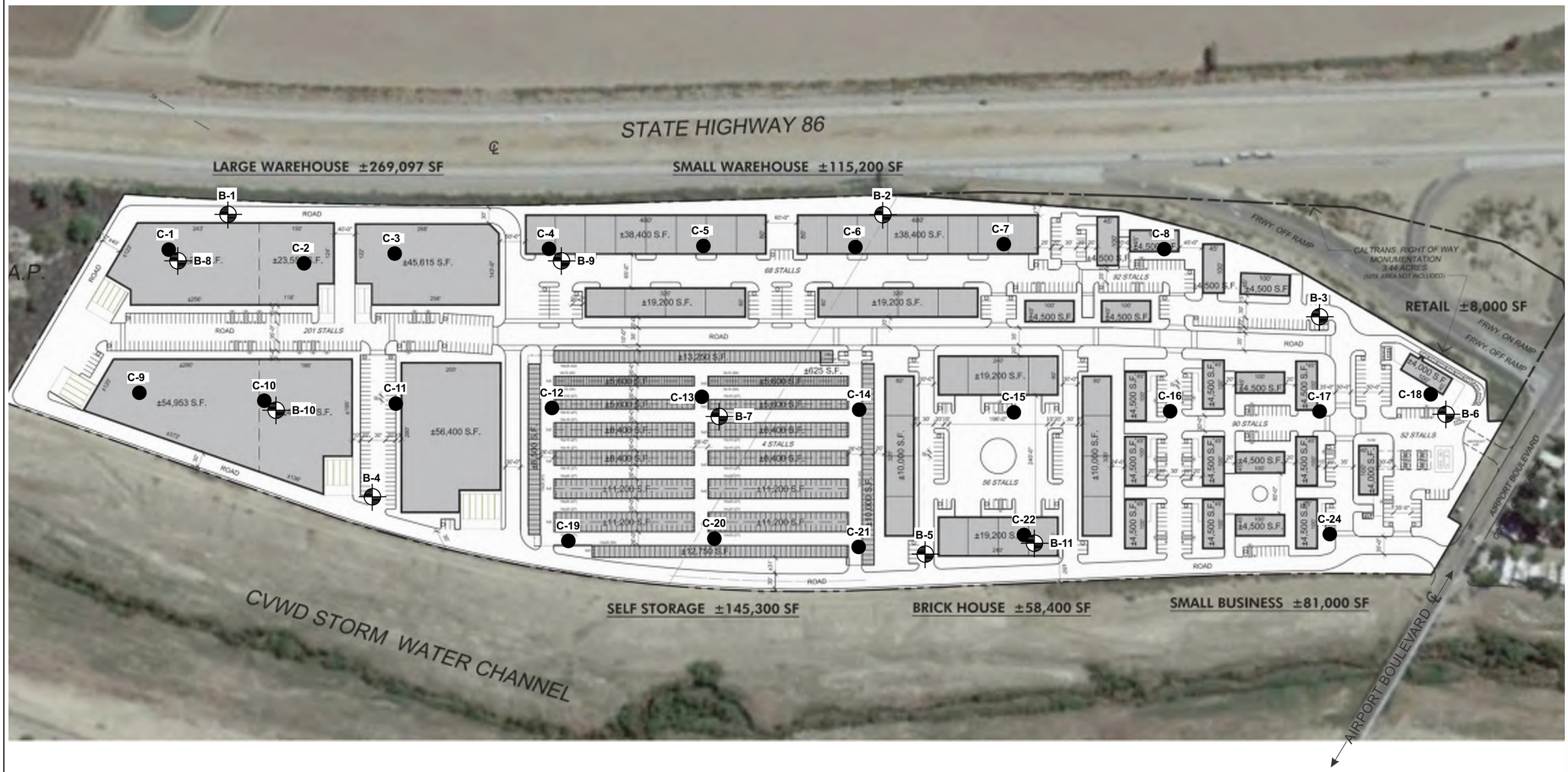
SITE LOCATION MAP

COACHELLA BUSINESS PARK

GPI PROJECT NO.: 2884.I

SCALE: 1" = 3000'

FIGURE 1



EXPLANATION

B-11 — APPROXIMATE LOCATION AND NUMBER OF EXPLORATORY BORING

C-24 — APPROXIMATE LOCATION AND NUMBER OF CONE PENETRATION TEST

0 200 400 FEET

BASE MAP REPRODUCED FROM PROPOSED SITE PLAN BY MCKENTLY MALAK ARCHITECTS DATED 5/1/18

GPI GEOTECHNICAL PROFESSIONALS, INC.

COACHELLA BUSINESS PARK

GPI PROJECT NO.: 2884.I | SCALE: 1" = 200'

SITE PLAN

FIGURE 2

APPENDIX A

APPENDIX A

CONE PENETRATION TESTS

Twenty-three Cone Penetration Tests (CPT's) were performed at the site. The soundings were advanced to depths of 50 to 80 feet below existing grades. One proposed CPT was not performed due to the location being inaccessible due to soft sands. The locations of the CPT's are shown on the Site Plan, Figure 2.

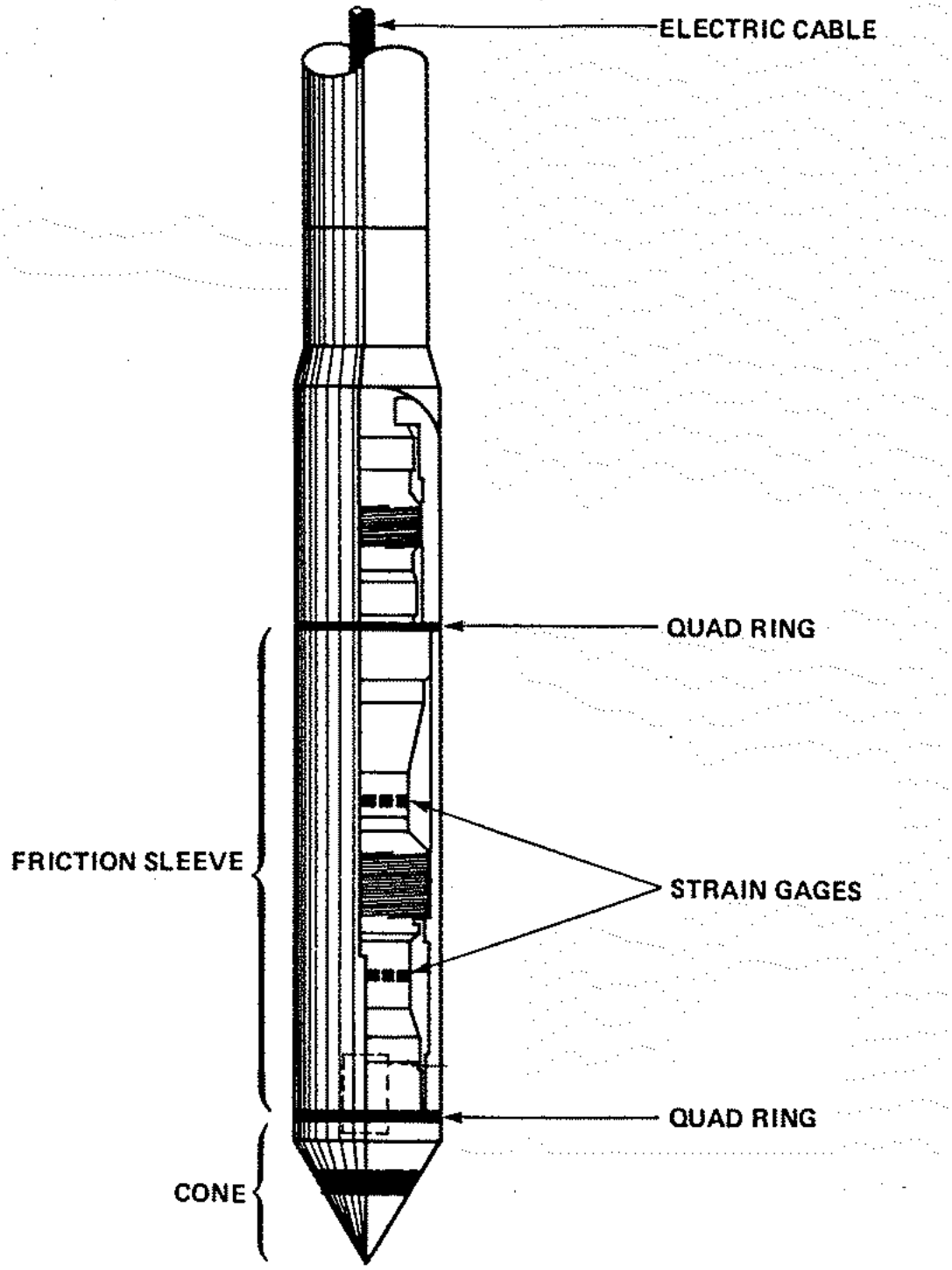
The Cone Penetration Test consists of pushing a cone-tipped probe into the soil deposit while simultaneously recording the cone tip resistance and side friction resistance of the soil to penetration (refer to Figure A-1). The CPT described in this report was conducted in general accordance with ASTM specifications (ASTM D 5778) using an electric cone penetrometer.

The CPT equipment consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to push the cone and rods into the soil while a continuous record of cone and friction resistance versus depth is obtained in both analog and digital form at the ground surface. A specially designed truck is used to transport and house the test equipment and to provide a 30-ton reaction to the thrust of the hydraulic rams.

Standard data obtained during a CPT consists of continuous stratigraphic information with close vertical resolution. Stratigraphic interpretation is based on relationships between cone tip resistance and friction resistance. The calculated friction ratio (CPT friction sleeve resistance divided by cone tip resistance) is used as an indicator of soil type. Granular soils typically have low friction ratios and high cone resistance, while cohesive or organic soils have high friction ratios and low cone resistance. These stratigraphic material categories form the basis for all subsequent calculations which utilize the CPT data.

Computer plots of the reduced CPT data acquired for this investigation are presented in Figures A-2 through A-24 of this appendix. The field testing and computer processing was performed by Kehoe Testing and Engineering under subcontract to Geotechnical Professionals Inc. (GPI). The interpreted soil descriptions were prepared by GPI.

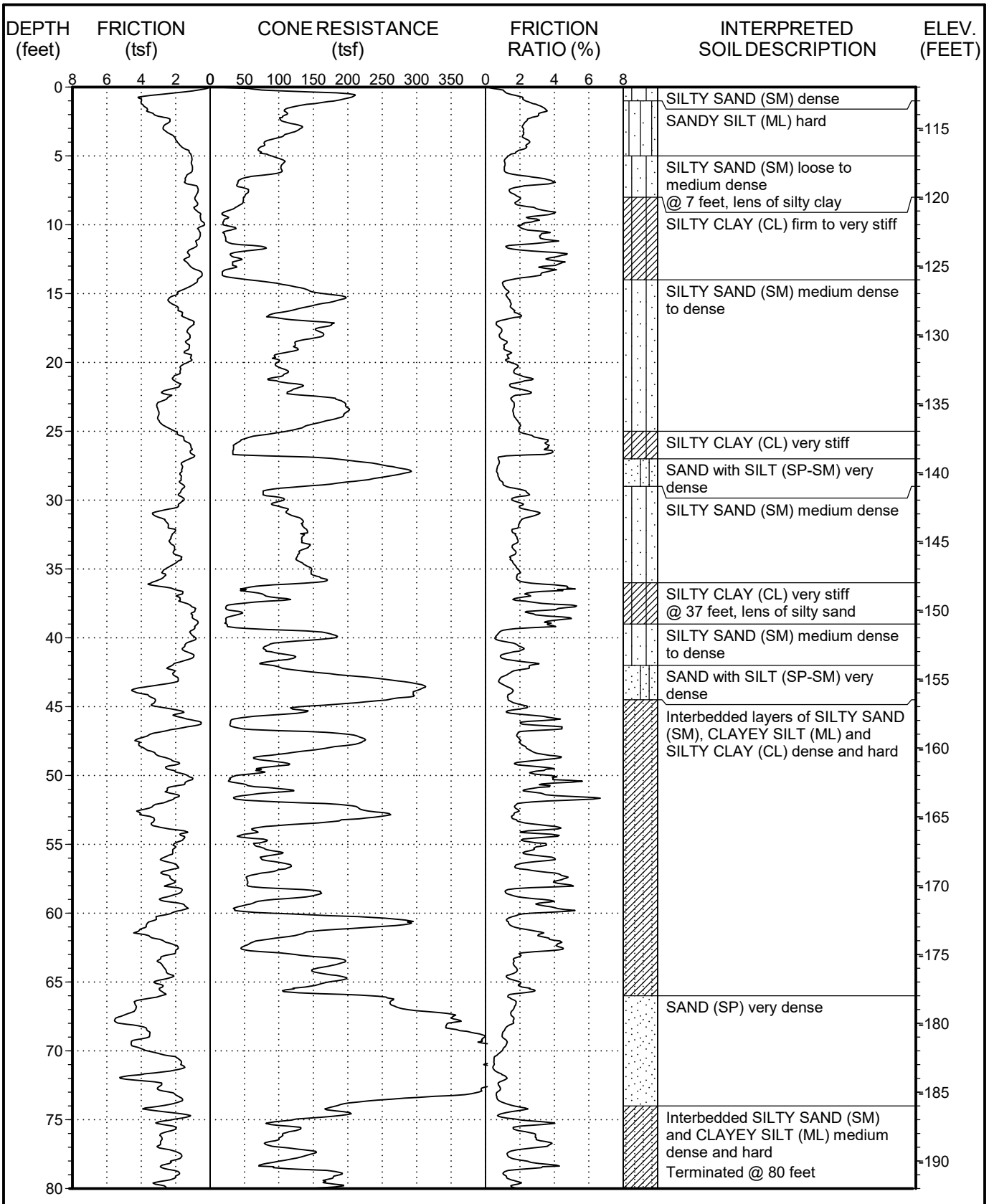
The CPT locations were laid out in the field by measuring from existing site features. Ground surface elevations at the CPT locations were estimated from topographic map dated July 5, 2018 by The Altum Group using a project datum and should be considered approximate. The project datum is 500 feet greater than actual MSL elevations to avoid negative elevations.



GEOTECHNICAL PROFESSIONALS, INC.

CONE PENETROMETER

FIGURE A-1



Date performed:7-23-18

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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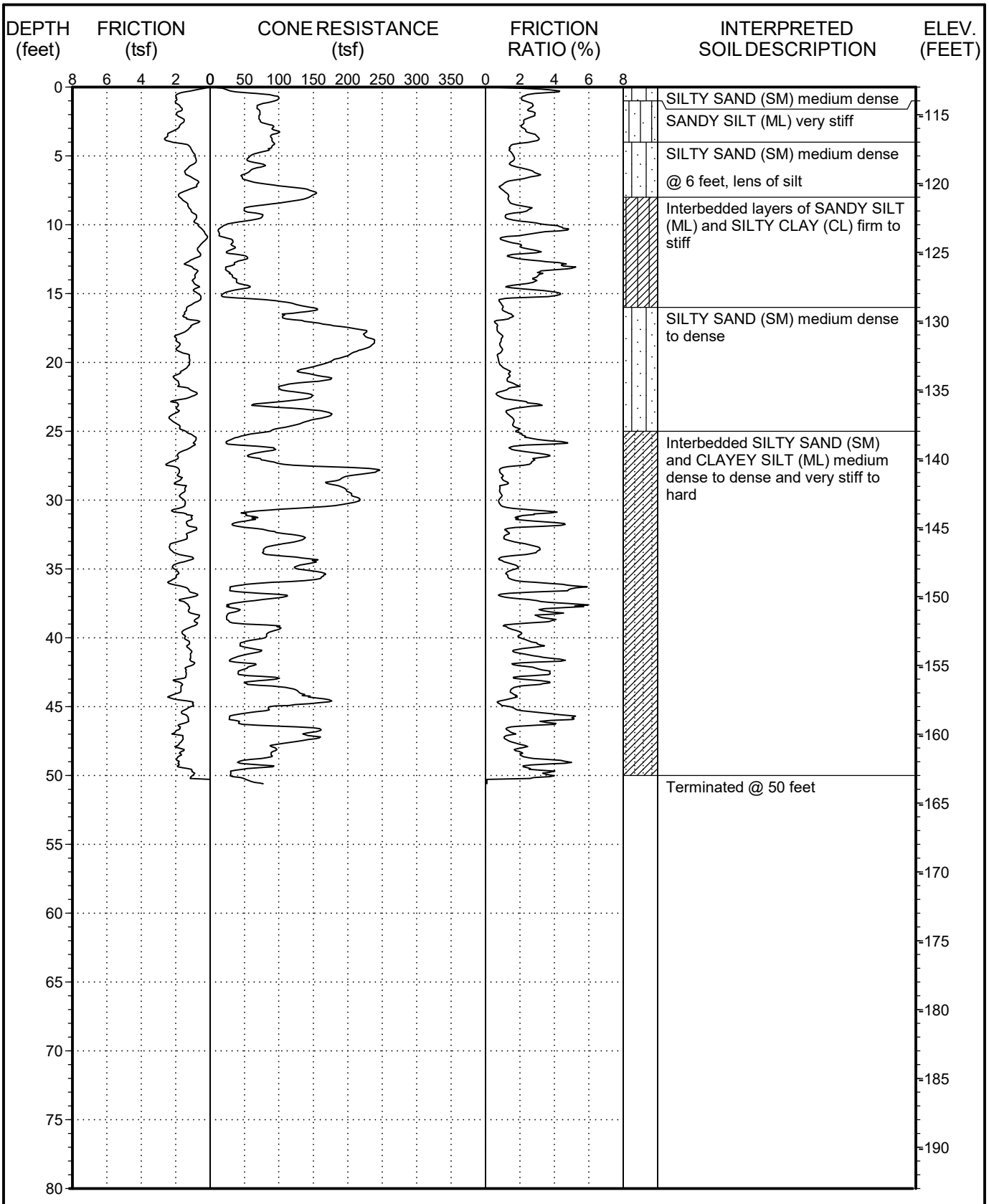
LOG OF CPT NO. C-1

FIGURE A-2



Date performed:7-23-18

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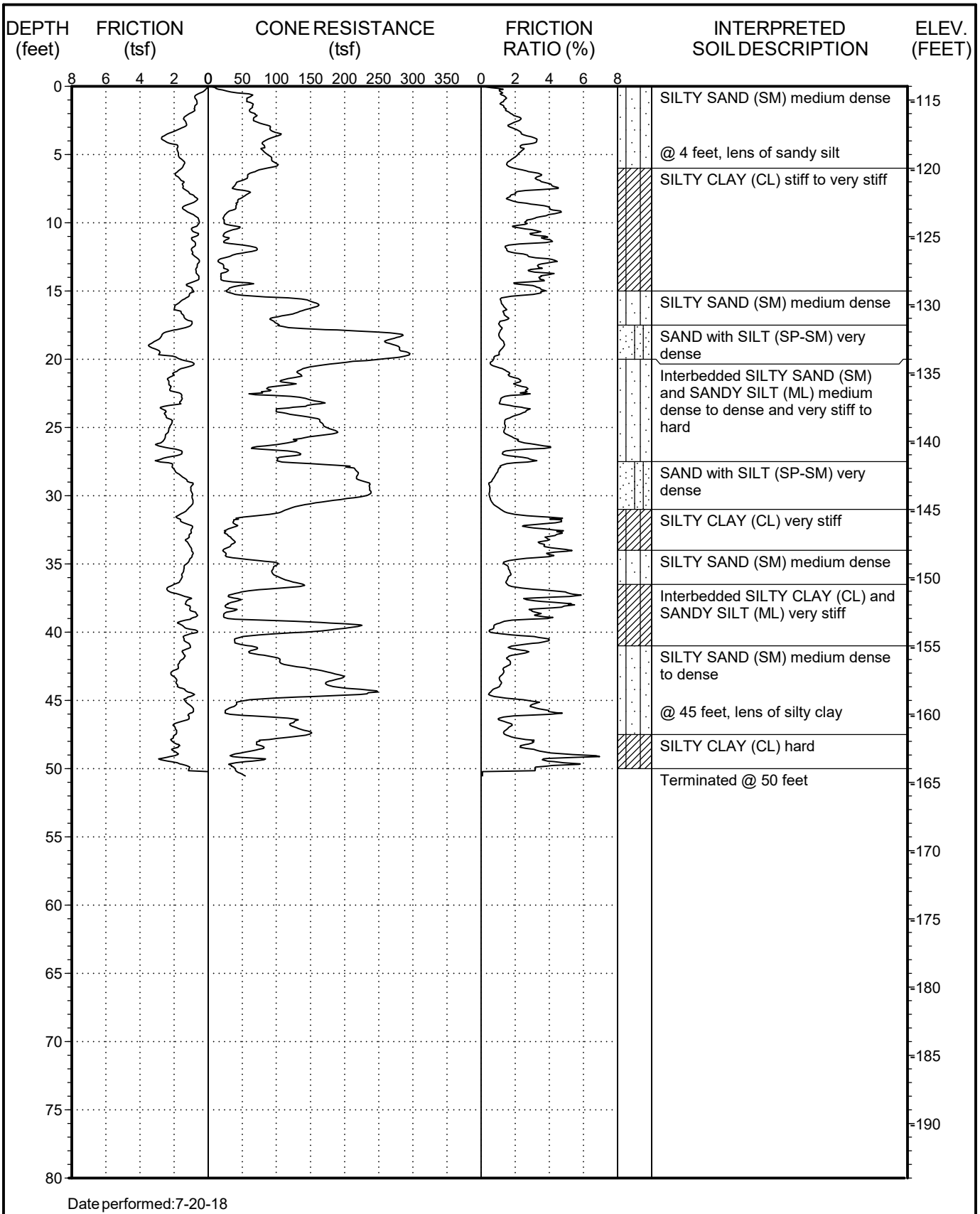
LOG OF CPT NO. C-2

FIGURE A-3



Date performed:7-20-18

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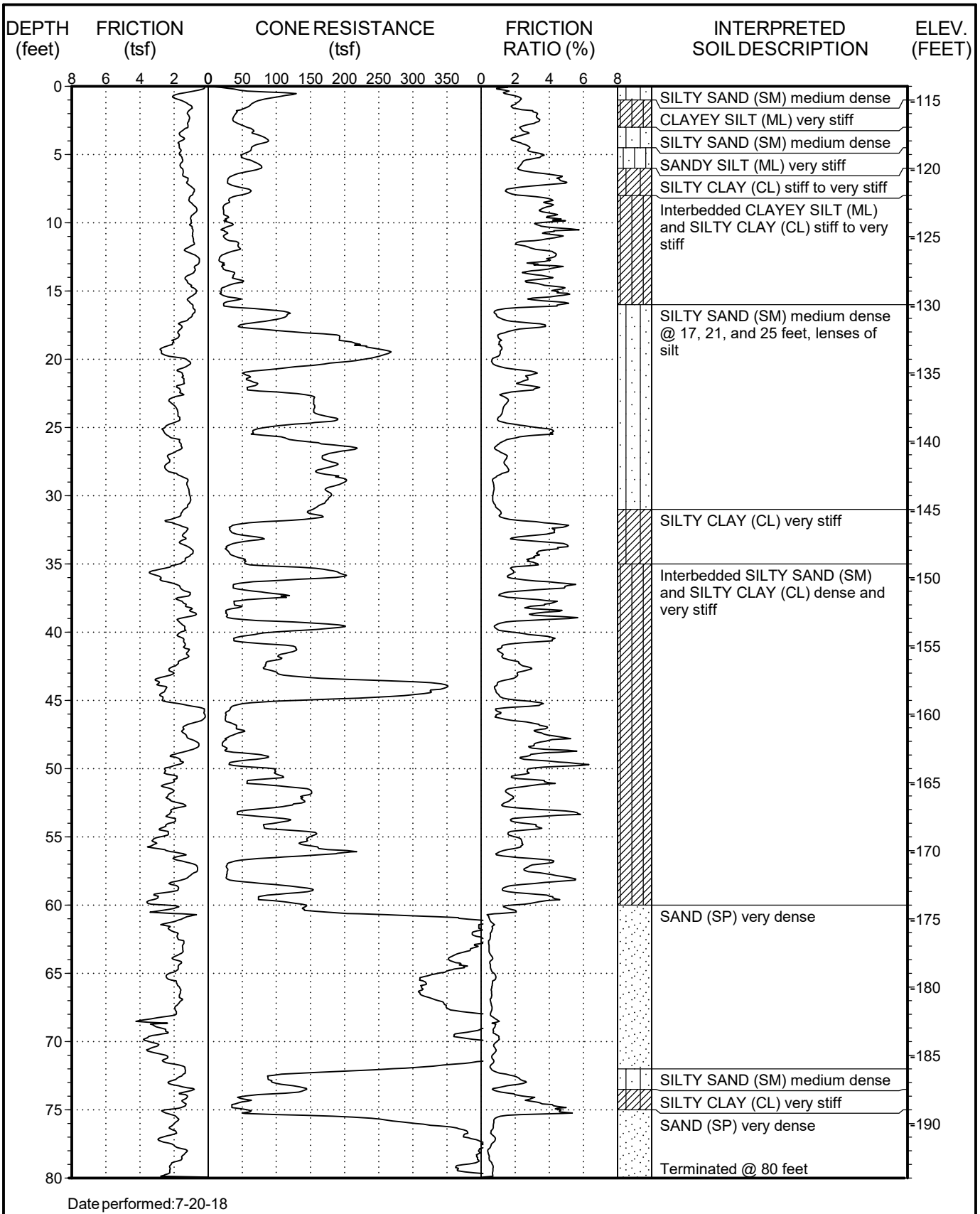
LOG OF CPT NO. C-3

FIGURE A-4



Date performed:7-20-18

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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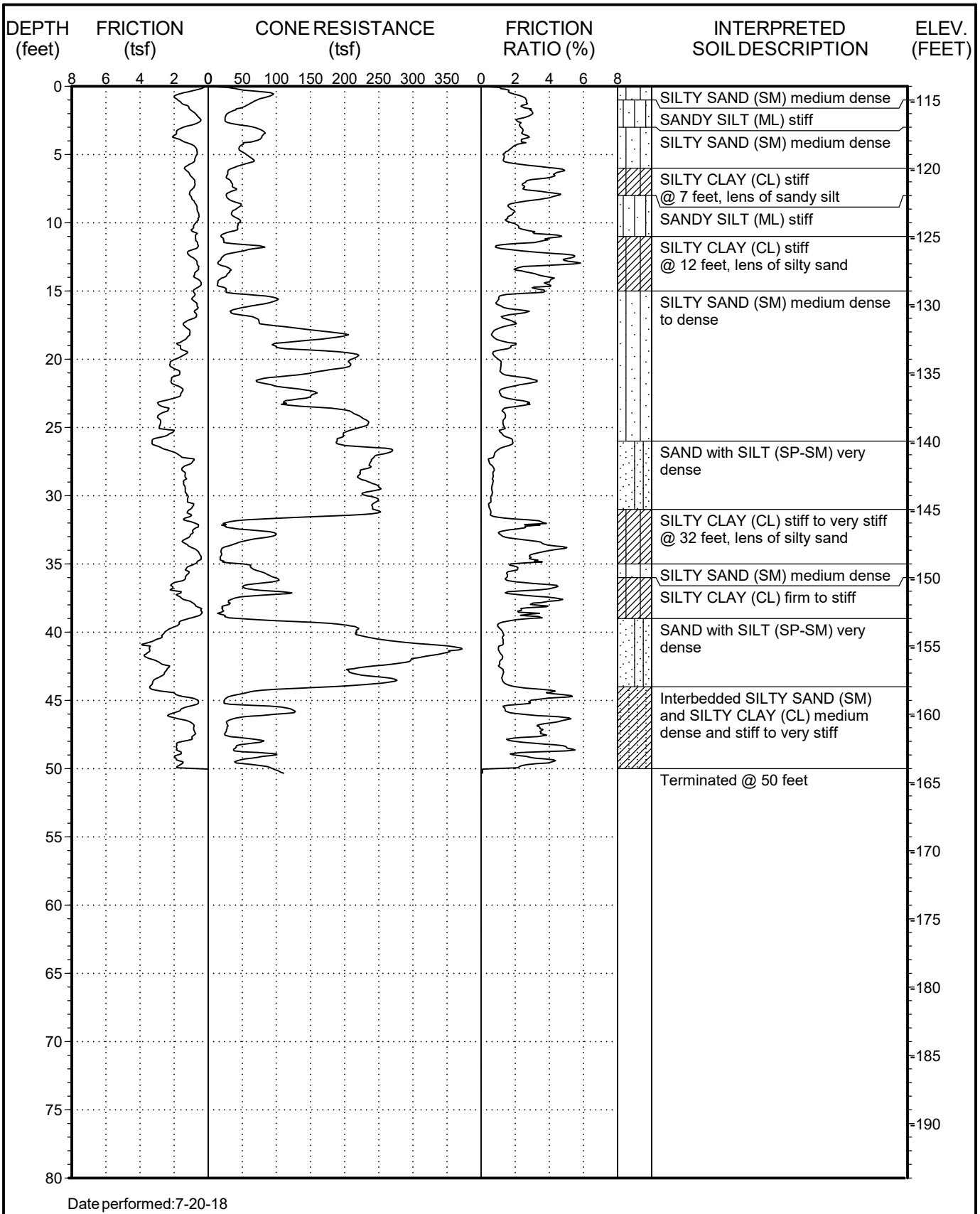
LOG OF CPT NO. C-4

FIGURE A-5



Date performed:7-20-18

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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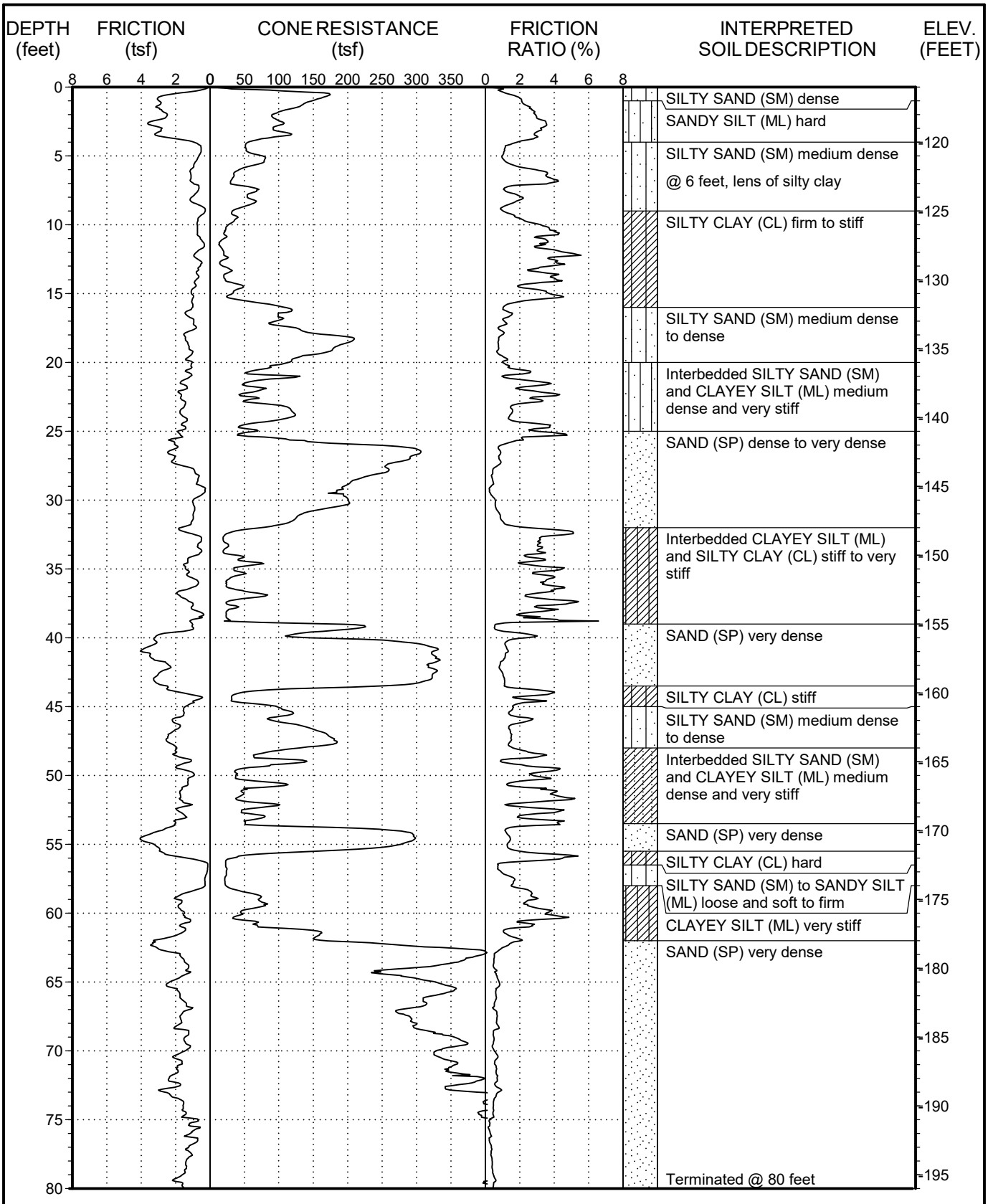
LOG OF CPT NO. C-5

FIGURE A-6



Date performed:7-23-18

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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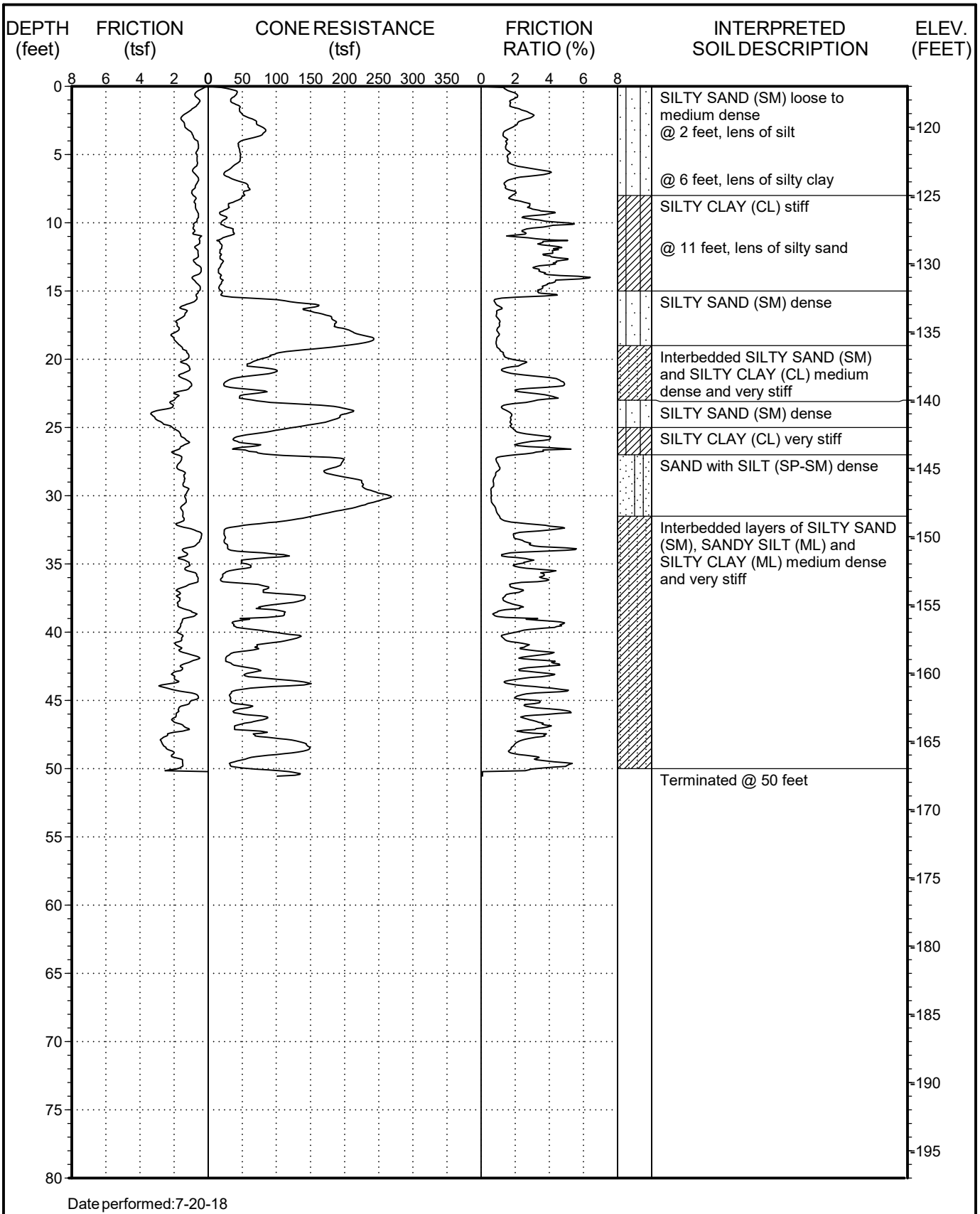
LOG OF CPT NO. C-6

FIGURE A-7



Date performed:7-20-18

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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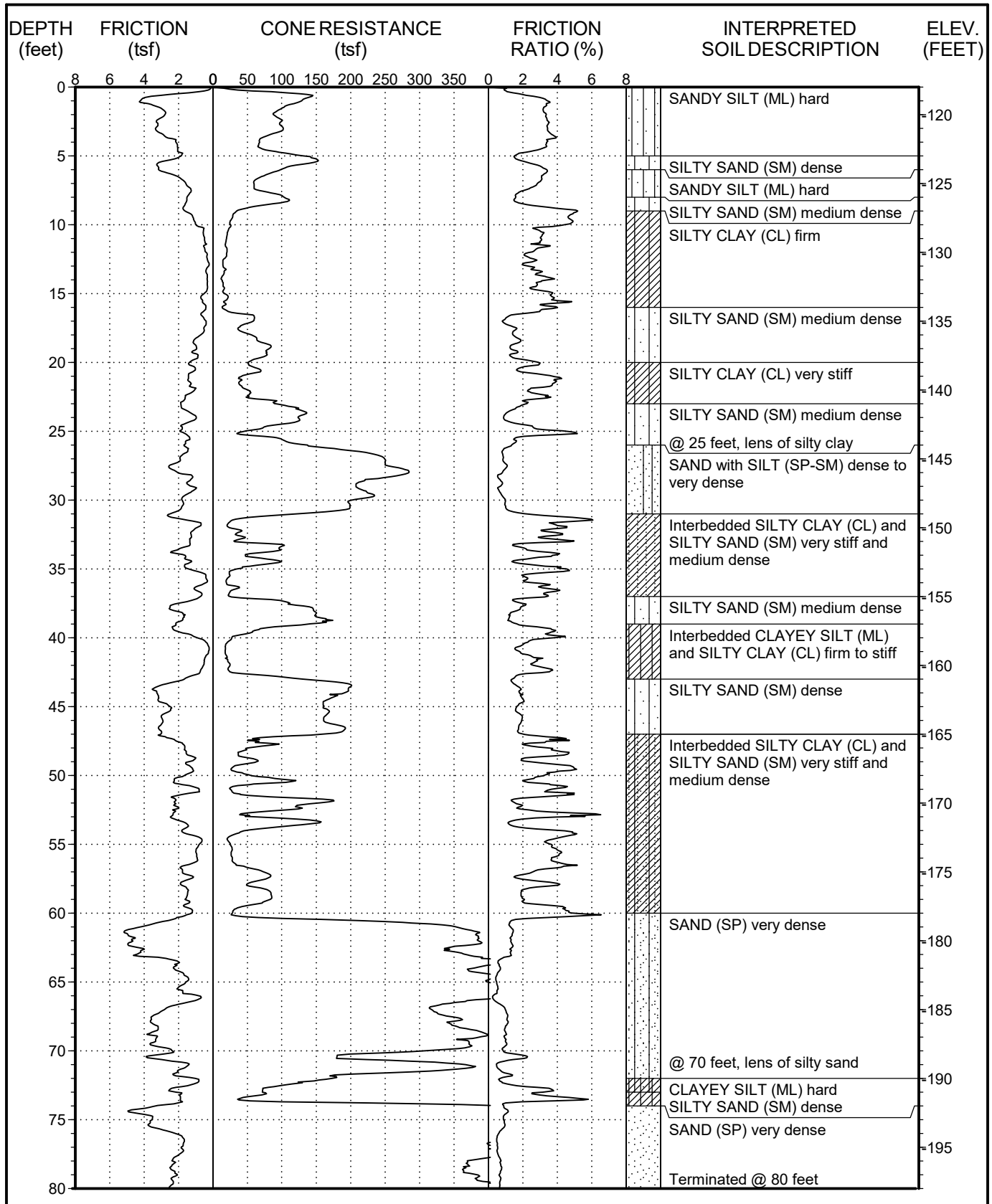
LOG OF CPT NO. C-7

FIGURE A-8



Date performed:7-20-18

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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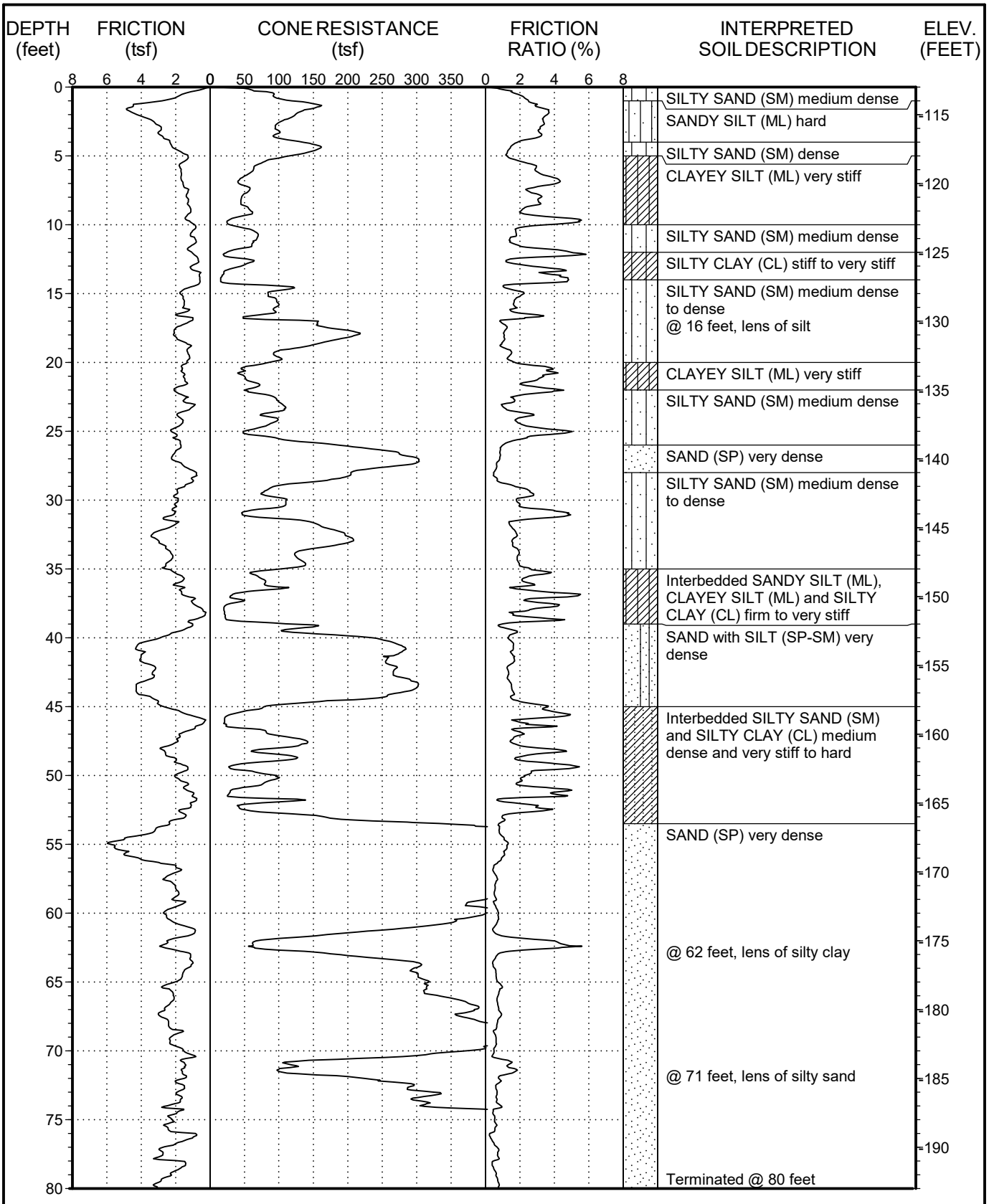
LOG OF CPT NO. C-8

FIGURE A-9



Date performed:7-23-18

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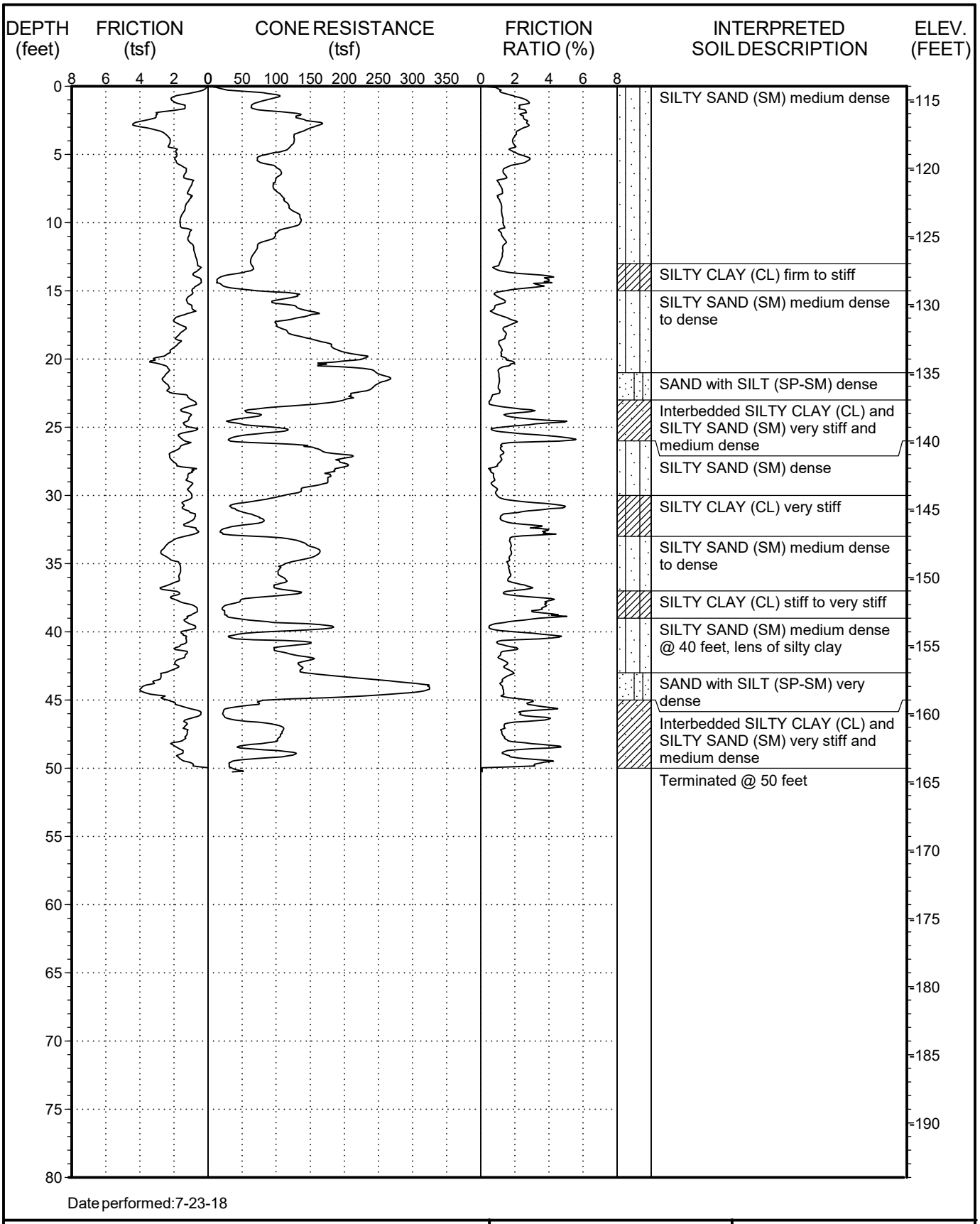
LOG OF CPT NO. C-9

FIGURE A-10



Date performed:7-23-18

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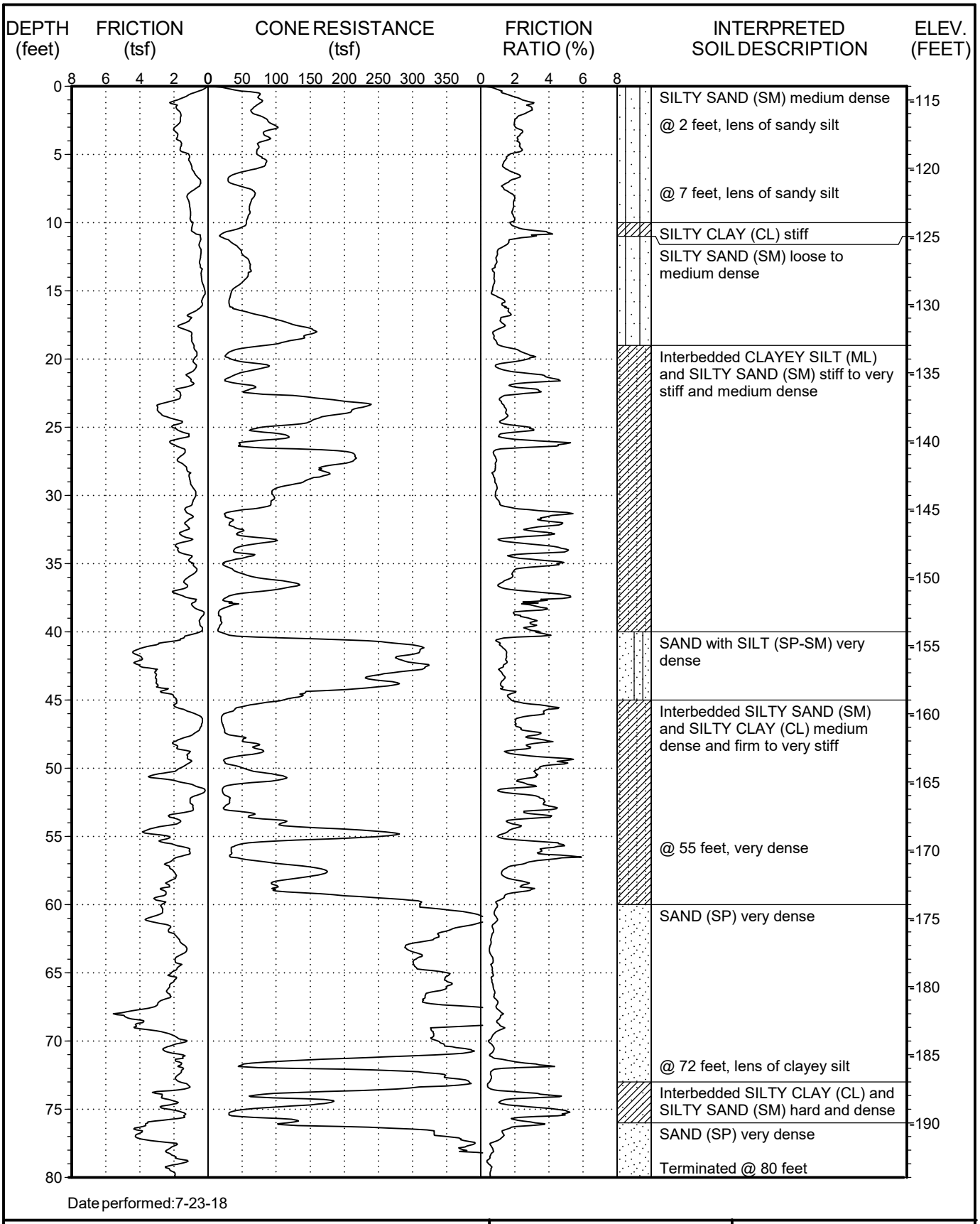
LOG OF CPT NO. C-10

FIGURE A-11



Date performed:7-23-18

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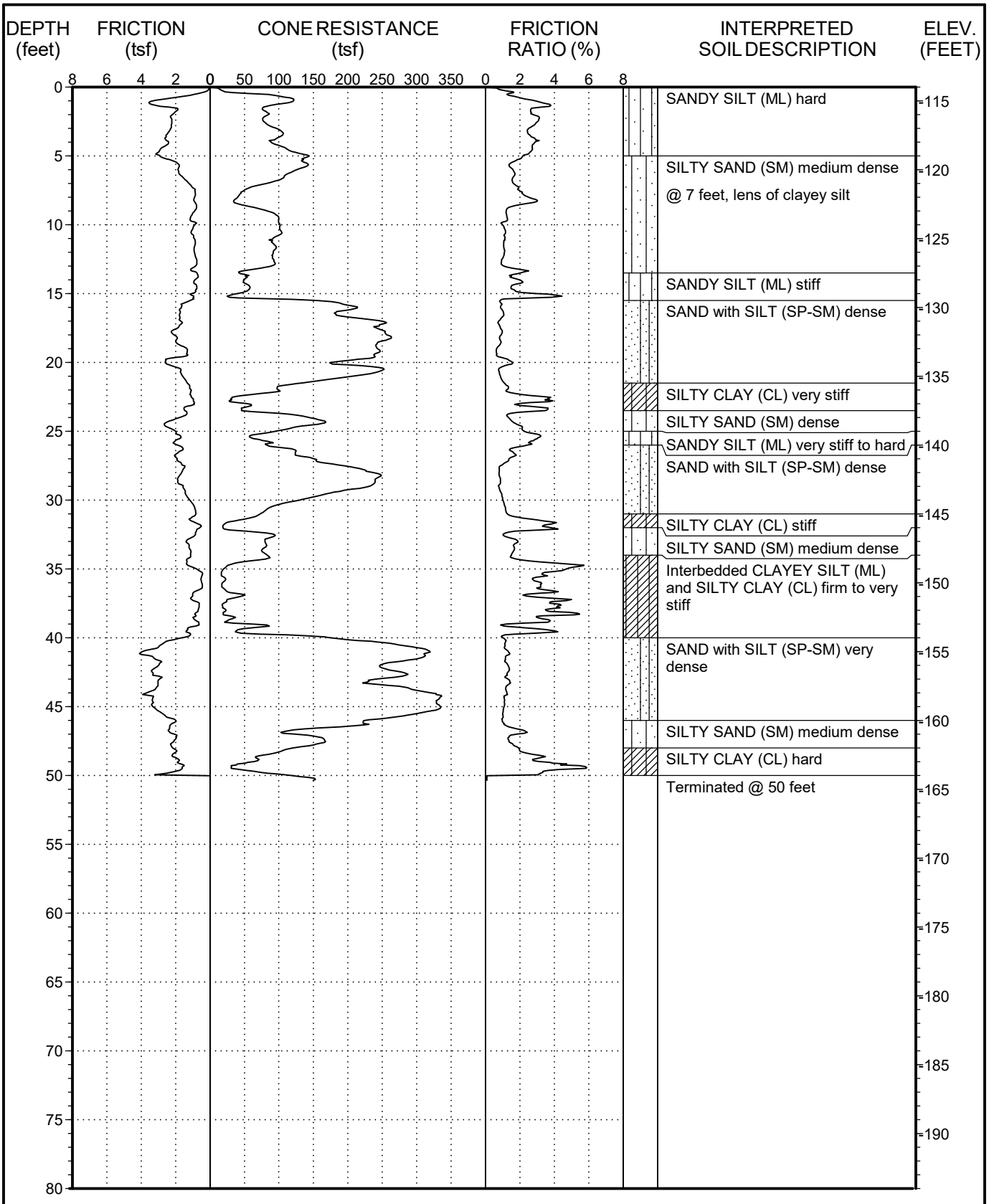
LOG OF CPT NO. C-11

FIGURE A-12



Date performed:7-19-18

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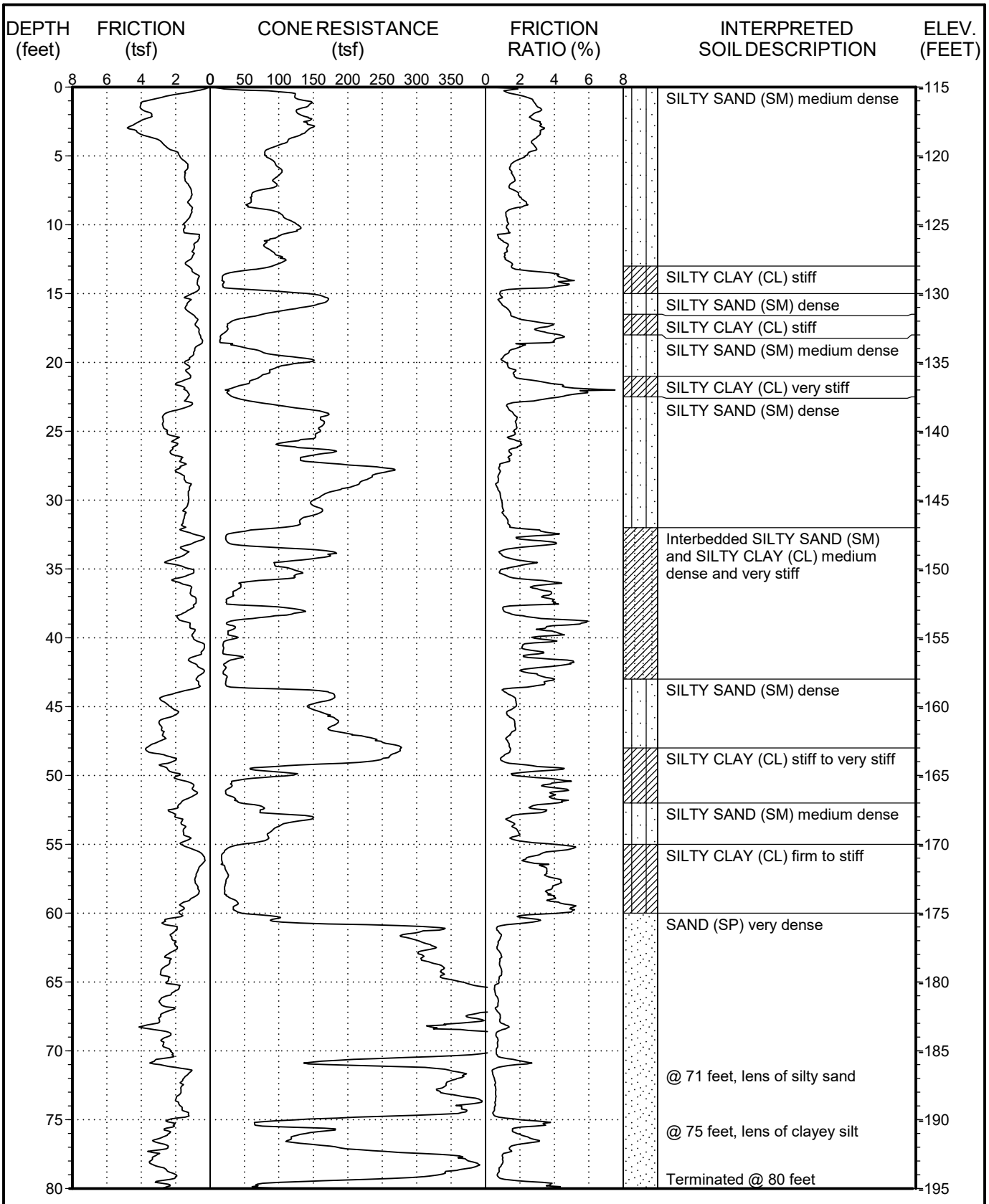
LOG OF CPT NO. C-12

FIGURE A-13



Date performed:7-19-18

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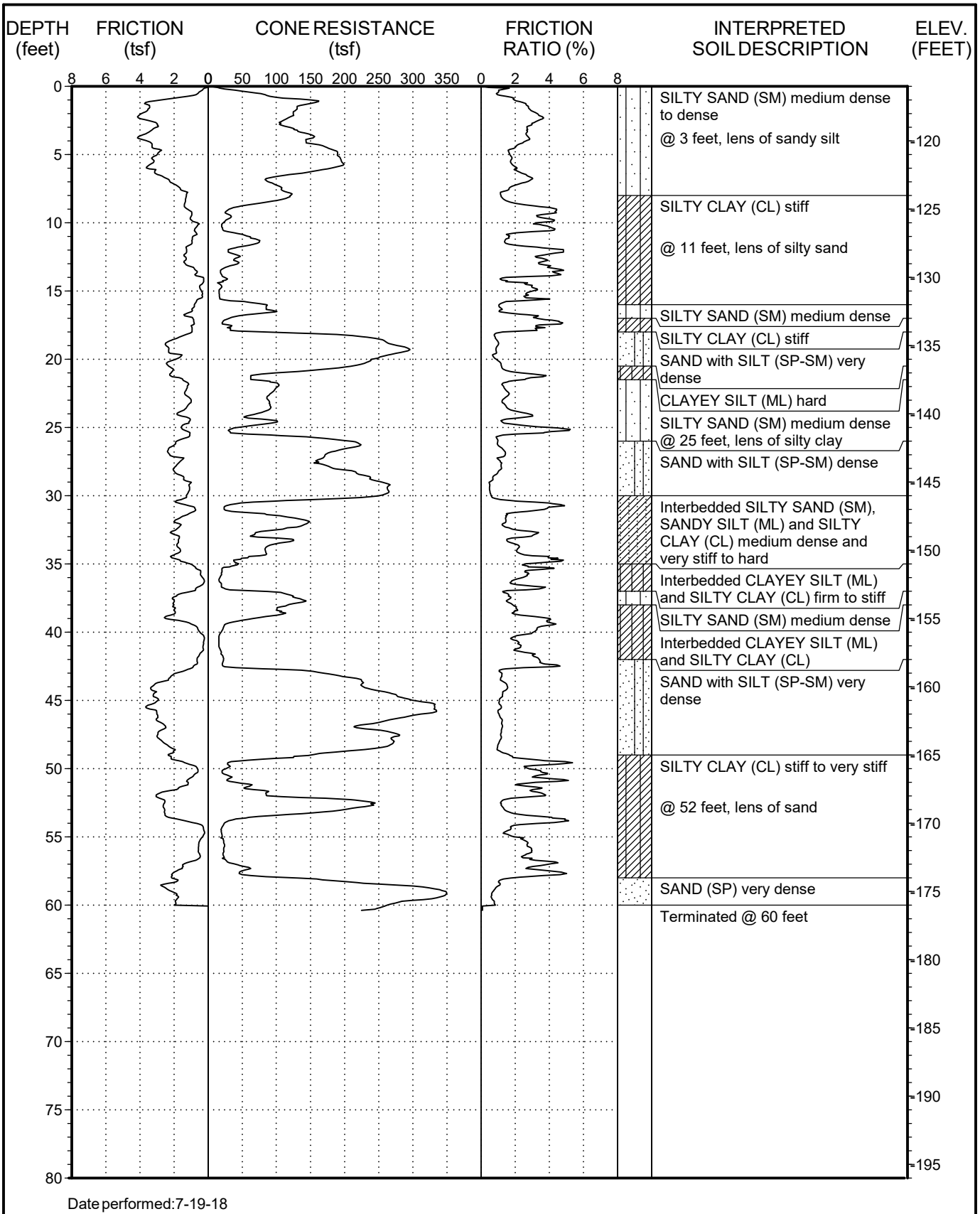
LOG OF CPT NO. C-13

FIGURE A-14



Date performed:7-19-18

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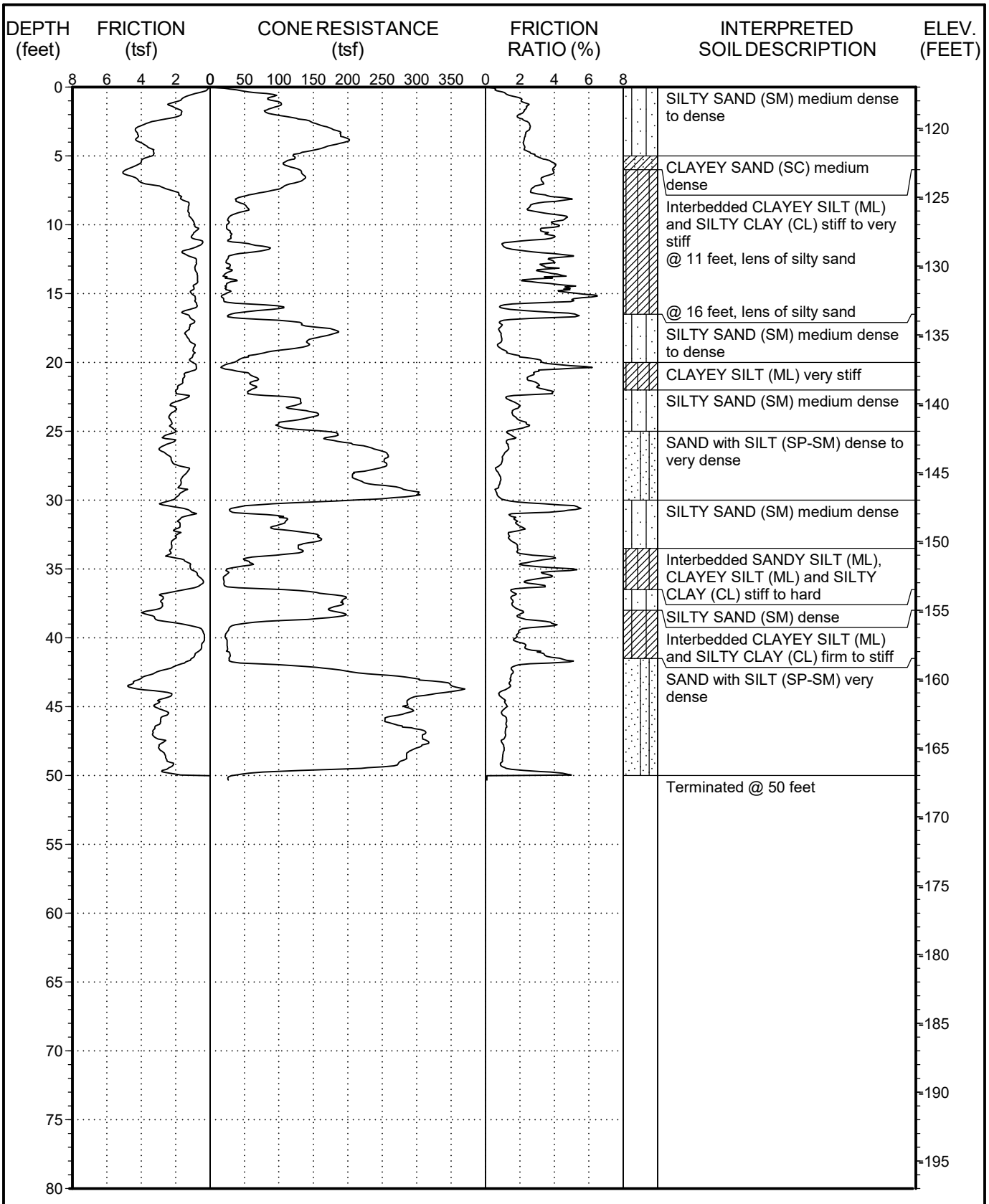
LOG OF CPT NO. C-14

FIGURE A-15



Date performed:7-19-18

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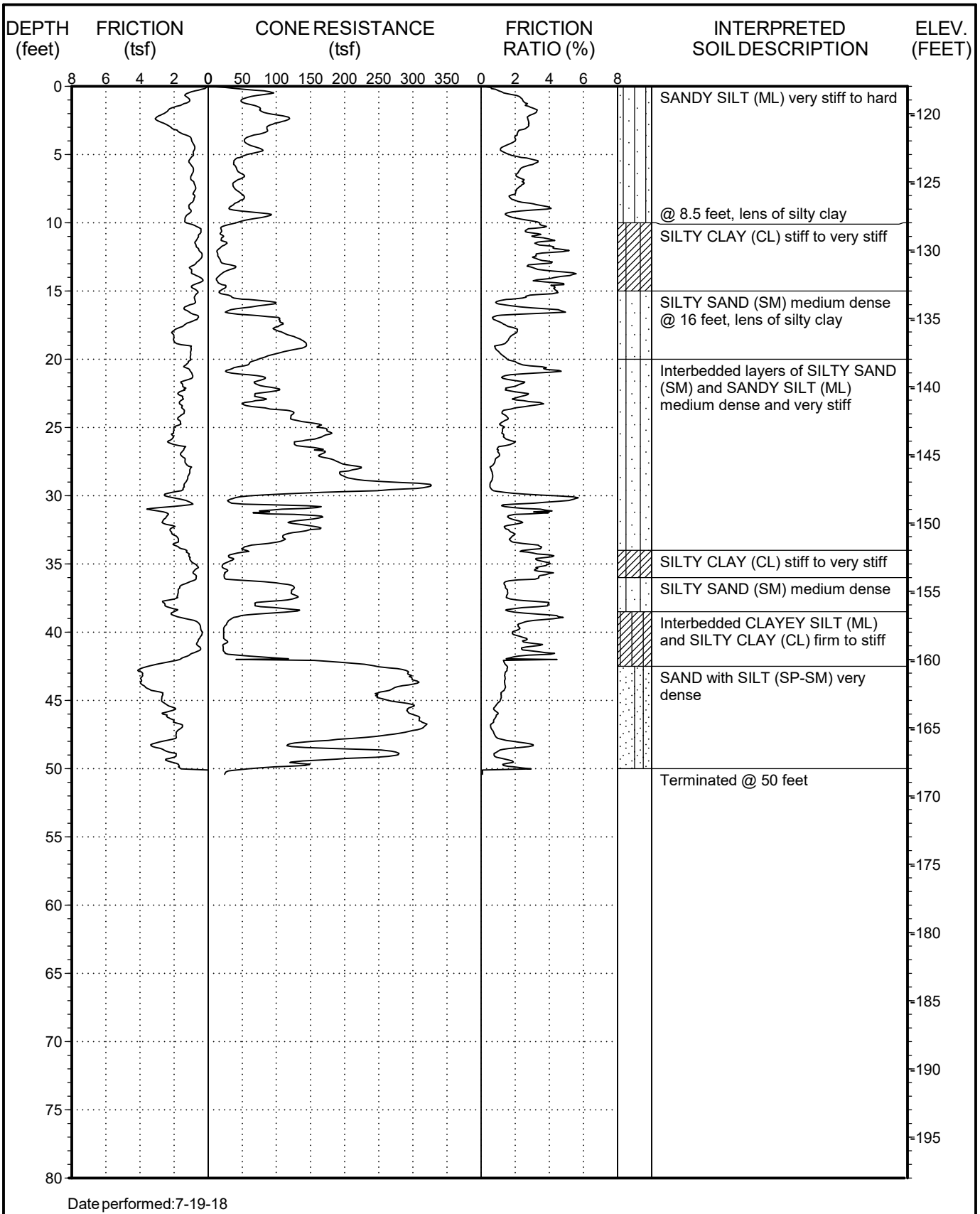
LOG OF CPT NO. C-15

FIGURE A-16



Date performed:7-19-18

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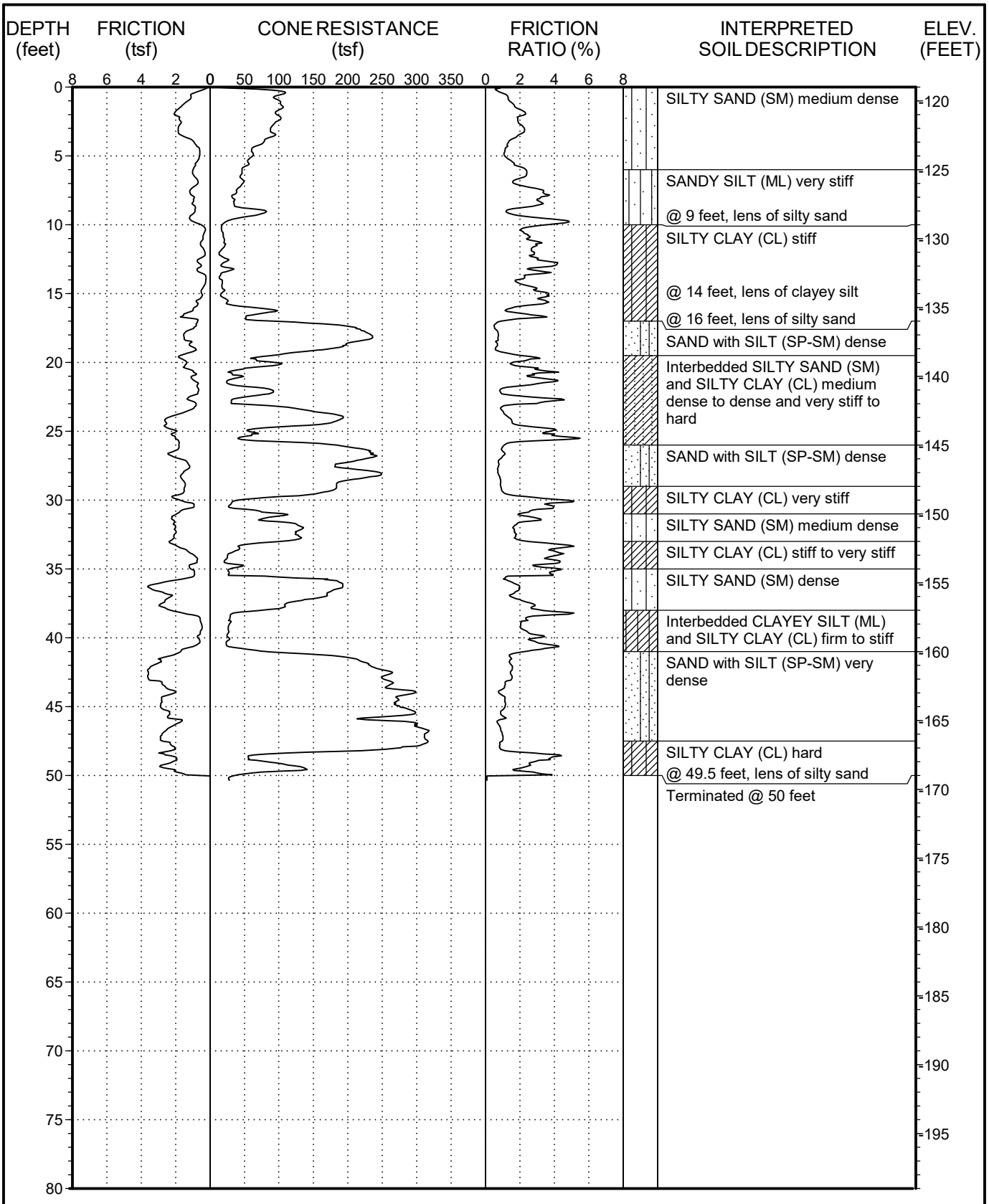
LOG OF CPT NO. C-16

FIGURE A-17



Date performed:7-19-18

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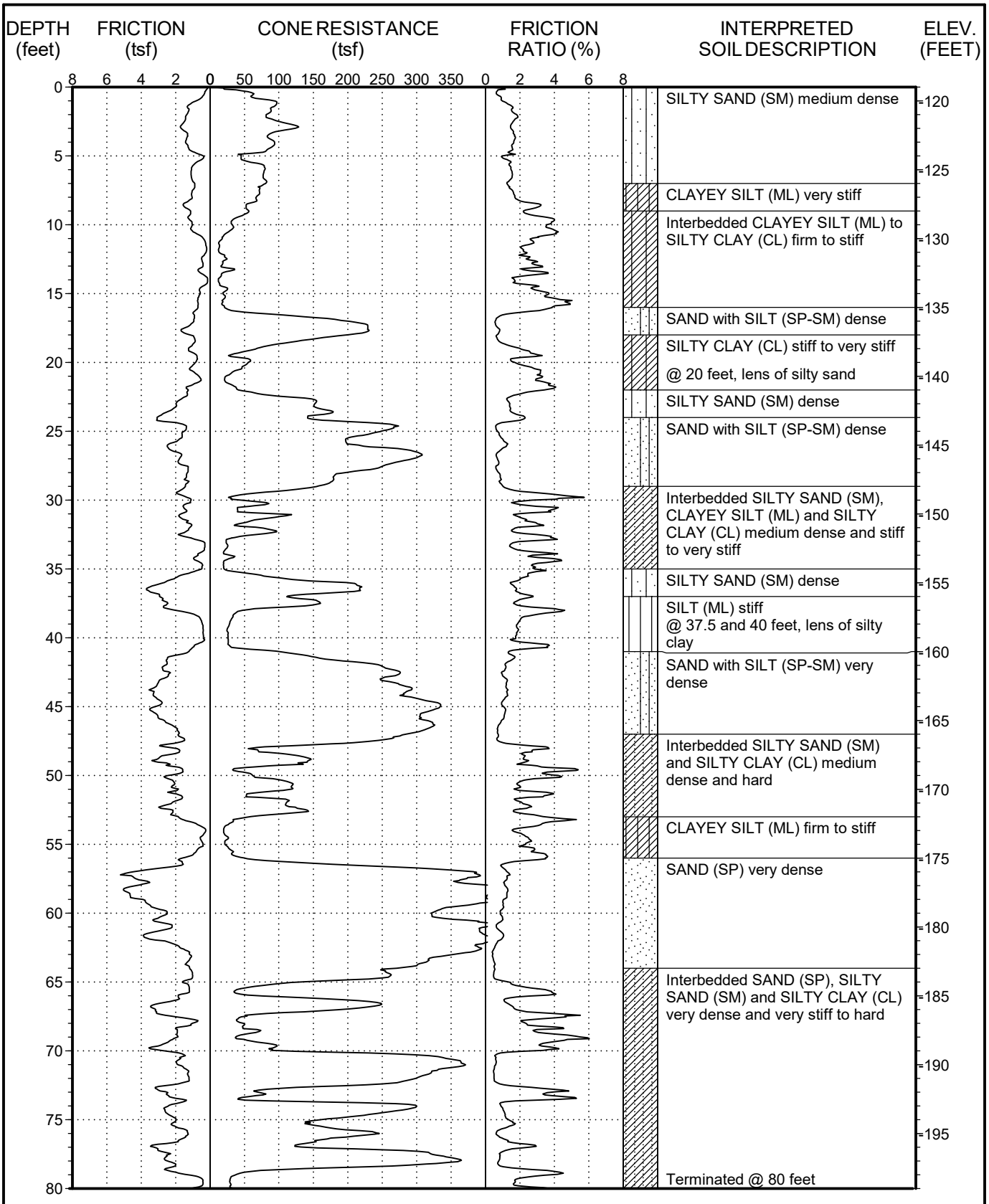
LOG OF CPT NO. C-17

FIGURE A-18



Date performed:7-20-18

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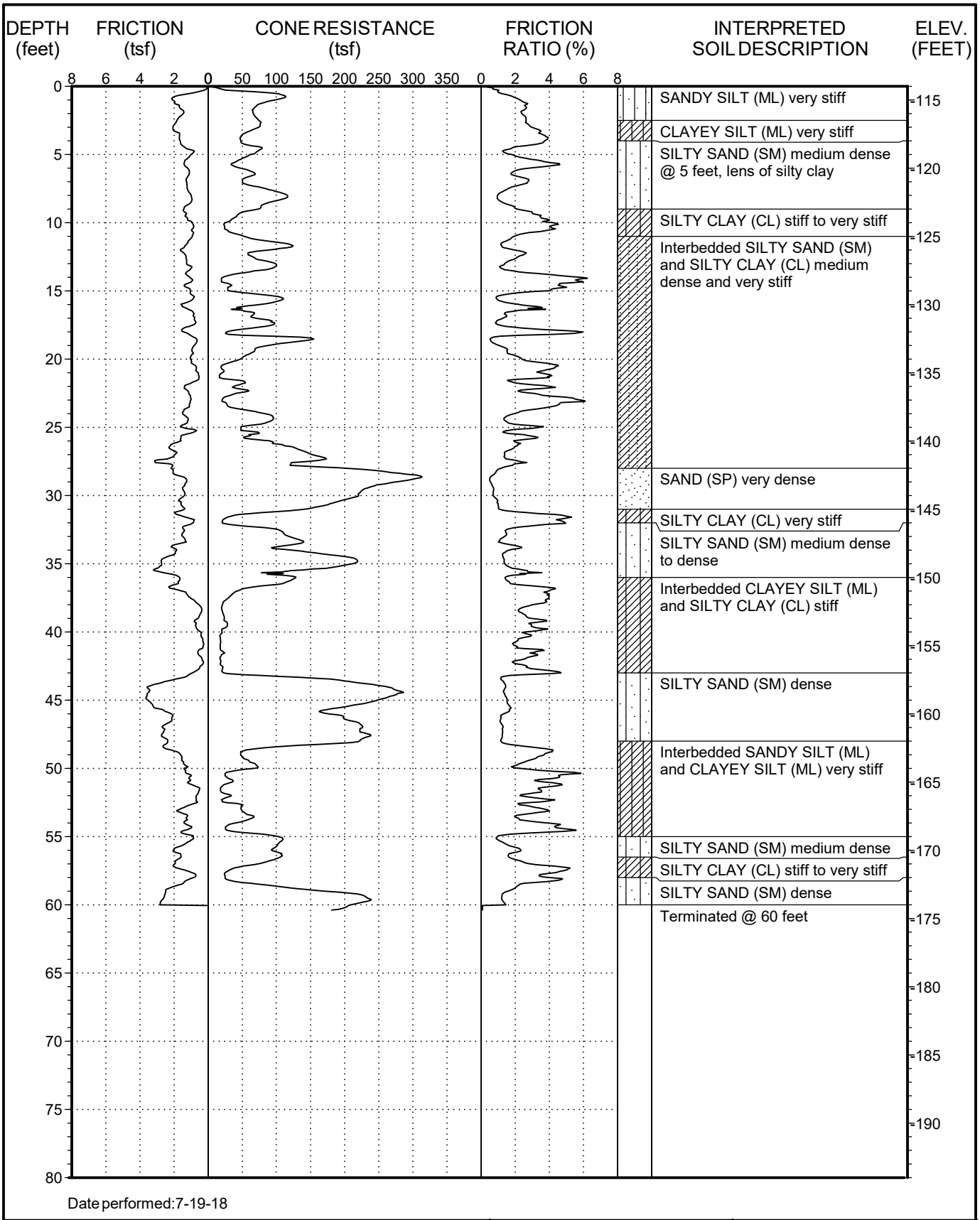
LOG OF CPT NO. C-18

FIGURE A-19



Date performed:7-19-18

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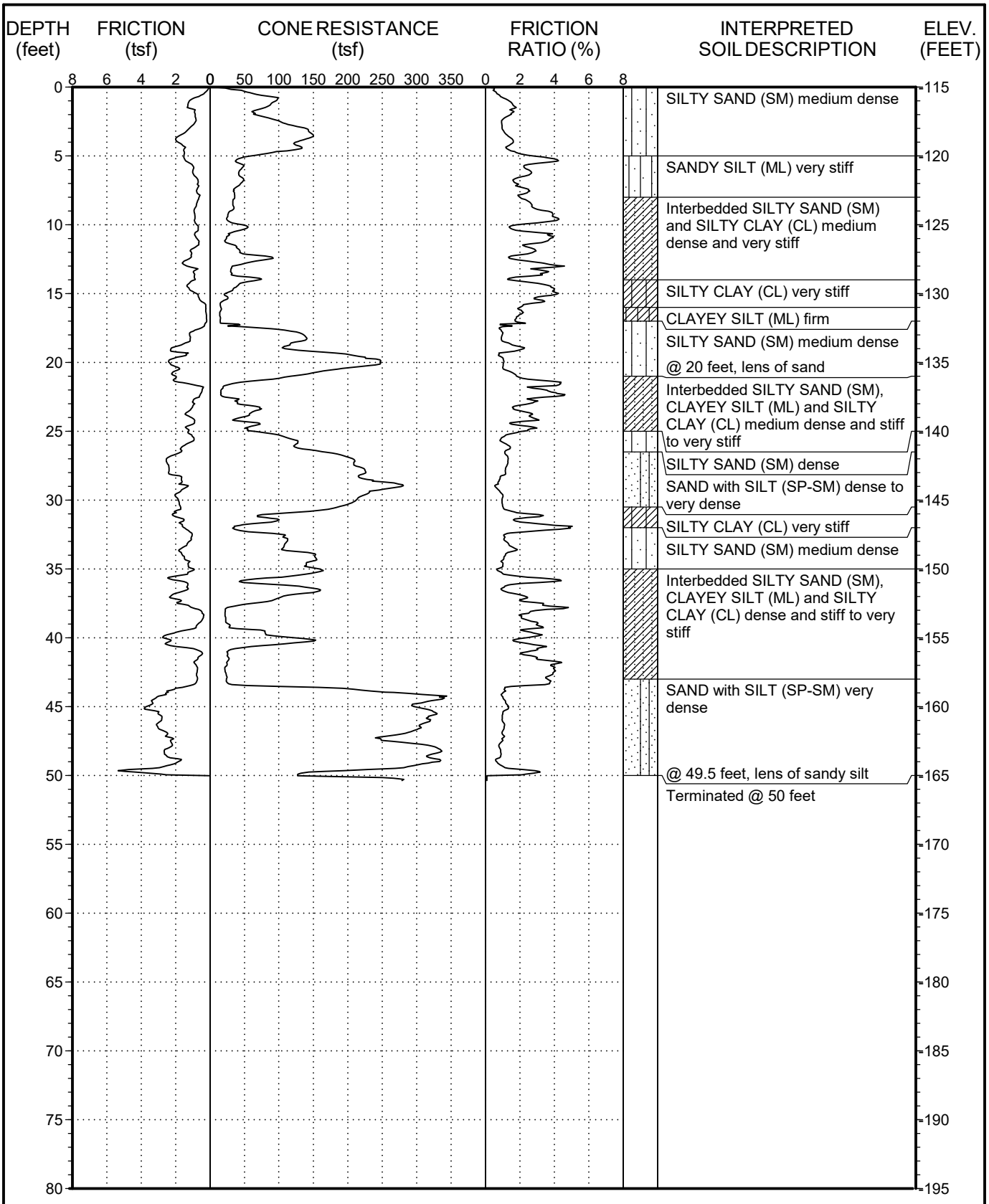
LOG OF CPT NO. C-19

FIGURE A-20



Date performed:7-23-18

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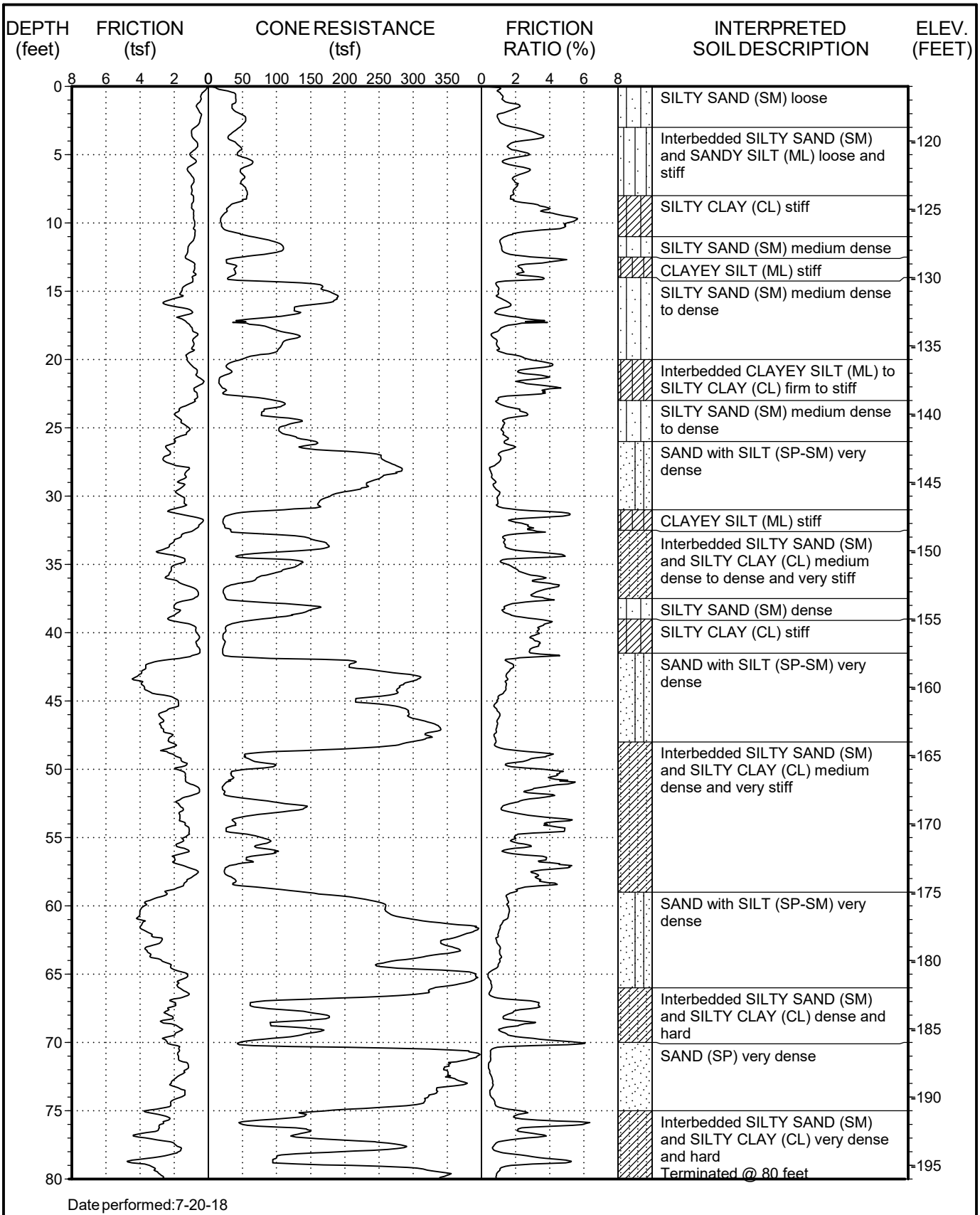
LOG OF CPT NO. C-20

FIGURE A-21



Date performed:7-20-18

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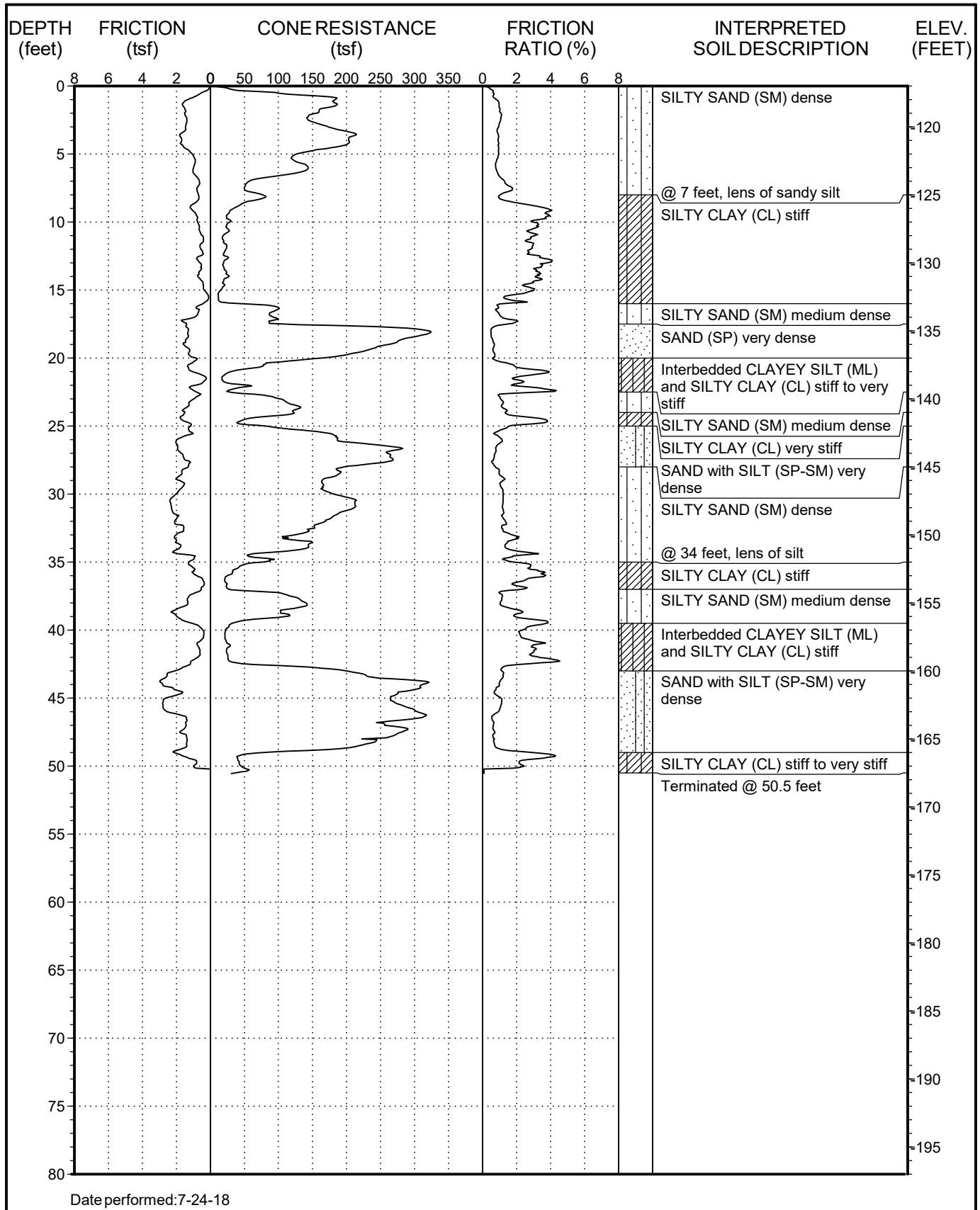
LOG OF CPT NO. C-21

FIGURE A-22



Date performed:7-24-18

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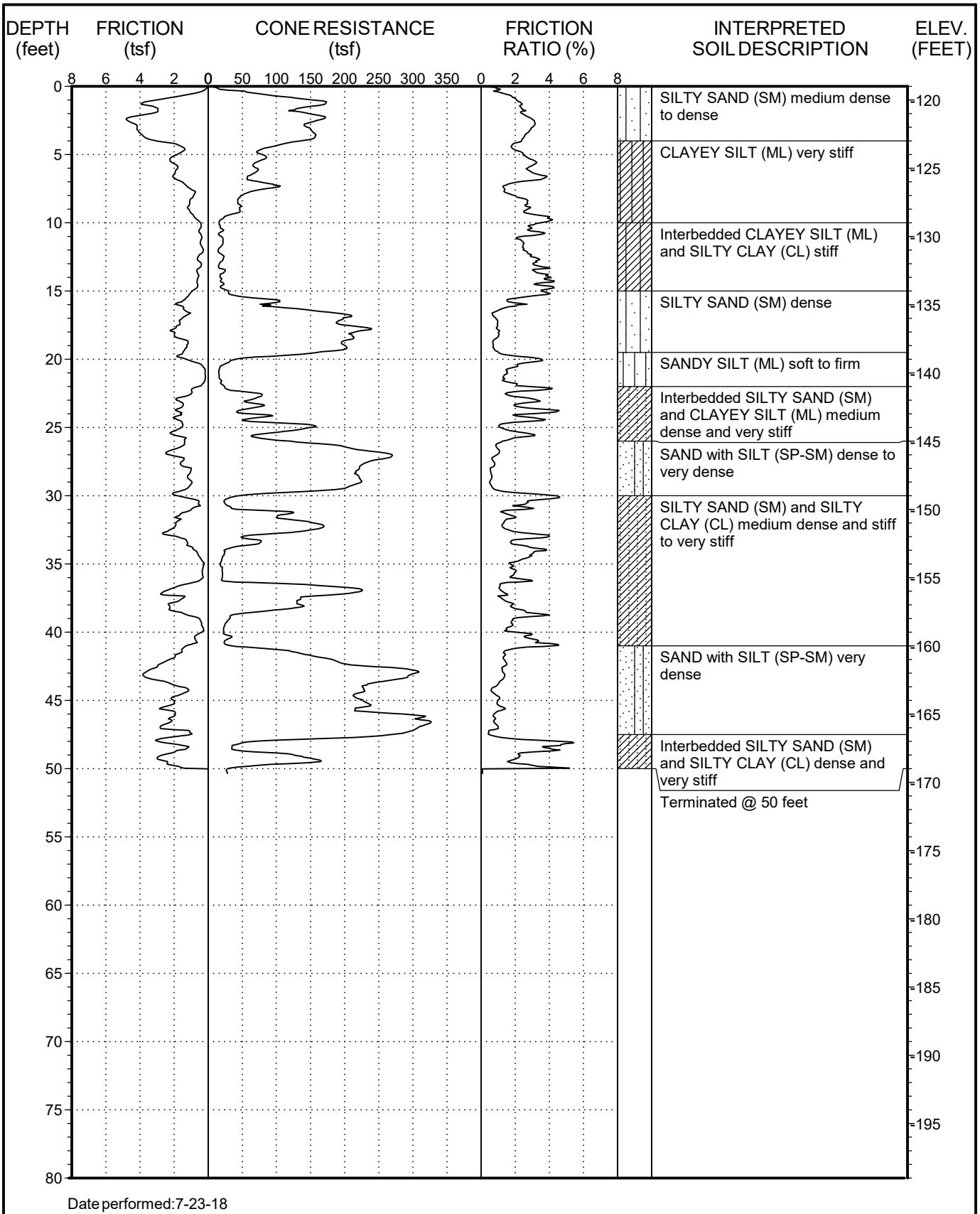
LOG OF CPT NO. C-22

FIGURE A-23



Date performed:7-23-18

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LOG OF CPT NO. C-24

FIGURE A-24

APPENDIX B

APPENDIX B

EXPLORATORY BORINGS

The subsurface conditions at the site were investigated by drilling and sampling eleven exploratory borings. The borings were advanced to depths of 6 to 81½ feet below the existing ground surface. The locations of the explorations are shown on the Site Plan, Figure 2.

The exploratory borings were drilled using truck-mounted hollow-stem auger drill equipment. Relatively undisturbed samples were obtained using a brass-ring lined sampler (ASTM D 3550). The brass-rings have an inside diameter of 2.42 inches. The ring samples were driven into the soil by a 140-pound hammer dropping 30 inches. The number of blows needed to drive the sampler into the soil was recorded as the penetration resistance.

At selected locations, disturbed samples were obtained using a split-spoon sampler by means of the Standard Penetration Test (SPT, ASTM D 6066). The spoon sampler was driven into the soil by a 140-pound hammer dropping 30 inches, employing the “free-fall” hammer described above. After an initial seating drive of 6 inches, the number of blows needed to drive the sampler into the soil a depth of 12 inches was recorded as the penetration resistance. These values are the raw uncorrected blowcounts.

The field explorations for the investigation were performed under the continuous technical supervision of GPI's representative, who visually inspected the site, maintained detailed logs of the borings, classified the soils encountered, and obtained relatively undisturbed samples for examination and laboratory testing. The soils encountered in the borings were classified in the field and through further examination in the laboratory in accordance with the Unified Soils Classification System. Detailed logs of the borings are presented in Figures B-1 to B-11 in this appendix.

The boring locations were laid out in the field by measuring from existing site features. Ground surface elevations at the boring locations were estimated from topographic map dated July 5, 2018 by The Altum Group using a project datum and should be considered approximate. The project datum is 500 feet greater than actual MSL elevations to avoid negative elevations.

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
			B	0	Natural: **SILTY SAND (SM)** light brown, dry, loose	
2.2	94	14	D			-115
8.6	105	15	D	5	**SILT (ML)** brown, slightly moist, stiff	
17.1	94	11	D		@ 7 feet, very moist, firm	-120
15.2	99	11	D	10	**SANDY SILT (ML)** grey, very moist, firm	
					CLAY (CL) grey, moist, firm	
					Total Depth 11 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-25-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-1

FIGURE B-1

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
			B	0	Natural: **SANDY SILT (ML)** light brown, dry to slightly moist, firm	
9.7	89	12	D		**SILT (ML)** light brown, slightly moist, firm	-120
6.7	92	10	D	5	**SILTY SAND (SM)** light brown, slightly moist, loose	
					Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-25-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2884.I

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LOG OF BORING NO. B-2

FIGURE B-2

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
			B	0	Natural: **SANDY SILT (ML)** light brown, very dry	
5.4	84	14	D		**SANDY SILT (ML)** light brown, dry, stiff	-120
					SILT (ML) light brown / grey, dry to slightly moist, stiff, with gravel	
32.0	88	15	D	5	**SANDY SILT (ML)** light brown, wet, stiff	
						-125
4.0	101	7	D	10	**SILTY CLAY (CL)** light brown, dry, firm	
					CLAY (CL) light brown, dry, firm	
					Total Depth 11 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-25-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-3

FIGURE B-3

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0	Natural: **SANDY SILT (ML)** light brown, dry	-115
0.4	92	30	D		**SILTY SAND (SM)** light brown, dry, medium dense	
2.0	95	18	D	5		
					Total Depth 6 feet	-120

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-23-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-4

FIGURE B-4

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
			B	0	Natural: **SANDY SILT (ML)** light brown, dry	
2.3	95	16	D		@ 2 feet, stiff	-120
				5		
14.8	88	16	D		**SILT (ML)** brown, moist, stiff	
					Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-25-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-5

FIGURE B-5

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Natural: **SANDY SILT (ML)** light brown, dry	-120
2.0	85	16	D		**SILT (ML)** light brown, dry, stiff	
2.8	88	15	D	5		-125
9.5		12	S		@ 7 feet, dry to slightly moist	
23.5	93	12	D	10	**CLAYEY SILT (ML)** brown, wet, stiff	-130
33.1	86	6	D	15	**SILTY SAND (SM)** brown, wet, loose	-135
					CLAYEY SILT (ML) brown, wet, firm, trace sand	
24.7	95	14	D	20	**SANDY SILT (ML)** grey brown, wet, stiff	-140
21.2		19	S	25	**SILTY SAND (SM)** grey brown, wet, medium dense	-145
				30		-150
39.2	82	16	D		**SILT (ML)** grey, wet, stiff, trace sand	
35.9	87	8	D	35	**CLAYEY SILT (ML)** brown grey, wet, firm	-155

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-23-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 14

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-6

FIGURE B-6

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
35.1	85	9	D	40	**SILTY CLAY (CL)** grey brown, wet, firm, with shells	-160
22.8		34	S	45	**SAND (SP)** grey, wet, dense, trace silt	-165
25.3	96	28	D	50	**SANDY SILT (ML)** grey, wet, very stiff, with clay lenses	-170
22.2	105	15	D	55	**SILT (ML)** grey and brown, wet, stiff, with porosity, trace sand	-175
21.5		52	S	60	**SILTY SAND (SM)** grey, wet, very dense	-180
				65		-185
19.8		60	S	70		-190
				75		-195

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-23-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 14

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-6

FIGURE B-6

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
	28.3		65	S	80	**SANDY SILT (ML)** grey, wet, hard	-200
						Total Depth 81.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-23-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 14

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-6

FIGURE B-6

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
			B	0	Natural: **SANDY SILT (ML)** light brown, dry	
2.1	81	8	D		**SILT (ML)** light brown, dry, firm, trace sand	-120
1.4	93	16	D	5	@ 5 feet, stiff	
14.1	92	9	D		**SILTY SAND (SM)** light brown, very moist, loose	-125
8.1		10	S	10	@ 10 feet, moist, medium dense	-130
21.4	101	25	D	15	**SAND (SP)** grey, wet, medium dense, trace silt	-135
20.2		11	S	20	**SAND with SILT (SP-SM)** grey, wet, medium dense	
					SAND (SP) grey, wet, medium dense, trace silt	-140
28.2	95	18	D	25	**SILT (ML)** grey, wet, stiff, trace sand and shells	-145
17.5		15	S	30	**SAND with SILT (SP-SM)** grey, wet, medium dense	-150
26.2	96	19	D	35		-155

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-23-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 14

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-7

FIGURE B-7

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
33.5	85	13	D	40	**CLAY (CL)** grey with brown, wet, stiff	-160
26.7		17	S	45	**SANDY SILT (ML)** grey, wet, very stiff	-165
23.1	97	17	D	50	**SILT (ML)** grey, wet, stiff	-170
29.7	92					
31.7	88	11	D	55	@ 55 feet, firm	-175
31.8		28	S	60	**CLAYEY SILT (ML)** grey, wet, very stiff	-180
				65		-185
15.8		51	S	70	**SILTY SAND (SM)** grey, wet, very dense	-190
				75		-195

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-23-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 14

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-7

FIGURE B-7

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
	16.2		26	S	80	@ 80 feet, medium dense	
						Total Depth 81.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-23-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 14

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-7

FIGURE B-7

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Natural: **SANDY SILT (ML)** light brown, dry	
3.6	89	14	D		**SILT (ML)** light brown grey, dry, stiff	-115
3.7	100	15	D	5	**SILTY SAND (SM)** light brown, dry to slightly moist, loose	
10.0	95	11	D		**SANDY SILT (ML)** light brown, slighty moist to moist, stiff, trace clay	-120
27.3	91	6	D	10	**CLAYEY SILT (ML)** light brown grey, wet, firm	-125
24.2		7	D	15	**SANDY SILT (ML)** grey, wet, very stiff	-130
24.4		9	S	20		-135
		29	S	25		-140
20.6		20	S	30	**SILTY SAND (SM)** grey, wet, medium dense	-145
				35		-150
17.8	101	21	D		**SILTY CLAY (CL)** grey, wet, firm	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-24-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 19

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-8

FIGURE B-8

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				40	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					@ 42 feet, very stiff	-155
34.9		19	S		**CLAYEY SILT (ML)** grey, wet, very stiff	
				45		-160
29.4	95	17	D	50	**SANDY SILT (ML)** grey, wet, stiff, trace clay	-165
				55		-170
28.9		19	S	60	**SILT (ML)** grey, wet, very stiff	-175
				65		-180
		32	S	70	@ 70 feet, no recovery	-185
				75		-190

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-24-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 19

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-8

FIGURE B-8

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
			26	S	80	@ 80 feet, no recovery	
						Total Depth 81.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-24-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 19

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-8

FIGURE B-8

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Natural: **SILT (ML)** light brown, very dry	-115
4.1	96	14	D		**SILT (ML)** light brown, dry, stiff, trace sand	
10.6	89	15	D	5	@ 5 feet, brown, moist	-120
					@ 7 feet, firm, trace clay	
14.9	98	11	D		**SANDY SILT (ML)** light brown grey, moist, firm	
29.5	92	6	D	10	**CLAY (CL)** grey, wet, firm	-125
30.1	89	7	D	15		-130
19.3		9	S	20	**SILTY SAND (SM)** light brown, grey, wet, loose	-135
25.2		29	S	25	@ 25 feet, medium dense	-140
12.7		20	S	30	**SAND (SP)** light brown, wet, medium dense	-145
28.7	93	21	D	35	**CLAYEY SILT (ML)** grey, wet, stiff	-150

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-24-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 19

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-9

FIGURE B-9

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				40	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					CLAYEY SILT (ML) grey, very moist, stiff	-155
				45		-160
28.0	92	23	D		**SILT (ML)** grey, wet, very stiff	
				50		-165
26.9		12	S	55	@ 55 feet, wet, stiff, trace sand	
28.8					**CLAYEY SILT (ML)** grey, wet, stiff	-170
18.7		32	S	60	**SILTY SAND (SM)** grey, very moist to wet, dense	-175
					Total Depth 61.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-24-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 19

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-9

FIGURE B-9

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Natural: **SANDY SILT (ML)** light brown, dry	
3.4	91	21	D		@ 2 feet, stiff	-115
3.3	96	17	D	5		
3.0	97	12	D		**SILTY SAND (SM)** light brown, dry, loose	-120
29.9	91	12	D	10	**CLAY (CL)** grey with brown, wet, stiff	
26.6	92	8	D			-125
25.0	94	7	D	15	**CLAYEY SILT (ML)** grey, wet, firm, with shells	
						-130
28.7		9	S	20	**SANDY SILT (ML)** grey, wet, trace clay	
						-135
28.8		20	S	25	**SILT (ML)** grey, wet, very stiff	
						-140
18.7	108	26	D	30	**SILTY SAND (SM)** grey, wet, medium dense	
						-145
36.5	86	10	D	35	**SILT (ML)** light brown, wet, firm	
						-150

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-24-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 19

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-10

FIGURE B-10

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
	33.0	88	9	D	40	@ 40 feet, with shells	
						Total Depth 41 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-24-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 19

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-10

FIGURE B-10

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Natural: **SANDY SILT (ML)** light brown, very dry	
3.0	109	20	D		**SILT (ML)** light brown, dry, stiff	-120
3.3	85	21	D	5	**SILTY SAND (SM)** light brown, dry, medium dense	
1.1	95	22	D			-125
30.5	82	10	D	10	**CLAY (CL)** brown, wet, firm, trace silt	
30.7	87	16	D		@ 12 feet, stiff	
					SILTY CLAY (CL) light brown, wet, stiff	-130
22.3		18	S	15	**SAND with SILT (SP-SM)** grey, wet, medium dense	
					SILTY CLAY (CL) grey, wet, very stiff	
						-135
				20		
					@ 22 feet, stiff	
27.1	96	15	D		**SANDY SILT (ML)** grey, wet, stiff	-140
28.9		19	S	25	**CLAY (CL)** grey brown, wet, very stiff, trace silt	
						-145
19.4		24	S	30	**SILTY SAND (SM)** grey, wet, medium dense	
						-150
				35		
						-155

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-25-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 20

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-11

FIGURE B-11

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
	34.3	85	8	D	40	**SANDY CLAY (CL)** grey, wet, stiff	-160
	26.4		21	D	45	**SAND (SP)** grey, wet, medium dense, trace silt	-165
	33.3						
	41.8		7	S	50	**CLAY (CL)** grey, wet, stiff	
						Total Depth 51.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 7-25-18

EQUIPMENT USED: 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft): 20

GPI

PROJECT NO.: 2884.I

COACHELLA

LOG OF BORING NO. B-11

FIGURE B-11

APPENDIX C

APPENDIX C

LABORATORY TESTS

INTRODUCTION

Representative undisturbed soil samples and bulk samples were carefully packaged in the field and sealed to prevent moisture loss. The samples were then transported to our Cypress office for examination and testing assignments. Laboratory tests were performed on selected representative samples as an aid in classifying the soils and to evaluate the physical properties of the soils affecting foundation design and construction procedures. Detailed descriptions of the laboratory tests are presented below under the appropriate test headings. Test results are presented in the figures that follow.

MOISTURE CONTENT AND DRY DENSITY

Moisture content and dry density were determined from a number of the ring samples. The samples were first trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D 2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. Moisture content and dry density values are presented on the boring logs in Appendix B.

GRAIN SIZE DISTRIBUTION

Soil samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. That portion of the material retained on the No. 200 sieve was oven-dried and weighed to determine the percentage of the material passing the No. 200 sieve. A summary of the percentages passing the No. 200 sieve is presented below.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	PERCENT PASSING No. 200 SIEVE
B-1	2	Silty Sand (SM)	40
B-3	0-4	Sandy Silt (ML)	68
B-7	20	Sand w/Silt (SP-SM)	10
B-7	35	Silty Sand (SP-SM)	13
B-7	45	Sandy Silt (ML)	54
B-8	30	Silty Sand (SM)	26
B-8	50	Sandy Silt (ML)	59
B-10	15	Clayey Silt (ML)	91
B-10	30	Silty Sand (SM)	44
B-11	15	Sand w/Silt (SP-SM)	8
B-11	30	Silty Sand (SM)	20
B-11	45	Sand (SP)	5

ATTERBERG LIMITS

Liquid and plastic limits were determined for selected samples in accordance with ASTM D4318. Results of the Atterberg Limits test are summarized on Figure C-1.

DIRECT SHEAR

Direct shear tests were performed on relatively undisturbed and remolded bulk samples in accordance with ASTM D 3080. The bulk samples were remolded to approximately 90 percent of the maximum dry density. The test specimens were placed in the shear machine, and a normal load comparable to the in-situ overburden stress was applied. The samples were inundated, allowed to consolidate, and then were sheared to failure at a strain rate of 0.001 to 0.002 inches per minute. The tests were repeated on additional test specimens under increased normal loads. Shear stress and sample deformation were monitored throughout the test. The results of the direct shear tests are presented in Figures C-2 to C-6.

CONSOLIDATION

One-dimensional consolidation tests were performed on undisturbed samples in accordance with ASTM D 2435. After trimming the ends, the samples were placed in the consolidometer and loaded to up to 0.4 ksf. Thereafter, the samples were incrementally loaded to a maximum load of up to 25.6 ksf. The samples were inundated at 1.6 ksf. Sample deformation was measured to 0.0001 inch. Rebound behavior was investigated by unloading the sample back to 0.4 ksf. Results of the consolidation tests, in the form of percent consolidation versus log pressure are presented in Figures C-7 to C-9.

COLLAPSE

Collapse tests were performed on undisturbed samples in accordance with ASTM D 5333. After trimming the ends, the sample was placed in the consolidometer and loaded to 0.4 ksf. Thereafter, the samples were incrementally loaded to 1.6 ksf at the in-situ moisture content and then saturated. Sample deformation was measured to 0.0001 inch. The amount of collapse is shown below as percent compression of the sample.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	IN-SITU MOISTURE CONTENT (%)	TOTAL COMPRESSION (%)	
				BEFORE SATURATION	AFTER SATURATION
B-6	15	Sandy Silt (SM)	33.1	5.1	5.2
B-9	7	Sandy Silt (SM)	14.9	1.5	1.5
B-10	7	Sand w/Silt (SP-SM)	3.0	1.4	2.2

COMPACTION TEST

A maximum dry density/optimum moisture tests were performed in accordance with ASTM D 1557 on representative bulk samples of the site soils. The test results are as follows:

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	OPIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)
B-1	0–4	Silty Sand (SM)	112	13.0
B-7	0–4	Sandy Silt (ML)	111	14.0

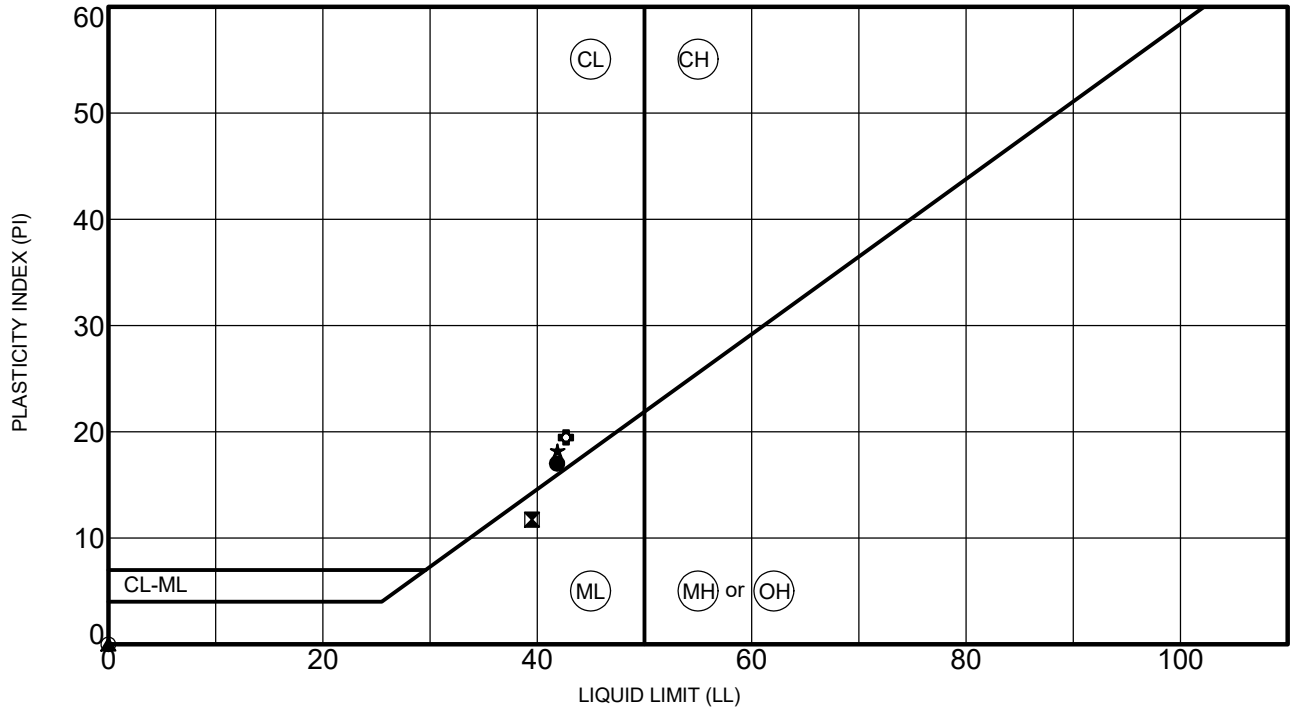
R-VALUE

Suitability of the near-surface soils for pavement was evaluated by conducting an R-value test. The test was performed in accordance with ASTM D 2844 by GeoLogic Associates (GLA) under subcontract to GPI. The result of the test is as follows:

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	R-VALUE
B-3	0 – 4	Silt w/Gravel (ML)	42

CORROSIVITY

Soil corrosivity testing was performed by HDR on soil samples provided by GPI. The test results are summarized in Table 1 of this Appendix.



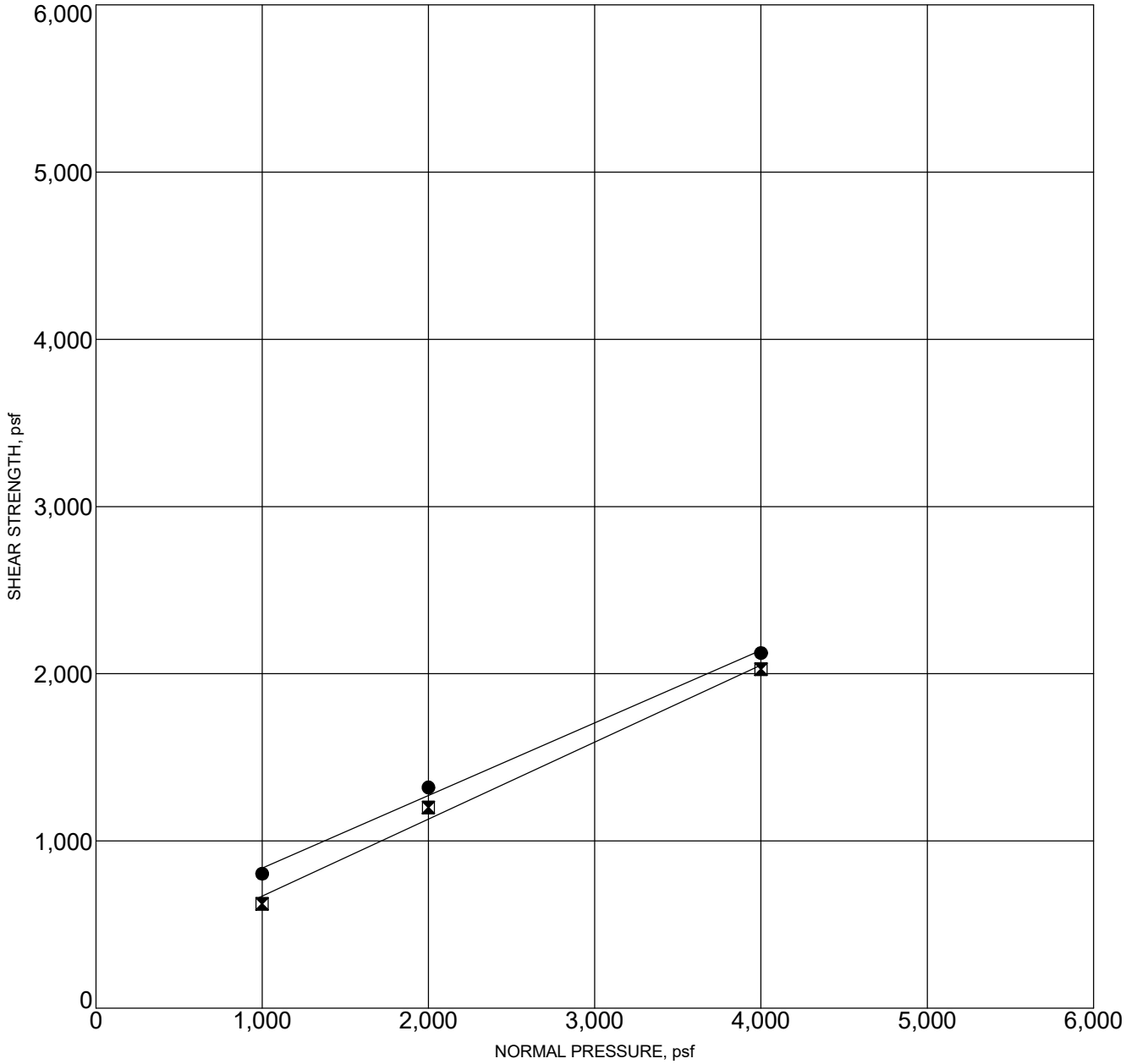
	SAMPLE LOCATION		LL	PL	PI	Fines, %	Classification
●	B-10	12.0	42	25	17		CLAY (CL)
⊠	B-10	35.0	40	28	12		SILT (ML)
▲	B-7	25.0	NP	NP	NP		SILT (ML)
★	B-7	40.0	42	24	18		CLAY (CL)
⊙	B-7	50.0	NP	NP	NP		SILT (ML)
✿	B-9	15.0	43	23	19		CLAY (CL)

PROJECT: COACHELLA PROJECT NO. 2884.I

GPI

ATTERBERG LIMITS TEST RESULTS

FIGURE C-1



● **PEAK STRENGTH**
Friction Angle= 23 degrees
Cohesion= 402 psf

⧓ **ULTIMATE STRENGTH**
Friction Angle= 25 degrees
Cohesion= 210 psf

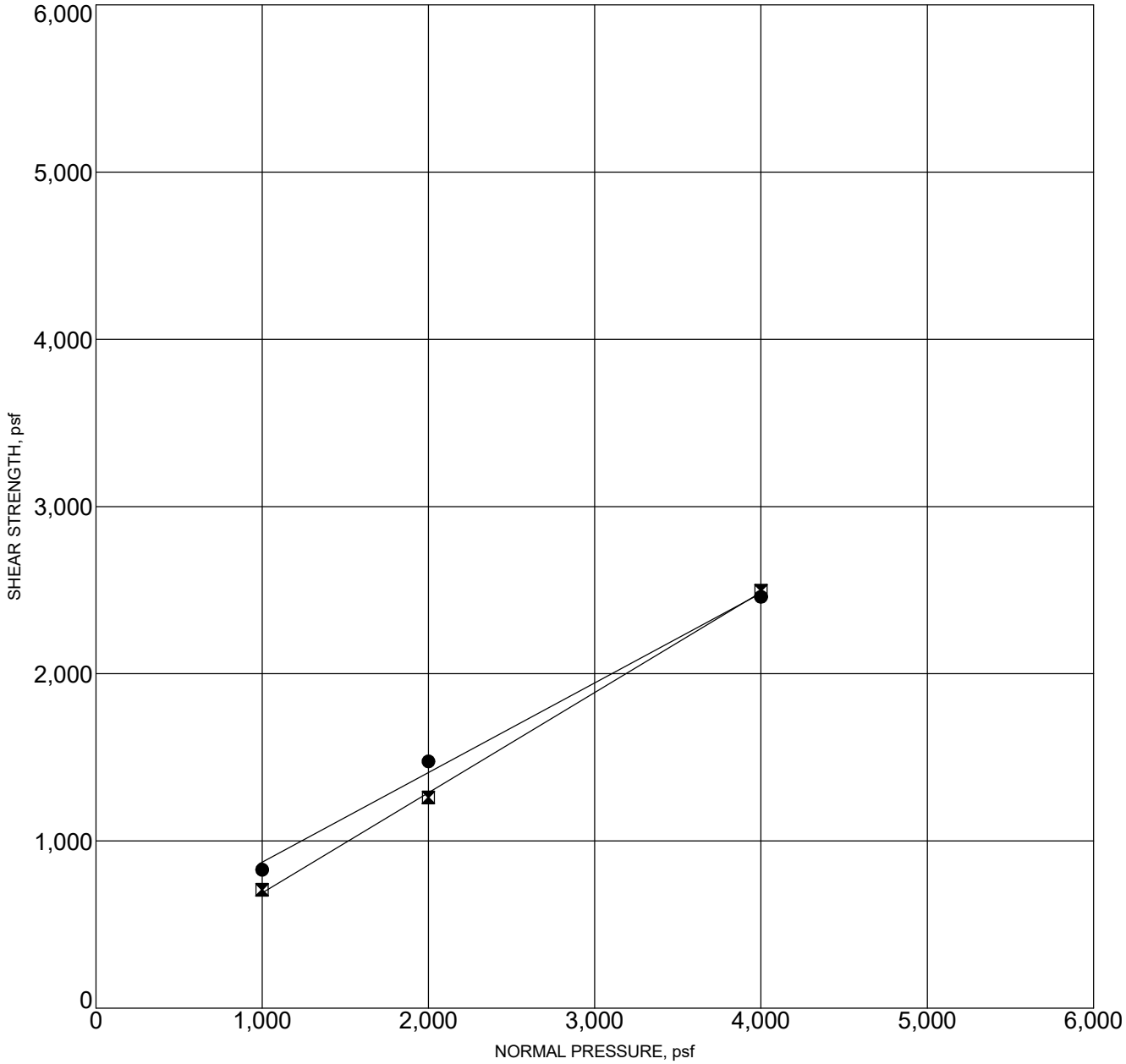
Sample Location		Classification	DD,pcf	MC,%
B-6	10.0	CLAYEY SILT (ML)	93	23.5

PROJECT: COACHELLA PROJECT NO.: 2884.I

GPI

DIRECT SHEAR TEST RESULTS

FIGURE C-2



● **PEAK STRENGTH**
Friction Angle= 28 degrees
Cohesion= 336 psf

⧓ **ULTIMATE STRENGTH**
Friction Angle= 31 degrees
Cohesion= 90 psf

Note: Samples remolded to 90% maximum dry density

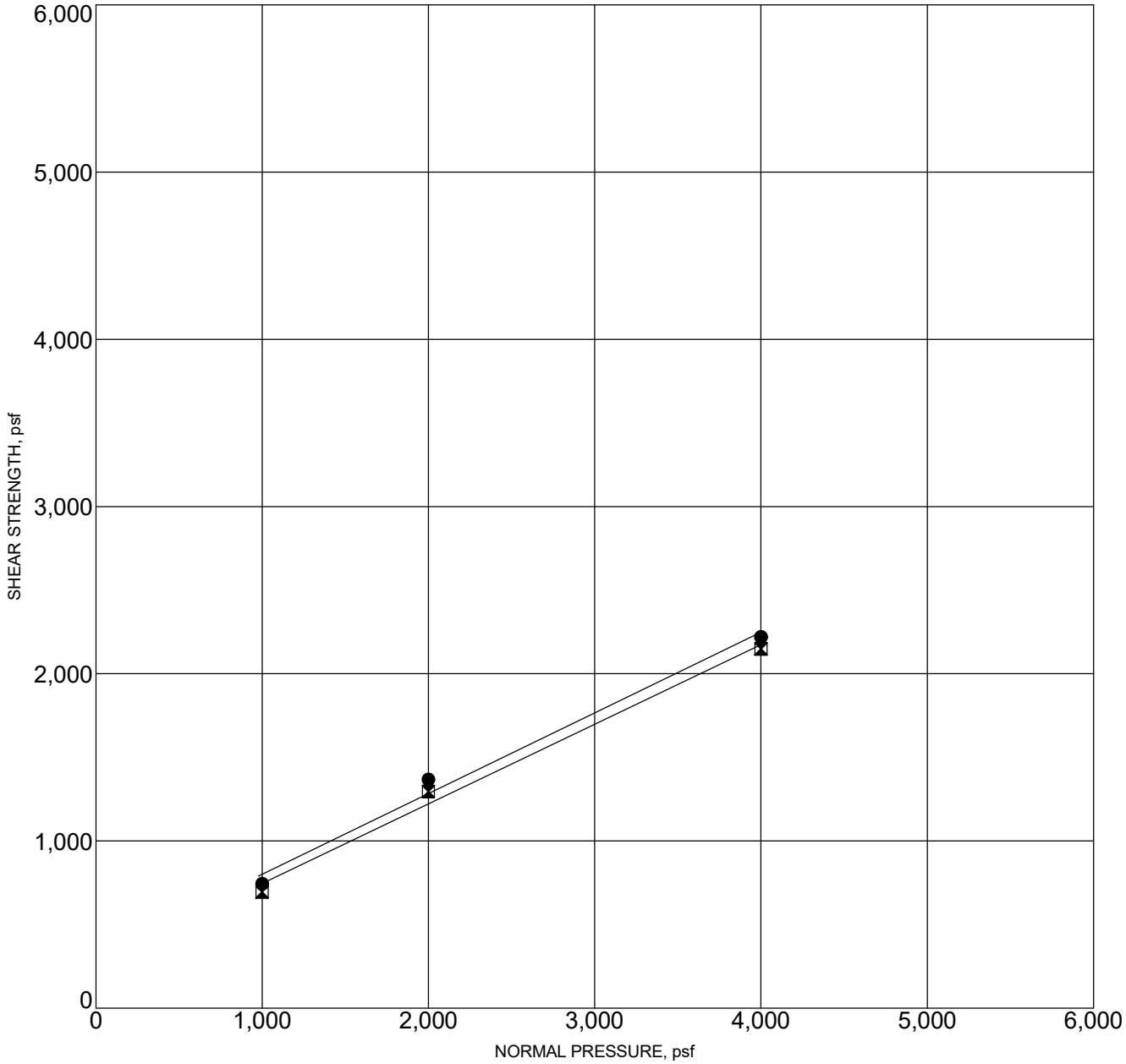
Sample Location		Classification	DD,pcf	MC,%
B-7	0-4	SANDY SILT (ML)	100	14.0

PROJECT: COACHELLA PROJECT NO.: 2884.I

GPI

DIRECT SHEAR TEST RESULTS

FIGURE C-3



● **PEAK STRENGTH**
Friction Angle= 26 degrees
Cohesion= 318 psf

⧓ **ULTIMATE STRENGTH**
Friction Angle= 25 degrees
Cohesion= 270 psf

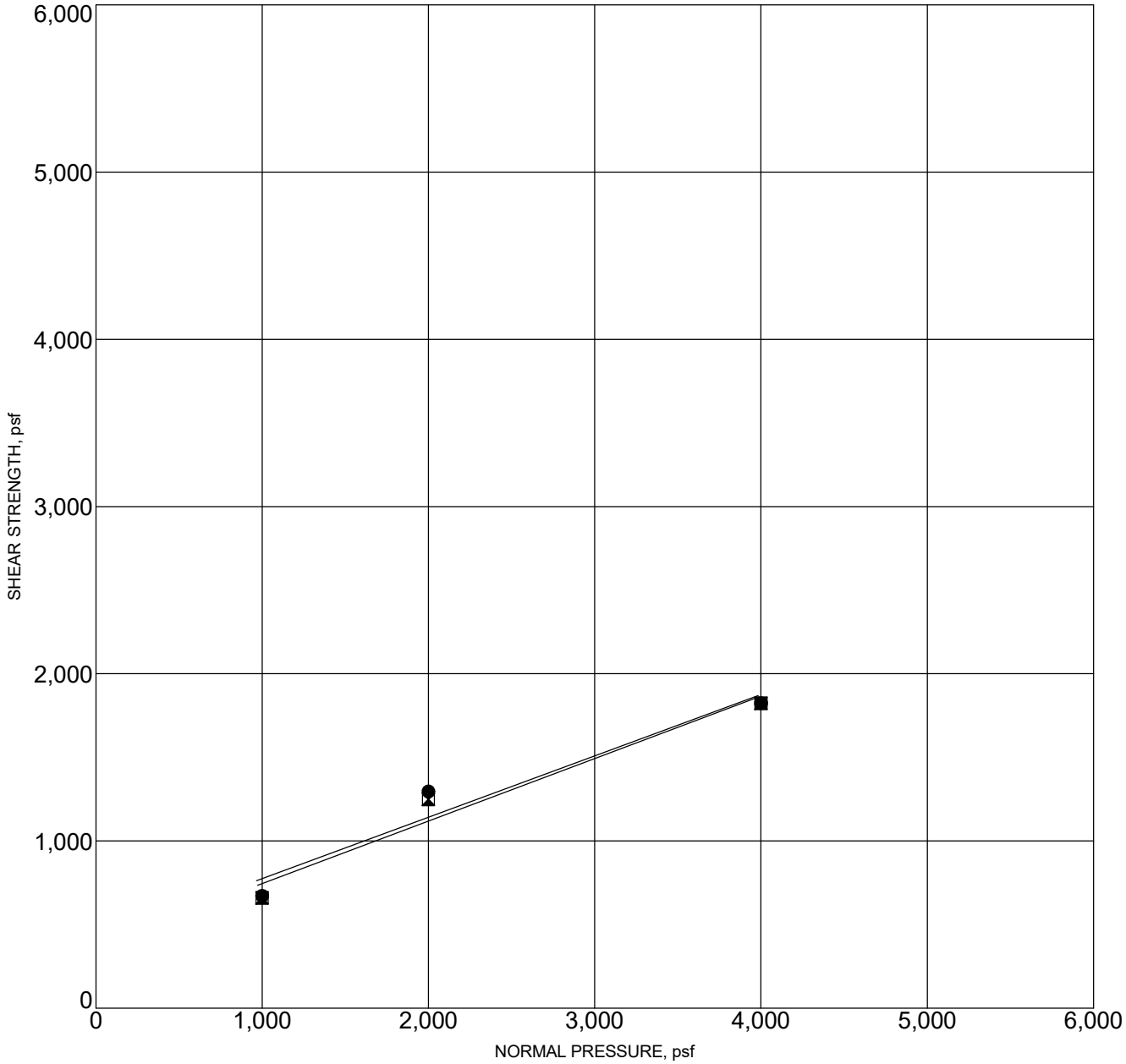
Sample Location		Classification	DD,pcf	MC,%
B-7	7.0	SILTY SAND (SM)	92	14.1

PROJECT: COACHELLA PROJECT NO.: 2884.I

GPI

DIRECT SHEAR TEST RESULTS

FIGURE C-4



● **PEAK STRENGTH**
Friction Angle= 20 degrees
Cohesion= 408 psf

⧓ **ULTIMATE STRENGTH**
Friction Angle= 20 degrees
Cohesion= 372 psf

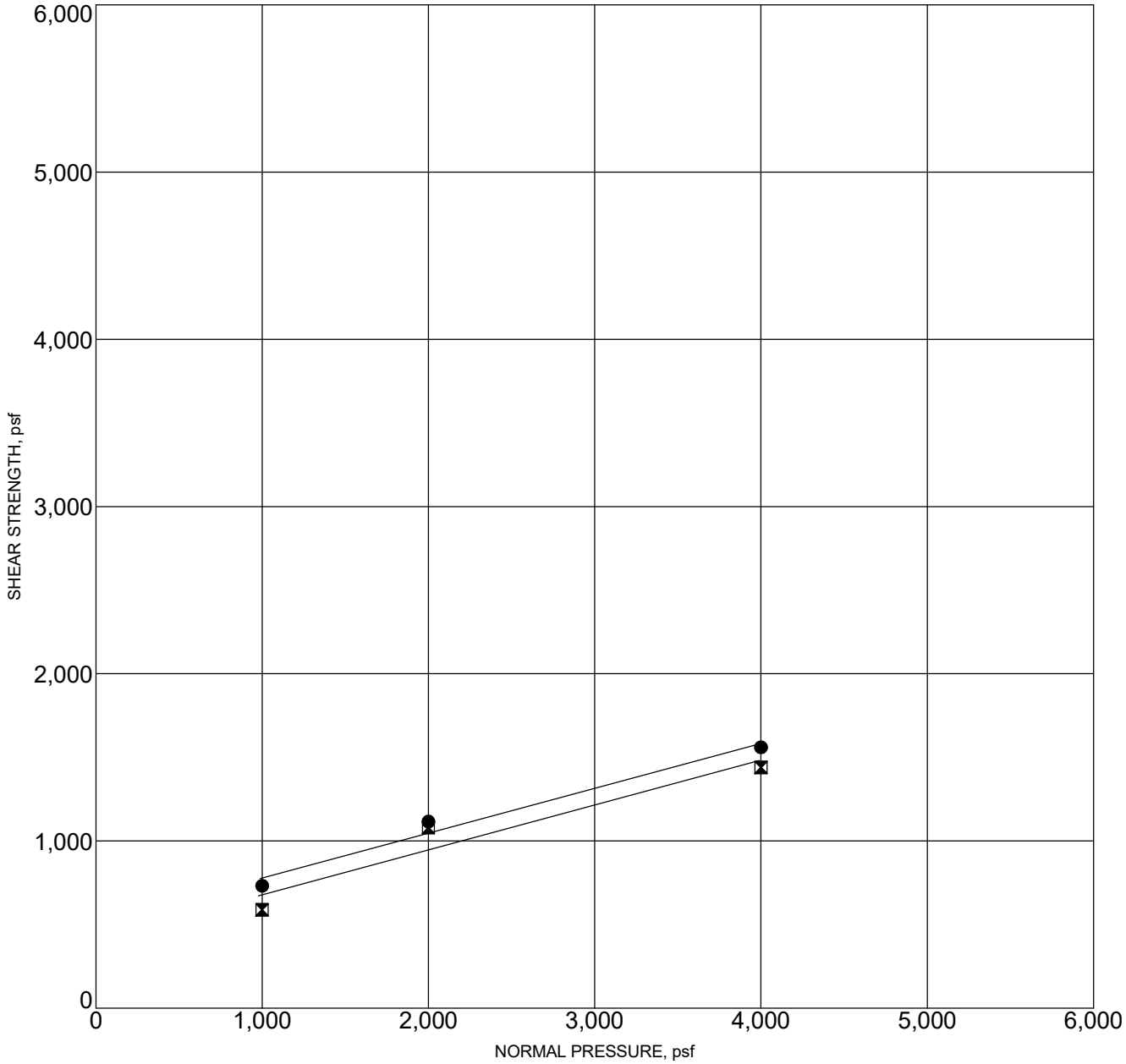
Sample Location		Classification	DD,pcf	MC,%
B-10	5.0	SANDY SILT (ML)	96	3.3

PROJECT: COACHELLA PROJECT NO.: 2884.I

GPI

DIRECT SHEAR TEST RESULTS

FIGURE C-5



● **PEAK STRENGTH**
Friction Angle= 15 degrees
Cohesion= 510 psf

⧓ **ULTIMATE STRENGTH**
Friction Angle= 15 degrees
Cohesion= 408 psf

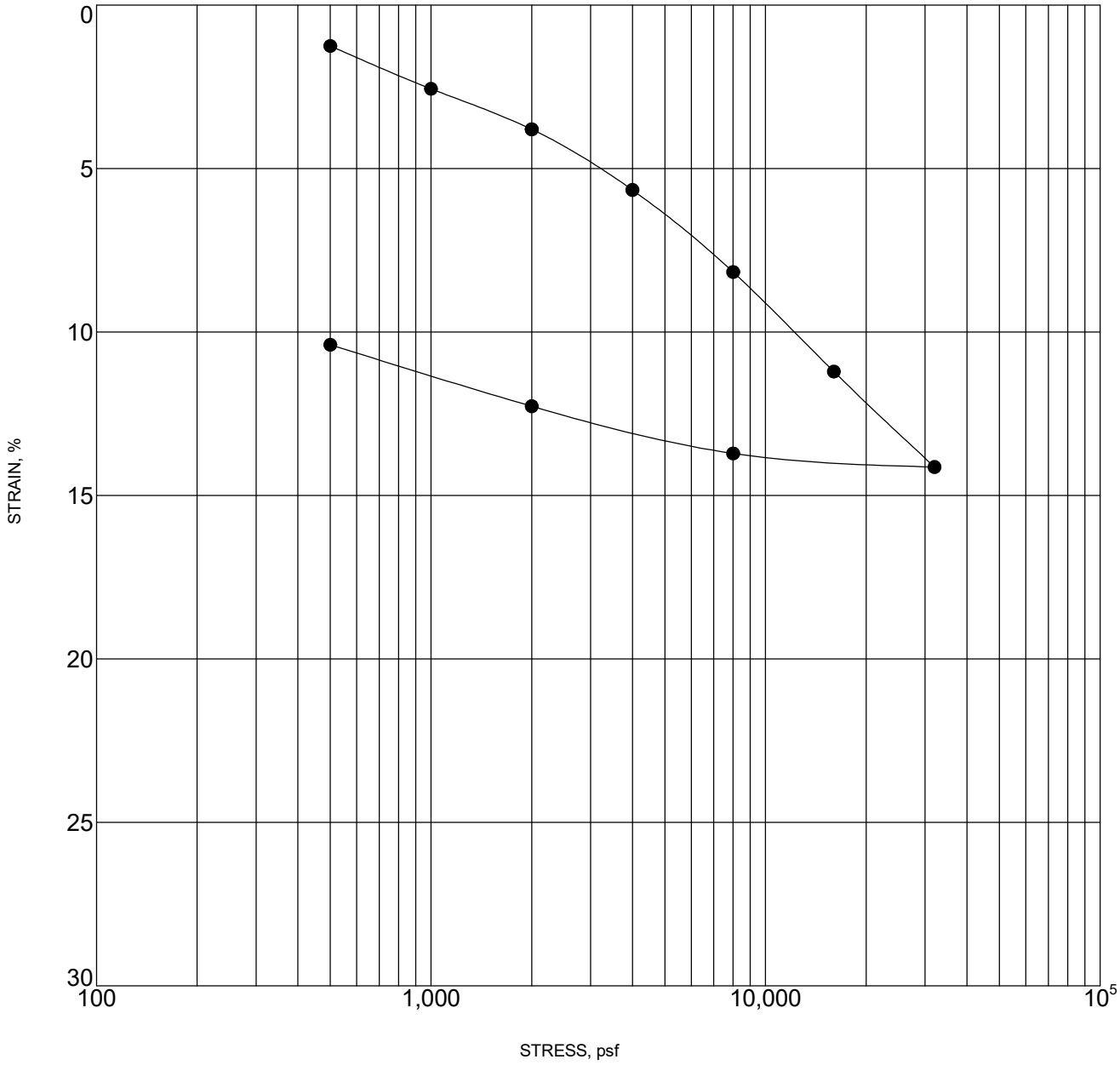
Sample Location		Classification	DD,pcf	MC,%
B-11	10.0	CLAY (CL)	82	30.5

PROJECT: COACHELLA PROJECT NO.: 2884.I

GPI

DIRECT SHEAR TEST RESULTS

FIGURE C-6



Sample inundated at 2000 psf

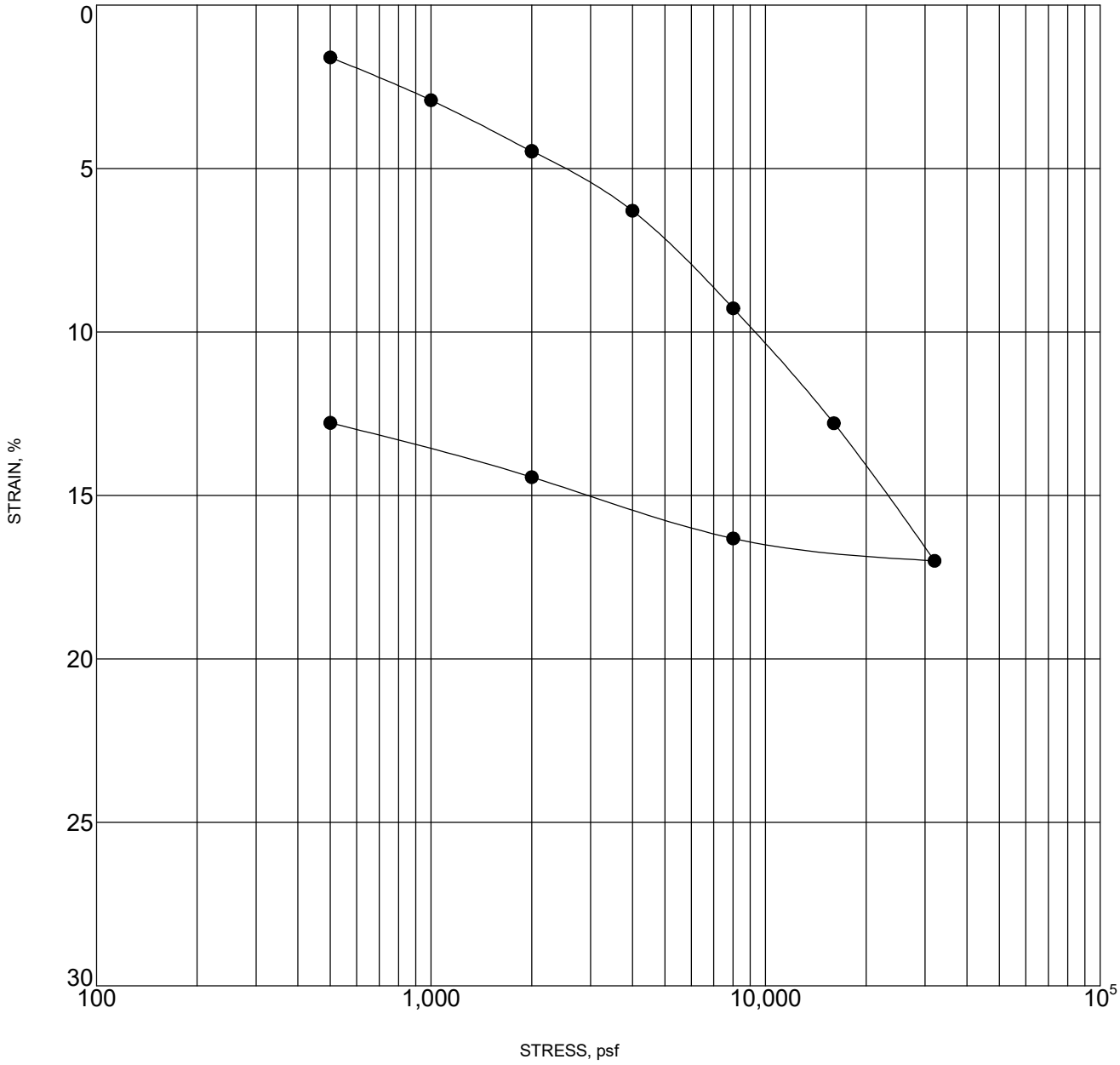
	Sample Location		Classification	DD,pcf	MC,%
●	B-6	32.0	SILT (ML)	82	39.2

PROJECT: COACHELLA PROJECT NO.: 2884.I

GPI

CONSOLIDATION TEST RESULTS

FIGURE C-7



Sample inundated at 2000 psf

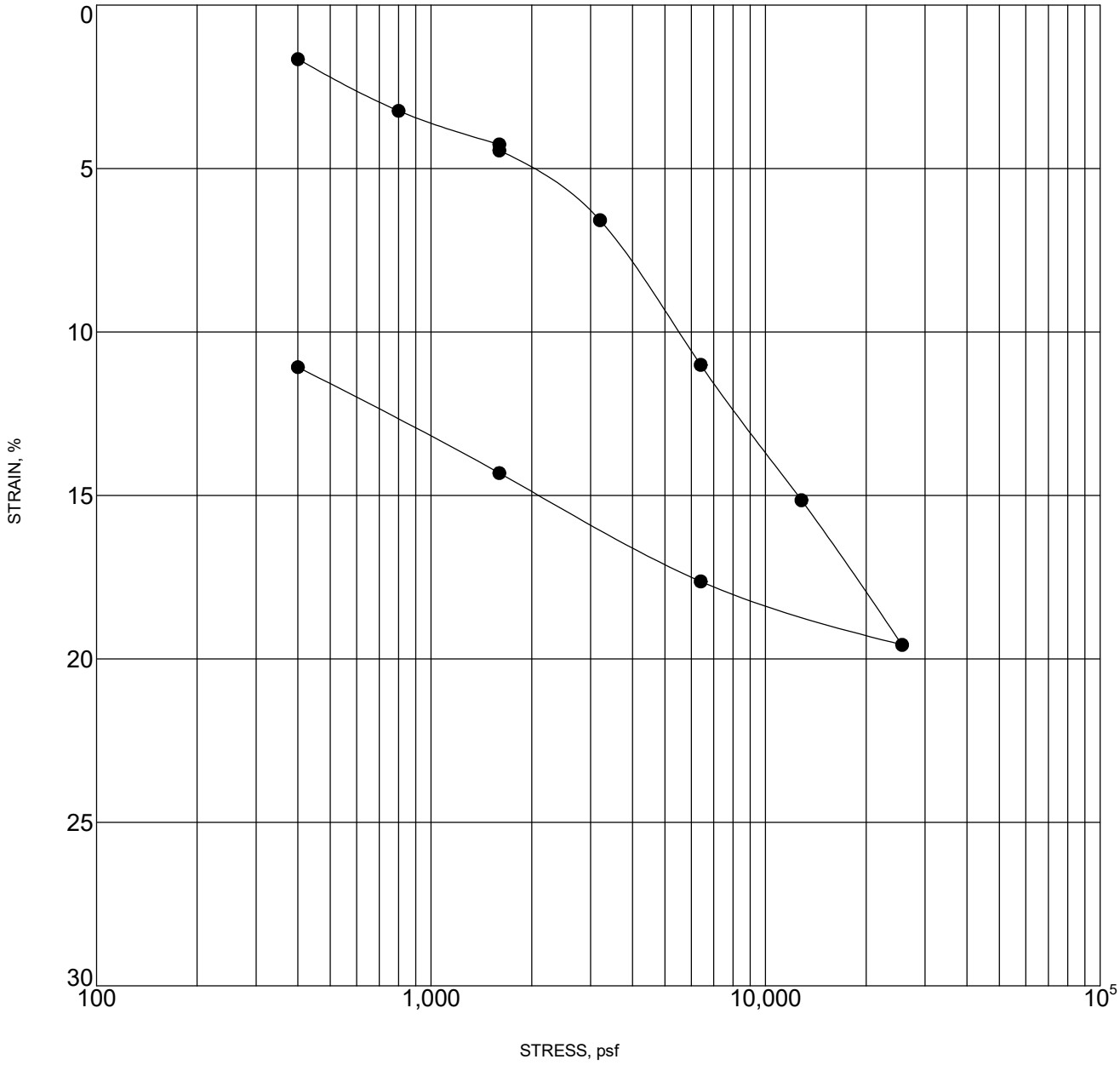
	Sample Location		Classification	DD,pcf	MC,%
●	B-9	15.0	CLAY (CL)	89	30.1

PROJECT: COACHELLA PROJECT NO.: 2884.I

GPI

CONSOLIDATION TEST RESULTS

FIGURE C-8



Sample inundated at 1600 psf

	Sample Location		Classification	DD,pcf	MC,%
●	B-11	10.0	CLAY (CL)	82	30.5

PROJECT: COACHELLA PROJECT NO.: 2884.I

GPI

CONSOLIDATION TEST RESULTS

FIGURE C-9

Table 1 - Laboratory Tests on Soil Samples

Geotechnical Professionals, Inc.
Coachella Business Park
Your #2884.I, HDR Lab #18-0502LAB
9-Aug-18

Sample ID			B-3 @ 0-4'	B-7 @ 0-4'
Resistivity		**Units**		
as-received		ohm-cm	2,480	600,000
saturated		ohm-cm	160	1,040
pH			7.7	7.7
Electrical Conductivity		mS/cm	3.04	0.27
Chemical Analyses				
Cations				
calcium	Ca^{2+}	mg/kg	1,220	100
magnesium	Mg^{2+}	mg/kg	232	16
sodium	Na^{1+}	mg/kg	2,290	128
potassium	K^{1+}	mg/kg	218	40
Anions				
carbonate	CO_3^{2-}	mg/kg	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	95	146
fluoride	F^{1-}	mg/kg	7.8	4.0
chloride	Cl^{1-}	mg/kg	2770	125
sulfate	SO_4^{2-}	mg/kg	4,080	163
phosphate	PO_4^{3-}	mg/kg	ND	ND
Other Tests				
ammonium	NH_4^{1+}	mg/kg	ND	ND
nitrate	NO_3^{1-}	mg/kg	861	174
sulfide	S^{2-}	qual	na	na
Redox		mV	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.
Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

431 West Baseline Road · Claremont, CA 91711
Phone: 909.962.5485 · Fax: 909.626.3316

Appendix F

Structural BMP and/or Retention Facility Sizing Calculations
and Design Details

Fueling Areas SD-30

Photo Credit: Geoff Brosseau

Design Objectives

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

Description

Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the stormwater conveyance system. Spills at vehicle and equipment fueling areas can be a significant source of pollution because fuels contain toxic materials and heavy metals that are not easily removed by stormwater treatment devices.

Approach

Project plans must be developed for cleaning near fuel dispensers, emergency spill cleanup, containment, and leak prevention.

Suitable Applications

Appropriate applications include commercial, industrial, and any other areas planned to have fuel dispensing equipment, including retail gasoline outlets, automotive repair shops, and major non-retail dispensing areas.

Design Considerations

Design requirements for fueling areas are governed by Building and Fire Codes and by current local agency ordinances and zoning requirements. Design requirements described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements.

Designing New Installations

Covering

Fuel dispensing areas should provide an overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. The fueling area should drain to the project's treatment control BMP(s) prior to discharging to the stormwater conveyance system. Note - If fueling large equipment or vehicles that would prohibit the use of covers or roofs, the fueling island should be designed to sufficiently accommodate the larger vehicles and equipment and to prevent stormwater run-on and runoff. Grade to direct stormwater to a dead-end sump.

Surfacing

Fuel dispensing areas should be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete should be prohibited. Use asphalt sealant to protect asphalt paved areas surrounding the fueling area. This provision may be made to sites that have pre-existing asphalt surfaces.

The concrete fuel dispensing area should be extended a minimum of 6.5 ft from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 ft, whichever is less.

Grading/Contouring

Dispensing areas should have an appropriate slope to prevent ponding, and be separated from the rest of the site by a grade break that prevents run-on of urban runoff. (Slope is required to be 2 to 4% in some jurisdictions' stormwater management and mitigation plans.)

Fueling areas should be graded to drain toward a dead-end sump. Runoff from downspouts/roofs should be directed away from fueling areas. Do not locate storm drains in the immediate vicinity of the fueling area.

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

- In the case of an emergency, provide storm drain seals, such as isolation valves, drain plugs, or drain covers, to prevent spills or contaminated stormwater from entering the stormwater conveyance system.

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.

Maintenance Bays & Docks SD-31

Design Objectives

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

Description

Several measures can be taken to prevent operations at maintenance bays and loading docks from contributing a variety of toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to the stormwater conveyance system.

Approach

In designs for maintenance bays and loading docks, containment is encouraged. Preventative measures include overflow containment structures and dead-end sumps. However, in the case of loading docks from grocery stores and warehouse/distribution centers, engineered infiltration systems may be considered.

Suitable Applications

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

Design Considerations

Design requirements for vehicle maintenance and repair 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 requirements.

Designing New Installations

Designs of maintenance bays should consider the following:

- Repair/maintenance bays and vehicle parts with fluids should be indoors; or designed to preclude urban run-on and runoff.
- Repair/maintenance floor areas should be paved with Portland cement concrete (or equivalent smooth impervious surface).

- Repair/maintenance bays should be designed to capture all wash water leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters form entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

- Other features may be comparable and equally effective.

The following designs of loading/unloading dock areas should be considered:

- Loading dock areas should be covered, or drainage should be designed to preclude urban run-on and runoff.

- Direct connections into storm drains from depressed loading docks (truck wells) are prohibited.

- Below-grade loading docks from grocery stores and warehouse/distribution centers of fresh food items should drain through water quality inlets, or to an engineered infiltration system, or an equally effective alternative. Pre-treatment may also be required.

- Other features may be 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.

Additional Information

Stormwater and non-stormwater will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and cannot be discharged directly to the storm drain or sanitary sewer system without the appropriate permit.

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.

COACHELLA AIRPORT BUSINESS PARK

IN THE CITY OF
COACHELLA, CA

PRELIMINARY HYDROLOGY REPORT

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COACHELLA AIRPORT BUSINESS PARK

PRELIMINARY HYDROLOGY REPORT

TABLE OF CONTENTS:

I. PROJECT DESCRIPTION

Haagen Co., LLC is proposing to develop the Coachella Airport Business Park (proposed project), a mixed-use business park development which includes warehouse/commercial uses, self-storage, small business, drive thru coffee shop and service station/mini mart-related land uses in the City of Coachella, in Riverside County, California. The project site is located at the northwest corner of the intersection of State Route 86 and Airport Boulevard and is comprised of three parcels totaling approximately 42.69 acres. The proposed project will require a change of zone from M-H (Heavy Industrial) to MS-IP (Manufacturing Service – Industrial Park Overlay) to allow the proposed uses.

The project site is bordered by a vacant, undeveloped property owned by Coachella Valley Water District (CVWD) located immediately north. To the west, the project site is bordered by the Coachella Valley Stormwater Channel, to the east, bordered by SR-86 and beyond followed by agricultural land uses, and to the south, bordered by a mobile home park. A 3.44-acre right-of-way under California Department of Transportation (Caltrans) jurisdiction that is vacant and abuts the southeastern frontage of the project site. (See Preliminary Hydrology Map – Appendix).

Although the site is adjacent to the Coachella Valley Storm Channel it is currently in the flood plain Zone AE (Base Flood Elevations Provided) based on FEMA Map Number 06065C2270H, Panel 2270 of 3805, reflected in the map revised 3/6/18. Coachella Valley Water District (CVWD) maintains the existing Storm Water Channel and has proposed future channel lining improvements that will remove the entirety of existing Coachella Airport Business Park from the flood plain. However, Coachella Airport Business Park intends to go forward with development in a manner that protects the site from off-site flows by establish elevated grades along affected portion of the project perimeter. CVWD will conduct a Flood Development Review of the project development on behalf of FEMA before Final Engineering drawings are submitted to City of Coachella for first review to confirm that the project design protects the development from off-site flows. Modeling of off-site flows affecting the site under existing and proposed conditions will be submitted to CVWD for review based on the Flood Development Review requirements listed in the CVWD Development Design Guidelines. This Preliminary Hydrology Report supports the Preliminary Grading and Drainage Plan for entitlement which shows proposed conditions protecting the site from off-site flows. However, modeling of the proposed conditions and review of the proposed conditions will not occur until after project entitlement and before submittal of final engineering documents.

II. PROJECT SCOPE AND DESIGN METHODOLOGY

This Preliminary Hydrology Report was prepared in support of the Preliminary Site Grading and Drainage Plan included as part of the Conditional Use Permit Application for the Coachella Airport Business Park. The proposed Coachella Airport Business Park Development will be required to collect and store 100% of the runoff generated during the 100 year storm event on-site per City of Coachella drainage standards. The purpose of this report is to provide a study of the storm runoff generated under the post development condition, and support the design of on-site storm retention facilities in order to satisfy the City of Coachella on-site retention requirements. An analysis supporting the design and sizing of underground storm drain conduits and drain inlets will be provided during final design phase for the development.

The project can be separated into three main subareas and storm water collection system boundaries, 1.) the majority of the site is designed to surface flow to a series of drain inlets, gutters and swales where runoff can be collected and conveyed in an underground storm drain system toward retention basins located along the westerly side of the property 2.) a smaller portion of the project located at the northerly interior of the site will drain its surface runoff toward an interim retention basin location 3.) A portion of project located on the Easterly boundary will flow to a single retention basin adjacent to the project boundary. There are several depressed loading docks (0.16 acres) serving the proposed warehouse buildings on the northerly side of the project site. These loading docks will drain separately to underground storage facilities as their depth does not allow for gravity flow into the proposed storm drain retention system. The project soils report notes that underground infiltration systems are not recommended for the site due to relatively high groundwater levels. However, recommendations for infiltration systems are given to provide for separation from infrastructure. These recommendations will be adhered to and the assumed location of underground storage systems serving the loading docks are show on the Preliminary Hydrology Map. Alternate means of providing drainage for the depressed loading dock areas, such as automatic pumping systems may be considered during Final Engineering Design phase.

It is anticipated that future improvements to the adjacent Coachella Valley Storm Water Channel proposed by CVWD will lower the hydraulic grade line within the channel sufficiently to remove Coachella Airport Business Park from the flood plain and allow gravity flow of storm runoff from project site. CVWD has confirmed that this would be allowed as long as all State Water Quality Management requirements are met. The current project design is such that gravity flow to the Coachella Valley Storm Water Channel can be achieved with minor changes to the on-site storm drain system (including removal of the interim retention basin) should the Channel be improved.

The maximum depth of any on-site retention basin will be three (3) feet and will be sized to retain the entire storm volume generated on-site during the 10 year design storm. The project site will also provide sufficient capacity to contain the runoff volume generated during the 100 year design storm in combination with the retention basin and shallow ponding on surface streets and parking areas at a depth not to exceed 1.5’ in depth. In the event of an emergency flooding condition, flows exceeding the capacity of the on-site collection system

will overflow at the southeasterly end of project site toward State Highway 86 right of way and onto an adjacent undeveloped parcel of land. Flows ultimately would then proceed southerly via surface flow where make their way into the Coachella Valley Storm Water Channel. Flows then continue in the channel ultimately to its terminus at the Salton Sea.

On-site retention basins shall be designed in a manner that allows the stored volume generated from the 100 year design storm event to completely evacuate via percolation into the soil within a 72 hour period assuming the maximum percolation rate allowed by City of Coachella of 10 gallons/s.f./day (0.67in./hr). Several City of Coachella drywell infiltration chambers will be used in the design of the storm drain system in order to facilitate the conveyance of the underground storm drain system into the shallow retention basin. However, any additional infiltration provided by these drywells will not be included in calculations to reduce the size of the retention basin or aid in showing that the 100 year storm volume can be evacuated within the allotted time period.

Existing soils in the project area are predominantly consistent with Soil Type B. An Antecedent Moisture Condition of II with a Runoff Index Number of 56 as defined by RCFCD is used for the 100 year design storm.

This report includes:

1) The determination of on-site drainage areas as identified on the hydrology map for the project;

2) The determination of flood volumes for the retention basin utilizing Riverside County Flood Control District (RCFCD) Synthetic Unit Hydrograph (Short-cut Method) for the 10 year and 100 year storm event. Soil Type C values and corresponding Runoff Index (RI) Numbers are assumed.

3) A discussion regarding the project's ability to dissipate runoff stored after a 100 year storm event within a 72 hour period.

DESIGN CRITERIA

1) On-site drainage areas:

SUBAREA A –	27.65 acres commercial (85% impervious)
	0.97 perimeter landscaping (100% pervious)
	2.1 acres retention basin areas (100% impervious)
SUBAREA B –	8.18 acres commercial (85% impervious)
	1.00 acres retention basin area (100% impervious)
SUBAREA C –	2.32 acres commercial (85% impervious)
	0.10 perimeter landscaping (100% pervious)
	0.21 acres retention basin area (100% impervious)

2) The following parameters were used in the preparation of the analyses:

• Antecedant Moisture Condition – 10 year	1	
• Antecedant Moisture Condition – 100 year	2	
• 10 year – 3 hour Precipitation	0.984”	NOAA ATLAS 14
• 10 year – 6 hour Precipitation	1.28”	NOAA ATLAS 14
• 10 year – 24 hour Precipitation	2.07”	NOAA ATLAS 14
• 100 year – 3 hour Precipitation	2.03”	NOAA ATLAS 14
• 100 year – 6 hour Precipitation	2.71”	NOAA ATLAS 14
• 100 year – 24 hour Precipitation	4.24”	NOAA ATLAS 14
• Hydrologic Soil Type “B”		RCFCD Plate C-1.36
• Runoff Index Number	56	RCFCD Plate D-5.5
• 10 year Infiltration Rate	.70	RCFCD Plate E-6.2
• 100 year Infiltration Rate	.51	RCFCD Plate E-6.2
• Slope – Intensity Duration Curve	59	RCFCD Plate D-4.6

III RETENTION BASIN SIZING/ SYNTHETIC UNIT HYDROGRAPH CALCULATIONS

The proposed on-site retention system design is intended to collect design storm runoff generated on-site. Each of the proposed retention basins are a maximum of three feet deep in accordance with City of Coachella requirements. The basins provide sufficient capacity to retain the entire storm volume generated on-site during the 10 year design storm. The runoff volume generated during the 100 year design storm will be contained on-site within the retention basins and within portions of the paved access roads and parking areas with shallow ponding at a maximum depth of 1.5'. The maximum depth of ponding at the point where emergency overflow occurs is 1.0'. For the purpose of calculating the volume of ponding that occurs on-site, maximum average ponding depth is assumed to be 0.5'.

Design storm runoff volume calculations using the RCFCD Synthetic Unit Hydrograph method are included in this section.

RETENTION VOLUME

SUBAREA	BASIN VOLUME (CU.FT.)	PONDING AREA (SQ.FT.)	PONDED VOLUME (0.5' DEEP)	TOTAL VOLUME PROVIDED (CU.FT.)
A	139,026	90,110	45,055	184,081
B	138,198	11,004	5,502	143,700
C	16,706	17,238	8,619	25,325

SUBAREA	10 YEAR VOLUME REQUIRED (CU.FT.)	100 YEAR VOLUME REQUIRED (CU.FT.)	TOTAL VOLUME PROVIDED (CU.FT.)
A	38,514	182,214	184,081
B	9,953	48,487	143,700
C	3,639	16,621	25,325

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES BAZUA, PE		
5				
6	PROJECT NAME	COACHELLA AIRPORT BUSINESS PARK		
7	TAG Project No.	C1443		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	SUBAREA A - 10 YEAR EVENT		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	27.87		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING	0.87		
23	RETENTION BASIN	1.98		
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	1000		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	250		
30				
31	ELEVATION OF HEADWATER	387		
32	ELEVATION OF CONCENTRATION POINT	382		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	10		
37				
38	POINT RAIN			
39	3-HOUR	0.984		
40	6-HOUR	1.28		
41	24-HOUR	2.07		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44		379	42516	
45		380	45027	
46		381	47609	
47		382	50263	
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0.67		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD — PROJECT: COACHELLA AIRPORT BUSINESS PARK
BASIC DATA CALCULATION FORM — TKC JOB # C1443
SHORTCUT METHOD — BY MES BAZUA, PE — DATE 6/10/2020

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	SUBAREA A - 10 YEAR EVENT
[3] AREA - ACRES	30.720
[4] L-FEET	1000
[5] L-MILES	0.189
[6] La-FEET	250.00
[7] La-MILES	0.047
[8] ELEVATION OF HEADWATER	387
[9] ELEVATION OF CONCENTRATION POINT	382
[10] H-FEET	5
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.002
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.04
[16] LAG TIME-MINUTES	2.6
[17] 100% OF LAG-MINUTES	2.6
[18] 200% OF LAG-MINUTES	5.2
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.66

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 10
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
0.98	30.720	1.00	0.98	1.28	30.720	1.00	1.28	2.07	30.720	1.00	2.07
		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	0.00			0.00	0.00			0.00	0.00
SUM [5]	30.72	SUM [7]	0.98	SUM [9]	30.72	SUM [11]	1.28	SUM [13]	30.72	SUM [15]	2.07
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.98				1.28				2.07

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.41	0.40	0.27
FLOOD VOLUME	(cu-ft)	45,515	44,163	30,125
	(acre-ft)	1.04	1.01	0.69
REQUIRED STORAGE	(cu-ft)	38,514	33,950	8,264
	(acre-ft)	0.88	0.78	0.19
PEAK FLOW	(cfs)	23.17	19.84	2.98
MAXIMUM WSEL	(ft)	379.88	379.78	379.17

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1
BY JAMES BAZUA, PE DATE 6/10/2020

ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
B	COMMERCIAL	56	0.70	85%	0.16	27.87	0.907	0.1492
B	PAVING/HARDSCAPE	56	0.70	100%	0.07	0.00	0.000	0.0000
B	SF - 1 ACRE	56	0.70	20%	0.57	0.00	0.000	0.0000
B	SF - 1/2 ACRE	56	0.70	40%	0.45	0.00	0.000	0.0000
B	SF - 1/4 ACRE	56	0.70	50%	0.39	0.00	0.000	0.0000
B	MF - COND0MINIUMS	56	0.70	65%	0.29	0.00	0.000	0.0000
B	MF - APARTMENTS	56	0.70	80%	0.20	0.00	0.000	0.0000
B	MOBILE HOME PARKS	56	0.70	75%	0.23	0.00	0.000	0.0000
B	LANDSCAPING	56	0.70	0%	0.70	0.87	0.028	0.0198
B	RETENTION BASINS	56	0.70	0%	0.70	1.98	0.064	0.0451
B	GOLF COURSE	56	0.70	0%	0.70	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.20	90%	0.20	0.00	0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					SUM	30.72	SUM	0.2142

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.107090088
C= 0.00198

Ft=C(24-(T/60))^1.55 = 0.00198 (24-(T/60))^1.55 + 0.11 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period, T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
10 YEAR - 3 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: \MES BAZUA, FDATE 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.72
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	2.58
UNIT TIME-PERCENT OF LAG	193.9
TOTAL ADJUSTED STORM RAIN-INCHES	0.98
CONSTANT LOSS RATE-in/hr	0.21
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.66 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.154	0.21	0.14	0.02	0.47	0.00
2	10	0.17	1.3	0.154	0.21	0.14	0.02	0.47	0.00
3	15	0.25	1.1	0.130	0.21	0.12	0.01	0.40	0.00
4	20	0.33	1.5	0.177	0.21	0.16	0.02	0.54	0.00
5	25	0.42	1.5	0.177	0.21	0.16	0.02	0.54	0.00
6	30	0.50	1.8	0.213	0.21	0.19	0.02	0.65	0.00
7	35	0.58	1.5	0.177	0.21	0.16	0.02	0.54	0.00
8	40	0.67	1.8	0.213	0.21	0.19	0.02	0.65	0.00
9	45	0.75	1.8	0.213	0.21	0.19	0.02	0.65	0.00
10	50	0.83	1.5	0.177	0.21	0.16	0.02	0.54	0.00
11	55	0.92	1.6	0.189	0.21	0.17	0.02	0.58	0.00
12	60	1.00	1.8	0.213	0.21	0.19	0.02	0.65	0.00
13	65	1.08	2.2	0.260	0.21	0.23	0.05	1.40	222.39
14	70	1.17	2.2	0.260	0.21	0.23	0.05	1.40	222.39
15	75	1.25	2.2	0.260	0.21	0.23	0.05	1.40	222.39
16	80	1.33	2.0	0.236	0.21	0.21	0.02	0.68	4.75
17	85	1.42	2.6	0.307	0.21	0.28	0.09	2.85	657.68
18	90	1.50	2.7	0.319	0.21	0.29	0.10	3.21	766.51
19	95	1.58	2.4	0.283	0.21	0.26	0.07	2.13	440.04
20	100	1.67	2.7	0.319	0.21	0.29	0.10	3.21	766.51
21	105	1.75	3.3	0.390	0.21	0.35	0.18	5.39	1419.44
22	110	1.83	3.1	0.366	0.21	0.33	0.15	4.67	1201.80
23	115	1.92	2.9	0.342	0.21	0.31	0.13	3.94	984.15
24	120	2.00	3.0	0.354	0.21	0.32	0.14	4.30	1092.97
25	125	2.08	3.1	0.366	0.21	0.33	0.15	4.67	1201.80
26	130	2.17	4.2	0.496	0.21	0.45	0.28	8.66	2398.84
27	135	2.25	5.0	0.590	0.21	0.53	0.38	11.56	3269.42
28	140	2.33	3.5	0.413	0.21	0.37	0.20	6.12	1637.09
29	145	2.42	6.8	0.803	0.21	0.72	0.59	18.09	5228.23
30	150	2.50	7.3	0.862	0.21	0.78	0.65	19.90	5772.34
31	155	2.58	8.2	0.968	0.21	0.87	0.75	23.17	6751.75
32	160	2.67	5.9	0.697	0.21	0.63	0.48	14.82	4248.83
33	165	2.75	2.0	0.236	0.21	0.21	0.02	0.68	4.75
34	170	2.83	1.8	0.213	0.21	0.19	0.02	0.65	0.00
35	175	2.92	1.8	0.213	0.21	0.19	0.02	0.65	0.00
36	180	3.00	0.6	0.071	0.21	0.06	0.01	0.22	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.41
FLOOD VOLUME (acft)	1.04
FLOOD VOLUME (cuft)	45514.84
REQUIRED STORAGE (acft)	0.88
REQUIRED STORAGE (cuft)	38514.07
PEAK FLOW RATE (cfs)	23.17

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 10 YEAR - 6 HOUR STORM EVENT	PROJECT: COACHELLA AIRPORT BUSINESS PARK CONCENTRATION POINT: 1 BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.72		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	2.58		
UNIT TIME-PERCENT OF LAG	193.9		
TOTAL ADJUSTED STORM RAIN-INCHES	1.28		
CONSTANT LOSS RATE-in/hr	0.214		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.66 cfs

Unit Time Period	Time		Pattern	Storm Rain	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	Percent (Plate E-5.9)	in/hr	Max	Low	in/hr	cfs	cf
1	5	0.08	0.5	0.077	0.21	0.07	0.01	0.24	0.00
2	10	0.17	0.6	0.092	0.21	0.08	0.01	0.28	0.00
3	15	0.25	0.6	0.092	0.21	0.08	0.01	0.28	0.00
4	20	0.33	0.6	0.092	0.21	0.08	0.01	0.28	0.00
5	25	0.42	0.6	0.092	0.21	0.08	0.01	0.28	0.00
6	30	0.50	0.7	0.108	0.21	0.10	0.01	0.33	0.00
7	35	0.58	0.7	0.108	0.21	0.10	0.01	0.33	0.00
8	40	0.67	0.7	0.108	0.21	0.10	0.01	0.33	0.00
9	45	0.75	0.7	0.108	0.21	0.10	0.01	0.33	0.00
10	50	0.83	0.7	0.108	0.21	0.10	0.01	0.33	0.00
11	55	0.92	0.7	0.108	0.21	0.10	0.01	0.33	0.00
12	60	1.00	0.8	0.123	0.21	0.11	0.01	0.38	0.00
13	65	1.08	0.8	0.123	0.21	0.11	0.01	0.38	0.00
14	70	1.17	0.8	0.123	0.21	0.11	0.01	0.38	0.00
15	75	1.25	0.8	0.123	0.21	0.11	0.01	0.38	0.00
16	80	1.33	0.8	0.123	0.21	0.11	0.01	0.38	0.00
17	85	1.42	0.8	0.123	0.21	0.11	0.01	0.38	0.00
18	90	1.50	0.8	0.123	0.21	0.11	0.01	0.38	0.00
19	95	1.58	0.8	0.123	0.21	0.11	0.01	0.38	0.00
20	100	1.67	0.8	0.123	0.21	0.11	0.01	0.38	0.00
21	105	1.75	0.8	0.123	0.21	0.11	0.01	0.38	0.00
22	110	1.83	0.8	0.123	0.21	0.11	0.01	0.38	0.00
23	115	1.92	0.8	0.123	0.21	0.11	0.01	0.38	0.00
24	120	2.00	0.9	0.138	0.21	0.12	0.01	0.42	0.00
25	125	2.08	0.8	0.123	0.21	0.11	0.01	0.38	0.00
26	130	2.17	0.9	0.138	0.21	0.12	0.01	0.42	0.00
27	135	2.25	0.9	0.138	0.21	0.12	0.01	0.42	0.00
28	140	2.33	0.9	0.138	0.21	0.12	0.01	0.42	0.00
29	145	2.42	0.9	0.138	0.21	0.12	0.01	0.42	0.00
30	150	2.50	0.9	0.138	0.21	0.12	0.01	0.42	0.00
31	155	2.58	0.9	0.138	0.21	0.12	0.01	0.42	0.00
32	160	2.67	0.9	0.138	0.21	0.12	0.01	0.42	0.00
33	165	2.75	1.0	0.154	0.21	0.14	0.02	0.47	0.00
34	170	2.83	1.0	0.154	0.21	0.14	0.02	0.47	0.00
35	175	2.92	1.0	0.154	0.21	0.14	0.02	0.47	0.00
36	180	3.00	1.0	0.154	0.21	0.14	0.02	0.47	0.00
37	185	3.08	1.0	0.154	0.21	0.14	0.02	0.47	0.00
38	190	3.17	1.1	0.169	0.21	0.15	0.02	0.52	0.00
39	195	3.25	1.1	0.169	0.21	0.15	0.02	0.52	0.00
40	200	3.33	1.1	0.169	0.21	0.15	0.02	0.52	0.00
41	205	3.42	1.2	0.184	0.21	0.17	0.02	0.57	0.00
42	210	3.50	1.3	0.200	0.21	0.18	0.02	0.61	0.00
43	215	3.58	1.4	0.215	0.21	0.19	0.00	0.03	0.00
44	220	3.67	1.4	0.215	0.21	0.19	0.00	0.03	0.00
45	225	3.75	1.5	0.230	0.21	0.21	0.02	0.50	0.00
46	230	3.83	1.5	0.230	0.21	0.21	0.02	0.50	0.00
47	235	3.92	1.6	0.246	0.21	0.22	0.03	0.97	93.22
48	240	4.00	1.6	0.246	0.21	0.22	0.03	0.97	93.22
49	245	4.08	1.7	0.261	0.21	0.24	0.05	1.44	234.78
50	250	4.17	1.8	0.276	0.21	0.25	0.06	1.91	376.34
51	255	4.25	1.9	0.292	0.21	0.26	0.08	2.39	517.90
52	260	4.33	2.0	0.307	0.21	0.28	0.09	2.86	659.45
53	265	4.42	2.1	0.323	0.21	0.29	0.11	3.33	801.01
54	270	4.50	2.1	0.323	0.21	0.29	0.11	3.33	801.01
55	275	4.58	2.2	0.338	0.21	0.30	0.12	3.80	942.57
56	280	4.67	2.3	0.353	0.21	0.32	0.14	4.27	1084.13

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 10 YEAR - 6 HOUR STORM EVENT	PROJECT: COACHELLA AIRPORT BUSINESS PARK CONCENTRATION POINT: 1 BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.72		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	2.58		
UNIT TIME-PERCENT OF LAG	193.9		
TOTAL ADJUSTED STORM RAIN-INCHES	1.28		
CONSTANT LOSS RATE-in/hr	0.214		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.66 cfs

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
57	285	4.75	2.4	0.369	0.21	0.33	0.15	4.75	1225.68
58	290	4.83	2.4	0.369	0.21	0.33	0.15	4.75	1225.68
59	295	4.92	2.5	0.384	0.21	0.35	0.17	5.22	1367.24
60	300	5.00	2.6	0.399	0.21	0.36	0.19	5.69	1508.80
61	305	5.08	3.1	0.476	0.21	0.43	0.26	8.05	2216.59
62	310	5.17	3.6	0.553	0.21	0.50	0.34	10.41	2924.38
63	315	5.25	3.9	0.599	0.21	0.54	0.38	11.82	3349.05
64	320	5.33	4.2	0.645	0.21	0.58	0.43	13.24	3773.72
65	325	5.42	4.7	0.722	0.21	0.65	0.51	15.60	4481.51
66	330	5.50	5.6	0.860	0.21	0.77	0.65	19.84	5755.53
67	335	5.58	1.9	0.292	0.21	0.26	0.08	2.39	517.90
68	340	5.67	0.9	0.138	0.21	0.12	0.01	0.42	0.00
69	345	5.75	0.6	0.092	0.21	0.08	0.01	0.28	0.00
70	350	5.83	0.5	0.077	0.21	0.07	0.01	0.24	0.00
71	355	5.92	0.3	0.046	0.21	0.04	0.00	0.14	0.00
72	360	6.00	0.2	0.031	0.21	0.03	0.00	0.09	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.40
FLOOD VOLUME (acft)	1.01
FLOOD VOLUME (cuft)	44163.05
REQUIRED STORAGE (acft)	0.78
REQUIRED STORAGE (cuft)	33949.72
PEAK FLOW RATE (cfs)	19.84

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
10 YEAR - 24 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.720	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2142
LAG TIME - MINUTES	2.58	MINIMUM LOSS RATE (for var. loss) - in/hr	0.107
UNIT TIME-PERCENT OF LAG	581.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.07	C	0.00198
		PERCOLATION RATE (cfs)	0.66

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	15	0.25	0.2	0.017	0.378	0.015	0.002	0.05	0.00
2	30	0.50	0.3	0.025	0.374	0.022	0.002	0.08	0.00
3	45	0.75	0.3	0.025	0.369	0.022	0.002	0.08	0.00
4	60	1.00	0.4	0.033	0.365	0.030	0.003	0.10	0.00
5	75	1.25	0.3	0.025	0.361	0.022	0.002	0.08	0.00
6	90	1.50	0.3	0.025	0.357	0.022	0.002	0.08	0.00
7	105	1.75	0.3	0.025	0.352	0.022	0.002	0.08	0.00
8	120	2.00	0.4	0.033	0.348	0.030	0.003	0.10	0.00
9	135	2.25	0.4	0.033	0.344	0.030	0.003	0.10	0.00
10	150	2.50	0.4	0.033	0.340	0.030	0.003	0.10	0.00
11	165	2.75	0.5	0.041	0.335	0.037	0.004	0.13	0.00
12	180	3.00	0.5	0.041	0.331	0.037	0.004	0.13	0.00
13	195	3.25	0.5	0.041	0.327	0.037	0.004	0.13	0.00
14	210	3.50	0.5	0.041	0.323	0.037	0.004	0.13	0.00
15	225	3.75	0.5	0.041	0.319	0.037	0.004	0.13	0.00
16	240	4.00	0.6	0.050	0.315	0.045	0.005	0.15	0.00
17	255	4.25	0.6	0.050	0.311	0.045	0.005	0.15	0.00
18	270	4.50	0.7	0.058	0.307	0.052	0.006	0.18	0.00
19	285	4.75	0.7	0.058	0.303	0.052	0.006	0.18	0.00
20	300	5.00	0.8	0.066	0.299	0.060	0.007	0.20	0.00
21	315	5.25	0.6	0.050	0.295	0.045	0.005	0.15	0.00
22	330	5.50	0.7	0.058	0.292	0.052	0.006	0.18	0.00
23	345	5.75	0.8	0.066	0.288	0.060	0.007	0.20	0.00
24	360	6.00	0.8	0.066	0.284	0.060	0.007	0.20	0.00
25	375	6.25	0.9	0.075	0.280	0.067	0.007	0.23	0.00
26	390	6.50	0.9	0.075	0.276	0.067	0.007	0.23	0.00
27	405	6.75	1.0	0.083	0.273	0.075	0.008	0.25	0.00
28	420	7.00	1.0	0.083	0.269	0.075	0.008	0.25	0.00
29	435	7.25	1.0	0.083	0.265	0.075	0.008	0.25	0.00
30	450	7.50	1.1	0.091	0.262	0.082	0.009	0.28	0.00
31	465	7.75	1.2	0.099	0.258	0.089	0.010	0.31	0.00
32	480	8.00	1.3	0.108	0.255	0.097	0.011	0.33	0.00
33	495	8.25	1.5	0.124	0.251	0.112	0.012	0.38	0.00
34	510	8.50	1.5	0.124	0.248	0.112	0.012	0.38	0.00
35	525	8.75	1.6	0.132	0.244	0.119	0.013	0.41	0.00
36	540	9.00	1.7	0.141	0.241	0.127	0.014	0.43	0.00
37	555	9.25	1.9	0.157	0.237	0.142	0.016	0.48	0.00
38	570	9.50	2.0	0.166	0.234	0.149	0.017	0.51	0.00
39	585	9.75	2.1	0.174	0.231	0.156	0.017	0.53	0.00
40	600	10.00	2.2	0.182	0.227	0.164	0.018	0.56	0.00
41	615	10.25	1.5	0.124	0.224	0.112	0.012	0.38	0.00
42	630	10.50	1.5	0.124	0.221	0.112	0.012	0.38	0.00
43	645	10.75	2.0	0.166	0.218	0.149	0.017	0.51	0.00
44	660	11.00	2.0	0.166	0.214	0.149	0.017	0.51	0.00
45	675	11.25	1.9	0.157	0.211	0.142	0.016	0.48	0.00
46	690	11.50	1.9	0.157	0.208	0.142	0.016	0.48	0.00
47	705	11.75	1.7	0.141	0.205	0.127	0.014	0.43	0.00
48	720	12.00	1.8	0.149	0.202	0.134	0.015	0.46	0.00
49	735	12.25	2.5	0.207	0.199	0.186	0.008	0.25	0.00
50	750	12.50	2.6	0.215	0.196	0.194	0.019	0.59	0.00
51	765	12.75	2.8	0.232	0.193	0.209	0.039	1.19	480.19
52	780	13.00	2.9	0.240	0.190	0.216	0.050	1.54	789.55
53	795	13.25	3.4	0.282	0.187	0.253	0.094	2.90	2013.62
54	810	13.50	3.4	0.282	0.184	0.253	0.097	2.98	2092.06
55	825	13.75	2.3	0.190	0.182	0.171	0.009	0.27	0.00
56	840	14.00	2.3	0.190	0.179	0.171	0.012	0.36	0.00
57	855	14.25	2.7	0.224	0.176	0.201	0.047	1.46	718.82
58	870	14.50	2.6	0.215	0.173	0.194	0.042	1.29	564.24
59	885	14.75	2.6	0.215	0.171	0.194	0.045	1.37	637.53
60	900	15.00	2.5	0.207	0.168	0.186	0.039	1.19	480.83
61	915	15.25	2.4	0.199	0.166	0.179	0.033	1.02	323.04

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 10 YEAR - 24 HOUR STORM EVENT	PROJECT: COACHELLA AIRPORT BUSINESS PARK CONCENTRATION POINT: 1 BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.720	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2142
LAG TIME - MINUTES	2.58	MINIMUM LOSS RATE (for var. loss) - in/hr	0.107
UNIT TIME-PERCENT OF LAG	581.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.07	C	0.00198
		PERCOLATION RATE (cfs)	0.66

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
62	930	15.50	2.3	0.190	0.163	0.171	0.027	0.84	164.16
63	945	15.75	1.9	0.157	0.161	0.142	0.016	0.48	0.00
64	960	16.00	1.9	0.157	0.158	0.142	0.016	0.48	0.00
65	975	16.25	0.4	0.033	0.156	0.030	0.003	0.10	0.00
66	990	16.50	0.4	0.033	0.153	0.030	0.003	0.10	0.00
67	1005	16.75	0.3	0.025	0.151	0.022	0.002	0.08	0.00
68	1020	17.00	0.3	0.025	0.149	0.022	0.002	0.08	0.00
69	1035	17.25	0.5	0.041	0.146	0.037	0.004	0.13	0.00
70	1050	17.50	0.5	0.041	0.144	0.037	0.004	0.13	0.00
71	1065	17.75	0.5	0.041	0.142	0.037	0.004	0.13	0.00
72	1080	18.00	0.4	0.033	0.140	0.030	0.003	0.10	0.00
73	1095	18.25	0.4	0.033	0.138	0.030	0.003	0.10	0.00
74	1110	18.50	0.4	0.033	0.136	0.030	0.003	0.10	0.00
75	1125	18.75	0.3	0.025	0.134	0.022	0.002	0.08	0.00
76	1140	19.00	0.2	0.017	0.132	0.015	0.002	0.05	0.00
77	1155	19.25	0.3	0.025	0.130	0.022	0.002	0.08	0.00
78	1170	19.50	0.4	0.033	0.128	0.030	0.003	0.10	0.00
79	1185	19.75	0.3	0.025	0.127	0.022	0.002	0.08	0.00
80	1200	20.00	0.2	0.017	0.125	0.015	0.002	0.05	0.00
81	1215	20.25	0.3	0.025	0.123	0.022	0.002	0.08	0.00
82	1230	20.50	0.3	0.025	0.122	0.022	0.002	0.08	0.00
83	1245	20.75	0.3	0.025	0.120	0.022	0.002	0.08	0.00
84	1260	21.00	0.2	0.017	0.119	0.015	0.002	0.05	0.00
85	1275	21.25	0.3	0.025	0.117	0.022	0.002	0.08	0.00
86	1290	21.50	0.2	0.017	0.116	0.015	0.002	0.05	0.00
87	1305	21.75	0.3	0.025	0.115	0.022	0.002	0.08	0.00
88	1320	22.00	0.2	0.017	0.113	0.015	0.002	0.05	0.00
89	1335	22.25	0.3	0.025	0.112	0.022	0.002	0.08	0.00
90	1350	22.50	0.2	0.017	0.111	0.015	0.002	0.05	0.00
91	1365	22.75	0.2	0.017	0.110	0.015	0.002	0.05	0.00
92	1380	23.00	0.2	0.017	0.109	0.015	0.002	0.05	0.00
93	1395	23.25	0.2	0.017	0.109	0.015	0.002	0.05	0.00
94	1410	23.50	0.2	0.017	0.108	0.015	0.002	0.05	0.00
95	1425	23.75	0.2	0.017	0.108	0.015	0.002	0.05	0.00
96	1440	24.00	0.2	0.017	0.107	0.015	0.002	0.05	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.27
FLOOD VOLUME (acft)	0.69
FLOOD VOLUME (cuft)	30124.72
REQUIRED STORAGE (acft)	0.19
REQUIRED STORAGE (cuft)	8264.06
PEAK FLOW (cfs)	2.98

PROJECT: COACHELLA AIRPORT BUSINESS PARK
TKC JOB # C1443
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
379	0	0		42516	0	0	0.00
380	1	1	2511	45027	43772	43772	1.00
381	1	2	2582	47609	46318	90090	2.07
382	1	3	2654	50263	48936	139026	3.19

PERCOLATION CALCULATIONS
PERCOLATION RATE 0.67 in/hr 0.66 cfs

MAXWELL IV DRYWELLS
NUMBER USED 0
RATE/DRYWELL 0 cfs
TOTAL DISSIPATED 0 cfs

TOTAL PERCOLATION RATE 0.66 cfs

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TKC JOB # C1443

10 YEAR - 3 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.47	141	141	198	-	379.00	-	0.00
2	10	0.47	141	141	198	-	379.00	-	0.00
3	15	0.40	120	120	198	-	379.00	-	0.00
4	20	0.54	163	163	198	-	379.00	-	0.00
5	25	0.54	163	163	198	-	379.00	-	0.00
6	30	0.65	196	196	198	-	379.00	-	0.00
7	35	0.54	163	163	198	-	379.00	-	0.00
8	40	0.65	196	196	198	-	379.00	-	0.00
9	45	0.65	196	196	198	-	379.00	-	0.00
10	50	0.54	163	163	198	-	379.00	-	0.00
11	55	0.58	174	174	198	-	379.00	-	0.00
12	60	0.65	196	196	198	-	379.00	-	0.00
13	65	1.40	420	420	198	222	379.01	222	0.01
14	70	1.40	420	643	198	445	379.01	445	0.01
15	75	1.40	420	865	198	667	379.02	667	0.02
16	80	0.68	203	870	198	672	379.02	672	0.02
17	85	2.85	856	1,527	198	1,330	379.03	1,330	0.03
18	90	3.21	964	2,294	198	2,096	379.05	2,096	0.05
19	95	2.13	638	2,734	198	2,536	379.06	2,536	0.06
20	100	3.21	964	3,500	198	3,303	379.08	3,303	0.08
21	105	5.39	1,617	4,920	198	4,722	379.11	4,722	0.11
22	110	4.67	1,400	6,122	198	5,924	379.14	5,924	0.14
23	115	3.94	1,182	7,106	198	6,908	379.16	6,908	0.16
24	120	4.30	1,291	8,199	198	8,001	379.18	8,001	0.18
25	125	4.67	1,400	9,401	198	9,203	379.21	9,203	0.21
26	130	8.66	2,597	11,799	198	11,602	379.27	11,602	0.27
27	135	11.56	3,467	15,069	198	14,871	379.34	14,871	0.34
28	140	6.12	1,835	16,706	198	16,508	379.38	16,508	0.38
29	145	18.09	5,426	21,934	198	21,736	379.50	21,736	0.50
30	150	19.90	5,970	27,707	198	27,509	379.63	27,509	0.63
31	155	23.17	6,950	34,458	198	34,260	379.78	34,260	0.79
32	160	14.82	4,447	38,707	198	38,509	379.88	38,509	0.88
33	165	0.68	203	38,712	198	38,514	379.88	38,514	0.88
34	170	0.65	196	38,710	198	38,512	379.88	38,512	0.88
35	175	0.65	196	38,708	198	38,510	379.88	38,510	0.88
36	180	0.22	65	38,575	198	38,378	379.88	38,378	0.88

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TKC JOB # C1443

10 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.24	71	71	198	-	379.00	-	0.00
2	10	0.28	85	85	198	-	379.00	-	0.00
3	15	0.28	85	85	198	-	379.00	-	0.00
4	20	0.28	85	85	198	-	379.00	-	0.00
5	25	0.28	85	85	198	-	379.00	-	0.00
6	30	0.33	99	99	198	-	379.00	-	0.00
7	35	0.33	99	99	198	-	379.00	-	0.00
8	40	0.33	99	99	198	-	379.00	-	0.00
9	45	0.33	99	99	198	-	379.00	-	0.00
10	50	0.33	99	99	198	-	379.00	-	0.00
11	55	0.33	99	99	198	-	379.00	-	0.00
12	60	0.38	113	113	198	-	379.00	-	0.00
13	65	0.38	113	113	198	-	379.00	-	0.00
14	70	0.38	113	113	198	-	379.00	-	0.00
15	75	0.38	113	113	198	-	379.00	-	0.00
16	80	0.38	113	113	198	-	379.00	-	0.00
17	85	0.38	113	113	198	-	379.00	-	0.00
18	90	0.38	113	113	198	-	379.00	-	0.00
19	95	0.38	113	113	198	-	379.00	-	0.00
20	100	0.38	113	113	198	-	379.00	-	0.00
21	105	0.38	113	113	198	-	379.00	-	0.00
22	110	0.38	113	113	198	-	379.00	-	0.00
23	115	0.38	113	113	198	-	379.00	-	0.00
24	120	0.42	127	127	198	-	379.00	-	0.00
25	125	0.38	113	113	198	-	379.00	-	0.00
26	130	0.42	127	127	198	-	379.00	-	0.00
27	135	0.42	127	127	198	-	379.00	-	0.00
28	140	0.42	127	127	198	-	379.00	-	0.00
29	145	0.42	127	127	198	-	379.00	-	0.00
30	150	0.42	127	127	198	-	379.00	-	0.00
31	155	0.42	127	127	198	-	379.00	-	0.00
32	160	0.42	127	127	198	-	379.00	-	0.00
33	165	0.47	142	142	198	-	379.00	-	0.00
34	170	0.47	142	142	198	-	379.00	-	0.00
35	175	0.47	142	142	198	-	379.00	-	0.00
36	180	0.47	142	142	198	-	379.00	-	0.00
37	185	0.47	142	142	198	-	379.00	-	0.00
38	190	0.52	156	156	198	-	379.00	-	0.00
39	195	0.52	156	156	198	-	379.00	-	0.00
40	200	0.52	156	156	198	-	379.00	-	0.00
41	205	0.57	170	170	198	-	379.00	-	0.00
42	210	0.61	184	184	198	-	379.00	-	0.00
43	215	0.03	8	8	198	-	379.00	-	0.00
44	220	0.03	8	8	198	-	379.00	-	0.00
45	225	0.50	149	149	198	-	379.00	-	0.00
46	230	0.50	149	149	198	-	379.00	-	0.00
47	235	0.97	291	291	198	93	379.00	93	0.00
48	240	0.97	291	384	198	186	379.00	186	0.00
49	245	1.44	433	619	198	421	379.01	421	0.01
50	250	1.91	574	995	198	798	379.02	798	0.02
51	255	2.39	716	1,513	198	1,315	379.03	1,315	0.03
52	260	2.86	857	2,173	198	1,975	379.05	1,975	0.05
53	265	3.33	999	2,974	198	2,776	379.06	2,776	0.06
54	270	3.33	999	3,775	198	3,577	379.08	3,577	0.08
55	275	3.80	1,140	4,717	198	4,520	379.10	4,520	0.10

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TKC JOB # C1443

10 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
56	280	4.27	1,282	5,801	198	5,604	379.13	5,604	0.13
57	285	4.75	1,424	7,027	198	6,829	379.16	6,829	0.16
58	290	4.75	1,424	8,253	198	8,055	379.18	8,055	0.18
59	295	5.22	1,565	9,620	198	9,422	379.22	9,422	0.22
60	300	5.69	1,707	11,129	198	10,931	379.25	10,931	0.25
61	305	8.05	2,414	13,345	198	13,148	379.30	13,148	0.30
62	310	10.41	3,122	16,270	198	16,072	379.37	16,072	0.37
63	315	11.82	3,547	19,619	198	19,421	379.44	19,421	0.45
64	320	13.24	3,972	23,393	198	23,195	379.53	23,195	0.53
65	325	15.60	4,679	27,874	198	27,676	379.63	27,676	0.64
66	330	19.84	5,953	33,630	198	33,432	379.76	33,432	0.77
67	335	2.39	716	34,148	198	33,950	379.78	33,950	0.78
68	340	0.42	127	34,077	198	33,879	379.77	33,879	0.78
69	345	0.28	85	33,964	198	33,766	379.77	33,766	0.78
70	350	0.24	71	33,837	198	33,639	379.77	33,639	0.77
71	355	0.14	42	33,682	198	33,484	379.76	33,484	0.77
72	360	0.09	28	33,512	198	33,315	379.76	33,315	0.76

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TKC JOB # C1443

10 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	15	0.05	46	46	593	-	379.00	-	0.00
2	30	0.08	69	69	593	-	379.00	-	0.00
3	45	0.08	69	69	593	-	379.00	-	0.00
4	60	0.10	92	92	593	-	379.00	-	0.00
5	75	0.08	69	69	593	-	379.00	-	0.00
6	90	0.08	69	69	593	-	379.00	-	0.00
7	105	0.08	69	69	593	-	379.00	-	0.00
8	120	0.10	92	92	593	-	379.00	-	0.00
9	135	0.10	92	92	593	-	379.00	-	0.00
10	150	0.10	92	92	593	-	379.00	-	0.00
11	165	0.13	114	114	593	-	379.00	-	0.00
12	180	0.13	114	114	593	-	379.00	-	0.00
13	195	0.13	114	114	593	-	379.00	-	0.00
14	210	0.13	114	114	593	-	379.00	-	0.00
15	225	0.13	114	114	593	-	379.00	-	0.00
16	240	0.15	137	137	593	-	379.00	-	0.00
17	255	0.15	137	137	593	-	379.00	-	0.00
18	270	0.18	160	160	593	-	379.00	-	0.00
19	285	0.18	160	160	593	-	379.00	-	0.00
20	300	0.20	183	183	593	-	379.00	-	0.00
21	315	0.15	137	137	593	-	379.00	-	0.00
22	330	0.18	160	160	593	-	379.00	-	0.00
23	345	0.20	183	183	593	-	379.00	-	0.00
24	360	0.20	183	183	593	-	379.00	-	0.00
25	375	0.23	206	206	593	-	379.00	-	0.00
26	390	0.23	206	206	593	-	379.00	-	0.00
27	405	0.25	229	229	593	-	379.00	-	0.00
28	420	0.25	229	229	593	-	379.00	-	0.00
29	435	0.25	229	229	593	-	379.00	-	0.00
30	450	0.28	252	252	593	-	379.00	-	0.00
31	465	0.31	275	275	593	-	379.00	-	0.00
32	480	0.33	298	298	593	-	379.00	-	0.00
33	495	0.38	343	343	593	-	379.00	-	0.00
34	510	0.38	343	343	593	-	379.00	-	0.00
35	525	0.41	366	366	593	-	379.00	-	0.00
36	540	0.43	389	389	593	-	379.00	-	0.00
37	555	0.48	435	435	593	-	379.00	-	0.00
38	570	0.51	458	458	593	-	379.00	-	0.00
39	585	0.53	481	481	593	-	379.00	-	0.00
40	600	0.56	504	504	593	-	379.00	-	0.00
41	615	0.38	343	343	593	-	379.00	-	0.00
42	630	0.38	343	343	593	-	379.00	-	0.00
43	645	0.51	458	458	593	-	379.00	-	0.00
44	660	0.51	458	458	593	-	379.00	-	0.00
45	675	0.48	435	435	593	-	379.00	-	0.00
46	690	0.48	435	435	593	-	379.00	-	0.00
47	705	0.43	389	389	593	-	379.00	-	0.00
48	720	0.46	412	412	593	-	379.00	-	0.00
49	735	0.25	223	223	593	-	379.00	-	0.00
50	750	0.59	534	534	593	-	379.00	-	0.00
51	765	1.19	1,074	1,074	593	480	379.01	480	0.01
52	780	1.54	1,383	1,863	593	1,270	379.03	1,270	0.03
53	795	2.90	2,607	3,877	593	3,283	379.08	3,283	0.08
54	810	2.98	2,686	5,969	593	5,375	379.12	5,375	0.12
55	825	0.27	245	5,620	593	5,027	379.11	5,027	0.12
56	840	0.36	321	5,348	593	4,754	379.11	4,754	0.11
57	855	1.46	1,312	6,067	593	5,473	379.13	5,473	0.13
58	870	1.29	1,158	6,631	593	6,038	379.14	6,038	0.14

1

TKC JOB # C1443

10 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
59	885	1.37	1,231	7,269	593	6,675	379.15	6,675	0.15
60	900	1.19	1,074	7,749	593	7,156	379.16	7,156	0.16
61	915	1.02	916	8,072	593	7,479	379.17	7,479	0.17
62	930	0.84	758	8,237	593	7,643	379.17	7,643	0.18
63	945	0.48	435	8,078	593	7,485	379.17	7,485	0.17
64	960	0.48	435	7,920	593	7,326	379.17	7,326	0.17
65	975	0.10	92	7,418	593	6,824	379.16	6,824	0.16
66	990	0.10	92	6,916	593	6,322	379.14	6,322	0.15
67	1005	0.08	69	6,391	593	5,798	379.13	5,798	0.13
68	1020	0.08	69	5,866	593	5,273	379.12	5,273	0.12
69	1035	0.13	114	5,387	593	4,794	379.11	4,794	0.11
70	1050	0.13	114	4,908	593	4,315	379.10	4,315	0.10
71	1065	0.13	114	4,429	593	3,836	379.09	3,836	0.09
72	1080	0.10	92	3,927	593	3,334	379.08	3,334	0.08
73	1095	0.10	92	3,426	593	2,832	379.06	2,832	0.07
74	1110	0.10	92	2,924	593	2,330	379.05	2,330	0.05
75	1125	0.08	69	2,399	593	1,805	379.04	1,805	0.04
76	1140	0.05	46	1,851	593	1,258	379.03	1,258	0.03
77	1155	0.08	69	1,326	593	733	379.02	733	0.02
78	1170	0.10	92	825	593	231	379.01	231	0.01
79	1185	0.08	69	300	593	-	379.00	-	0.00
80	1200	0.05	46	46	593	-	379.00	-	0.00
81	1215	0.08	69	69	593	-	379.00	-	0.00
82	1230	0.08	69	69	593	-	379.00	-	0.00
83	1245	0.08	69	69	593	-	379.00	-	0.00
84	1260	0.05	46	46	593	-	379.00	-	0.00
85	1275	0.08	69	69	593	-	379.00	-	0.00
86	1290	0.05	46	46	593	-	379.00	-	0.00
87	1305	0.08	69	69	593	-	379.00	-	0.00
88	1320	0.05	46	46	593	-	379.00	-	0.00
89	1335	0.08	69	69	593	-	379.00	-	0.00
90	1350	0.05	46	46	593	-	379.00	-	0.00
91	1365	0.05	46	46	593	-	379.00	-	0.00
92	1380	0.05	46	46	593	-	379.00	-	0.00
93	1395	0.05	46	46	593	-	379.00	-	0.00
94	1410	0.05	46	46	593	-	379.00	-	0.00
95	1425	0.05	46	46	593	-	379.00	-	0.00
96	1440	0.05	46	46	593	-	379.00	-	0.00

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES BAZUA, PE		
5				
6	PROJECT NAME	COACHELLA BUSINESS PARK - INTERIM BASIN		
7	TAG Project No.	C1443		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	SUBAREA B - 10 YEAR STORM EVENT		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	8.18		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING			
23	RETENTION BASIN	1		
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	1000		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	285		
30				
31	ELEVATION OF HEADWATER	387		
32	ELEVATION OF CONCENTRATION POINT	382		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.984		
40	6-HOUR	1.28		
41	24-HOUR	2.07		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44		382	42380	
45		383	44806	
46		384	47288	
47		385	49827	
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0.67		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: COACHELLA BUSINESS PARK - INTERIM BASIN
TKC JOB # C1443
BY MES BAZUA, PE DATE 6/10/2020

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	SUBAREA B - 10 YEAR STORM EVENT
[3] AREA - ACRES	9.180
[4] L-FEET	1000
[5] L-MILES	0.189
[6] La-FEET	285.00
[7] La-MILES	0.054
[8] ELEVATION OF HEADWATER	387
[9] ELEVATION OF CONCENTRATION POINT	382
[10] H-FEET	5
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.002
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.05
[16] LAG TIME-MINUTES	2.7
[17] 100% OF LAG-MINUTES	2.7
[18] 200% OF LAG-MINUTES	5.4
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.66

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 100
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
0.98	9.180	1.00	0.98	1.28	9.180	1.00	1.28	2.07	9.180	1.00	2.07
		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	0.00			0.00	0.00			0.00	0.00
SUM [5]	9.18	SUM [7]	0.98	SUM [9]	9.18	SUM [11]	1.28	SUM [13]	9.18	SUM [15]	2.07
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.98				1.28				2.07

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.44	0.44	0.33
FLOOD VOLUME	(cu-ft)	14,675	14,503	10,856
	(acre-ft)	0.34	0.33	0.25
REQUIRED STORAGE	(cu-ft)	9,953	8,496	677
	(acre-ft)	0.23	0.20	0.02
PEAK FLOW	(cfs)	7.10	6.11	1.05
MAXIMUM WSEL	(ft)	382.23	382.19	382.02

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT COACHELLA BUSINESS PARK - INTERIM BASIN
CONCENTRATION POINT: 1
BY JAMES BAZUA, PE DATE 6/10/2020

ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
B	COMMERCIAL	56	0.70	90%	0.13	8.18	0.891	0.1185
B	PAVING/HARDSCAPE	56	0.70	100%	0.07	0.00	0.000	0.0000
B	SF - 1 ACRE	56	0.70	20%	0.57	0.00	0.000	0.0000
B	SF - 1/2 ACRE	56	0.70	40%	0.45	0.00	0.000	0.0000
B	SF - 1/4 ACRE	56	0.70	50%	0.39	0.00	0.000	0.0000
B	MF - COND0MINIUMS	56	0.70	65%	0.29	0.00	0.000	0.0000
B	MF - APARTMENTS	56	0.70	80%	0.20	0.00	0.000	0.0000
B	MOBILE HOME PARKS	56	0.70	75%	0.23	0.00	0.000	0.0000
B	LANDSCAPING	56	0.70	0%	0.70	0.00	0.000	0.0000
B	RETENTION BASINS	32	0.70	0%	0.70	1.00	0.109	0.0763
B	GOLF COURSE	56	0.70	0%	0.70	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.20	90%	0.04	0.00	0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					SUM	9.18	SUM	0.1948

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.097382353
C= 0.00180

Ft=C(24-(T/60))^1.55 = 0.00180 (24-(T/60))^1.55 + 0.10 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period, T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 3 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BASIN
CONCENTRATION POINT: 1

BY: \MES BAZUA, F DATE 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.18
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	2.71
UNIT TIME-PERCENT OF LAG	184.5
TOTAL ADJUSTED STORM RAIN-INCHES	0.98
CONSTANT LOSS RATE-in/hr	0.19
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.66 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.154	0.19	0.14	0.02	0.14	0.00
2	10	0.17	1.3	0.154	0.19	0.14	0.02	0.14	0.00
3	15	0.25	1.1	0.130	0.19	0.12	0.01	0.12	0.00
4	20	0.33	1.5	0.177	0.19	0.16	0.02	0.16	0.00
5	25	0.42	1.5	0.177	0.19	0.16	0.02	0.16	0.00
6	30	0.50	1.8	0.213	0.19	0.19	0.02	0.16	0.00
7	35	0.58	1.5	0.177	0.19	0.16	0.02	0.16	0.00
8	40	0.67	1.8	0.213	0.19	0.19	0.02	0.16	0.00
9	45	0.75	1.8	0.213	0.19	0.19	0.02	0.16	0.00
10	50	0.83	1.5	0.177	0.19	0.16	0.02	0.16	0.00
11	55	0.92	1.6	0.189	0.19	0.17	0.02	0.17	0.00
12	60	1.00	1.8	0.213	0.19	0.19	0.02	0.16	0.00
13	65	1.08	2.2	0.260	0.19	0.23	0.07	0.60	0.00
14	70	1.17	2.2	0.260	0.19	0.23	0.07	0.60	0.00
15	75	1.25	2.2	0.260	0.19	0.23	0.07	0.60	0.00
16	80	1.33	2.0	0.236	0.19	0.21	0.04	0.38	0.00
17	85	1.42	2.6	0.307	0.19	0.28	0.11	1.03	111.93
18	90	1.50	2.7	0.319	0.19	0.29	0.12	1.14	144.45
19	95	1.58	2.4	0.283	0.19	0.26	0.09	0.81	46.89
20	100	1.67	2.7	0.319	0.19	0.29	0.12	1.14	144.45
21	105	1.75	3.3	0.390	0.19	0.35	0.19	1.79	339.57
22	110	1.83	3.1	0.366	0.19	0.33	0.17	1.57	274.53
23	115	1.92	2.9	0.342	0.19	0.31	0.15	1.36	209.49
24	120	2.00	3.0	0.354	0.19	0.32	0.16	1.46	242.01
25	125	2.08	3.1	0.366	0.19	0.33	0.17	1.57	274.53
26	130	2.17	4.2	0.496	0.19	0.45	0.30	2.76	632.24
27	135	2.25	5.0	0.590	0.19	0.53	0.40	3.63	892.39
28	140	2.33	3.5	0.413	0.19	0.37	0.22	2.01	404.61
29	145	2.42	6.8	0.803	0.19	0.72	0.61	5.58	1477.74
30	150	2.50	7.3	0.862	0.19	0.78	0.67	6.13	1640.34
31	155	2.58	8.2	0.968	0.19	0.87	0.77	7.10	1933.01
32	160	2.67	5.9	0.697	0.19	0.63	0.50	4.61	1185.07
33	165	2.75	2.0	0.236	0.19	0.21	0.04	0.38	0.00
34	170	2.83	1.8	0.213	0.19	0.19	0.02	0.16	0.00
35	175	2.92	1.8	0.213	0.19	0.19	0.02	0.16	0.00
36	180	3.00	0.6	0.071	0.19	0.06	0.01	0.07	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.44
FLOOD VOLUME (acft)	0.34
FLOOD VOLUME (cuft)	14675.45
REQUIRED STORAGE (acft)	0.23
REQUIRED STORAGE (cuft)	9953.26
PEAK FLOW RATE (cfs)	7.10

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 6 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BA
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.18
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	2.71
UNIT TIME-PERCENT OF LAG	184.5
TOTAL ADJUSTED STORM RAIN-INCHES	1.28
CONSTANT LOSS RATE-in/hr	0.195
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.66 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	0.5	0.077	0.19	0.07	0.01	0.07	0.00
2	10	0.17	0.6	0.092	0.19	0.08	0.01	0.08	0.00
3	15	0.25	0.6	0.092	0.19	0.08	0.01	0.08	0.00
4	20	0.33	0.6	0.092	0.19	0.08	0.01	0.08	0.00
5	25	0.42	0.6	0.092	0.19	0.08	0.01	0.08	0.00
6	30	0.50	0.7	0.108	0.19	0.10	0.01	0.10	0.00
7	35	0.58	0.7	0.108	0.19	0.10	0.01	0.10	0.00
8	40	0.67	0.7	0.108	0.19	0.10	0.01	0.10	0.00
9	45	0.75	0.7	0.108	0.19	0.10	0.01	0.10	0.00
10	50	0.83	0.7	0.108	0.19	0.10	0.01	0.10	0.00
11	55	0.92	0.7	0.108	0.19	0.10	0.01	0.10	0.00
12	60	1.00	0.8	0.123	0.19	0.11	0.01	0.11	0.00
13	65	1.08	0.8	0.123	0.19	0.11	0.01	0.11	0.00
14	70	1.17	0.8	0.123	0.19	0.11	0.01	0.11	0.00
15	75	1.25	0.8	0.123	0.19	0.11	0.01	0.11	0.00
16	80	1.33	0.8	0.123	0.19	0.11	0.01	0.11	0.00
17	85	1.42	0.8	0.123	0.19	0.11	0.01	0.11	0.00
18	90	1.50	0.8	0.123	0.19	0.11	0.01	0.11	0.00
19	95	1.58	0.8	0.123	0.19	0.11	0.01	0.11	0.00
20	100	1.67	0.8	0.123	0.19	0.11	0.01	0.11	0.00
21	105	1.75	0.8	0.123	0.19	0.11	0.01	0.11	0.00
22	110	1.83	0.8	0.123	0.19	0.11	0.01	0.11	0.00
23	115	1.92	0.8	0.123	0.19	0.11	0.01	0.11	0.00
24	120	2.00	0.9	0.138	0.19	0.12	0.01	0.13	0.00
25	125	2.08	0.8	0.123	0.19	0.11	0.01	0.11	0.00
26	130	2.17	0.9	0.138	0.19	0.12	0.01	0.13	0.00
27	135	2.25	0.9	0.138	0.19	0.12	0.01	0.13	0.00
28	140	2.33	0.9	0.138	0.19	0.12	0.01	0.13	0.00
29	145	2.42	0.9	0.138	0.19	0.12	0.01	0.13	0.00
30	150	2.50	0.9	0.138	0.19	0.12	0.01	0.13	0.00
31	155	2.58	0.9	0.138	0.19	0.12	0.01	0.13	0.00
32	160	2.67	0.9	0.138	0.19	0.12	0.01	0.13	0.00
33	165	2.75	1.0	0.154	0.19	0.14	0.02	0.14	0.00
34	170	2.83	1.0	0.154	0.19	0.14	0.02	0.14	0.00
35	175	2.92	1.0	0.154	0.19	0.14	0.02	0.14	0.00
36	180	3.00	1.0	0.154	0.19	0.14	0.02	0.14	0.00
37	185	3.08	1.0	0.154	0.19	0.14	0.02	0.14	0.00
38	190	3.17	1.1	0.169	0.19	0.15	0.02	0.16	0.00
39	195	3.25	1.1	0.169	0.19	0.15	0.02	0.16	0.00
40	200	3.33	1.1	0.169	0.19	0.15	0.02	0.16	0.00
41	205	3.42	1.2	0.184	0.19	0.17	0.02	0.17	0.00
42	210	3.50	1.3	0.200	0.19	0.18	0.00	0.05	0.00
43	215	3.58	1.4	0.215	0.19	0.19	0.02	0.19	0.00
44	220	3.67	1.4	0.215	0.19	0.19	0.02	0.19	0.00
45	225	3.75	1.5	0.230	0.19	0.21	0.04	0.33	0.00
46	230	3.83	1.5	0.230	0.19	0.21	0.04	0.33	0.00
47	235	3.92	1.6	0.246	0.19	0.22	0.05	0.47	0.00
48	240	4.00	1.6	0.246	0.19	0.22	0.05	0.47	0.00
49	245	4.08	1.7	0.261	0.19	0.24	0.07	0.61	0.00
50	250	4.17	1.8	0.276	0.19	0.25	0.08	0.75	27.86
51	255	4.25	1.9	0.292	0.19	0.26	0.10	0.89	70.16
52	260	4.33	2.0	0.307	0.19	0.28	0.11	1.03	112.46
53	265	4.42	2.1	0.323	0.19	0.29	0.13	1.17	154.76
54	270	4.50	2.1	0.323	0.19	0.29	0.13	1.17	154.76
55	275	4.58	2.2	0.338	0.19	0.30	0.14	1.31	197.06
56	280	4.67	2.3	0.353	0.19	0.32	0.16	1.46	239.37

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 6 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BA
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.18
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	2.71
UNIT TIME-PERCENT OF LAG	184.5
TOTAL ADJUSTED STORM RAIN-INCHES	1.28
CONSTANT LOSS RATE-in/hr	0.195
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.66 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
57	285	4.75	2.4	0.369	0.19	0.33	0.17	1.60	281.67
58	290	4.83	2.4	0.369	0.19	0.33	0.17	1.60	281.67
59	295	4.92	2.5	0.384	0.19	0.35	0.19	1.74	323.97
60	300	5.00	2.6	0.399	0.19	0.36	0.20	1.88	366.27
61	305	5.08	3.1	0.476	0.19	0.43	0.28	2.58	577.78
62	310	5.17	3.6	0.553	0.19	0.50	0.36	3.29	789.29
63	315	5.25	3.9	0.599	0.19	0.54	0.40	3.71	916.19
64	320	5.33	4.2	0.645	0.19	0.58	0.45	4.13	1043.09
65	325	5.42	4.7	0.722	0.19	0.65	0.53	4.84	1254.60
66	330	5.50	5.6	0.860	0.19	0.77	0.67	6.11	1635.31
67	335	5.58	1.9	0.292	0.19	0.26	0.10	0.89	70.16
68	340	5.67	0.9	0.138	0.19	0.12	0.01	0.13	0.00
69	345	5.75	0.6	0.092	0.19	0.08	0.01	0.08	0.00
70	350	5.83	0.5	0.077	0.19	0.07	0.01	0.07	0.00
71	355	5.92	0.3	0.046	0.19	0.04	0.00	0.04	0.00
72	360	6.00	0.2	0.031	0.19	0.03	0.00	0.03	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.44
FLOOD VOLUME (acft)	0.33
FLOOD VOLUME (cuft)	14503.26
REQUIRED STORAGE (acft)	0.20
REQUIRED STORAGE (cuft)	8496.44
PEAK FLOW RATE (cfs)	6.11

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 24 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BA
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.180	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1948
LAG TIME - MINUTES	2.71	MINIMUM LOSS RATE (for var. loss) - in/hr	0.097
UNIT TIME-PERCENT OF LAG	553.6	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.07	C	0.00180
		PERCOLATION RATE (cfs)	0.66

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
1	15	0.25	0.2	0.017	0.344	0.015	0.002	0.02	0.00
2	30	0.50	0.3	0.025	0.340	0.022	0.002	0.02	0.00
3	45	0.75	0.3	0.025	0.336	0.022	0.002	0.02	0.00
4	60	1.00	0.4	0.033	0.332	0.030	0.003	0.03	0.00
5	75	1.25	0.3	0.025	0.328	0.022	0.002	0.02	0.00
6	90	1.50	0.3	0.025	0.324	0.022	0.002	0.02	0.00
7	105	1.75	0.3	0.025	0.320	0.022	0.002	0.02	0.00
8	120	2.00	0.4	0.033	0.316	0.030	0.003	0.03	0.00
9	135	2.25	0.4	0.033	0.313	0.030	0.003	0.03	0.00
10	150	2.50	0.4	0.033	0.309	0.030	0.003	0.03	0.00
11	165	2.75	0.5	0.041	0.305	0.037	0.004	0.04	0.00
12	180	3.00	0.5	0.041	0.301	0.037	0.004	0.04	0.00
13	195	3.25	0.5	0.041	0.298	0.037	0.004	0.04	0.00
14	210	3.50	0.5	0.041	0.294	0.037	0.004	0.04	0.00
15	225	3.75	0.5	0.041	0.290	0.037	0.004	0.04	0.00
16	240	4.00	0.6	0.050	0.287	0.045	0.005	0.05	0.00
17	255	4.25	0.6	0.050	0.283	0.045	0.005	0.05	0.00
18	270	4.50	0.7	0.058	0.279	0.052	0.006	0.05	0.00
19	285	4.75	0.7	0.058	0.276	0.052	0.006	0.05	0.00
20	300	5.00	0.8	0.066	0.272	0.060	0.007	0.06	0.00
21	315	5.25	0.6	0.050	0.269	0.045	0.005	0.05	0.00
22	330	5.50	0.7	0.058	0.265	0.052	0.006	0.05	0.00
23	345	5.75	0.8	0.066	0.262	0.060	0.007	0.06	0.00
24	360	6.00	0.8	0.066	0.258	0.060	0.007	0.06	0.00
25	375	6.25	0.9	0.075	0.255	0.067	0.007	0.07	0.00
26	390	6.50	0.9	0.075	0.251	0.067	0.007	0.07	0.00
27	405	6.75	1.0	0.083	0.248	0.075	0.008	0.08	0.00
28	420	7.00	1.0	0.083	0.245	0.075	0.008	0.08	0.00
29	435	7.25	1.0	0.083	0.241	0.075	0.008	0.08	0.00
30	450	7.50	1.1	0.091	0.238	0.082	0.009	0.08	0.00
31	465	7.75	1.2	0.099	0.235	0.089	0.010	0.09	0.00
32	480	8.00	1.3	0.108	0.232	0.097	0.011	0.10	0.00
33	495	8.25	1.5	0.124	0.228	0.112	0.012	0.11	0.00
34	510	8.50	1.5	0.124	0.225	0.112	0.012	0.11	0.00
35	525	8.75	1.6	0.132	0.222	0.119	0.013	0.12	0.00
36	540	9.00	1.7	0.141	0.219	0.127	0.014	0.13	0.00
37	555	9.25	1.9	0.157	0.216	0.142	0.016	0.14	0.00
38	570	9.50	2.0	0.166	0.213	0.149	0.017	0.15	0.00
39	585	9.75	2.1	0.174	0.210	0.156	0.017	0.16	0.00
40	600	10.00	2.2	0.182	0.207	0.164	0.018	0.17	0.00
41	615	10.25	1.5	0.124	0.204	0.112	0.012	0.11	0.00
42	630	10.50	1.5	0.124	0.201	0.112	0.012	0.11	0.00
43	645	10.75	2.0	0.166	0.198	0.149	0.017	0.15	0.00
44	660	11.00	2.0	0.166	0.195	0.149	0.017	0.15	0.00
45	675	11.25	1.9	0.157	0.192	0.142	0.016	0.14	0.00
46	690	11.50	1.9	0.157	0.189	0.142	0.016	0.14	0.00
47	705	11.75	1.7	0.141	0.186	0.127	0.014	0.13	0.00
48	720	12.00	1.8	0.149	0.184	0.134	0.015	0.14	0.00
49	735	12.25	2.5	0.207	0.181	0.186	0.026	0.24	0.00
50	750	12.50	2.6	0.215	0.178	0.194	0.037	0.34	0.00
51	765	12.75	2.8	0.232	0.176	0.209	0.056	0.52	0.00
52	780	13.00	2.9	0.240	0.173	0.216	0.067	0.62	0.00
53	795	13.25	3.4	0.282	0.170	0.253	0.111	1.02	327.73
54	810	13.50	3.4	0.282	0.168	0.253	0.114	1.05	349.05
55	825	13.75	2.3	0.190	0.165	0.171	0.025	0.23	0.00
56	840	14.00	2.3	0.190	0.163	0.171	0.028	0.26	0.00
57	855	14.25	2.7	0.224	0.160	0.201	0.063	0.58	0.00
58	870	14.50	2.6	0.215	0.158	0.194	0.058	0.53	0.00
59	885	14.75	2.6	0.215	0.155	0.194	0.060	0.55	0.00
60	900	15.00	2.5	0.207	0.153	0.186	0.054	0.50	0.00
61	915	15.25	2.4	0.199	0.151	0.179	0.048	0.44	0.00

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 24 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BA
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.180	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1948
LAG TIME - MINUTES	2.71	MINIMUM LOSS RATE (for var. loss) - in/hr	0.097
UNIT TIME-PERCENT OF LAG	553.6	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.07	C	0.00180
		PERCOLATION RATE (cfs)	0.66

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
62	930	15.50	2.3	0.190	0.148	0.171	0.042	0.39	0.00
63	945	15.75	1.9	0.157	0.146	0.142	0.011	0.10	0.00
64	960	16.00	1.9	0.157	0.144	0.142	0.014	0.12	0.00
65	975	16.25	0.4	0.033	0.142	0.030	0.003	0.03	0.00
66	990	16.50	0.4	0.033	0.139	0.030	0.003	0.03	0.00
67	1005	16.75	0.3	0.025	0.137	0.022	0.002	0.02	0.00
68	1020	17.00	0.3	0.025	0.135	0.022	0.002	0.02	0.00
69	1035	17.25	0.5	0.041	0.133	0.037	0.004	0.04	0.00
70	1050	17.50	0.5	0.041	0.131	0.037	0.004	0.04	0.00
71	1065	17.75	0.5	0.041	0.129	0.037	0.004	0.04	0.00
72	1080	18.00	0.4	0.033	0.127	0.030	0.003	0.03	0.00
73	1095	18.25	0.4	0.033	0.125	0.030	0.003	0.03	0.00
74	1110	18.50	0.4	0.033	0.124	0.030	0.003	0.03	0.00
75	1125	18.75	0.3	0.025	0.122	0.022	0.002	0.02	0.00
76	1140	19.00	0.2	0.017	0.120	0.015	0.002	0.02	0.00
77	1155	19.25	0.3	0.025	0.118	0.022	0.002	0.02	0.00
78	1170	19.50	0.4	0.033	0.117	0.030	0.003	0.03	0.00
79	1185	19.75	0.3	0.025	0.115	0.022	0.002	0.02	0.00
80	1200	20.00	0.2	0.017	0.114	0.015	0.002	0.02	0.00
81	1215	20.25	0.3	0.025	0.112	0.022	0.002	0.02	0.00
82	1230	20.50	0.3	0.025	0.111	0.022	0.002	0.02	0.00
83	1245	20.75	0.3	0.025	0.109	0.022	0.002	0.02	0.00
84	1260	21.00	0.2	0.017	0.108	0.015	0.002	0.02	0.00
85	1275	21.25	0.3	0.025	0.107	0.022	0.002	0.02	0.00
86	1290	21.50	0.2	0.017	0.105	0.015	0.002	0.02	0.00
87	1305	21.75	0.3	0.025	0.104	0.022	0.002	0.02	0.00
88	1320	22.00	0.2	0.017	0.103	0.015	0.002	0.02	0.00
89	1335	22.25	0.3	0.025	0.102	0.022	0.002	0.02	0.00
90	1350	22.50	0.2	0.017	0.101	0.015	0.002	0.02	0.00
91	1365	22.75	0.2	0.017	0.100	0.015	0.002	0.02	0.00
92	1380	23.00	0.2	0.017	0.100	0.015	0.002	0.02	0.00
93	1395	23.25	0.2	0.017	0.099	0.015	0.002	0.02	0.00
94	1410	23.50	0.2	0.017	0.098	0.015	0.002	0.02	0.00
95	1425	23.75	0.2	0.017	0.098	0.015	0.002	0.02	0.00
96	1440	24.00	0.2	0.017	0.097	0.015	0.002	0.02	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.33
FLOOD VOLUME (acft)	0.25
FLOOD VOLUME (cuft)	10855.73
REQUIRED STORAGE (acft)	0.02
REQUIRED STORAGE (cuft)	676.79
PEAK FLOW (cfs)	1.05

SIN

SIN

PROJECT: COACHELLA BUSINESS PARK - INTERIM BASIN
TKC JOB # C1443
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
382	0	0		42380	0	0	0.00
383	1	1	2426	44806	43593	43593	1.00
384	1	2	2482	47288	46047	89640	2.06
385	1	3	2539	49827	48558	138198	3.17

PERCOLATION CALCULATIONS

PERCOLATION RATE	0.67 in/hr	0.66 cfs

MAXWELL IV DRYWELLS

NUMBER USED	0	
RATE/DRYWELL	0 cfs	
TOTAL DISSIPATED		0 cfs

TOTAL PERCOLATION RATE 0.66 cfs

1

TKC JOB # C1443

100 YEAR - 3 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.14	42	42	197	-	382.00	-	0.00
2	10	0.14	42	42	197	-	382.00	-	0.00
3	15	0.12	36	36	197	-	382.00	-	0.00
4	20	0.16	49	49	197	-	382.00	-	0.00
5	25	0.16	49	49	197	-	382.00	-	0.00
6	30	0.16	49	49	197	-	382.00	-	0.00
7	35	0.16	49	49	197	-	382.00	-	0.00
8	40	0.16	49	49	197	-	382.00	-	0.00
9	45	0.16	49	49	197	-	382.00	-	0.00
10	50	0.16	49	49	197	-	382.00	-	0.00
11	55	0.17	52	52	197	-	382.00	-	0.00
12	60	0.16	49	49	197	-	382.00	-	0.00
13	65	0.60	179	179	197	-	382.00	-	0.00
14	70	0.60	179	179	197	-	382.00	-	0.00
15	75	0.60	179	179	197	-	382.00	-	0.00
16	80	0.38	114	114	197	-	382.00	-	0.00
17	85	1.03	309	309	197	112	382.00	112	0.00
18	90	1.14	342	454	197	256	382.01	256	0.01
19	95	0.81	244	500	197	303	382.01	303	0.01
20	100	1.14	342	645	197	448	382.01	448	0.01
21	105	1.79	537	984	197	787	382.02	787	0.02
22	110	1.57	472	1,259	197	1,062	382.02	1,062	0.02
23	115	1.36	407	1,469	197	1,271	382.03	1,271	0.03
24	120	1.46	439	1,711	197	1,513	382.03	1,513	0.03
25	125	1.57	472	1,985	197	1,788	382.04	1,788	0.04
26	130	2.76	829	2,617	197	2,420	382.06	2,420	0.06
27	135	3.63	1,090	3,510	197	3,312	382.08	3,312	0.08
28	140	2.01	602	3,914	197	3,717	382.09	3,717	0.09
29	145	5.58	1,675	5,392	197	5,195	382.12	5,195	0.12
30	150	6.13	1,838	7,032	197	6,835	382.16	6,835	0.16
31	155	7.10	2,130	8,965	197	8,768	382.20	8,768	0.20
32	160	4.61	1,382	10,150	197	9,953	382.23	9,953	0.23
33	165	0.38	114	10,067	197	9,870	382.23	9,870	0.23
34	170	0.16	49	9,919	197	9,722	382.22	9,722	0.22
35	175	0.16	49	9,771	197	9,574	382.22	9,574	0.22
36	180	0.07	20	9,593	197	9,396	382.22	9,396	0.22

1

TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.07	21	21	197	-	382.00	-	0.00
2	10	0.08	25	25	197	-	382.00	-	0.00
3	15	0.08	25	25	197	-	382.00	-	0.00
4	20	0.08	25	25	197	-	382.00	-	0.00
5	25	0.08	25	25	197	-	382.00	-	0.00
6	30	0.10	30	30	197	-	382.00	-	0.00
7	35	0.10	30	30	197	-	382.00	-	0.00
8	40	0.10	30	30	197	-	382.00	-	0.00
9	45	0.10	30	30	197	-	382.00	-	0.00
10	50	0.10	30	30	197	-	382.00	-	0.00
11	55	0.10	30	30	197	-	382.00	-	0.00
12	60	0.11	34	34	197	-	382.00	-	0.00
13	65	0.11	34	34	197	-	382.00	-	0.00
14	70	0.11	34	34	197	-	382.00	-	0.00
15	75	0.11	34	34	197	-	382.00	-	0.00
16	80	0.11	34	34	197	-	382.00	-	0.00
17	85	0.11	34	34	197	-	382.00	-	0.00
18	90	0.11	34	34	197	-	382.00	-	0.00
19	95	0.11	34	34	197	-	382.00	-	0.00
20	100	0.11	34	34	197	-	382.00	-	0.00
21	105	0.11	34	34	197	-	382.00	-	0.00
22	110	0.11	34	34	197	-	382.00	-	0.00
23	115	0.11	34	34	197	-	382.00	-	0.00
24	120	0.13	38	38	197	-	382.00	-	0.00
25	125	0.11	34	34	197	-	382.00	-	0.00
26	130	0.13	38	38	197	-	382.00	-	0.00
27	135	0.13	38	38	197	-	382.00	-	0.00
28	140	0.13	38	38	197	-	382.00	-	0.00
29	145	0.13	38	38	197	-	382.00	-	0.00
30	150	0.13	38	38	197	-	382.00	-	0.00
31	155	0.13	38	38	197	-	382.00	-	0.00
32	160	0.13	38	38	197	-	382.00	-	0.00
33	165	0.14	42	42	197	-	382.00	-	0.00
34	170	0.14	42	42	197	-	382.00	-	0.00
35	175	0.14	42	42	197	-	382.00	-	0.00
36	180	0.14	42	42	197	-	382.00	-	0.00
37	185	0.14	42	42	197	-	382.00	-	0.00
38	190	0.16	47	47	197	-	382.00	-	0.00
39	195	0.16	47	47	197	-	382.00	-	0.00
40	200	0.16	47	47	197	-	382.00	-	0.00
41	205	0.17	51	51	197	-	382.00	-	0.00
42	210	0.05	14	14	197	-	382.00	-	0.00
43	215	0.19	56	56	197	-	382.00	-	0.00
44	220	0.19	56	56	197	-	382.00	-	0.00
45	225	0.33	98	98	197	-	382.00	-	0.00
46	230	0.33	98	98	197	-	382.00	-	0.00
47	235	0.47	140	140	197	-	382.00	-	0.00
48	240	0.47	140	140	197	-	382.00	-	0.00
49	245	0.61	183	183	197	-	382.00	-	0.00
50	250	0.75	225	225	197	28	382.00	28	0.00
51	255	0.89	267	295	197	98	382.00	98	0.00
52	260	1.03	310	408	197	210	382.00	210	0.00
53	265	1.17	352	562	197	365	382.01	365	0.01
54	270	1.17	352	717	197	520	382.01	520	0.01
55	275	1.31	394	914	197	717	382.02	717	0.02

1

TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
56	280	1.46	437	1,154	197	956	382.02	956	0.02
57	285	1.60	479	1,435	197	1,238	382.03	1,238	0.03
58	290	1.60	479	1,717	197	1,520	382.03	1,520	0.03
59	295	1.74	521	2,041	197	1,844	382.04	1,844	0.04
60	300	1.88	563	2,407	197	2,210	382.05	2,210	0.05
61	305	2.58	775	2,985	197	2,788	382.06	2,788	0.06
62	310	3.29	986	3,774	197	3,577	382.08	3,577	0.08
63	315	3.71	1,113	4,690	197	4,493	382.10	4,493	0.10
64	320	4.13	1,240	5,734	197	5,536	382.13	5,536	0.13
65	325	4.84	1,452	6,988	197	6,791	382.16	6,791	0.16
66	330	6.11	1,832	8,623	197	8,426	382.19	8,426	0.19
67	335	0.89	267	8,694	197	8,496	382.19	8,496	0.20
68	340	0.13	38	8,535	197	8,337	382.19	8,337	0.19
69	345	0.08	25	8,363	197	8,166	382.19	8,166	0.19
70	350	0.07	21	8,187	197	7,989	382.18	7,989	0.18
71	355	0.04	13	8,002	197	7,805	382.18	7,805	0.18
72	360	0.03	8	7,813	197	7,616	382.17	7,616	0.17

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TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	15	0.02	14	14	592	-	382.00	-	0.00
2	30	0.02	21	21	592	-	382.00	-	0.00
3	45	0.02	21	21	592	-	382.00	-	0.00
4	60	0.03	27	27	592	-	382.00	-	0.00
5	75	0.02	21	21	592	-	382.00	-	0.00
6	90	0.02	21	21	592	-	382.00	-	0.00
7	105	0.02	21	21	592	-	382.00	-	0.00
8	120	0.03	27	27	592	-	382.00	-	0.00
9	135	0.03	27	27	592	-	382.00	-	0.00
10	150	0.03	27	27	592	-	382.00	-	0.00
11	165	0.04	34	34	592	-	382.00	-	0.00
12	180	0.04	34	34	592	-	382.00	-	0.00
13	195	0.04	34	34	592	-	382.00	-	0.00
14	210	0.04	34	34	592	-	382.00	-	0.00
15	225	0.04	34	34	592	-	382.00	-	0.00
16	240	0.05	41	41	592	-	382.00	-	0.00
17	255	0.05	41	41	592	-	382.00	-	0.00
18	270	0.05	48	48	592	-	382.00	-	0.00
19	285	0.05	48	48	592	-	382.00	-	0.00
20	300	0.06	55	55	592	-	382.00	-	0.00
21	315	0.05	41	41	592	-	382.00	-	0.00
22	330	0.05	48	48	592	-	382.00	-	0.00
23	345	0.06	55	55	592	-	382.00	-	0.00
24	360	0.06	55	55	592	-	382.00	-	0.00
25	375	0.07	62	62	592	-	382.00	-	0.00
26	390	0.07	62	62	592	-	382.00	-	0.00
27	405	0.08	68	68	592	-	382.00	-	0.00
28	420	0.08	68	68	592	-	382.00	-	0.00
29	435	0.08	68	68	592	-	382.00	-	0.00
30	450	0.08	75	75	592	-	382.00	-	0.00
31	465	0.09	82	82	592	-	382.00	-	0.00
32	480	0.10	89	89	592	-	382.00	-	0.00
33	495	0.11	103	103	592	-	382.00	-	0.00
34	510	0.11	103	103	592	-	382.00	-	0.00
35	525	0.12	109	109	592	-	382.00	-	0.00
36	540	0.13	116	116	592	-	382.00	-	0.00
37	555	0.14	130	130	592	-	382.00	-	0.00
38	570	0.15	137	137	592	-	382.00	-	0.00
39	585	0.16	144	144	592	-	382.00	-	0.00
40	600	0.17	151	151	592	-	382.00	-	0.00
41	615	0.11	103	103	592	-	382.00	-	0.00
42	630	0.11	103	103	592	-	382.00	-	0.00
43	645	0.15	137	137	592	-	382.00	-	0.00
44	660	0.15	137	137	592	-	382.00	-	0.00
45	675	0.14	130	130	592	-	382.00	-	0.00
46	690	0.14	130	130	592	-	382.00	-	0.00
47	705	0.13	116	116	592	-	382.00	-	0.00
48	720	0.14	123	123	592	-	382.00	-	0.00
49	735	0.24	216	216	592	-	382.00	-	0.00
50	750	0.34	306	306	592	-	382.00	-	0.00
51	765	0.52	465	465	592	-	382.00	-	0.00
52	780	0.62	556	556	592	-	382.00	-	0.00
53	795	1.02	919	919	592	328	382.01	328	0.01
54	810	1.05	941	1,268	592	677	382.02	677	0.02
55	825	0.23	209	886	592	294	382.01	294	0.01
56	840	0.26	230	524	592	-	382.00	-	0.00
57	855	0.58	524	524	592	-	382.00	-	0.00
58	870	0.53	476	476	592	-	382.00	-	0.00

1

TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
59	885	0.55	496	496	592	-	382.00	-	0.00
60	900	0.50	447	447	592	-	382.00	-	0.00
61	915	0.44	398	398	592	-	382.00	-	0.00
62	930	0.39	349	349	592	-	382.00	-	0.00
63	945	0.10	94	94	592	-	382.00	-	0.00
64	960	0.12	112	112	592	-	382.00	-	0.00
65	975	0.03	27	27	592	-	382.00	-	0.00
66	990	0.03	27	27	592	-	382.00	-	0.00
67	1005	0.02	21	21	592	-	382.00	-	0.00
68	1020	0.02	21	21	592	-	382.00	-	0.00
69	1035	0.04	34	34	592	-	382.00	-	0.00
70	1050	0.04	34	34	592	-	382.00	-	0.00
71	1065	0.04	34	34	592	-	382.00	-	0.00
72	1080	0.03	27	27	592	-	382.00	-	0.00
73	1095	0.03	27	27	592	-	382.00	-	0.00
74	1110	0.03	27	27	592	-	382.00	-	0.00
75	1125	0.02	21	21	592	-	382.00	-	0.00
76	1140	0.02	14	14	592	-	382.00	-	0.00
77	1155	0.02	21	21	592	-	382.00	-	0.00
78	1170	0.03	27	27	592	-	382.00	-	0.00
79	1185	0.02	21	21	592	-	382.00	-	0.00
80	1200	0.02	14	14	592	-	382.00	-	0.00
81	1215	0.02	21	21	592	-	382.00	-	0.00
82	1230	0.02	21	21	592	-	382.00	-	0.00
83	1245	0.02	21	21	592	-	382.00	-	0.00
84	1260	0.02	14	14	592	-	382.00	-	0.00
85	1275	0.02	21	21	592	-	382.00	-	0.00
86	1290	0.02	14	14	592	-	382.00	-	0.00
87	1305	0.02	21	21	592	-	382.00	-	0.00
88	1320	0.02	14	14	592	-	382.00	-	0.00
89	1335	0.02	21	21	592	-	382.00	-	0.00
90	1350	0.02	14	14	592	-	382.00	-	0.00
91	1365	0.02	14	14	592	-	382.00	-	0.00
92	1380	0.02	14	14	592	-	382.00	-	0.00
93	1395	0.02	14	14	592	-	382.00	-	0.00
94	1410	0.02	14	14	592	-	382.00	-	0.00
95	1425	0.02	14	14	592	-	382.00	-	0.00
96	1440	0.02	14	14	592	-	382.00	-	0.00

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES BAZUA, PE		
5				
6	PROJECT NAME	COACHELLA AIRPORT BUSINESS PARK		
7	TAG Project No.	C1443		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	SUBAREA C - 10 YEAR EVENT		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	2.32		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING	0.1		
23	RETENTION BASIN	0.21		
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	400		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	30		
30				
31	ELEVATION OF HEADWATER	386		
32	ELEVATION OF CONCENTRATION POINT	384		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.984		
40	6-HOUR	1.28		
41	24-HOUR	2.07		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44		381	2664	
45		382	4561	
46		383	6529	
47		384	8568	
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0.67		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: COACHELLA AIRPORT BUSINESS PARK
TKC JOB # C1443
BY MES BAZUA, PE DATE 6/10/2020

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	SUBAREA C - 10 YEAR EVENT
[3] AREA - ACRES	2.630
[4] L-FEET	400
[5] L-MILES	0.076
[6] La-FEET	30.00
[7] La-MILES	0.006
[8] ELEVATION OF HEADWATER	386
[9] ELEVATION OF CONCENTRATION POINT	384
[10] H-FEET	2
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.8
[17] 100% OF LAG-MINUTES	0.8
[18] 200% OF LAG-MINUTES	1.6
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.04

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 100
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
0.98	2.630	1.00	0.98	1.28	2.630	1.00	1.28	2.07	2.630	1.00	2.07
		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	0.00			0.00	0.00			0.00	0.00
SUM [5]	2.63	SUM [7]	0.98	SUM [9]	2.63	SUM [11]	1.28	SUM [13]	2.63	SUM [15]	2.07
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.98				1.28				2.07

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.43	0.43	0.31
FLOOD VOLUME	(cu-ft)	4,096	4,066	2,949
	(acre-ft)	0.09	0.09	0.07
REQUIRED STORAGE	(cu-ft)	3,639	3,271	1,225
	(acre-ft)	0.08	0.08	0.03
PEAK FLOW	(cfs)	2.02	1.74	0.29
MAXIMUM WSEL	(ft)	382.00	381.91	381.33

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1
BY JAMES BAZUA, PE DATE 6/10/2020

ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
B	COMMERCIAL	56	0.70	90%	0.13	2.32	0.882	0.1173
B	PAVING/HARDSCAPE	56	0.70	100%	0.07	0.00	0.000	0.0000
B	SF - 1 ACRE	56	0.70	20%	0.57	0.00	0.000	0.0000
B	SF - 1/2 ACRE	56	0.70	40%	0.45	0.00	0.000	0.0000
B	SF - 1/4 ACRE	56	0.70	50%	0.39	0.00	0.000	0.0000
B	MF - COND0MINIUMS	56	0.70	65%	0.29	0.00	0.000	0.0000
B	MF - APARTMENTS	56	0.70	80%	0.20	0.00	0.000	0.0000
B	MOBILE HOME PARKS	56	0.70	75%	0.23	0.00	0.000	0.0000
B	LANDSCAPING	56	0.70	0%	0.70	0.10	0.038	0.0266
B	RETENTION BASINS	56	0.70	0%	0.70	0.21	0.080	0.0559
B	GOLF COURSE	56	0.70	0%	0.70	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.20	90%	0.04	0.00	0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					SUM	2.63	SUM	0.1998

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.09991635
C= 0.00185

Ft=C(24-(T/60))^1.55 = 0.00185 (24-(T/60))^1.55 + 0.10 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period, T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 3 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: \MES BAZUA, FDATE 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.63
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.81
UNIT TIME-PERCENT OF LAG	614.9
TOTAL ADJUSTED STORM RAIN-INCHES	0.98
CONSTANT LOSS RATE-in/hr	0.20
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.04 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.154	0.20	0.14	0.02	0.04	0.00
2	10	0.17	1.3	0.154	0.20	0.14	0.02	0.04	0.00
3	15	0.25	1.1	0.130	0.20	0.12	0.01	0.03	0.00
4	20	0.33	1.5	0.177	0.20	0.16	0.02	0.05	1.58
5	25	0.42	1.5	0.177	0.20	0.16	0.02	0.05	1.58
6	30	0.50	1.8	0.213	0.20	0.19	0.01	0.03	0.00
7	35	0.58	1.5	0.177	0.20	0.16	0.02	0.05	1.58
8	40	0.67	1.8	0.213	0.20	0.19	0.01	0.03	0.00
9	45	0.75	1.8	0.213	0.20	0.19	0.01	0.03	0.00
10	50	0.83	1.5	0.177	0.20	0.16	0.02	0.05	1.58
11	55	0.92	1.6	0.189	0.20	0.17	0.02	0.05	2.51
12	60	1.00	1.8	0.213	0.20	0.19	0.01	0.03	0.00
13	65	1.08	2.2	0.260	0.20	0.23	0.06	0.16	34.90
14	70	1.17	2.2	0.260	0.20	0.23	0.06	0.16	34.90
15	75	1.25	2.2	0.260	0.20	0.23	0.06	0.16	34.90
16	80	1.33	2.0	0.236	0.20	0.21	0.04	0.10	16.27
17	85	1.42	2.6	0.307	0.20	0.28	0.11	0.28	72.17
18	90	1.50	2.7	0.319	0.20	0.29	0.12	0.31	81.48
19	95	1.58	2.4	0.283	0.20	0.26	0.08	0.22	53.53
20	100	1.67	2.7	0.319	0.20	0.29	0.12	0.31	81.48
21	105	1.75	3.3	0.390	0.20	0.35	0.19	0.50	137.38
22	110	1.83	3.1	0.366	0.20	0.33	0.17	0.44	118.75
23	115	1.92	2.9	0.342	0.20	0.31	0.14	0.38	100.12
24	120	2.00	3.0	0.354	0.20	0.32	0.15	0.41	109.43
25	125	2.08	3.1	0.366	0.20	0.33	0.17	0.44	118.75
26	130	2.17	4.2	0.496	0.20	0.45	0.30	0.78	221.23
27	135	2.25	5.0	0.590	0.20	0.53	0.39	1.03	295.76
28	140	2.33	3.5	0.413	0.20	0.37	0.21	0.56	156.01
29	145	2.42	6.8	0.803	0.20	0.72	0.60	1.59	463.46
30	150	2.50	7.3	0.862	0.20	0.78	0.66	1.74	510.04
31	155	2.58	8.2	0.968	0.20	0.87	0.77	2.02	593.89
32	160	2.67	5.9	0.697	0.20	0.63	0.50	1.31	379.61
33	165	2.75	2.0	0.236	0.20	0.21	0.04	0.10	16.27
34	170	2.83	1.8	0.213	0.20	0.19	0.01	0.03	0.00
35	175	2.92	1.8	0.213	0.20	0.19	0.01	0.03	0.00
36	180	3.00	0.6	0.071	0.20	0.06	0.01	0.02	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.43
FLOOD VOLUME (acft)	0.09
FLOOD VOLUME (cuft)	4095.54
REQUIRED STORAGE (acft)	0.08
REQUIRED STORAGE (cuft)	3639.17
PEAK FLOW RATE (cfs)	2.02

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 6 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.63
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.81
UNIT TIME-PERCENT OF LAG	614.9
TOTAL ADJUSTED STORM RAIN-INCHES	1.28
CONSTANT LOSS RATE-in/hr	0.200
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.04 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	0.5	0.077	0.20	0.07	0.01	0.02	0.00
2	10	0.17	0.6	0.092	0.20	0.08	0.01	0.02	0.00
3	15	0.25	0.6	0.092	0.20	0.08	0.01	0.02	0.00
4	20	0.33	0.6	0.092	0.20	0.08	0.01	0.02	0.00
5	25	0.42	0.6	0.092	0.20	0.08	0.01	0.02	0.00
6	30	0.50	0.7	0.108	0.20	0.10	0.01	0.03	0.00
7	35	0.58	0.7	0.108	0.20	0.10	0.01	0.03	0.00
8	40	0.67	0.7	0.108	0.20	0.10	0.01	0.03	0.00
9	45	0.75	0.7	0.108	0.20	0.10	0.01	0.03	0.00
10	50	0.83	0.7	0.108	0.20	0.10	0.01	0.03	0.00
11	55	0.92	0.7	0.108	0.20	0.10	0.01	0.03	0.00
12	60	1.00	0.8	0.123	0.20	0.11	0.01	0.03	0.00
13	65	1.08	0.8	0.123	0.20	0.11	0.01	0.03	0.00
14	70	1.17	0.8	0.123	0.20	0.11	0.01	0.03	0.00
15	75	1.25	0.8	0.123	0.20	0.11	0.01	0.03	0.00
16	80	1.33	0.8	0.123	0.20	0.11	0.01	0.03	0.00
17	85	1.42	0.8	0.123	0.20	0.11	0.01	0.03	0.00
18	90	1.50	0.8	0.123	0.20	0.11	0.01	0.03	0.00
19	95	1.58	0.8	0.123	0.20	0.11	0.01	0.03	0.00
20	100	1.67	0.8	0.123	0.20	0.11	0.01	0.03	0.00
21	105	1.75	0.8	0.123	0.20	0.11	0.01	0.03	0.00
22	110	1.83	0.8	0.123	0.20	0.11	0.01	0.03	0.00
23	115	1.92	0.8	0.123	0.20	0.11	0.01	0.03	0.00
24	120	2.00	0.9	0.138	0.20	0.12	0.01	0.04	0.00
25	125	2.08	0.8	0.123	0.20	0.11	0.01	0.03	0.00
26	130	2.17	0.9	0.138	0.20	0.12	0.01	0.04	0.00
27	135	2.25	0.9	0.138	0.20	0.12	0.01	0.04	0.00
28	140	2.33	0.9	0.138	0.20	0.12	0.01	0.04	0.00
29	145	2.42	0.9	0.138	0.20	0.12	0.01	0.04	0.00
30	150	2.50	0.9	0.138	0.20	0.12	0.01	0.04	0.00
31	155	2.58	0.9	0.138	0.20	0.12	0.01	0.04	0.00
32	160	2.67	0.9	0.138	0.20	0.12	0.01	0.04	0.00
33	165	2.75	1.0	0.154	0.20	0.14	0.02	0.04	0.00
34	170	2.83	1.0	0.154	0.20	0.14	0.02	0.04	0.00
35	175	2.92	1.0	0.154	0.20	0.14	0.02	0.04	0.00
36	180	3.00	1.0	0.154	0.20	0.14	0.02	0.04	0.00
37	185	3.08	1.0	0.154	0.20	0.14	0.02	0.04	0.00
38	190	3.17	1.1	0.169	0.20	0.15	0.02	0.04	0.94
39	195	3.25	1.1	0.169	0.20	0.15	0.02	0.04	0.94
40	200	3.33	1.1	0.169	0.20	0.15	0.02	0.04	0.94
41	205	3.42	1.2	0.184	0.20	0.17	0.02	0.05	2.15
42	210	3.50	1.3	0.200	0.20	0.18	0.02	0.05	3.36
43	215	3.58	1.4	0.215	0.20	0.19	0.02	0.04	0.00
44	220	3.67	1.4	0.215	0.20	0.19	0.02	0.04	0.00
45	225	3.75	1.5	0.230	0.20	0.21	0.03	0.08	11.72
46	230	3.83	1.5	0.230	0.20	0.21	0.03	0.08	11.72
47	235	3.92	1.6	0.246	0.20	0.22	0.05	0.12	23.84
48	240	4.00	1.6	0.246	0.20	0.22	0.05	0.12	23.84
49	245	4.08	1.7	0.261	0.20	0.24	0.06	0.16	35.96
50	250	4.17	1.8	0.276	0.20	0.25	0.08	0.20	48.08
51	255	4.25	1.9	0.292	0.20	0.26	0.09	0.24	60.20
52	260	4.33	2.0	0.307	0.20	0.28	0.11	0.28	72.32
53	265	4.42	2.1	0.323	0.20	0.29	0.12	0.32	84.44
54	270	4.50	2.1	0.323	0.20	0.29	0.12	0.32	84.44
55	275	4.58	2.2	0.338	0.20	0.30	0.14	0.36	96.56
56	280	4.67	2.3	0.353	0.20	0.32	0.15	0.40	108.67

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: COACHELLA AIRPORT BUSINESS PARK CONCENTRATION POINT: 1 BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.63		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.81		
UNIT TIME-PERCENT OF LAG	614.9		
TOTAL ADJUSTED STORM RAIN-INCHES	1.28		
CONSTANT LOSS RATE-in/hr	0.200		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.04 cfs

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
57	285	4.75	2.4	0.369	0.20	0.33	0.17	0.44	120.79
58	290	4.83	2.4	0.369	0.20	0.33	0.17	0.44	120.79
59	295	4.92	2.5	0.384	0.20	0.35	0.18	0.48	132.91
60	300	5.00	2.6	0.399	0.20	0.36	0.20	0.52	145.03
61	305	5.08	3.1	0.476	0.20	0.43	0.28	0.73	205.63
62	310	5.17	3.6	0.553	0.20	0.50	0.35	0.93	266.22
63	315	5.25	3.9	0.599	0.20	0.54	0.40	1.05	302.58
64	320	5.33	4.2	0.645	0.20	0.58	0.45	1.17	338.94
65	325	5.42	4.7	0.722	0.20	0.65	0.52	1.37	399.53
66	330	5.50	5.6	0.860	0.20	0.77	0.66	1.74	508.60
67	335	5.58	1.9	0.292	0.20	0.26	0.09	0.24	60.20
68	340	5.67	0.9	0.138	0.20	0.12	0.01	0.04	0.00
69	345	5.75	0.6	0.092	0.20	0.08	0.01	0.02	0.00
70	350	5.83	0.5	0.077	0.20	0.07	0.01	0.02	0.00
71	355	5.92	0.3	0.046	0.20	0.04	0.00	0.01	0.00
72	360	6.00	0.2	0.031	0.20	0.03	0.00	0.01	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.43
FLOOD VOLUME (acft)	0.09
FLOOD VOLUME (cuft)	4066.25
REQUIRED STORAGE (acft)	0.08
REQUIRED STORAGE (cuft)	3271.34
PEAK FLOW RATE (cfs)	1.74

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 24 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.630	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1998
LAG TIME - MINUTES	0.81	MINIMUM LOSS RATE (for var. loss) - in/hr	0.100
UNIT TIME-PERCENT OF LAG	1844.7	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.07	C	0.00185
		PERCOLATION RATE (cfs)	0.04

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
1	15	0.25	0.2	0.017	0.353	0.015	0.002	0.00	0.00
2	30	0.50	0.3	0.025	0.349	0.022	0.002	0.01	0.00
3	45	0.75	0.3	0.025	0.345	0.022	0.002	0.01	0.00
4	60	1.00	0.4	0.033	0.341	0.030	0.003	0.01	0.00
5	75	1.25	0.3	0.025	0.337	0.022	0.002	0.01	0.00
6	90	1.50	0.3	0.025	0.333	0.022	0.002	0.01	0.00
7	105	1.75	0.3	0.025	0.329	0.022	0.002	0.01	0.00
8	120	2.00	0.4	0.033	0.325	0.030	0.003	0.01	0.00
9	135	2.25	0.4	0.033	0.321	0.030	0.003	0.01	0.00
10	150	2.50	0.4	0.033	0.317	0.030	0.003	0.01	0.00
11	165	2.75	0.5	0.041	0.313	0.037	0.004	0.01	0.00
12	180	3.00	0.5	0.041	0.309	0.037	0.004	0.01	0.00
13	195	3.25	0.5	0.041	0.305	0.037	0.004	0.01	0.00
14	210	3.50	0.5	0.041	0.302	0.037	0.004	0.01	0.00
15	225	3.75	0.5	0.041	0.298	0.037	0.004	0.01	0.00
16	240	4.00	0.6	0.050	0.294	0.045	0.005	0.01	0.00
17	255	4.25	0.6	0.050	0.290	0.045	0.005	0.01	0.00
18	270	4.50	0.7	0.058	0.287	0.052	0.006	0.02	0.00
19	285	4.75	0.7	0.058	0.283	0.052	0.006	0.02	0.00
20	300	5.00	0.8	0.066	0.279	0.060	0.007	0.02	0.00
21	315	5.25	0.6	0.050	0.276	0.045	0.005	0.01	0.00
22	330	5.50	0.7	0.058	0.272	0.052	0.006	0.02	0.00
23	345	5.75	0.8	0.066	0.268	0.060	0.007	0.02	0.00
24	360	6.00	0.8	0.066	0.265	0.060	0.007	0.02	0.00
25	375	6.25	0.9	0.075	0.261	0.067	0.007	0.02	0.00
26	390	6.50	0.9	0.075	0.258	0.067	0.007	0.02	0.00
27	405	6.75	1.0	0.083	0.254	0.075	0.008	0.02	0.00
28	420	7.00	1.0	0.083	0.251	0.075	0.008	0.02	0.00
29	435	7.25	1.0	0.083	0.248	0.075	0.008	0.02	0.00
30	450	7.50	1.1	0.091	0.244	0.082	0.009	0.02	0.00
31	465	7.75	1.2	0.099	0.241	0.089	0.010	0.03	0.00
32	480	8.00	1.3	0.108	0.238	0.097	0.011	0.03	0.00
33	495	8.25	1.5	0.124	0.234	0.112	0.012	0.03	0.00
34	510	8.50	1.5	0.124	0.231	0.112	0.012	0.03	0.00
35	525	8.75	1.6	0.132	0.228	0.119	0.013	0.03	0.00
36	540	9.00	1.7	0.141	0.225	0.127	0.014	0.04	0.00
37	555	9.25	1.9	0.157	0.221	0.142	0.016	0.04	0.05
38	570	9.50	2.0	0.166	0.218	0.149	0.017	0.04	2.01
39	585	9.75	2.1	0.174	0.215	0.156	0.017	0.05	3.97
40	600	10.00	2.2	0.182	0.212	0.164	0.018	0.05	5.93
41	615	10.25	1.5	0.124	0.209	0.112	0.012	0.03	0.00
42	630	10.50	1.5	0.124	0.206	0.112	0.012	0.03	0.00
43	645	10.75	2.0	0.166	0.203	0.149	0.017	0.04	2.01
44	660	11.00	2.0	0.166	0.200	0.149	0.017	0.04	2.01
45	675	11.25	1.9	0.157	0.197	0.142	0.016	0.04	0.05
46	690	11.50	1.9	0.157	0.194	0.142	0.016	0.04	0.05
47	705	11.75	1.7	0.141	0.191	0.127	0.014	0.04	0.00
48	720	12.00	1.8	0.149	0.188	0.134	0.015	0.04	0.00
49	735	12.25	2.5	0.207	0.186	0.186	0.021	0.06	13.46
50	750	12.50	2.6	0.215	0.183	0.194	0.032	0.09	39.64
51	765	12.75	2.8	0.232	0.180	0.209	0.052	0.14	85.34
52	780	13.00	2.9	0.240	0.177	0.216	0.063	0.17	111.36
53	795	13.25	3.4	0.282	0.175	0.253	0.107	0.28	215.70
54	810	13.50	3.4	0.282	0.172	0.253	0.109	0.29	221.96
55	825	13.75	2.3	0.190	0.169	0.171	0.021	0.06	12.56
56	840	14.00	2.3	0.190	0.167	0.171	0.024	0.06	18.67
57	855	14.25	2.7	0.224	0.164	0.201	0.059	0.16	103.08
58	870	14.50	2.6	0.215	0.162	0.194	0.053	0.14	89.42
59	885	14.75	2.6	0.215	0.159	0.194	0.056	0.15	95.28
60	900	15.00	2.5	0.207	0.157	0.186	0.050	0.13	81.45
61	915	15.25	2.4	0.199	0.154	0.179	0.044	0.12	67.53

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 24 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.630	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1998
LAG TIME - MINUTES	0.81	MINIMUM LOSS RATE (for var. loss) - in/hr	0.100
UNIT TIME-PERCENT OF LAG	1844.7	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.07	C	0.00185
		PERCOLATION RATE (cfs)	0.04

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
62	930	15.50	2.3	0.190	0.152	0.171	0.038	0.10	53.53
63	945	15.75	1.9	0.157	0.150	0.142	0.008	0.02	0.00
64	960	16.00	1.9	0.157	0.148	0.142	0.010	0.03	0.00
65	975	16.25	0.4	0.033	0.145	0.030	0.003	0.01	0.00
66	990	16.50	0.4	0.033	0.143	0.030	0.003	0.01	0.00
67	1005	16.75	0.3	0.025	0.141	0.022	0.002	0.01	0.00
68	1020	17.00	0.3	0.025	0.139	0.022	0.002	0.01	0.00
69	1035	17.25	0.5	0.041	0.137	0.037	0.004	0.01	0.00
70	1050	17.50	0.5	0.041	0.135	0.037	0.004	0.01	0.00
71	1065	17.75	0.5	0.041	0.133	0.037	0.004	0.01	0.00
72	1080	18.00	0.4	0.033	0.131	0.030	0.003	0.01	0.00
73	1095	18.25	0.4	0.033	0.129	0.030	0.003	0.01	0.00
74	1110	18.50	0.4	0.033	0.127	0.030	0.003	0.01	0.00
75	1125	18.75	0.3	0.025	0.125	0.022	0.002	0.01	0.00
76	1140	19.00	0.2	0.017	0.123	0.015	0.002	0.00	0.00
77	1155	19.25	0.3	0.025	0.121	0.022	0.002	0.01	0.00
78	1170	19.50	0.4	0.033	0.120	0.030	0.003	0.01	0.00
79	1185	19.75	0.3	0.025	0.118	0.022	0.002	0.01	0.00
80	1200	20.00	0.2	0.017	0.117	0.015	0.002	0.00	0.00
81	1215	20.25	0.3	0.025	0.115	0.022	0.002	0.01	0.00
82	1230	20.50	0.3	0.025	0.114	0.022	0.002	0.01	0.00
83	1245	20.75	0.3	0.025	0.112	0.022	0.002	0.01	0.00
84	1260	21.00	0.2	0.017	0.111	0.015	0.002	0.00	0.00
85	1275	21.25	0.3	0.025	0.109	0.022	0.002	0.01	0.00
86	1290	21.50	0.2	0.017	0.108	0.015	0.002	0.00	0.00
87	1305	21.75	0.3	0.025	0.107	0.022	0.002	0.01	0.00
88	1320	22.00	0.2	0.017	0.106	0.015	0.002	0.00	0.00
89	1335	22.25	0.3	0.025	0.105	0.022	0.002	0.01	0.00
90	1350	22.50	0.2	0.017	0.104	0.015	0.002	0.00	0.00
91	1365	22.75	0.2	0.017	0.103	0.015	0.002	0.00	0.00
92	1380	23.00	0.2	0.017	0.102	0.015	0.002	0.00	0.00
93	1395	23.25	0.2	0.017	0.101	0.015	0.002	0.00	0.00
94	1410	23.50	0.2	0.017	0.101	0.015	0.002	0.00	0.00
95	1425	23.75	0.2	0.017	0.100	0.015	0.002	0.00	0.00
96	1440	24.00	0.2	0.017	0.100	0.015	0.002	0.00	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.31
FLOOD VOLUME (acft)	0.07
FLOOD VOLUME (cuft)	2949.37
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1225.07
PEAK FLOW (cfs)	0.29

PROJECT: COACHELLA AIRPORT BUSINESS PARK
TKC JOB # C1443
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
381	0	0		2664	0	0	0.00
382	1	1	1897	4561	3613	3613	0.08
383	1	2	1968	6529	5545	9158	0.21
384	1	3	2039	8568	7549	16706	0.38

PERCOLATION CALCULATIONS
PERCOLATION RATE 0.67 in/hr 0.04 cfs

MAXWELL IV DRYWELLS
NUMBER USED 0
RATE/DRYWELL 0 cfs
TOTAL DISSIPATED 0 cfs

TOTAL PERCOLATION RATE 0.04 cfs

1

TKC JOB # C1443

100 YEAR - 3 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.04	12	12	12	-	381.00	-	0.00
2	10	0.04	12	12	12	-	381.00	-	0.00
3	15	0.03	10	10	12	-	381.00	-	0.00
4	20	0.05	14	14	12	2	381.00	2	0.00
5	25	0.05	14	16	12	3	381.00	3	0.00
6	30	0.03	10	13	12	1	381.00	1	0.00
7	35	0.05	14	15	12	2	381.00	2	0.00
8	40	0.03	10	12	12	0	381.00	0	0.00
9	45	0.03	10	10	12	-	381.00	-	0.00
10	50	0.05	14	14	12	2	381.00	2	0.00
11	55	0.05	15	16	12	4	381.00	4	0.00
12	60	0.03	10	14	12	2	381.00	2	0.00
13	65	0.16	47	49	12	37	381.01	37	0.00
14	70	0.16	47	84	12	72	381.02	72	0.00
15	75	0.16	47	119	12	106	381.03	106	0.00
16	80	0.10	29	135	12	123	381.03	123	0.00
17	85	0.28	85	207	12	195	381.05	195	0.00
18	90	0.31	94	289	12	276	381.08	276	0.01
19	95	0.22	66	342	12	330	381.09	330	0.01
20	100	0.31	94	424	12	411	381.11	411	0.01
21	105	0.50	150	561	12	549	381.15	549	0.01
22	110	0.44	131	680	12	667	381.18	667	0.02
23	115	0.38	113	780	12	768	381.21	768	0.02
24	120	0.41	122	889	12	877	381.24	877	0.02
25	125	0.44	131	1,008	12	996	381.28	996	0.02
26	130	0.78	234	1,229	12	1,217	381.34	1,217	0.03
27	135	1.03	308	1,525	12	1,513	381.42	1,513	0.03
28	140	0.56	168	1,681	12	1,669	381.46	1,669	0.04
29	145	1.59	476	2,145	12	2,132	381.59	2,132	0.05
30	150	1.74	522	2,655	12	2,642	381.73	2,642	0.06
31	155	2.02	606	3,249	12	3,236	381.90	3,236	0.07
32	160	1.31	392	3,628	12	3,616	382.00	3,616	0.08
33	165	0.10	29	3,644	12	3,632	382.00	3,632	0.08
34	170	0.03	10	3,642	12	3,630	382.00	3,630	0.08
35	175	0.03	10	3,640	12	3,627	382.00	3,627	0.08
36	180	0.02	6	3,633	12	3,621	382.00	3,621	0.08

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TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.02	6	6	12	-	381.00	-	0.00
2	10	0.02	7	7	12	-	381.00	-	0.00
3	15	0.02	7	7	12	-	381.00	-	0.00
4	20	0.02	7	7	12	-	381.00	-	0.00
5	25	0.02	7	7	12	-	381.00	-	0.00
6	30	0.03	8	8	12	-	381.00	-	0.00
7	35	0.03	8	8	12	-	381.00	-	0.00
8	40	0.03	8	8	12	-	381.00	-	0.00
9	45	0.03	8	8	12	-	381.00	-	0.00
10	50	0.03	8	8	12	-	381.00	-	0.00
11	55	0.03	8	8	12	-	381.00	-	0.00
12	60	0.03	10	10	12	-	381.00	-	0.00
13	65	0.03	10	10	12	-	381.00	-	0.00
14	70	0.03	10	10	12	-	381.00	-	0.00
15	75	0.03	10	10	12	-	381.00	-	0.00
16	80	0.03	10	10	12	-	381.00	-	0.00
17	85	0.03	10	10	12	-	381.00	-	0.00
18	90	0.03	10	10	12	-	381.00	-	0.00
19	95	0.03	10	10	12	-	381.00	-	0.00
20	100	0.03	10	10	12	-	381.00	-	0.00
21	105	0.03	10	10	12	-	381.00	-	0.00
22	110	0.03	10	10	12	-	381.00	-	0.00
23	115	0.03	10	10	12	-	381.00	-	0.00
24	120	0.04	11	11	12	-	381.00	-	0.00
25	125	0.03	10	10	12	-	381.00	-	0.00
26	130	0.04	11	11	12	-	381.00	-	0.00
27	135	0.04	11	11	12	-	381.00	-	0.00
28	140	0.04	11	11	12	-	381.00	-	0.00
29	145	0.04	11	11	12	-	381.00	-	0.00
30	150	0.04	11	11	12	-	381.00	-	0.00
31	155	0.04	11	11	12	-	381.00	-	0.00
32	160	0.04	11	11	12	-	381.00	-	0.00
33	165	0.04	12	12	12	-	381.00	-	0.00
34	170	0.04	12	12	12	-	381.00	-	0.00
35	175	0.04	12	12	12	-	381.00	-	0.00
36	180	0.04	12	12	12	-	381.00	-	0.00
37	185	0.04	12	12	12	-	381.00	-	0.00
38	190	0.04	13	13	12	1	381.00	1	0.00
39	195	0.04	13	14	12	2	381.00	2	0.00
40	200	0.04	13	15	12	3	381.00	3	0.00
41	205	0.05	15	17	12	5	381.00	5	0.00
42	210	0.05	16	21	12	8	381.00	8	0.00
43	215	0.04	12	20	12	8	381.00	8	0.00
44	220	0.04	12	20	12	8	381.00	8	0.00
45	225	0.08	24	32	12	19	381.01	19	0.00
46	230	0.08	24	43	12	31	381.01	31	0.00
47	235	0.12	36	67	12	55	381.02	55	0.00
48	240	0.12	36	91	12	79	381.02	79	0.00
49	245	0.16	48	127	12	115	381.03	115	0.00
50	250	0.20	60	175	12	163	381.05	163	0.00
51	255	0.24	73	235	12	223	381.06	223	0.01
52	260	0.28	85	308	12	295	381.08	295	0.01
53	265	0.32	97	392	12	380	381.11	380	0.01
54	270	0.32	97	476	12	464	381.13	464	0.01
55	275	0.36	109	573	12	561	381.16	561	0.01

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TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
56	280	0.40	121	682	12	669	381.19	669	0.02
57	285	0.44	133	803	12	790	381.22	790	0.02
58	290	0.44	133	923	12	911	381.25	911	0.02
59	295	0.48	145	1,056	12	1,044	381.29	1,044	0.02
60	300	0.52	157	1,201	12	1,189	381.33	1,189	0.03
61	305	0.73	218	1,407	12	1,394	381.39	1,394	0.03
62	310	0.93	279	1,673	12	1,661	381.46	1,661	0.04
63	315	1.05	315	1,976	12	1,963	381.54	1,963	0.05
64	320	1.17	351	2,315	12	2,302	381.64	2,302	0.05
65	325	1.37	412	2,714	12	2,702	381.75	2,702	0.06
66	330	1.74	521	3,223	12	3,210	381.89	3,210	0.07
67	335	0.24	73	3,283	12	3,271	381.91	3,271	0.08
68	340	0.04	11	3,281	12	3,269	381.90	3,269	0.08
69	345	0.02	7	3,276	12	3,264	381.90	3,264	0.07
70	350	0.02	6	3,270	12	3,258	381.90	3,258	0.07
71	355	0.01	4	3,261	12	3,249	381.90	3,249	0.07
72	360	0.01	2	3,251	12	3,239	381.90	3,239	0.07

1

TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	15	0.00	4	4	37	-	381.00	-	0.00
2	30	0.01	6	6	37	-	381.00	-	0.00
3	45	0.01	6	6	37	-	381.00	-	0.00
4	60	0.01	8	8	37	-	381.00	-	0.00
5	75	0.01	6	6	37	-	381.00	-	0.00
6	90	0.01	6	6	37	-	381.00	-	0.00
7	105	0.01	6	6	37	-	381.00	-	0.00
8	120	0.01	8	8	37	-	381.00	-	0.00
9	135	0.01	8	8	37	-	381.00	-	0.00
10	150	0.01	8	8	37	-	381.00	-	0.00
11	165	0.01	10	10	37	-	381.00	-	0.00
12	180	0.01	10	10	37	-	381.00	-	0.00
13	195	0.01	10	10	37	-	381.00	-	0.00
14	210	0.01	10	10	37	-	381.00	-	0.00
15	225	0.01	10	10	37	-	381.00	-	0.00
16	240	0.01	12	12	37	-	381.00	-	0.00
17	255	0.01	12	12	37	-	381.00	-	0.00
18	270	0.02	14	14	37	-	381.00	-	0.00
19	285	0.02	14	14	37	-	381.00	-	0.00
20	300	0.02	16	16	37	-	381.00	-	0.00
21	315	0.01	12	12	37	-	381.00	-	0.00
22	330	0.02	14	14	37	-	381.00	-	0.00
23	345	0.02	16	16	37	-	381.00	-	0.00
24	360	0.02	16	16	37	-	381.00	-	0.00
25	375	0.02	18	18	37	-	381.00	-	0.00
26	390	0.02	18	18	37	-	381.00	-	0.00
27	405	0.02	20	20	37	-	381.00	-	0.00
28	420	0.02	20	20	37	-	381.00	-	0.00
29	435	0.02	20	20	37	-	381.00	-	0.00
30	450	0.02	22	22	37	-	381.00	-	0.00
31	465	0.03	24	24	37	-	381.00	-	0.00
32	480	0.03	25	25	37	-	381.00	-	0.00
33	495	0.03	29	29	37	-	381.00	-	0.00
34	510	0.03	29	29	37	-	381.00	-	0.00
35	525	0.03	31	31	37	-	381.00	-	0.00
36	540	0.04	33	33	37	-	381.00	-	0.00
37	555	0.04	37	37	37	0	381.00	0	0.00
38	570	0.04	39	39	37	2	381.00	2	0.00
39	585	0.05	41	43	37	6	381.00	6	0.00
40	600	0.05	43	49	37	12	381.00	12	0.00
41	615	0.03	29	41	37	4	381.00	4	0.00
42	630	0.03	29	34	37	-	381.00	-	0.00
43	645	0.04	39	39	37	2	381.00	2	0.00
44	660	0.04	39	41	37	4	381.00	4	0.00
45	675	0.04	37	41	37	4	381.00	4	0.00
46	690	0.04	37	41	37	4	381.00	4	0.00
47	705	0.04	33	37	37	0	381.00	0	0.00
48	720	0.04	35	36	37	-	381.00	-	0.00
49	735	0.06	51	51	37	13	381.00	13	0.00
50	750	0.09	77	90	37	53	381.01	53	0.00
51	765	0.14	123	176	37	138	381.04	138	0.00
52	780	0.17	149	287	37	250	381.07	250	0.01
53	795	0.28	253	503	37	465	381.13	465	0.01
54	810	0.29	259	725	37	687	381.19	687	0.02
55	825	0.06	50	737	37	700	381.19	700	0.02
56	840	0.06	56	756	37	719	381.20	719	0.02
57	855	0.16	140	859	37	822	381.23	822	0.02
58	870	0.14	127	948	37	911	381.25	911	0.02

1

TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
59	885	0.15	132	1,044	37	1,006	381.28	1,006	0.02
60	900	0.13	119	1,125	37	1,088	381.30	1,088	0.02
61	915	0.12	105	1,193	37	1,155	381.32	1,155	0.03
62	930	0.10	91	1,246	37	1,209	381.33	1,209	0.03
63	945	0.02	18	1,227	37	1,190	381.33	1,190	0.03
64	960	0.03	23	1,213	37	1,176	381.33	1,176	0.03
65	975	0.01	8	1,184	37	1,146	381.32	1,146	0.03
66	990	0.01	8	1,154	37	1,117	381.31	1,117	0.03
67	1005	0.01	6	1,123	37	1,086	381.30	1,086	0.02
68	1020	0.01	6	1,092	37	1,054	381.29	1,054	0.02
69	1035	0.01	10	1,064	37	1,027	381.28	1,027	0.02
70	1050	0.01	10	1,037	37	1,000	381.28	1,000	0.02
71	1065	0.01	10	1,009	37	972	381.27	972	0.02
72	1080	0.01	8	980	37	943	381.26	943	0.02
73	1095	0.01	8	951	37	914	381.25	914	0.02
74	1110	0.01	8	921	37	884	381.24	884	0.02
75	1125	0.01	6	890	37	853	381.24	853	0.02
76	1140	0.00	4	857	37	820	381.23	820	0.02
77	1155	0.01	6	825	37	788	381.22	788	0.02
78	1170	0.01	8	796	37	759	381.21	759	0.02
79	1185	0.01	6	765	37	728	381.20	728	0.02
80	1200	0.00	4	732	37	694	381.19	694	0.02
81	1215	0.01	6	700	37	663	381.18	663	0.02
82	1230	0.01	6	669	37	632	381.17	632	0.01
83	1245	0.01	6	638	37	600	381.17	600	0.01
84	1260	0.00	4	604	37	567	381.16	567	0.01
85	1275	0.01	6	573	37	536	381.15	536	0.01
86	1290	0.00	4	540	37	503	381.14	503	0.01
87	1305	0.01	6	509	37	471	381.13	471	0.01
88	1320	0.00	4	475	37	438	381.12	438	0.01
89	1335	0.01	6	444	37	407	381.11	407	0.01
90	1350	0.00	4	411	37	373	381.10	373	0.01
91	1365	0.00	4	377	37	340	381.09	340	0.01
92	1380	0.00	4	344	37	307	381.08	307	0.01
93	1395	0.00	4	311	37	274	381.08	274	0.01
94	1410	0.00	4	278	37	240	381.07	240	0.01
95	1425	0.00	4	244	37	207	381.06	207	0.00
96	1440	0.00	4	211	37	174	381.05	174	0.00

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES BAZUA, PE		
5				
6	PROJECT NAME	COACHELLA AIRPORT BUSINESS PARK		
7	TAG Project No.	C1443		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	SUBAREA A - 100 YEAR EVENT		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	27.65		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING	0.97		
23	RETENTION BASIN	2.1		
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	1000		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	250		
30				
31	ELEVATION OF HEADWATER	387		
32	ELEVATION OF CONCENTRATION POINT	382		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	2.03		
40	6-HOUR	2.71		
41	24-HOUR	4.24		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44		379	42516	
45		380	45027	
46		381	47609	
47		382	50263	
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0.67		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD — PROJECT: COACHELLA AIRPORT BUSINESS PARK
BASIC DATA CALCULATION FORM — TKC JOB # C1443
SHORTCUT METHOD — BY MES BAZUA, PE — DATE 6/10/2020

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	SUBAREA A - 100 YEAR EVENT
[3] AREA - ACRES	30.720
[4] L-FEET	1000
[5] L-MILES	0.189
[6] La-FEET	250.00
[7] La-MILES	0.047
[8] ELEVATION OF HEADWATER	387
[9] ELEVATION OF CONCENTRATION POINT	382
[10] H-FEET	5
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.002
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.04
[16] LAG TIME-MINUTES	2.6
[17] 100% OF LAG-MINUTES	2.6
[18] 200% OF LAG-MINUTES	5.2
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.66

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 100
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
2.03	30.720	1.00	2.03	2.71	30.720	1.00	2.71	4.24	30.720	1.00	4.24
		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	0.00			0.00	0.00			0.00	0.00
SUM [5]	30.72	SUM [7]	2.03	SUM [9]	30.72	SUM [11]	2.71	SUM [13]	30.72	SUM [15]	4.24
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			2.03				2.71				4.24

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	1.56	1.77	1.89
FLOOD VOLUME	(cu-ft)	173,489	197,518	211,182
	(acre-ft)	3.98	4.53	4.85
REQUIRED STORAGE	(cu-ft)	164,996	182,214	176,577
	(acre-ft)	3.79	4.18	4.05
PEAK FLOW	(cfs)	56.48	51.07	13.51
MAXIMUM WSEL	(ft)	381.80	381.99	381.95

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1
BY JAMES BAZUA, PE DATE 6/10/2020

ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
B	COMMERCIAL	56	0.51	85%	0.12	27.65	0.900	0.1079
B	PAVING/HARDSCAPE	56	0.51	100%	0.05	0.00	0.000	0.0000
B	SF - 1 ACRE	56	0.51	20%	0.42	0.00	0.000	0.0000
B	SF - 1/2 ACRE	56	0.51	40%	0.33	0.00	0.000	0.0000
B	SF - 1/4 ACRE	56	0.51	50%	0.28	0.00	0.000	0.0000
B	MF - COND0MINIUMS	56	0.51	65%	0.21	0.00	0.000	0.0000
B	MF - APARTMENTS	56	0.51	80%	0.14	0.00	0.000	0.0000
B	MOBILE HOME PARKS	56	0.51	75%	0.17	0.00	0.000	0.0000
B	LANDSCAPING	56	0.51	0%	0.51	0.97	0.032	0.0161
B	RETENTION BASINS	56	0.51	0%	0.51	2.10	0.068	0.0349
B	GOLF COURSE	56	0.51	0%	0.51	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.08	90%	0.02	0.00	0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					SUM	30.72	SUM	0.1588

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.0794198
C= 0.00147

Ft=C(24-(T/60))^1.55 = 0.00147 (24-(T/60))^1.55 + 0.08 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period, T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 3 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: \MES BAZUA, FDATE 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.72
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	2.58
UNIT TIME-PERCENT OF LAG	193.9
TOTAL ADJUSTED STORM RAIN-INCHES	2.03
CONSTANT LOSS RATE-in/hr	0.16
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.66 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.317	0.16	0.29	0.16	4.85	1256.84
2	10	0.17	1.3	0.317	0.16	0.29	0.16	4.85	1256.84
3	15	0.25	1.1	0.268	0.16	0.24	0.11	3.35	807.84
4	20	0.33	1.5	0.365	0.16	0.33	0.21	6.35	1705.84
5	25	0.42	1.5	0.365	0.16	0.33	0.21	6.35	1705.84
6	30	0.50	1.8	0.438	0.16	0.39	0.28	8.59	2379.35
7	35	0.58	1.5	0.365	0.16	0.33	0.21	6.35	1705.84
8	40	0.67	1.8	0.438	0.16	0.39	0.28	8.59	2379.35
9	45	0.75	1.8	0.438	0.16	0.39	0.28	8.59	2379.35
10	50	0.83	1.5	0.365	0.16	0.33	0.21	6.35	1705.84
11	55	0.92	1.6	0.390	0.16	0.35	0.23	7.09	1930.34
12	60	1.00	1.8	0.438	0.16	0.39	0.28	8.59	2379.35
13	65	1.08	2.2	0.536	0.16	0.48	0.38	11.58	3277.36
14	70	1.17	2.2	0.536	0.16	0.48	0.38	11.58	3277.36
15	75	1.25	2.2	0.536	0.16	0.48	0.38	11.58	3277.36
16	80	1.33	2.0	0.487	0.16	0.44	0.33	10.09	2828.35
17	85	1.42	2.6	0.633	0.16	0.57	0.47	14.58	4175.36
18	90	1.50	2.7	0.658	0.16	0.59	0.50	15.33	4399.86
19	95	1.58	2.4	0.585	0.16	0.53	0.43	13.08	3726.36
20	100	1.67	2.7	0.658	0.16	0.59	0.50	15.33	4399.86
21	105	1.75	3.3	0.804	0.16	0.72	0.65	19.82	5746.87
22	110	1.83	3.1	0.755	0.16	0.68	0.60	18.32	5297.87
23	115	1.92	2.9	0.706	0.16	0.64	0.55	16.82	4848.87
24	120	2.00	3.0	0.731	0.16	0.66	0.57	17.57	5073.37
25	125	2.08	3.1	0.755	0.16	0.68	0.60	18.32	5297.87
26	130	2.17	4.2	1.023	0.16	0.92	0.86	26.55	7767.39
27	135	2.25	5.0	1.218	0.16	1.10	1.06	32.54	9563.40
28	140	2.33	3.5	0.853	0.16	0.77	0.69	21.31	6195.88
29	145	2.42	6.8	1.656	0.16	1.49	1.50	46.01	13604.44
30	150	2.50	7.3	1.778	0.16	1.60	1.62	49.75	14726.95
31	155	2.58	8.2	1.998	0.16	1.80	1.84	56.48	16747.46
32	160	2.67	5.9	1.437	0.16	1.29	1.28	39.27	11583.92
33	165	2.75	2.0	0.487	0.16	0.44	0.33	10.09	2828.35
34	170	2.83	1.8	0.438	0.16	0.39	0.28	8.59	2379.35
35	175	2.92	1.8	0.438	0.16	0.39	0.28	8.59	2379.35
36	180	3.00	0.6	0.146	0.16	0.13	0.01	0.45	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	1.56
FLOOD VOLUME (acft)	3.98
FLOOD VOLUME (cuft)	173488.61
REQUIRED STORAGE (acft)	3.79
REQUIRED STORAGE (cuft)	164995.84
PEAK FLOW RATE (cfs)	56.48

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: COACHELLA AIRPORT BUSINESS PARK CONCENTRATION POINT: 1 BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.72		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	2.58		
UNIT TIME-PERCENT OF LAG	193.9		
TOTAL ADJUSTED STORM RAIN-INCHES	2.71		
CONSTANT LOSS RATE-in/hr	0.159		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.66 cfs

Unit Time Period	Time		Pattern	Storm Rain	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	Percent (Plate E-5.9)	in/hr	Max	Low	in/hr	cfs	cf
1	5	0.08	0.5	0.163	0.16	0.15	0.00	0.12	0.00
2	10	0.17	0.6	0.195	0.16	0.18	0.04	1.11	136.54
3	15	0.25	0.6	0.195	0.16	0.18	0.04	1.11	136.54
4	20	0.33	0.6	0.195	0.16	0.18	0.04	1.11	136.54
5	25	0.42	0.6	0.195	0.16	0.18	0.04	1.11	136.54
6	30	0.50	0.7	0.228	0.16	0.20	0.07	2.11	436.25
7	35	0.58	0.7	0.228	0.16	0.20	0.07	2.11	436.25
8	40	0.67	0.7	0.228	0.16	0.20	0.07	2.11	436.25
9	45	0.75	0.7	0.228	0.16	0.20	0.07	2.11	436.25
10	50	0.83	0.7	0.228	0.16	0.20	0.07	2.11	436.25
11	55	0.92	0.7	0.228	0.16	0.20	0.07	2.11	436.25
12	60	1.00	0.8	0.260	0.16	0.23	0.10	3.11	735.95
13	65	1.08	0.8	0.260	0.16	0.23	0.10	3.11	735.95
14	70	1.17	0.8	0.260	0.16	0.23	0.10	3.11	735.95
15	75	1.25	0.8	0.260	0.16	0.23	0.10	3.11	735.95
16	80	1.33	0.8	0.260	0.16	0.23	0.10	3.11	735.95
17	85	1.42	0.8	0.260	0.16	0.23	0.10	3.11	735.95
18	90	1.50	0.8	0.260	0.16	0.23	0.10	3.11	735.95
19	95	1.58	0.8	0.260	0.16	0.23	0.10	3.11	735.95
20	100	1.67	0.8	0.260	0.16	0.23	0.10	3.11	735.95
21	105	1.75	0.8	0.260	0.16	0.23	0.10	3.11	735.95
22	110	1.83	0.8	0.260	0.16	0.23	0.10	3.11	735.95
23	115	1.92	0.8	0.260	0.16	0.23	0.10	3.11	735.95
24	120	2.00	0.9	0.293	0.16	0.26	0.13	4.11	1035.66
25	125	2.08	0.8	0.260	0.16	0.23	0.10	3.11	735.95
26	130	2.17	0.9	0.293	0.16	0.26	0.13	4.11	1035.66
27	135	2.25	0.9	0.293	0.16	0.26	0.13	4.11	1035.66
28	140	2.33	0.9	0.293	0.16	0.26	0.13	4.11	1035.66
29	145	2.42	0.9	0.293	0.16	0.26	0.13	4.11	1035.66
30	150	2.50	0.9	0.293	0.16	0.26	0.13	4.11	1035.66
31	155	2.58	0.9	0.293	0.16	0.26	0.13	4.11	1035.66
32	160	2.67	0.9	0.293	0.16	0.26	0.13	4.11	1035.66
33	165	2.75	1.0	0.325	0.16	0.29	0.17	5.11	1335.36
34	170	2.83	1.0	0.325	0.16	0.29	0.17	5.11	1335.36
35	175	2.92	1.0	0.325	0.16	0.29	0.17	5.11	1335.36
36	180	3.00	1.0	0.325	0.16	0.29	0.17	5.11	1335.36
37	185	3.08	1.0	0.325	0.16	0.29	0.17	5.11	1335.36
38	190	3.17	1.1	0.358	0.16	0.32	0.20	6.11	1635.06
39	195	3.25	1.1	0.358	0.16	0.32	0.20	6.11	1635.06
40	200	3.33	1.1	0.358	0.16	0.32	0.20	6.11	1635.06
41	205	3.42	1.2	0.390	0.16	0.35	0.23	7.11	1934.77
42	210	3.50	1.3	0.423	0.16	0.38	0.26	8.11	2234.47
43	215	3.58	1.4	0.455	0.16	0.41	0.30	9.11	2534.18
44	220	3.67	1.4	0.455	0.16	0.41	0.30	9.11	2534.18
45	225	3.75	1.5	0.488	0.16	0.44	0.33	10.11	2833.88
46	230	3.83	1.5	0.488	0.16	0.44	0.33	10.11	2833.88
47	235	3.92	1.6	0.520	0.16	0.47	0.36	11.10	3133.59
48	240	4.00	1.6	0.520	0.16	0.47	0.36	11.10	3133.59
49	245	4.08	1.7	0.553	0.16	0.50	0.39	12.10	3433.29
50	250	4.17	1.8	0.585	0.16	0.53	0.43	13.10	3732.99
51	255	4.25	1.9	0.618	0.16	0.56	0.46	14.10	4032.70
52	260	4.33	2.0	0.650	0.16	0.59	0.49	15.10	4332.40
53	265	4.42	2.1	0.683	0.16	0.61	0.52	16.10	4632.11
54	270	4.50	2.1	0.683	0.16	0.61	0.52	16.10	4632.11
55	275	4.58	2.2	0.715	0.16	0.64	0.56	17.10	4931.81
56	280	4.67	2.3	0.748	0.16	0.67	0.59	18.10	5231.52

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 6 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.72
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	2.58
UNIT TIME-PERCENT OF LAG	193.9
TOTAL ADJUSTED STORM RAIN-INCHES	2.71
CONSTANT LOSS RATE-in/hr	0.159
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.66 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
57	285	4.75	2.4	0.780	0.16	0.70	0.62	19.10	5531.22
58	290	4.83	2.4	0.780	0.16	0.70	0.62	19.10	5531.22
59	295	4.92	2.5	0.813	0.16	0.73	0.65	20.10	5830.92
60	300	5.00	2.6	0.846	0.16	0.76	0.69	21.09	6130.63
61	305	5.08	3.1	1.008	0.16	0.91	0.85	26.09	7629.15
62	310	5.17	3.6	1.171	0.16	1.05	1.01	31.08	9127.67
63	315	5.25	3.9	1.268	0.16	1.14	1.11	34.08	10026.79
64	320	5.33	4.2	1.366	0.16	1.23	1.21	37.08	10925.90
65	325	5.42	4.7	1.528	0.16	1.38	1.37	42.07	12424.42
66	330	5.50	5.6	1.821	0.16	1.64	1.66	51.07	15121.76
67	335	5.58	1.9	0.618	0.16	0.56	0.46	14.10	4032.70
68	340	5.67	0.9	0.293	0.16	0.26	0.13	4.11	1035.66
69	345	5.75	0.6	0.195	0.16	0.18	0.04	1.11	136.54
70	350	5.83	0.5	0.163	0.16	0.15	0.00	0.12	0.00
71	355	5.92	0.3	0.098	0.16	0.09	0.01	0.30	0.00
72	360	6.00	0.2	0.065	0.16	0.06	0.01	0.20	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	1.77
FLOOD VOLUME (acft)	4.53
FLOOD VOLUME (cuft)	197518.19
REQUIRED STORAGE (acft)	4.18
REQUIRED STORAGE (cuft)	182214.29
PEAK FLOW RATE (cfs)	51.07

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 24 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.720	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1588
LAG TIME - MINUTES	2.58	MINIMUM LOSS RATE (for var. loss) - in/hr	0.079
UNIT TIME-PERCENT OF LAG	581.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	4.24	C	0.00147
		PERCOLATION RATE (cfs)	0.66

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
1	15	0.25	0.2	0.034	0.280	0.031	0.003	0.10	0.00
2	30	0.50	0.3	0.051	0.277	0.046	0.005	0.16	0.00
3	45	0.75	0.3	0.051	0.274	0.046	0.005	0.16	0.00
4	60	1.00	0.4	0.068	0.271	0.061	0.007	0.21	0.00
5	75	1.25	0.3	0.051	0.268	0.046	0.005	0.16	0.00
6	90	1.50	0.3	0.051	0.264	0.046	0.005	0.16	0.00
7	105	1.75	0.3	0.051	0.261	0.046	0.005	0.16	0.00
8	120	2.00	0.4	0.068	0.258	0.061	0.007	0.21	0.00
9	135	2.25	0.4	0.068	0.255	0.061	0.007	0.21	0.00
10	150	2.50	0.4	0.068	0.252	0.061	0.007	0.21	0.00
11	165	2.75	0.5	0.085	0.249	0.076	0.008	0.26	0.00
12	180	3.00	0.5	0.085	0.246	0.076	0.008	0.26	0.00
13	195	3.25	0.5	0.085	0.243	0.076	0.008	0.26	0.00
14	210	3.50	0.5	0.085	0.240	0.076	0.008	0.26	0.00
15	225	3.75	0.5	0.085	0.237	0.076	0.008	0.26	0.00
16	240	4.00	0.6	0.102	0.234	0.092	0.010	0.31	0.00
17	255	4.25	0.6	0.102	0.231	0.092	0.010	0.31	0.00
18	270	4.50	0.7	0.119	0.228	0.107	0.012	0.36	0.00
19	285	4.75	0.7	0.119	0.225	0.107	0.012	0.36	0.00
20	300	5.00	0.8	0.136	0.222	0.122	0.014	0.42	0.00
21	315	5.25	0.6	0.102	0.219	0.092	0.010	0.31	0.00
22	330	5.50	0.7	0.119	0.216	0.107	0.012	0.36	0.00
23	345	5.75	0.8	0.136	0.213	0.122	0.014	0.42	0.00
24	360	6.00	0.8	0.136	0.211	0.122	0.014	0.42	0.00
25	375	6.25	0.9	0.153	0.208	0.137	0.015	0.47	0.00
26	390	6.50	0.9	0.153	0.205	0.137	0.015	0.47	0.00
27	405	6.75	1.0	0.170	0.202	0.153	0.017	0.52	0.00
28	420	7.00	1.0	0.170	0.200	0.153	0.017	0.52	0.00
29	435	7.25	1.0	0.170	0.197	0.153	0.017	0.52	0.00
30	450	7.50	1.1	0.187	0.194	0.168	0.019	0.57	0.00
31	465	7.75	1.2	0.204	0.191	0.183	0.012	0.37	0.00
32	480	8.00	1.3	0.220	0.189	0.198	0.032	0.97	280.90
33	495	8.25	1.5	0.254	0.186	0.229	0.068	2.09	1291.12
34	510	8.50	1.5	0.254	0.184	0.229	0.071	2.17	1362.89
35	525	8.75	1.6	0.271	0.181	0.244	0.090	2.77	1902.95
36	540	9.00	1.7	0.288	0.179	0.259	0.110	3.37	2442.37
37	555	9.25	1.9	0.322	0.176	0.290	0.146	4.49	3450.07
38	570	9.50	2.0	0.339	0.173	0.305	0.166	5.09	3988.21
39	585	9.75	2.1	0.356	0.171	0.321	0.185	5.69	4525.70
40	600	10.00	2.2	0.373	0.169	0.336	0.205	6.28	5062.54
41	615	10.25	1.5	0.254	0.166	0.229	0.088	2.71	1847.45
42	630	10.50	1.5	0.254	0.164	0.229	0.091	2.79	1914.05
43	645	10.75	2.0	0.339	0.161	0.305	0.178	5.46	4324.55
44	660	11.00	2.0	0.339	0.159	0.305	0.180	5.54	4389.81
45	675	11.25	1.9	0.322	0.157	0.290	0.166	5.09	3985.49
46	690	11.50	1.9	0.322	0.154	0.290	0.168	5.16	4049.39
47	705	11.75	1.7	0.288	0.152	0.259	0.136	4.19	3174.77
48	720	12.00	1.8	0.305	0.150	0.275	0.156	4.78	3706.19
49	735	12.25	2.5	0.424	0.148	0.382	0.276	8.49	7050.37
50	750	12.50	2.6	0.441	0.145	0.397	0.296	9.08	7580.37
51	765	12.75	2.8	0.475	0.143	0.427	0.332	10.19	8578.57
52	780	13.00	2.9	0.492	0.141	0.443	0.351	10.78	9107.12
53	795	13.25	3.4	0.577	0.139	0.519	0.438	13.45	11510.59
54	810	13.50	3.4	0.577	0.137	0.519	0.440	13.51	11568.77
55	825	13.75	2.3	0.390	0.135	0.351	0.255	7.85	6468.18
56	840	14.00	2.3	0.390	0.133	0.351	0.257	7.91	6524.86
57	855	14.25	2.7	0.458	0.131	0.412	0.327	10.06	8456.40
58	870	14.50	2.6	0.441	0.129	0.397	0.312	9.60	8042.63
59	885	14.75	2.6	0.441	0.127	0.397	0.314	9.66	8096.98
60	900	15.00	2.5	0.424	0.125	0.382	0.299	9.19	7681.63
61	915	15.25	2.4	0.407	0.123	0.366	0.284	8.73	7265.48

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: COACHELLA AIRPORT BUSINESS PARK CONCENTRATION POINT: 1 BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	30.720	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1588
LAG TIME - MINUTES	2.58	MINIMUM LOSS RATE (for var. loss) - in/hr	0.079
UNIT TIME-PERCENT OF LAG	581.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	4.24	C	0.00147
		PERCOLATION RATE (cfs)	0.66

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
62	930	15.50	2.3	0.390	0.121	0.351	0.269	8.27	6848.52
63	945	15.75	1.9	0.322	0.119	0.290	0.203	6.24	5024.00
64	960	16.00	1.9	0.322	0.117	0.290	0.205	6.30	5074.30
65	975	16.25	0.4	0.068	0.115	0.061	0.007	0.21	0.00
66	990	16.50	0.4	0.068	0.114	0.061	0.007	0.21	0.00
67	1005	16.75	0.3	0.051	0.112	0.046	0.005	0.16	0.00
68	1020	17.00	0.3	0.051	0.110	0.046	0.005	0.16	0.00
69	1035	17.25	0.5	0.085	0.109	0.076	0.008	0.26	0.00
70	1050	17.50	0.5	0.085	0.107	0.076	0.008	0.26	0.00
71	1065	17.75	0.5	0.085	0.105	0.076	0.008	0.26	0.00
72	1080	18.00	0.4	0.068	0.104	0.061	0.007	0.21	0.00
73	1095	18.25	0.4	0.068	0.102	0.061	0.007	0.21	0.00
74	1110	18.50	0.4	0.068	0.101	0.061	0.007	0.21	0.00
75	1125	18.75	0.3	0.051	0.099	0.046	0.005	0.16	0.00
76	1140	19.00	0.2	0.034	0.098	0.031	0.003	0.10	0.00
77	1155	19.25	0.3	0.051	0.097	0.046	0.005	0.16	0.00
78	1170	19.50	0.4	0.068	0.095	0.061	0.007	0.21	0.00
79	1185	19.75	0.3	0.051	0.094	0.046	0.005	0.16	0.00
80	1200	20.00	0.2	0.034	0.093	0.031	0.003	0.10	0.00
81	1215	20.25	0.3	0.051	0.091	0.046	0.005	0.16	0.00
82	1230	20.50	0.3	0.051	0.090	0.046	0.005	0.16	0.00
83	1245	20.75	0.3	0.051	0.089	0.046	0.005	0.16	0.00
84	1260	21.00	0.2	0.034	0.088	0.031	0.003	0.10	0.00
85	1275	21.25	0.3	0.051	0.087	0.046	0.005	0.16	0.00
86	1290	21.50	0.2	0.034	0.086	0.031	0.003	0.10	0.00
87	1305	21.75	0.3	0.051	0.085	0.046	0.005	0.16	0.00
88	1320	22.00	0.2	0.034	0.084	0.031	0.003	0.10	0.00
89	1335	22.25	0.3	0.051	0.083	0.046	0.005	0.16	0.00
90	1350	22.50	0.2	0.034	0.083	0.031	0.003	0.10	0.00
91	1365	22.75	0.2	0.034	0.082	0.031	0.003	0.10	0.00
92	1380	23.00	0.2	0.034	0.081	0.031	0.003	0.10	0.00
93	1395	23.25	0.2	0.034	0.081	0.031	0.003	0.10	0.00
94	1410	23.50	0.2	0.034	0.080	0.031	0.003	0.10	0.00
95	1425	23.75	0.2	0.034	0.080	0.031	0.003	0.10	0.00
96	1440	24.00	0.2	0.034	0.079	0.031	0.003	0.10	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	1.89
FLOOD VOLUME (acft)	4.85
FLOOD VOLUME (cuft)	211181.60
REQUIRED STORAGE (acft)	4.05
REQUIRED STORAGE (cuft)	176577.21
PEAK FLOW (cfs)	13.51

PROJECT: COACHELLA AIRPORT BUSINESS PARK
TKC JOB # C1443
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
379	0	0		42516	0	0	0.00
380	1	1	2511	45027	43772	43772	1.00
381	1	2	2582	47609	46318	90090	2.07
382	1	3	2654	50263	48936	139026	3.19

PERCOLATION CALCULATIONS
PERCOLATION RATE 0.67 in/hr 0.66 cfs

MAXWELL IV DRYWELLS
NUMBER USED 0
RATE/DRYWELL 0 cfs
TOTAL DISSIPATED 0 cfs

TOTAL PERCOLATION RATE 0.66 cfs

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TKC JOB # C1443

100 YEAR - 3 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	4.85	1,455	1,455	198	1,257	379.03	1,257	0.03
2	10	4.85	1,455	2,711	198	2,514	379.06	2,514	0.06
3	15	3.35	1,006	3,519	198	3,322	379.08	3,322	0.08
4	20	6.35	1,904	5,225	198	5,027	379.11	5,027	0.12
5	25	6.35	1,904	6,931	198	6,733	379.15	6,733	0.15
6	30	8.59	2,577	9,310	198	9,113	379.21	9,113	0.21
7	35	6.35	1,904	11,016	198	10,818	379.25	10,818	0.25
8	40	8.59	2,577	13,396	198	13,198	379.30	13,198	0.30
9	45	8.59	2,577	15,775	198	15,577	379.36	15,577	0.36
10	50	6.35	1,904	17,481	198	17,283	379.39	17,283	0.40
11	55	7.09	2,128	19,411	198	19,213	379.44	19,213	0.44
12	60	8.59	2,577	21,790	198	21,593	379.49	21,593	0.50
13	65	11.58	3,475	25,068	198	24,870	379.57	24,870	0.57
14	70	11.58	3,475	28,345	198	28,147	379.64	28,147	0.65
15	75	11.58	3,475	31,623	198	31,425	379.72	31,425	0.72
16	80	10.09	3,026	34,451	198	34,253	379.78	34,253	0.79
17	85	14.58	4,373	38,626	198	38,428	379.88	38,428	0.88
18	90	15.33	4,598	43,026	198	42,828	379.98	42,828	0.98
19	95	13.08	3,924	46,752	198	46,555	380.06	46,555	1.07
20	100	15.33	4,598	51,152	198	50,954	380.16	50,954	1.17
21	105	19.82	5,945	56,899	198	56,701	380.28	56,701	1.30
22	110	18.32	5,496	62,197	198	61,999	380.39	61,999	1.42
23	115	16.82	5,047	67,046	198	66,848	380.50	66,848	1.53
24	120	17.57	5,271	72,119	198	71,921	380.61	71,921	1.65
25	125	18.32	5,496	77,417	198	77,219	380.72	77,219	1.77
26	130	26.55	7,965	85,185	198	84,987	380.89	84,987	1.95
27	135	32.54	9,761	94,748	198	94,550	381.09	94,550	2.17
28	140	21.31	6,394	100,944	198	100,746	381.22	100,746	2.31
29	145	46.01	13,802	114,548	198	114,350	381.50	114,350	2.63
30	150	49.75	14,925	129,275	198	129,077	381.80	129,077	2.96
31	155	56.48	16,945	146,023	198	145,825	-	145,825	3.35
32	160	39.27	11,782	157,607	198	157,409	-	157,409	3.61
33	165	10.09	3,026	160,435	198	160,237	-	160,237	3.68
34	170	8.59	2,577	162,814	198	162,616	-	162,616	3.73
35	175	8.59	2,577	165,194	198	164,996	-	164,996	3.79
36	180	0.45	135	165,131	198	164,933	-	164,933	3.79

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TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.12	35	35	198	-	379.00	-	0.00
2	10	1.11	334	334	198	137	379.00	137	0.00
3	15	1.11	334	471	198	273	379.01	273	0.01
4	20	1.11	334	607	198	410	379.01	410	0.01
5	25	1.11	334	744	198	546	379.01	546	0.01
6	30	2.11	634	1,180	198	982	379.02	982	0.02
7	35	2.11	634	1,616	198	1,419	379.03	1,419	0.03
8	40	2.11	634	2,053	198	1,855	379.04	1,855	0.04
9	45	2.11	634	2,489	198	2,291	379.05	2,291	0.05
10	50	2.11	634	2,925	198	2,727	379.06	2,727	0.06
11	55	2.11	634	3,361	198	3,164	379.07	3,164	0.07
12	60	3.11	934	4,097	198	3,900	379.09	3,900	0.09
13	65	3.11	934	4,833	198	4,636	379.11	4,636	0.11
14	70	3.11	934	5,569	198	5,372	379.12	5,372	0.12
15	75	3.11	934	6,305	198	6,107	379.14	6,107	0.14
16	80	3.11	934	7,041	198	6,843	379.16	6,843	0.16
17	85	3.11	934	7,777	198	7,579	379.17	7,579	0.17
18	90	3.11	934	8,513	198	8,315	379.19	8,315	0.19
19	95	3.11	934	9,249	198	9,051	379.21	9,051	0.21
20	100	3.11	934	9,985	198	9,787	379.22	9,787	0.22
21	105	3.11	934	10,721	198	10,523	379.24	10,523	0.24
22	110	3.11	934	11,457	198	11,259	379.26	11,259	0.26
23	115	3.11	934	12,193	198	11,995	379.27	11,995	0.28
24	120	4.11	1,233	13,229	198	13,031	379.30	13,031	0.30
25	125	3.11	934	13,964	198	13,767	379.31	13,767	0.32
26	130	4.11	1,233	15,000	198	14,802	379.34	14,802	0.34
27	135	4.11	1,233	16,036	198	15,838	379.36	15,838	0.36
28	140	4.11	1,233	17,071	198	16,874	379.39	16,874	0.39
29	145	4.11	1,233	18,107	198	17,909	379.41	17,909	0.41
30	150	4.11	1,233	19,143	198	18,945	379.43	18,945	0.43
31	155	4.11	1,233	20,178	198	19,981	379.46	19,981	0.46
32	160	4.11	1,233	21,214	198	21,016	379.48	21,016	0.48
33	165	5.11	1,533	22,549	198	22,352	379.51	22,352	0.51
34	170	5.11	1,533	23,885	198	23,687	379.54	23,687	0.54
35	175	5.11	1,533	25,220	198	25,022	379.57	25,022	0.57
36	180	5.11	1,533	26,556	198	26,358	379.60	26,358	0.61
37	185	5.11	1,533	27,891	198	27,693	379.63	27,693	0.64
38	190	6.11	1,833	29,526	198	29,328	379.67	29,328	0.67
39	195	6.11	1,833	31,161	198	30,963	379.71	30,963	0.71
40	200	6.11	1,833	32,796	198	32,598	379.74	32,598	0.75
41	205	7.11	2,133	34,731	198	34,533	379.79	34,533	0.79
42	210	8.11	2,432	36,965	198	36,767	379.84	36,767	0.84
43	215	9.11	2,732	39,499	198	39,302	379.90	39,302	0.90
44	220	9.11	2,732	42,034	198	41,836	379.96	41,836	0.96
45	225	10.11	3,032	44,868	198	44,670	380.02	44,670	1.03
46	230	10.11	3,032	47,701	198	47,504	380.08	47,504	1.09
47	235	11.10	3,331	50,835	198	50,637	380.15	50,637	1.16
48	240	11.10	3,331	53,969	198	53,771	380.22	53,771	1.23
49	245	12.10	3,631	57,402	198	57,204	380.29	57,204	1.31
50	250	13.10	3,931	61,135	198	60,937	380.37	60,937	1.40
51	255	14.10	4,231	65,168	198	64,970	380.46	64,970	1.49
52	260	15.10	4,530	69,500	198	69,302	380.55	69,302	1.59
53	265	16.10	4,830	74,132	198	73,934	380.65	73,934	1.70
54	270	16.10	4,830	78,764	198	78,566	380.75	78,566	1.80
55	275	17.10	5,130	83,696	198	83,498	380.86	83,498	1.92

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TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
56	280	18.10	5,429	88,928	198	88,730	380.97	88,730	2.04
57	285	19.10	5,729	94,459	198	94,261	381.09	94,261	2.16
58	290	19.10	5,729	99,990	198	99,792	381.20	99,792	2.29
59	295	20.10	6,029	105,821	198	105,623	381.32	105,623	2.42
60	300	21.09	6,328	111,952	198	111,754	381.44	111,754	2.57
61	305	26.09	7,827	119,581	198	119,383	381.60	119,383	2.74
62	310	31.08	9,325	128,708	198	128,511	381.79	128,511	2.95
63	315	34.08	10,225	138,735	198	138,537	381.99	138,537	3.18
64	320	37.08	11,124	149,661	198	149,463	-	149,463	3.43
65	325	42.07	12,622	162,085	198	161,888	-	161,888	3.72
66	330	51.07	15,320	177,207	198	177,009	-	177,009	4.06
67	335	14.10	4,231	181,240	198	181,042	-	181,042	4.16
68	340	4.11	1,233	182,276	198	182,078	-	182,078	4.18
69	345	1.11	334	182,412	198	182,214	-	182,214	4.18
70	350	0.12	35	182,249	198	182,051	-	182,051	4.18
71	355	0.30	90	182,141	198	181,943	-	181,943	4.18
72	360	0.20	60	182,003	198	181,805	-	181,805	4.17

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TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	15	0.10	94	94	593	-	379.00	-	0.00
2	30	0.16	141	141	593	-	379.00	-	0.00
3	45	0.16	141	141	593	-	379.00	-	0.00
4	60	0.21	188	188	593	-	379.00	-	0.00
5	75	0.16	141	141	593	-	379.00	-	0.00
6	90	0.16	141	141	593	-	379.00	-	0.00
7	105	0.16	141	141	593	-	379.00	-	0.00
8	120	0.21	188	188	593	-	379.00	-	0.00
9	135	0.21	188	188	593	-	379.00	-	0.00
10	150	0.21	188	188	593	-	379.00	-	0.00
11	165	0.26	234	234	593	-	379.00	-	0.00
12	180	0.26	234	234	593	-	379.00	-	0.00
13	195	0.26	234	234	593	-	379.00	-	0.00
14	210	0.26	234	234	593	-	379.00	-	0.00
15	225	0.26	234	234	593	-	379.00	-	0.00
16	240	0.31	281	281	593	-	379.00	-	0.00
17	255	0.31	281	281	593	-	379.00	-	0.00
18	270	0.36	328	328	593	-	379.00	-	0.00
19	285	0.36	328	328	593	-	379.00	-	0.00
20	300	0.42	375	375	593	-	379.00	-	0.00
21	315	0.31	281	281	593	-	379.00	-	0.00
22	330	0.36	328	328	593	-	379.00	-	0.00
23	345	0.42	375	375	593	-	379.00	-	0.00
24	360	0.42	375	375	593	-	379.00	-	0.00
25	375	0.47	422	422	593	-	379.00	-	0.00
26	390	0.47	422	422	593	-	379.00	-	0.00
27	405	0.52	469	469	593	-	379.00	-	0.00
28	420	0.52	469	469	593	-	379.00	-	0.00
29	435	0.52	469	469	593	-	379.00	-	0.00
30	450	0.57	516	516	593	-	379.00	-	0.00
31	465	0.37	332	332	593	-	379.00	-	0.00
32	480	0.97	874	874	593	281	379.01	281	0.01
33	495	2.09	1,885	2,165	593	1,572	379.04	1,572	0.04
34	510	2.17	1,956	3,528	593	2,935	379.07	2,935	0.07
35	525	2.77	2,496	5,431	593	4,838	379.11	4,838	0.11
36	540	3.37	3,036	7,874	593	7,280	379.17	7,280	0.17
37	555	4.49	4,044	11,324	593	10,730	379.25	10,730	0.25
38	570	5.09	4,582	15,312	593	14,719	379.34	14,719	0.34
39	585	5.69	5,119	19,838	593	19,244	379.44	19,244	0.44
40	600	6.28	5,656	24,900	593	24,307	379.56	24,307	0.56
41	615	2.71	2,441	26,748	593	26,154	379.60	26,154	0.60
42	630	2.79	2,508	28,662	593	28,068	379.64	28,068	0.64
43	645	5.46	4,918	32,986	593	32,393	379.74	32,393	0.74
44	660	5.54	4,983	37,376	593	36,783	379.84	36,783	0.84
45	675	5.09	4,579	41,362	593	40,768	379.93	40,768	0.94
46	690	5.16	4,643	45,411	593	44,817	380.02	44,817	1.03
47	705	4.19	3,768	48,586	593	47,992	380.09	47,992	1.10
48	720	4.78	4,300	52,292	593	51,698	380.17	51,698	1.19
49	735	8.49	7,644	59,342	593	58,749	380.32	58,749	1.35
50	750	9.08	8,174	66,923	593	66,329	380.49	66,329	1.52
51	765	10.19	9,172	75,501	593	74,908	380.67	74,908	1.72
52	780	10.78	9,701	84,608	593	84,015	380.87	84,015	1.93
53	795	13.45	12,104	96,119	593	95,525	381.11	95,525	2.19
54	810	13.51	12,162	107,688	593	107,094	381.35	107,094	2.46
55	825	7.85	7,062	114,156	593	113,562	381.48	113,562	2.61
56	840	7.91	7,118	120,681	593	120,087	381.61	120,087	2.76
57	855	10.06	9,050	129,137	593	128,544	381.79	128,544	2.95
58	870	9.60	8,636	137,180	593	136,586	381.95	136,586	3.14

1

TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
59	885	9.66	8,690	145,277	593	144,683	-	144,683	3.32
60	900	9.19	8,275	152,958	593	152,365	-	152,365	3.50
61	915	8.73	7,859	160,224	593	159,630	-	159,630	3.66
62	930	8.27	7,442	167,072	593	166,479	-	166,479	3.82
63	945	6.24	5,617	172,096	593	171,503	-	171,503	3.94
64	960	6.30	5,668	177,171	593	176,577	-	176,577	4.05
65	975	0.21	188	176,765	593	176,171	-	176,171	4.04
66	990	0.21	188	176,359	593	175,765	-	175,765	4.04
67	1005	0.16	141	175,906	593	175,313	-	175,313	4.02
68	1020	0.16	141	175,453	593	174,860	-	174,860	4.01
69	1035	0.26	234	175,094	593	174,501	-	174,501	4.01
70	1050	0.26	234	174,735	593	174,142	-	174,142	4.00
71	1065	0.26	234	174,376	593	173,783	-	173,783	3.99
72	1080	0.21	188	173,970	593	173,377	-	173,377	3.98
73	1095	0.21	188	173,565	593	172,971	-	172,971	3.97
74	1110	0.21	188	173,159	593	172,565	-	172,565	3.96
75	1125	0.16	141	172,706	593	172,112	-	172,112	3.95
76	1140	0.10	94	172,206	593	171,613	-	171,613	3.94
77	1155	0.16	141	171,753	593	171,160	-	171,160	3.93
78	1170	0.21	188	171,348	593	170,754	-	170,754	3.92
79	1185	0.16	141	170,895	593	170,301	-	170,301	3.91
80	1200	0.10	94	170,395	593	169,802	-	169,802	3.90
81	1215	0.16	141	169,942	593	169,349	-	169,349	3.89
82	1230	0.16	141	169,490	593	168,896	-	168,896	3.88
83	1245	0.16	141	169,037	593	168,443	-	168,443	3.87
84	1260	0.10	94	168,537	593	167,944	-	167,944	3.86
85	1275	0.16	141	168,084	593	167,491	-	167,491	3.85
86	1290	0.10	94	167,585	593	166,991	-	166,991	3.83
87	1305	0.16	141	167,132	593	166,538	-	166,538	3.82
88	1320	0.10	94	166,632	593	166,039	-	166,039	3.81
89	1335	0.16	141	166,179	593	165,586	-	165,586	3.80
90	1350	0.10	94	165,680	593	165,086	-	165,086	3.79
91	1365	0.10	94	165,180	593	164,587	-	164,587	3.78
92	1380	0.10	94	164,680	593	164,087	-	164,087	3.77
93	1395	0.10	94	164,181	593	163,587	-	163,587	3.76
94	1410	0.10	94	163,681	593	163,088	-	163,088	3.74
95	1425	0.10	94	163,181	593	162,588	-	162,588	3.73
96	1440	0.10	94	162,682	593	162,088	-	162,088	3.72

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES BAZUA, PE		
5				
6	PROJECT NAME	COACHELLA BUSINESS PARK - INTERIM BASIN		
7	TAG Project No.	C1443		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	SUBAREA B - 100 YEAR STORM EVENT		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	8.18		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING			
23	RETENTION BASIN	1		
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	1000		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	285		
30				
31	ELEVATION OF HEADWATER	387		
32	ELEVATION OF CONCENTRATION POINT	382		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	2.03		
40	6-HOUR	2.71		
41	24-HOUR	4.24		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44		382	42380	
45		383	44806	
46		384	47288	
47		385	49827	
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0.67		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES BAZUA, PE		
5				
6	PROJECT NAME	COACHELLA AIRPORT BUSINESS PARK		
7	TAG Project No.	C1443		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	SUBAREA C - 100 YEAR EVENT		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL	2.32		
15	PAVING/HARDSCAPE			
16	SF - 1 ACRE			
17	SF - 1/2 ACRE			
18	SF - 1/4 ACRE			
19	MF - CONDOMINIUMS			
20	MF - APARTMENTS			
21	MOBILE HOME PARK			
22	LANDSCAPING	0.1		
23	RETENTION BASIN	0.21		
24	GOLF COURSE			
25	MOUNTAINOUS			
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	400		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	30		
30				
31	ELEVATION OF HEADWATER	386		
32	ELEVATION OF CONCENTRATION POINT	384		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	2.03		
40	6-HOUR	2.71		
41	24-HOUR	4.24		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44		381	2664	
45		382	4561	
46		383	6529	
47		384	8568	
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)	0.67		
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: COACHELLA AIRPORT BUSINESS PARK
TKC JOB # C1443
BY MES BAZUA, PE DATE 6/10/2020

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	SUBAREA C - 100 YEAR EVENT
[3] AREA - ACRES	2.630
[4] L-FEET	400
[5] L-MILES	0.076
[6] La-FEET	30.00
[7] La-MILES	0.006
[8] ELEVATION OF HEADWATER	386
[9] ELEVATION OF CONCENTRATION POINT	384
[10] H-FEET	2
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.8
[17] 100% OF LAG-MINUTES	0.8
[18] 200% OF LAG-MINUTES	1.6
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.04

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 100
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
2.03	2.630	1.00	2.03	2.71	2.630	1.00	2.71	4.24	2.630	1.00	4.24
		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	0.00			0.00	0.00			0.00	0.00
SUM [5]	2.63	SUM [7]	2.03	SUM [9]	2.63	SUM [11]	2.71	SUM [13]	2.63	SUM [15]	4.24
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			2.03				2.71				4.24

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	1.59	1.85	2.00
FLOOD VOLUME	(cu-ft)	15,210	17,648	19,085
	(acre-ft)	0.35	0.41	0.44
REQUIRED STORAGE	(cu-ft)	14,650	16,621	16,588
	(acre-ft)	0.34	0.38	0.38
PEAK FLOW	(cfs)	4.87	4.41	1.19
MAXIMUM WSEL	(ft)	383.73	383.99	383.98

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1
BY JAMES BAZUA, PE DATE 6/10/2020

ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
B	COMMERCIAL	56	0.51	90%	0.10	2.32	0.882	0.0855
B	PAVING/HARDSCAPE	56	0.51	100%	0.05	0.00	0.000	0.0000
B	SF - 1 ACRE	56	0.51	20%	0.42	0.00	0.000	0.0000
B	SF - 1/2 ACRE	56	0.51	40%	0.33	0.00	0.000	0.0000
B	SF - 1/4 ACRE	56	0.51	50%	0.28	0.00	0.000	0.0000
B	MF - COND0MINIUMS	56	0.51	65%	0.21	0.00	0.000	0.0000
B	MF - APARTMENTS	56	0.51	80%	0.14	0.00	0.000	0.0000
B	MOBILE HOME PARKS	56	0.51	75%	0.17	0.00	0.000	0.0000
B	LANDSCAPING	56	0.51	0%	0.51	0.10	0.038	0.0194
B	RETENTION BASINS	56	0.51	0%	0.51	0.21	0.080	0.0407
B	GOLF COURSE	56	0.51	0%	0.51	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.08	90%	0.02	0.00	0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					SUM	2.63	SUM	0.1456

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.072796198
C= 0.00135

Ft=C(24-(T/60))^1.55 = 0.00135 (24-(T/60))^1.55 + 0.07 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period, T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 3 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: \MES BAZUA, FDATE 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.63
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.81
UNIT TIME-PERCENT OF LAG	614.9
TOTAL ADJUSTED STORM RAIN-INCHES	2.03
CONSTANT LOSS RATE-in/hr	0.15
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.04 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.317	0.15	0.29	0.17	0.45	122.59
2	10	0.17	1.3	0.317	0.15	0.29	0.17	0.45	122.59
3	15	0.25	1.1	0.268	0.15	0.24	0.12	0.32	84.15
4	20	0.33	1.5	0.365	0.15	0.33	0.22	0.58	161.03
5	25	0.42	1.5	0.365	0.15	0.33	0.22	0.58	161.03
6	30	0.50	1.8	0.438	0.15	0.39	0.29	0.77	218.69
7	35	0.58	1.5	0.365	0.15	0.33	0.22	0.58	161.03
8	40	0.67	1.8	0.438	0.15	0.39	0.29	0.77	218.69
9	45	0.75	1.8	0.438	0.15	0.39	0.29	0.77	218.69
10	50	0.83	1.5	0.365	0.15	0.33	0.22	0.58	161.03
11	55	0.92	1.6	0.390	0.15	0.35	0.24	0.64	180.25
12	60	1.00	1.8	0.438	0.15	0.39	0.29	0.77	218.69
13	65	1.08	2.2	0.536	0.15	0.48	0.39	1.03	295.57
14	70	1.17	2.2	0.536	0.15	0.48	0.39	1.03	295.57
15	75	1.25	2.2	0.536	0.15	0.48	0.39	1.03	295.57
16	80	1.33	2.0	0.487	0.15	0.44	0.34	0.90	257.13
17	85	1.42	2.6	0.633	0.15	0.57	0.49	1.28	372.45
18	90	1.50	2.7	0.658	0.15	0.59	0.51	1.35	391.67
19	95	1.58	2.4	0.585	0.15	0.53	0.44	1.15	334.01
20	100	1.67	2.7	0.658	0.15	0.59	0.51	1.35	391.67
21	105	1.75	3.3	0.804	0.15	0.72	0.66	1.73	506.99
22	110	1.83	3.1	0.755	0.15	0.68	0.61	1.60	468.55
23	115	1.92	2.9	0.706	0.15	0.64	0.56	1.48	430.11
24	120	2.00	3.0	0.731	0.15	0.66	0.59	1.54	449.33
25	125	2.08	3.1	0.755	0.15	0.68	0.61	1.60	468.55
26	130	2.17	4.2	1.023	0.15	0.92	0.88	2.31	679.97
27	135	2.25	5.0	1.218	0.15	1.10	1.07	2.82	833.73
28	140	2.33	3.5	0.853	0.15	0.77	0.71	1.86	545.43
29	145	2.42	6.8	1.656	0.15	1.49	1.51	3.97	1179.70
30	150	2.50	7.3	1.778	0.15	1.60	1.63	4.29	1275.80
31	155	2.58	8.2	1.998	0.15	1.80	1.85	4.87	1448.78
32	160	2.67	5.9	1.437	0.15	1.29	1.29	3.40	1006.71
33	165	2.75	2.0	0.487	0.15	0.44	0.34	0.90	257.13
34	170	2.83	1.8	0.438	0.15	0.39	0.29	0.77	218.69
35	175	2.92	1.8	0.438	0.15	0.39	0.29	0.77	218.69
36	180	3.00	0.6	0.146	0.15	0.13	0.00	0.00	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	1.59
FLOOD VOLUME (acft)	0.35
FLOOD VOLUME (cuft)	15210.40
REQUIRED STORAGE (acft)	0.34
REQUIRED STORAGE (cuft)	14650.36
PEAK FLOW RATE (cfs)	4.87

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 6 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.63
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.81
UNIT TIME-PERCENT OF LAG	614.9
TOTAL ADJUSTED STORM RAIN-INCHES	2.71
CONSTANT LOSS RATE-in/hr	0.146
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.04 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	0.5	0.163	0.15	0.15	0.02	0.04	1.02
2	10	0.17	0.6	0.195	0.15	0.18	0.05	0.13	26.68
3	15	0.25	0.6	0.195	0.15	0.18	0.05	0.13	26.68
4	20	0.33	0.6	0.195	0.15	0.18	0.05	0.13	26.68
5	25	0.42	0.6	0.195	0.15	0.18	0.05	0.13	26.68
6	30	0.50	0.7	0.228	0.15	0.20	0.08	0.22	52.34
7	35	0.58	0.7	0.228	0.15	0.20	0.08	0.22	52.34
8	40	0.67	0.7	0.228	0.15	0.20	0.08	0.22	52.34
9	45	0.75	0.7	0.228	0.15	0.20	0.08	0.22	52.34
10	50	0.83	0.7	0.228	0.15	0.20	0.08	0.22	52.34
11	55	0.92	0.7	0.228	0.15	0.20	0.08	0.22	52.34
12	60	1.00	0.8	0.260	0.15	0.23	0.11	0.30	78.00
13	65	1.08	0.8	0.260	0.15	0.23	0.11	0.30	78.00
14	70	1.17	0.8	0.260	0.15	0.23	0.11	0.30	78.00
15	75	1.25	0.8	0.260	0.15	0.23	0.11	0.30	78.00
16	80	1.33	0.8	0.260	0.15	0.23	0.11	0.30	78.00
17	85	1.42	0.8	0.260	0.15	0.23	0.11	0.30	78.00
18	90	1.50	0.8	0.260	0.15	0.23	0.11	0.30	78.00
19	95	1.58	0.8	0.260	0.15	0.23	0.11	0.30	78.00
20	100	1.67	0.8	0.260	0.15	0.23	0.11	0.30	78.00
21	105	1.75	0.8	0.260	0.15	0.23	0.11	0.30	78.00
22	110	1.83	0.8	0.260	0.15	0.23	0.11	0.30	78.00
23	115	1.92	0.8	0.260	0.15	0.23	0.11	0.30	78.00
24	120	2.00	0.9	0.293	0.15	0.26	0.15	0.39	103.66
25	125	2.08	0.8	0.260	0.15	0.23	0.11	0.30	78.00
26	130	2.17	0.9	0.293	0.15	0.26	0.15	0.39	103.66
27	135	2.25	0.9	0.293	0.15	0.26	0.15	0.39	103.66
28	140	2.33	0.9	0.293	0.15	0.26	0.15	0.39	103.66
29	145	2.42	0.9	0.293	0.15	0.26	0.15	0.39	103.66
30	150	2.50	0.9	0.293	0.15	0.26	0.15	0.39	103.66
31	155	2.58	0.9	0.293	0.15	0.26	0.15	0.39	103.66
32	160	2.67	0.9	0.293	0.15	0.26	0.15	0.39	103.66
33	165	2.75	1.0	0.325	0.15	0.29	0.18	0.47	129.32
34	170	2.83	1.0	0.325	0.15	0.29	0.18	0.47	129.32
35	175	2.92	1.0	0.325	0.15	0.29	0.18	0.47	129.32
36	180	3.00	1.0	0.325	0.15	0.29	0.18	0.47	129.32
37	185	3.08	1.0	0.325	0.15	0.29	0.18	0.47	129.32
38	190	3.17	1.1	0.358	0.15	0.32	0.21	0.56	154.97
39	195	3.25	1.1	0.358	0.15	0.32	0.21	0.56	154.97
40	200	3.33	1.1	0.358	0.15	0.32	0.21	0.56	154.97
41	205	3.42	1.2	0.390	0.15	0.35	0.24	0.64	180.63
42	210	3.50	1.3	0.423	0.15	0.38	0.28	0.73	206.29
43	215	3.58	1.4	0.455	0.15	0.41	0.31	0.81	231.95
44	220	3.67	1.4	0.455	0.15	0.41	0.31	0.81	231.95
45	225	3.75	1.5	0.488	0.15	0.44	0.34	0.90	257.61
46	230	3.83	1.5	0.488	0.15	0.44	0.34	0.90	257.61
47	235	3.92	1.6	0.520	0.15	0.47	0.37	0.99	283.27
48	240	4.00	1.6	0.520	0.15	0.47	0.37	0.99	283.27
49	245	4.08	1.7	0.553	0.15	0.50	0.41	1.07	308.92
50	250	4.17	1.8	0.585	0.15	0.53	0.44	1.16	334.58
51	255	4.25	1.9	0.618	0.15	0.56	0.47	1.24	360.24
52	260	4.33	2.0	0.650	0.15	0.59	0.50	1.33	385.90
53	265	4.42	2.1	0.683	0.15	0.61	0.54	1.41	411.56
54	270	4.50	2.1	0.683	0.15	0.61	0.54	1.41	411.56
55	275	4.58	2.2	0.715	0.15	0.64	0.57	1.50	437.21
56	280	4.67	2.3	0.748	0.15	0.67	0.60	1.58	462.87

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: COACHELLA AIRPORT BUSINESS PARK CONCENTRATION POINT: 1 BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.63		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.81		
UNIT TIME-PERCENT OF LAG	614.9		
TOTAL ADJUSTED STORM RAIN-INCHES	2.71		
CONSTANT LOSS RATE-in/hr	0.146		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.04 cfs

Unit Time Period	Time		Pattern	Storm Rain	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	Percent (Plate E-5.9)	in/hr	Max	Low	in/hr	cfs	cf
57	285	4.75	2.4	0.780	0.15	0.70	0.63	1.67	488.53
58	290	4.83	2.4	0.780	0.15	0.70	0.63	1.67	488.53
59	295	4.92	2.5	0.813	0.15	0.73	0.67	1.76	514.19
60	300	5.00	2.6	0.846	0.15	0.76	0.70	1.84	539.85
61	305	5.08	3.1	1.008	0.15	0.91	0.86	2.27	668.14
62	310	5.17	3.6	1.171	0.15	1.05	1.03	2.70	796.43
63	315	5.25	3.9	1.268	0.15	1.14	1.12	2.95	873.41
64	320	5.33	4.2	1.366	0.15	1.23	1.22	3.21	950.38
65	325	5.42	4.7	1.528	0.15	1.38	1.38	3.64	1078.67
66	330	5.50	5.6	1.821	0.15	1.64	1.68	4.41	1309.60
67	335	5.58	1.9	0.618	0.15	0.56	0.47	1.24	360.24
68	340	5.67	0.9	0.293	0.15	0.26	0.15	0.39	103.66
69	345	5.75	0.6	0.195	0.15	0.18	0.05	0.13	26.68
70	350	5.83	0.5	0.163	0.15	0.15	0.02	0.04	1.02
71	355	5.92	0.3	0.098	0.15	0.09	0.01	0.03	0.00
72	360	6.00	0.2	0.065	0.15	0.06	0.01	0.02	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	1.85
FLOOD VOLUME (acft)	0.41
FLOOD VOLUME (cuft)	17647.67
REQUIRED STORAGE (acft)	0.38
REQUIRED STORAGE (cuft)	16621.27
PEAK FLOW RATE (cfs)	4.41

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 24 HOUR STORM EVENT

PROJECT: COACHELLA AIRPORT BUSINESS PARK
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.630	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1456
LAG TIME - MINUTES	0.81	MINIMUM LOSS RATE (for var. loss) - in/hr	0.073
UNIT TIME-PERCENT OF LAG	1844.7	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	4.24	C	0.00135
		PERCOLATION RATE (cfs)	0.04

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
1	15	0.25	0.2	0.034	0.257	0.031	0.003	0.01	0.00
2	30	0.50	0.3	0.051	0.254	0.046	0.005	0.01	0.00
3	45	0.75	0.3	0.051	0.251	0.046	0.005	0.01	0.00
4	60	1.00	0.4	0.068	0.248	0.061	0.007	0.02	0.00
5	75	1.25	0.3	0.051	0.245	0.046	0.005	0.01	0.00
6	90	1.50	0.3	0.051	0.242	0.046	0.005	0.01	0.00
7	105	1.75	0.3	0.051	0.239	0.046	0.005	0.01	0.00
8	120	2.00	0.4	0.068	0.237	0.061	0.007	0.02	0.00
9	135	2.25	0.4	0.068	0.234	0.061	0.007	0.02	0.00
10	150	2.50	0.4	0.068	0.231	0.061	0.007	0.02	0.00
11	165	2.75	0.5	0.085	0.228	0.076	0.008	0.02	0.00
12	180	3.00	0.5	0.085	0.225	0.076	0.008	0.02	0.00
13	195	3.25	0.5	0.085	0.222	0.076	0.008	0.02	0.00
14	210	3.50	0.5	0.085	0.220	0.076	0.008	0.02	0.00
15	225	3.75	0.5	0.085	0.217	0.076	0.008	0.02	0.00
16	240	4.00	0.6	0.102	0.214	0.092	0.010	0.03	0.00
17	255	4.25	0.6	0.102	0.212	0.092	0.010	0.03	0.00
18	270	4.50	0.7	0.119	0.209	0.107	0.012	0.03	0.00
19	285	4.75	0.7	0.119	0.206	0.107	0.012	0.03	0.00
20	300	5.00	0.8	0.136	0.203	0.122	0.014	0.04	0.00
21	315	5.25	0.6	0.102	0.201	0.092	0.010	0.03	0.00
22	330	5.50	0.7	0.119	0.198	0.107	0.012	0.03	0.00
23	345	5.75	0.8	0.136	0.196	0.122	0.014	0.04	0.00
24	360	6.00	0.8	0.136	0.193	0.122	0.014	0.04	0.00
25	375	6.25	0.9	0.153	0.190	0.137	0.015	0.04	0.00
26	390	6.50	0.9	0.153	0.188	0.137	0.015	0.04	0.00
27	405	6.75	1.0	0.170	0.185	0.153	0.017	0.04	2.96
28	420	7.00	1.0	0.170	0.183	0.153	0.017	0.04	2.96
29	435	7.25	1.0	0.170	0.180	0.153	0.017	0.04	2.96
30	450	7.50	1.1	0.187	0.178	0.168	0.009	0.02	0.00
31	465	7.75	1.2	0.204	0.176	0.183	0.028	0.07	29.08
32	480	8.00	1.3	0.220	0.173	0.198	0.047	0.12	74.95
33	495	8.25	1.5	0.254	0.171	0.229	0.084	0.22	160.92
34	510	8.50	1.5	0.254	0.168	0.229	0.086	0.23	166.55
35	525	8.75	1.6	0.271	0.166	0.244	0.105	0.28	212.28
36	540	9.00	1.7	0.288	0.164	0.259	0.125	0.33	257.96
37	555	9.25	1.9	0.322	0.161	0.290	0.161	0.42	343.73
38	570	9.50	2.0	0.339	0.159	0.305	0.180	0.47	389.31
39	585	9.75	2.1	0.356	0.157	0.321	0.199	0.52	434.83
40	600	10.00	2.2	0.373	0.154	0.336	0.219	0.57	480.31
41	615	10.25	1.5	0.254	0.152	0.229	0.102	0.27	204.58
42	630	10.50	1.5	0.254	0.150	0.229	0.104	0.27	209.80
43	645	10.75	2.0	0.339	0.148	0.305	0.191	0.50	415.70
44	660	11.00	2.0	0.339	0.146	0.305	0.193	0.51	420.82
45	675	11.25	1.9	0.322	0.144	0.290	0.179	0.47	385.75
46	690	11.50	1.9	0.322	0.141	0.290	0.181	0.48	390.76
47	705	11.75	1.7	0.288	0.139	0.259	0.149	0.39	315.43
48	720	12.00	1.8	0.305	0.137	0.275	0.168	0.44	360.48
49	735	12.25	2.5	0.424	0.135	0.382	0.289	0.76	646.34
50	750	12.50	2.6	0.441	0.133	0.397	0.308	0.81	691.28
51	765	12.75	2.8	0.475	0.131	0.427	0.344	0.90	776.31
52	780	13.00	2.9	0.492	0.129	0.443	0.363	0.95	821.13
53	795	13.25	3.4	0.577	0.127	0.519	0.449	1.18	1026.48
54	810	13.50	3.4	0.577	0.125	0.519	0.451	1.19	1031.04
55	825	13.75	2.3	0.390	0.123	0.351	0.267	0.70	593.96
56	840	14.00	2.3	0.390	0.122	0.351	0.269	0.71	598.41
57	855	14.25	2.7	0.458	0.120	0.412	0.338	0.89	763.37
58	870	14.50	2.6	0.441	0.118	0.397	0.323	0.85	727.55
59	885	14.75	2.6	0.441	0.116	0.397	0.325	0.85	731.82
60	900	15.00	2.5	0.424	0.114	0.382	0.310	0.81	695.88
61	915	15.25	2.4	0.407	0.113	0.366	0.294	0.77	659.87

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: COACHELLA AIRPORT BUSINESS PARK CONCENTRATION POINT: 1 BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.630	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1456
LAG TIME - MINUTES	0.81	MINIMUM LOSS RATE (for var. loss) - in/hr	0.073
UNIT TIME-PERCENT OF LAG	1844.7	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	4.24	C	0.00135
		PERCOLATION RATE (cfs)	0.04

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
	Minutes	Hours	(Plate E-5.9)		Max	Low			
62	930	15.50	2.3	0.390	0.111	0.351	0.279	0.73	623.81
63	945	15.75	1.9	0.322	0.109	0.290	0.213	0.56	467.24
64	960	16.00	1.9	0.322	0.107	0.290	0.215	0.56	471.19
65	975	16.25	0.4	0.068	0.106	0.061	0.007	0.02	0.00
66	990	16.50	0.4	0.068	0.104	0.061	0.007	0.02	0.00
67	1005	16.75	0.3	0.051	0.103	0.046	0.005	0.01	0.00
68	1020	17.00	0.3	0.051	0.101	0.046	0.005	0.01	0.00
69	1035	17.25	0.5	0.085	0.100	0.076	0.008	0.02	0.00
70	1050	17.50	0.5	0.085	0.098	0.076	0.008	0.02	0.00
71	1065	17.75	0.5	0.085	0.097	0.076	0.008	0.02	0.00
72	1080	18.00	0.4	0.068	0.095	0.061	0.007	0.02	0.00
73	1095	18.25	0.4	0.068	0.094	0.061	0.007	0.02	0.00
74	1110	18.50	0.4	0.068	0.092	0.061	0.007	0.02	0.00
75	1125	18.75	0.3	0.051	0.091	0.046	0.005	0.01	0.00
76	1140	19.00	0.2	0.034	0.090	0.031	0.003	0.01	0.00
77	1155	19.25	0.3	0.051	0.089	0.046	0.005	0.01	0.00
78	1170	19.50	0.4	0.068	0.087	0.061	0.007	0.02	0.00
79	1185	19.75	0.3	0.051	0.086	0.046	0.005	0.01	0.00
80	1200	20.00	0.2	0.034	0.085	0.031	0.003	0.01	0.00
81	1215	20.25	0.3	0.051	0.084	0.046	0.005	0.01	0.00
82	1230	20.50	0.3	0.051	0.083	0.046	0.005	0.01	0.00
83	1245	20.75	0.3	0.051	0.082	0.046	0.005	0.01	0.00
84	1260	21.00	0.2	0.034	0.081	0.031	0.003	0.01	0.00
85	1275	21.25	0.3	0.051	0.080	0.046	0.005	0.01	0.00
86	1290	21.50	0.2	0.034	0.079	0.031	0.003	0.01	0.00
87	1305	21.75	0.3	0.051	0.078	0.046	0.005	0.01	0.00
88	1320	22.00	0.2	0.034	0.077	0.031	0.003	0.01	0.00
89	1335	22.25	0.3	0.051	0.076	0.046	0.005	0.01	0.00
90	1350	22.50	0.2	0.034	0.076	0.031	0.003	0.01	0.00
91	1365	22.75	0.2	0.034	0.075	0.031	0.003	0.01	0.00
92	1380	23.00	0.2	0.034	0.074	0.031	0.003	0.01	0.00
93	1395	23.25	0.2	0.034	0.074	0.031	0.003	0.01	0.00
94	1410	23.50	0.2	0.034	0.073	0.031	0.003	0.01	0.00
95	1425	23.75	0.2	0.034	0.073	0.031	0.003	0.01	0.00
96	1440	24.00	0.2	0.034	0.073	0.031	0.003	0.01	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	2.00
FLOOD VOLUME (acft)	0.44
FLOOD VOLUME (cuft)	19085.17
REQUIRED STORAGE (acft)	0.38
REQUIRED STORAGE (cuft)	16587.80
PEAK FLOW (cfs)	1.19

PROJECT: COACHELLA AIRPORT BUSINESS PARK
TKC JOB # C1443
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
381	0	0		2664	0	0	0.00
382	1	1	1897	4561	3613	3613	0.08
383	1	2	1968	6529	5545	9158	0.21
384	1	3	2039	8568	7549	16706	0.38

PERCOLATION CALCULATIONS
PERCOLATION RATE 0.67 in/hr 0.04 cfs

MAXWELL IV DRYWELLS
NUMBER USED 0
RATE/DRYWELL 0 cfs
TOTAL DISSIPATED 0 cfs

TOTAL PERCOLATION RATE 0.04 cfs

1

TKC JOB # C1443

100 YEAR - 3 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.45	135	135	12	123	381.03	123	0.00
2	10	0.45	135	258	12	245	381.07	245	0.01
3	15	0.32	97	342	12	329	381.09	329	0.01
4	20	0.58	173	503	12	490	381.14	490	0.01
5	25	0.58	173	664	12	651	381.18	651	0.01
6	30	0.77	231	882	12	870	381.24	870	0.02
7	35	0.58	173	1,044	12	1,031	381.29	1,031	0.02
8	40	0.77	231	1,262	12	1,250	381.35	1,250	0.03
9	45	0.77	231	1,481	12	1,469	381.41	1,469	0.03
10	50	0.58	173	1,642	12	1,630	381.45	1,630	0.04
11	55	0.64	193	1,822	12	1,810	381.50	1,810	0.04
12	60	0.77	231	2,041	12	2,028	381.56	2,028	0.05
13	65	1.03	308	2,336	12	2,324	381.64	2,324	0.05
14	70	1.03	308	2,632	12	2,620	381.73	2,620	0.06
15	75	1.03	308	2,928	12	2,915	381.81	2,915	0.07
16	80	0.90	270	3,185	12	3,172	381.88	3,172	0.07
17	85	1.28	385	3,557	12	3,545	381.98	3,545	0.08
18	90	1.35	404	3,949	12	3,936	382.06	3,936	0.09
19	95	1.15	346	4,283	12	4,270	382.12	4,270	0.10
20	100	1.35	404	4,675	12	4,662	382.19	4,662	0.11
21	105	1.73	519	5,182	12	5,169	382.28	5,169	0.12
22	110	1.60	481	5,650	12	5,638	382.37	5,638	0.13
23	115	1.48	443	6,080	12	6,068	382.44	6,068	0.14
24	120	1.54	462	6,530	12	6,517	382.52	6,517	0.15
25	125	1.60	481	6,998	12	6,986	382.61	6,986	0.16
26	130	2.31	692	7,678	12	7,666	382.73	7,666	0.18
27	135	2.82	846	8,512	12	8,499	382.88	8,499	0.20
28	140	1.86	558	9,057	12	9,045	382.98	9,045	0.21
29	145	3.97	1,192	10,237	12	10,225	383.14	10,225	0.23
30	150	4.29	1,288	11,513	12	11,500	383.31	11,500	0.26
31	155	4.87	1,461	12,962	12	12,949	383.50	12,949	0.30
32	160	3.40	1,019	13,968	12	13,956	383.64	13,956	0.32
33	165	0.90	270	14,225	12	14,213	383.67	14,213	0.33
34	170	0.77	231	14,444	12	14,432	383.70	14,432	0.33
35	175	0.77	231	14,663	12	14,650	383.73	14,650	0.34
36	180	0.00	0	14,651	12	14,638	383.73	14,638	0.34

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TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.04	13	13	12	1	381.00	1	0.00
2	10	0.13	39	40	12	28	381.01	28	0.00
3	15	0.13	39	67	12	54	381.02	54	0.00
4	20	0.13	39	93	12	81	381.02	81	0.00
5	25	0.13	39	120	12	108	381.03	108	0.00
6	30	0.22	65	172	12	160	381.04	160	0.00
7	35	0.22	65	225	12	212	381.06	212	0.00
8	40	0.22	65	277	12	265	381.07	265	0.01
9	45	0.22	65	330	12	317	381.09	317	0.01
10	50	0.22	65	382	12	369	381.10	369	0.01
11	55	0.22	65	434	12	422	381.12	422	0.01
12	60	0.30	90	512	12	500	381.14	500	0.01
13	65	0.30	90	590	12	578	381.16	578	0.01
14	70	0.30	90	668	12	656	381.18	656	0.02
15	75	0.30	90	746	12	734	381.20	734	0.02
16	80	0.30	90	824	12	812	381.22	812	0.02
17	85	0.30	90	902	12	890	381.25	890	0.02
18	90	0.30	90	980	12	968	381.27	968	0.02
19	95	0.30	90	1,058	12	1,046	381.29	1,046	0.02
20	100	0.30	90	1,136	12	1,124	381.31	1,124	0.03
21	105	0.30	90	1,214	12	1,202	381.33	1,202	0.03
22	110	0.30	90	1,292	12	1,280	381.35	1,280	0.03
23	115	0.30	90	1,370	12	1,358	381.38	1,358	0.03
24	120	0.39	116	1,474	12	1,461	381.40	1,461	0.03
25	125	0.30	90	1,552	12	1,539	381.43	1,539	0.04
26	130	0.39	116	1,655	12	1,643	381.45	1,643	0.04
27	135	0.39	116	1,759	12	1,747	381.48	1,747	0.04
28	140	0.39	116	1,863	12	1,850	381.51	1,850	0.04
29	145	0.39	116	1,966	12	1,954	381.54	1,954	0.04
30	150	0.39	116	2,070	12	2,058	381.57	2,058	0.05
31	155	0.39	116	2,174	12	2,161	381.60	2,161	0.05
32	160	0.39	116	2,277	12	2,265	381.63	2,265	0.05
33	165	0.47	142	2,407	12	2,394	381.66	2,394	0.05
34	170	0.47	142	2,536	12	2,524	381.70	2,524	0.06
35	175	0.47	142	2,665	12	2,653	381.73	2,653	0.06
36	180	0.47	142	2,795	12	2,782	381.77	2,782	0.06
37	185	0.47	142	2,924	12	2,912	381.81	2,912	0.07
38	190	0.56	167	3,079	12	3,067	381.85	3,067	0.07
39	195	0.56	167	3,234	12	3,222	381.89	3,222	0.07
40	200	0.56	167	3,389	12	3,377	381.93	3,377	0.08
41	205	0.64	193	3,570	12	3,557	381.98	3,557	0.08
42	210	0.73	219	3,776	12	3,763	382.03	3,763	0.09
43	215	0.81	244	4,008	12	3,995	382.07	3,995	0.09
44	220	0.81	244	4,240	12	4,227	382.11	4,227	0.10
45	225	0.90	270	4,497	12	4,485	382.16	4,485	0.10
46	230	0.90	270	4,755	12	4,743	382.20	4,743	0.11
47	235	0.99	296	5,038	12	5,026	382.25	5,026	0.12
48	240	0.99	296	5,321	12	5,309	382.31	5,309	0.12
49	245	1.07	321	5,630	12	5,618	382.36	5,618	0.13
50	250	1.16	347	5,965	12	5,953	382.42	5,953	0.14
51	255	1.24	373	6,325	12	6,313	382.49	6,313	0.14
52	260	1.33	398	6,711	12	6,699	382.56	6,699	0.15
53	265	1.41	424	7,123	12	7,110	382.63	7,110	0.16
54	270	1.41	424	7,534	12	7,522	382.71	7,522	0.17
55	275	1.50	450	7,971	12	7,959	382.78	7,959	0.18

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TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
56	280	1.58	475	8,434	12	8,422	382.87	8,422	0.19
57	285	1.67	501	8,923	12	8,910	382.96	8,910	0.20
58	290	1.67	501	9,411	12	9,399	383.03	9,399	0.22
59	295	1.76	527	9,926	12	9,913	383.10	9,913	0.23
60	300	1.84	552	10,465	12	10,453	383.17	10,453	0.24
61	305	2.27	681	11,134	12	11,121	383.26	11,121	0.26
62	310	2.70	809	11,930	12	11,918	383.37	11,918	0.27
63	315	2.95	886	12,803	12	12,791	383.48	12,791	0.29
64	320	3.21	963	13,754	12	13,741	383.61	13,741	0.32
65	325	3.64	1,091	14,832	12	14,820	383.75	14,820	0.34
66	330	4.41	1,322	16,142	12	16,130	383.92	16,130	0.37
67	335	1.24	373	16,502	12	16,490	383.97	16,490	0.38
68	340	0.39	116	16,606	12	16,594	383.99	16,594	0.38
69	345	0.13	39	16,633	12	16,620	383.99	16,620	0.38
70	350	0.04	13	16,634	12	16,621	383.99	16,621	0.38
71	355	0.03	8	16,629	12	16,617	383.99	16,617	0.38
72	360	0.02	5	16,622	12	16,609	383.99	16,609	0.38

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TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	15	0.01	8	8	37	-	381.00	-	0.00
2	30	0.01	12	12	37	-	381.00	-	0.00
3	45	0.01	12	12	37	-	381.00	-	0.00
4	60	0.02	16	16	37	-	381.00	-	0.00
5	75	0.01	12	12	37	-	381.00	-	0.00
6	90	0.01	12	12	37	-	381.00	-	0.00
7	105	0.01	12	12	37	-	381.00	-	0.00
8	120	0.02	16	16	37	-	381.00	-	0.00
9	135	0.02	16	16	37	-	381.00	-	0.00
10	150	0.02	16	16	37	-	381.00	-	0.00
11	165	0.02	20	20	37	-	381.00	-	0.00
12	180	0.02	20	20	37	-	381.00	-	0.00
13	195	0.02	20	20	37	-	381.00	-	0.00
14	210	0.02	20	20	37	-	381.00	-	0.00
15	225	0.02	20	20	37	-	381.00	-	0.00
16	240	0.03	24	24	37	-	381.00	-	0.00
17	255	0.03	24	24	37	-	381.00	-	0.00
18	270	0.03	28	28	37	-	381.00	-	0.00
19	285	0.03	28	28	37	-	381.00	-	0.00
20	300	0.04	32	32	37	-	381.00	-	0.00
21	315	0.03	24	24	37	-	381.00	-	0.00
22	330	0.03	28	28	37	-	381.00	-	0.00
23	345	0.04	32	32	37	-	381.00	-	0.00
24	360	0.04	32	32	37	-	381.00	-	0.00
25	375	0.04	36	36	37	-	381.00	-	0.00
26	390	0.04	36	36	37	-	381.00	-	0.00
27	405	0.04	40	40	37	3	381.00	3	0.00
28	420	0.04	40	43	37	6	381.00	6	0.00
29	435	0.04	40	46	37	9	381.00	9	0.00
30	450	0.02	20	29	37	-	381.00	-	0.00
31	465	0.07	66	66	37	29	381.01	29	0.00
32	480	0.12	112	141	37	104	381.03	104	0.00
33	495	0.22	198	302	37	265	381.07	265	0.01
34	510	0.23	204	469	37	432	381.12	432	0.01
35	525	0.28	249	681	37	644	381.18	644	0.01
36	540	0.33	295	939	37	902	381.25	902	0.02
37	555	0.42	381	1,283	37	1,245	381.34	1,245	0.03
38	570	0.47	426	1,672	37	1,635	381.45	1,635	0.04
39	585	0.52	472	2,107	37	2,070	381.57	2,070	0.05
40	600	0.57	517	2,587	37	2,550	381.71	2,550	0.06
41	615	0.27	242	2,792	37	2,755	381.76	2,755	0.06
42	630	0.27	247	3,001	37	2,964	381.82	2,964	0.07
43	645	0.50	453	3,417	37	3,380	381.94	3,380	0.08
44	660	0.51	458	3,838	37	3,801	382.03	3,801	0.09
45	675	0.47	423	4,224	37	4,187	382.10	4,187	0.10
46	690	0.48	428	4,615	37	4,577	382.17	4,577	0.11
47	705	0.39	353	4,930	37	4,893	382.23	4,893	0.11
48	720	0.44	398	5,290	37	5,253	382.30	5,253	0.12
49	735	0.76	684	5,937	37	5,900	382.41	5,900	0.14
50	750	0.81	728	6,628	37	6,591	382.54	6,591	0.15
51	765	0.90	813	7,404	37	7,367	382.68	7,367	0.17
52	780	0.95	858	8,225	37	8,188	382.83	8,188	0.19
53	795	1.18	1,064	9,252	37	9,215	383.01	9,215	0.21
54	810	1.19	1,068	10,283	37	10,246	383.14	10,246	0.24
55	825	0.70	631	10,877	37	10,840	383.22	10,840	0.25
56	840	0.71	636	11,475	37	11,438	383.30	11,438	0.26
57	855	0.89	801	12,239	37	12,202	383.40	12,202	0.28
58	870	0.85	765	12,966	37	12,929	383.50	12,929	0.30

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TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
59	885	0.85	769	13,698	37	13,661	383.60	13,661	0.31
60	900	0.81	733	14,394	37	14,357	383.69	14,357	0.33
61	915	0.77	697	15,054	37	15,017	383.78	15,017	0.34
62	930	0.73	661	15,678	37	15,640	383.86	15,640	0.36
63	945	0.56	504	16,145	37	16,108	383.92	16,108	0.37
64	960	0.56	508	16,616	37	16,579	383.98	16,579	0.38
65	975	0.02	16	16,595	37	16,558	383.98	16,558	0.38
66	990	0.02	16	16,574	37	16,537	383.98	16,537	0.38
67	1005	0.01	12	16,549	37	16,512	383.97	16,512	0.38
68	1020	0.01	12	16,524	37	16,486	383.97	16,486	0.38
69	1035	0.02	20	16,506	37	16,469	383.97	16,469	0.38
70	1050	0.02	20	16,489	37	16,452	383.97	16,452	0.38
71	1065	0.02	20	16,472	37	16,435	383.96	16,435	0.38
72	1080	0.02	16	16,451	37	16,414	383.96	16,414	0.38
73	1095	0.02	16	16,430	37	16,393	383.96	16,393	0.38
74	1110	0.02	16	16,409	37	16,372	383.96	16,372	0.38
75	1125	0.01	12	16,384	37	16,347	383.95	16,347	0.38
76	1140	0.01	8	16,355	37	16,317	383.95	16,317	0.37
77	1155	0.01	12	16,329	37	16,292	383.95	16,292	0.37
78	1170	0.02	16	16,308	37	16,271	383.94	16,271	0.37
79	1185	0.01	12	16,283	37	16,246	383.94	16,246	0.37
80	1200	0.01	8	16,254	37	16,217	383.94	16,217	0.37
81	1215	0.01	12	16,229	37	16,192	383.93	16,192	0.37
82	1230	0.01	12	16,204	37	16,167	383.93	16,167	0.37
83	1245	0.01	12	16,179	37	16,141	383.93	16,141	0.37
84	1260	0.01	8	16,149	37	16,112	383.92	16,112	0.37
85	1275	0.01	12	16,124	37	16,087	383.92	16,087	0.37
86	1290	0.01	8	16,095	37	16,058	383.91	16,058	0.37
87	1305	0.01	12	16,070	37	16,033	383.91	16,033	0.37
88	1320	0.01	8	16,041	37	16,004	383.91	16,004	0.37
89	1335	0.01	12	16,016	37	15,978	383.90	15,978	0.37
90	1350	0.01	8	15,987	37	15,949	383.90	15,949	0.37
91	1365	0.01	8	15,957	37	15,920	383.90	15,920	0.37
92	1380	0.01	8	15,928	37	15,891	383.89	15,891	0.36
93	1395	0.01	8	15,899	37	15,862	383.89	15,862	0.36
94	1410	0.01	8	15,870	37	15,833	383.88	15,833	0.36
95	1425	0.01	8	15,841	37	15,804	383.88	15,804	0.36
96	1440	0.01	8	15,812	37	15,774	383.88	15,774	0.36

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: COACHELLA BUSINESS PARK - INTERIM BASIN
TKC JOB # C1443
BY MES BAZUA, PE DATE 6/10/2020

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	SUBAREA B - 100 YEAR STORM EVENT
[3] AREA - ACRES	9.180
[4] L-FEET	1000
[5] L-MILES	0.189
[6] La-FEET	285.00
[7] La-MILES	0.054
[8] ELEVATION OF HEADWATER	387
[9] ELEVATION OF CONCENTRATION POINT	382
[10] H-FEET	5
[11] S-FEET/MILE	26.4
[12] S^0.5	5.14
[13] L*LCA/S^0.5	0.002
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.05
[16] LAG TIME-MINUTES	2.7
[17] 100% OF LAG-MINUTES	2.7
[18] 200% OF LAG-MINUTES	5.4
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.66

RAINFALL DATA

[1] SOURCE
[2] FREQUENCY-YEARS 100
[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
2.03	9.180	1.00	2.03	2.71	9.180	1.00	2.71	4.24	9.180	1.00	4.24
		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	0.00			0.00	0.00			0.00	0.00
SUM [5]	9.18	SUM [7]	2.03	SUM [9]	9.18	SUM [11]	2.71	SUM [13]	9.18	SUM [15]	4.24
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			2.03				2.71				4.24

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	1.60	1.87	2.03
FLOOD VOLUME	(cu-ft)	53,461	62,317	67,656
	(acre-ft)	1.23	1.43	1.55
REQUIRED STORAGE	(cu-ft)	46,106	48,487	43,649
	(acre-ft)	1.06	1.11	1.00
PEAK FLOW	(cfs)	17.03	15.42	4.17
MAXIMUM WSEL	(ft)	383.05	383.11	383.00

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT COACHELLA BUSINESS PARK - INTERIM BASIN
CONCENTRATION POINT: 1
BY JAMES BAZUA, PE DATE 6/10/2020

ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
B	COMMERCIAL	56	0.51	90%	0.10	8.18	0.891	0.0863
B	PAVING/HARDSCAPE	56	0.51	100%	0.05	0.00	0.000	0.0000
B	SF - 1 ACRE	56	0.51	20%	0.42	0.00	0.000	0.0000
B	SF - 1/2 ACRE	56	0.51	40%	0.33	0.00	0.000	0.0000
B	SF - 1/4 ACRE	56	0.51	50%	0.28	0.00	0.000	0.0000
B	MF - COND0MINIUMS	56	0.51	65%	0.21	0.00	0.000	0.0000
B	MF - APARTMENTS	56	0.51	80%	0.14	0.00	0.000	0.0000
B	MOBILE HOME PARKS	56	0.51	75%	0.17	0.00	0.000	0.0000
B	LANDSCAPING	56	0.51	0%	0.51	0.00	0.000	0.0000
B	RETENTION BASINS	32	0.51	0%	0.51	1.00	0.109	0.0556
B	GOLF COURSE	56	0.51	0%	0.51	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.08	90%	0.02	0.00	0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					SUM	9.18	SUM	0.1419

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.07095
C= 0.00131

Ft=C(24-(T/60))^1.55 = 0.00131 (24-(T/60))^1.55 + 0.07 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period, T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 3 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BASIN
CONCENTRATION POINT: 1

BY: \MES BAZUA, FDATE 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.18
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	2.71
UNIT TIME-PERCENT OF LAG	184.5
TOTAL ADJUSTED STORM RAIN-INCHES	2.03
CONSTANT LOSS RATE-in/hr	0.14
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.66 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.317	0.14	0.29	0.17	1.60	284.16
2	10	0.17	1.3	0.317	0.14	0.29	0.17	1.60	284.16
3	15	0.25	1.1	0.268	0.14	0.24	0.13	1.16	149.98
4	20	0.33	1.5	0.365	0.14	0.33	0.22	2.05	418.33
5	25	0.42	1.5	0.365	0.14	0.33	0.22	2.05	418.33
6	30	0.50	1.8	0.438	0.14	0.39	0.30	2.72	619.60
7	35	0.58	1.5	0.365	0.14	0.33	0.22	2.05	418.33
8	40	0.67	1.8	0.438	0.14	0.39	0.30	2.72	619.60
9	45	0.75	1.8	0.438	0.14	0.39	0.30	2.72	619.60
10	50	0.83	1.5	0.365	0.14	0.33	0.22	2.05	418.33
11	55	0.92	1.6	0.390	0.14	0.35	0.25	2.28	485.42
12	60	1.00	1.8	0.438	0.14	0.39	0.30	2.72	619.60
13	65	1.08	2.2	0.536	0.14	0.48	0.39	3.62	887.95
14	70	1.17	2.2	0.536	0.14	0.48	0.39	3.62	887.95
15	75	1.25	2.2	0.536	0.14	0.48	0.39	3.62	887.95
16	80	1.33	2.0	0.487	0.14	0.44	0.35	3.17	753.77
17	85	1.42	2.6	0.633	0.14	0.57	0.49	4.51	1156.30
18	90	1.50	2.7	0.658	0.14	0.59	0.52	4.74	1223.38
19	95	1.58	2.4	0.585	0.14	0.53	0.44	4.06	1022.12
20	100	1.67	2.7	0.658	0.14	0.59	0.52	4.74	1223.38
21	105	1.75	3.3	0.804	0.14	0.72	0.66	6.08	1625.91
22	110	1.83	3.1	0.755	0.14	0.68	0.61	5.63	1491.73
23	115	1.92	2.9	0.706	0.14	0.64	0.56	5.18	1357.56
24	120	2.00	3.0	0.731	0.14	0.66	0.59	5.41	1424.65
25	125	2.08	3.1	0.755	0.14	0.68	0.61	5.63	1491.73
26	130	2.17	4.2	1.023	0.14	0.92	0.88	8.09	2229.70
27	135	2.25	5.0	1.218	0.14	1.10	1.08	9.88	2766.39
28	140	2.33	3.5	0.853	0.14	0.77	0.71	6.52	1760.08
29	145	2.42	6.8	1.656	0.14	1.49	1.51	13.90	3973.97
30	150	2.50	7.3	1.778	0.14	1.60	1.64	15.02	4309.41
31	155	2.58	8.2	1.998	0.14	1.80	1.86	17.03	4913.19
32	160	2.67	5.9	1.437	0.14	1.29	1.30	11.89	3370.18
33	165	2.75	2.0	0.487	0.14	0.44	0.35	3.17	753.77
34	170	2.83	1.8	0.438	0.14	0.39	0.30	2.72	619.60
35	175	2.92	1.8	0.438	0.14	0.39	0.30	2.72	619.60
36	180	3.00	0.6	0.146	0.14	0.13	0.00	0.04	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	1.60
FLOOD VOLUME (acft)	1.23
FLOOD VOLUME (cuft)	53460.94
REQUIRED STORAGE (acft)	1.06
REQUIRED STORAGE (cuft)	46105.71
PEAK FLOW RATE (cfs)	17.03

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 6 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BA
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.18
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	2.71
UNIT TIME-PERCENT OF LAG	184.5
TOTAL ADJUSTED STORM RAIN-INCHES	2.71
CONSTANT LOSS RATE-in/hr	0.142
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.66 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	0.5	0.163	0.14	0.15	0.02	0.19	0.00
2	10	0.17	0.6	0.195	0.14	0.18	0.05	0.49	0.00
3	15	0.25	0.6	0.195	0.14	0.18	0.05	0.49	0.00
4	20	0.33	0.6	0.195	0.14	0.18	0.05	0.49	0.00
5	25	0.42	0.6	0.195	0.14	0.18	0.05	0.49	0.00
6	30	0.50	0.7	0.228	0.14	0.20	0.09	0.79	38.94
7	35	0.58	0.7	0.228	0.14	0.20	0.09	0.79	38.94
8	40	0.67	0.7	0.228	0.14	0.20	0.09	0.79	38.94
9	45	0.75	0.7	0.228	0.14	0.20	0.09	0.79	38.94
10	50	0.83	0.7	0.228	0.14	0.20	0.09	0.79	38.94
11	55	0.92	0.7	0.228	0.14	0.20	0.09	0.79	38.94
12	60	1.00	0.8	0.260	0.14	0.23	0.12	1.09	128.50
13	65	1.08	0.8	0.260	0.14	0.23	0.12	1.09	128.50
14	70	1.17	0.8	0.260	0.14	0.23	0.12	1.09	128.50
15	75	1.25	0.8	0.260	0.14	0.23	0.12	1.09	128.50
16	80	1.33	0.8	0.260	0.14	0.23	0.12	1.09	128.50
17	85	1.42	0.8	0.260	0.14	0.23	0.12	1.09	128.50
18	90	1.50	0.8	0.260	0.14	0.23	0.12	1.09	128.50
19	95	1.58	0.8	0.260	0.14	0.23	0.12	1.09	128.50
20	100	1.67	0.8	0.260	0.14	0.23	0.12	1.09	128.50
21	105	1.75	0.8	0.260	0.14	0.23	0.12	1.09	128.50
22	110	1.83	0.8	0.260	0.14	0.23	0.12	1.09	128.50
23	115	1.92	0.8	0.260	0.14	0.23	0.12	1.09	128.50
24	120	2.00	0.9	0.293	0.14	0.26	0.15	1.38	218.06
25	125	2.08	0.8	0.260	0.14	0.23	0.12	1.09	128.50
26	130	2.17	0.9	0.293	0.14	0.26	0.15	1.38	218.06
27	135	2.25	0.9	0.293	0.14	0.26	0.15	1.38	218.06
28	140	2.33	0.9	0.293	0.14	0.26	0.15	1.38	218.06
29	145	2.42	0.9	0.293	0.14	0.26	0.15	1.38	218.06
30	150	2.50	0.9	0.293	0.14	0.26	0.15	1.38	218.06
31	155	2.58	0.9	0.293	0.14	0.26	0.15	1.38	218.06
32	160	2.67	0.9	0.293	0.14	0.26	0.15	1.38	218.06
33	165	2.75	1.0	0.325	0.14	0.29	0.18	1.68	307.62
34	170	2.83	1.0	0.325	0.14	0.29	0.18	1.68	307.62
35	175	2.92	1.0	0.325	0.14	0.29	0.18	1.68	307.62
36	180	3.00	1.0	0.325	0.14	0.29	0.18	1.68	307.62
37	185	3.08	1.0	0.325	0.14	0.29	0.18	1.68	307.62
38	190	3.17	1.1	0.358	0.14	0.32	0.22	1.98	397.18
39	195	3.25	1.1	0.358	0.14	0.32	0.22	1.98	397.18
40	200	3.33	1.1	0.358	0.14	0.32	0.22	1.98	397.18
41	205	3.42	1.2	0.390	0.14	0.35	0.25	2.28	486.74
42	210	3.50	1.3	0.423	0.14	0.38	0.28	2.58	576.30
43	215	3.58	1.4	0.455	0.14	0.41	0.31	2.88	665.86
44	220	3.67	1.4	0.455	0.14	0.41	0.31	2.88	665.86
45	225	3.75	1.5	0.488	0.14	0.44	0.35	3.18	755.42
46	230	3.83	1.5	0.488	0.14	0.44	0.35	3.18	755.42
47	235	3.92	1.6	0.520	0.14	0.47	0.38	3.47	844.98
48	240	4.00	1.6	0.520	0.14	0.47	0.38	3.47	844.98
49	245	4.08	1.7	0.553	0.14	0.50	0.41	3.77	934.54
50	250	4.17	1.8	0.585	0.14	0.53	0.44	4.07	1024.10
51	255	4.25	1.9	0.618	0.14	0.56	0.48	4.37	1113.66
52	260	4.33	2.0	0.650	0.14	0.59	0.51	4.67	1203.22
53	265	4.42	2.1	0.683	0.14	0.61	0.54	4.97	1292.78
54	270	4.50	2.1	0.683	0.14	0.61	0.54	4.97	1292.78
55	275	4.58	2.2	0.715	0.14	0.64	0.57	5.27	1382.34
56	280	4.67	2.3	0.748	0.14	0.67	0.61	5.56	1471.90

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 6 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BA
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.18
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	2.71
UNIT TIME-PERCENT OF LAG	184.5
TOTAL ADJUSTED STORM RAIN-INCHES	2.71
CONSTANT LOSS RATE-in/hr	0.142
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.66 cfs

Unit Time Period	Time		Pattern	Storm Rain	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	Percent (Plate E-5.9)	in/hr	Max	Low	in/hr	cfs	cf
57	285	4.75	2.4	0.780	0.14	0.70	0.64	5.86	1561.46
58	290	4.83	2.4	0.780	0.14	0.70	0.64	5.86	1561.46
59	295	4.92	2.5	0.813	0.14	0.73	0.67	6.16	1651.02
60	300	5.00	2.6	0.846	0.14	0.76	0.70	6.46	1740.58
61	305	5.08	3.1	1.008	0.14	0.91	0.87	7.95	2188.39
62	310	5.17	3.6	1.171	0.14	1.05	1.03	9.44	2636.19
63	315	5.25	3.9	1.268	0.14	1.14	1.13	10.34	2904.87
64	320	5.33	4.2	1.366	0.14	1.23	1.22	11.24	3173.55
65	325	5.42	4.7	1.528	0.14	1.38	1.39	12.73	3621.35
66	330	5.50	5.6	1.821	0.14	1.64	1.68	15.42	4427.39
67	335	5.58	1.9	0.618	0.14	0.56	0.48	4.37	1113.66
68	340	5.67	0.9	0.293	0.14	0.26	0.15	1.38	218.06
69	345	5.75	0.6	0.195	0.14	0.18	0.05	0.49	0.00
70	350	5.83	0.5	0.163	0.14	0.15	0.02	0.19	0.00
71	355	5.92	0.3	0.098	0.14	0.09	0.01	0.09	0.00
72	360	6.00	0.2	0.065	0.14	0.06	0.01	0.06	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	1.87
FLOOD VOLUME (acft)	1.43
FLOOD VOLUME (cuft)	62316.83
REQUIRED STORAGE (acft)	1.11
REQUIRED STORAGE (cuft)	48487.31
PEAK FLOW RATE (cfs)	15.42

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 24 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BA
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.180	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1419
LAG TIME - MINUTES	2.71	MINIMUM LOSS RATE (for var. loss) - in/hr	0.071
UNIT TIME-PERCENT OF LAG	553.6	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	4.24	C	0.00131
		PERCOLATION RATE (cfs)	0.66

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
1	15	0.25	0.2	0.034	0.251	0.031	0.003	0.03	0.00
2	30	0.50	0.3	0.051	0.248	0.046	0.005	0.05	0.00
3	45	0.75	0.3	0.051	0.245	0.046	0.005	0.05	0.00
4	60	1.00	0.4	0.068	0.242	0.061	0.007	0.06	0.00
5	75	1.25	0.3	0.051	0.239	0.046	0.005	0.05	0.00
6	90	1.50	0.3	0.051	0.236	0.046	0.005	0.05	0.00
7	105	1.75	0.3	0.051	0.233	0.046	0.005	0.05	0.00
8	120	2.00	0.4	0.068	0.231	0.061	0.007	0.06	0.00
9	135	2.25	0.4	0.068	0.228	0.061	0.007	0.06	0.00
10	150	2.50	0.4	0.068	0.225	0.061	0.007	0.06	0.00
11	165	2.75	0.5	0.085	0.222	0.076	0.008	0.08	0.00
12	180	3.00	0.5	0.085	0.220	0.076	0.008	0.08	0.00
13	195	3.25	0.5	0.085	0.217	0.076	0.008	0.08	0.00
14	210	3.50	0.5	0.085	0.214	0.076	0.008	0.08	0.00
15	225	3.75	0.5	0.085	0.211	0.076	0.008	0.08	0.00
16	240	4.00	0.6	0.102	0.209	0.092	0.010	0.09	0.00
17	255	4.25	0.6	0.102	0.206	0.092	0.010	0.09	0.00
18	270	4.50	0.7	0.119	0.204	0.107	0.012	0.11	0.00
19	285	4.75	0.7	0.119	0.201	0.107	0.012	0.11	0.00
20	300	5.00	0.8	0.136	0.198	0.122	0.014	0.12	0.00
21	315	5.25	0.6	0.102	0.196	0.092	0.010	0.09	0.00
22	330	5.50	0.7	0.119	0.193	0.107	0.012	0.11	0.00
23	345	5.75	0.8	0.136	0.191	0.122	0.014	0.12	0.00
24	360	6.00	0.8	0.136	0.188	0.122	0.014	0.12	0.00
25	375	6.25	0.9	0.153	0.186	0.137	0.015	0.14	0.00
26	390	6.50	0.9	0.153	0.183	0.137	0.015	0.14	0.00
27	405	6.75	1.0	0.170	0.181	0.153	0.017	0.16	0.00
28	420	7.00	1.0	0.170	0.178	0.153	0.017	0.16	0.00
29	435	7.25	1.0	0.170	0.176	0.153	0.017	0.16	0.00
30	450	7.50	1.1	0.187	0.173	0.168	0.013	0.12	0.00
31	465	7.75	1.2	0.204	0.171	0.183	0.032	0.30	0.00
32	480	8.00	1.3	0.220	0.169	0.198	0.052	0.48	0.00
33	495	8.25	1.5	0.254	0.166	0.229	0.088	0.81	135.70
34	510	8.50	1.5	0.254	0.164	0.229	0.090	0.83	154.86
35	525	8.75	1.6	0.271	0.162	0.244	0.110	1.01	313.98
36	540	9.00	1.7	0.288	0.159	0.259	0.129	1.18	472.93
37	555	9.25	1.9	0.322	0.157	0.290	0.165	1.51	771.83
38	570	9.50	2.0	0.339	0.155	0.305	0.184	1.69	930.43
39	585	9.75	2.1	0.356	0.153	0.321	0.203	1.87	1088.87
40	600	10.00	2.2	0.373	0.151	0.336	0.223	2.04	1247.13
41	615	10.25	1.5	0.254	0.148	0.229	0.106	0.97	284.22
42	630	10.50	1.5	0.254	0.146	0.229	0.108	0.99	302.00
43	645	10.75	2.0	0.339	0.144	0.305	0.195	1.79	1020.22
44	660	11.00	2.0	0.339	0.142	0.305	0.197	1.81	1037.65
45	675	11.25	1.9	0.322	0.140	0.290	0.182	1.67	914.76
46	690	11.50	1.9	0.322	0.138	0.290	0.184	1.69	931.82
47	705	11.75	1.7	0.288	0.136	0.259	0.153	1.40	668.45
48	720	12.00	1.8	0.305	0.134	0.275	0.171	1.57	825.26
49	735	12.25	2.5	0.424	0.132	0.382	0.292	2.68	1822.63
50	750	12.50	2.6	0.441	0.130	0.397	0.311	2.86	1979.06
51	765	12.75	2.8	0.475	0.128	0.427	0.347	3.19	2275.42
52	780	13.00	2.9	0.492	0.126	0.443	0.366	3.36	2431.47
53	795	13.25	3.4	0.577	0.124	0.519	0.453	4.15	3147.82
54	810	13.50	3.4	0.577	0.122	0.519	0.454	4.17	3163.35
55	825	13.75	2.3	0.390	0.120	0.351	0.270	2.48	1637.32
56	840	14.00	2.3	0.390	0.118	0.351	0.272	2.49	1652.45
57	855	14.25	2.7	0.458	0.117	0.412	0.341	3.13	2227.87
58	870	14.50	2.6	0.441	0.115	0.397	0.326	2.99	2102.46
59	885	14.75	2.6	0.441	0.113	0.397	0.328	3.01	2116.97
60	900	15.00	2.5	0.424	0.111	0.382	0.313	2.87	1991.15
61	915	15.25	2.4	0.407	0.110	0.366	0.297	2.73	1865.11

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 24 HOUR STORM EVENT

PROJECT: COACHELLA BUSINESS PARK - INTERIM BA
CONCENTRATION POINT: 1

BY: JAMES BAZUA DATE: 6/10/2020

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	9.180	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.1419
LAG TIME - MINUTES	2.71	MINIMUM LOSS RATE (for var. loss) - in/hr	0.071
UNIT TIME-PERCENT OF LAG	553.6	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	4.24	C	0.00131
		PERCOLATION RATE (cfs)	0.66

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
62	930	15.50	2.3	0.390	0.108	0.351	0.282	2.59	1738.85
63	945	15.75	1.9	0.322	0.106	0.290	0.216	1.98	1192.01
64	960	16.00	1.9	0.322	0.105	0.290	0.218	2.00	1205.43
65	975	16.25	0.4	0.068	0.103	0.061	0.007	0.06	0.00
66	990	16.50	0.4	0.068	0.102	0.061	0.007	0.06	0.00
67	1005	16.75	0.3	0.051	0.100	0.046	0.005	0.05	0.00
68	1020	17.00	0.3	0.051	0.099	0.046	0.005	0.05	0.00
69	1035	17.25	0.5	0.085	0.097	0.076	0.008	0.08	0.00
70	1050	17.50	0.5	0.085	0.096	0.076	0.008	0.08	0.00
71	1065	17.75	0.5	0.085	0.094	0.076	0.008	0.08	0.00
72	1080	18.00	0.4	0.068	0.093	0.061	0.007	0.06	0.00
73	1095	18.25	0.4	0.068	0.091	0.061	0.007	0.06	0.00
74	1110	18.50	0.4	0.068	0.090	0.061	0.007	0.06	0.00
75	1125	18.75	0.3	0.051	0.089	0.046	0.005	0.05	0.00
76	1140	19.00	0.2	0.034	0.087	0.031	0.003	0.03	0.00
77	1155	19.25	0.3	0.051	0.086	0.046	0.005	0.05	0.00
78	1170	19.50	0.4	0.068	0.085	0.061	0.007	0.06	0.00
79	1185	19.75	0.3	0.051	0.084	0.046	0.005	0.05	0.00
80	1200	20.00	0.2	0.034	0.083	0.031	0.003	0.03	0.00
81	1215	20.25	0.3	0.051	0.082	0.046	0.005	0.05	0.00
82	1230	20.50	0.3	0.051	0.081	0.046	0.005	0.05	0.00
83	1245	20.75	0.3	0.051	0.080	0.046	0.005	0.05	0.00
84	1260	21.00	0.2	0.034	0.079	0.031	0.003	0.03	0.00
85	1275	21.25	0.3	0.051	0.078	0.046	0.005	0.05	0.00
86	1290	21.50	0.2	0.034	0.077	0.031	0.003	0.03	0.00
87	1305	21.75	0.3	0.051	0.076	0.046	0.005	0.05	0.00
88	1320	22.00	0.2	0.034	0.075	0.031	0.003	0.03	0.00
89	1335	22.25	0.3	0.051	0.074	0.046	0.005	0.05	0.00
90	1350	22.50	0.2	0.034	0.074	0.031	0.003	0.03	0.00
91	1365	22.75	0.2	0.034	0.073	0.031	0.003	0.03	0.00
92	1380	23.00	0.2	0.034	0.073	0.031	0.003	0.03	0.00
93	1395	23.25	0.2	0.034	0.072	0.031	0.003	0.03	0.00
94	1410	23.50	0.2	0.034	0.072	0.031	0.003	0.03	0.00
95	1425	23.75	0.2	0.034	0.071	0.031	0.003	0.03	0.00
96	1440	24.00	0.2	0.034	0.071	0.031	0.003	0.03	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	2.03
FLOOD VOLUME (acft)	1.55
FLOOD VOLUME (cuft)	67655.92
REQUIRED STORAGE (acft)	1.00
REQUIRED STORAGE (cuft)	43649.48
PEAK FLOW (cfs)	4.17

SIN

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PROJECT: COACHELLA BUSINESS PARK - INTERIM BASIN
TKC JOB # C1443
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
382	0	0		42380	0	0	0.00
383	1	1	2426	44806	43593	43593	1.00
384	1	2	2482	47288	46047	89640	2.06
385	1	3	2539	49827	48558	138198	3.17

PERCOLATION CALCULATIONS

PERCOLATION RATE	0.67 in/hr	0.66 cfs

MAXWELL IV DRYWELLS

NUMBER USED	0	
RATE/DRYWELL	0 cfs	
TOTAL DISSIPATED		0 cfs

TOTAL PERCOLATION RATE 0.66 cfs

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TKC JOB # C1443

100 YEAR - 3 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	1.60	481	481	197	284	382.01	284	0.01
2	10	1.60	481	766	197	568	382.01	568	0.01
3	15	1.16	347	915	197	718	382.02	718	0.02
4	20	2.05	616	1,334	197	1,137	382.03	1,137	0.03
5	25	2.05	616	1,752	197	1,555	382.04	1,555	0.04
6	30	2.72	817	2,372	197	2,175	382.05	2,175	0.05
7	35	2.05	616	2,790	197	2,593	382.06	2,593	0.06
8	40	2.72	817	3,410	197	3,212	382.07	3,212	0.07
9	45	2.72	817	4,029	197	3,832	382.09	3,832	0.09
10	50	2.05	616	4,448	197	4,250	382.10	4,250	0.10
11	55	2.28	683	4,933	197	4,736	382.11	4,736	0.11
12	60	2.72	817	5,553	197	5,355	382.12	5,355	0.12
13	65	3.62	1,085	6,441	197	6,243	382.14	6,243	0.14
14	70	3.62	1,085	7,329	197	7,131	382.16	7,131	0.16
15	75	3.62	1,085	8,216	197	8,019	382.18	8,019	0.18
16	80	3.17	951	8,970	197	8,773	382.20	8,773	0.20
17	85	4.51	1,353	10,127	197	9,929	382.23	9,929	0.23
18	90	4.74	1,421	11,350	197	11,153	382.26	11,153	0.26
19	95	4.06	1,219	12,372	197	12,175	382.28	12,175	0.28
20	100	4.74	1,421	13,595	197	13,398	382.31	13,398	0.31
21	105	6.08	1,823	15,221	197	15,024	382.34	15,024	0.34
22	110	5.63	1,689	16,713	197	16,516	382.38	16,516	0.38
23	115	5.18	1,555	18,071	197	17,873	382.41	17,873	0.41
24	120	5.41	1,622	19,495	197	19,298	382.44	19,298	0.44
25	125	5.63	1,689	20,987	197	20,790	382.48	20,790	0.48
26	130	8.09	2,427	23,217	197	23,020	382.53	23,020	0.53
27	135	9.88	2,964	25,983	197	25,786	382.59	25,786	0.59
28	140	6.52	1,957	27,743	197	27,546	382.63	27,546	0.63
29	145	13.90	4,171	31,717	197	31,520	382.72	31,520	0.72
30	150	15.02	4,507	36,027	197	35,829	382.82	35,829	0.82
31	155	17.03	5,110	40,940	197	40,743	382.93	40,743	0.94
32	160	11.89	3,567	44,310	197	44,113	383.01	44,113	1.01
33	165	3.17	951	45,064	197	44,867	383.03	44,867	1.03
34	170	2.72	817	45,683	197	45,486	383.04	45,486	1.04
35	175	2.72	817	46,303	197	46,106	383.05	46,106	1.06
36	180	0.04	12	46,117	197	45,920	383.05	45,920	1.05

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TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.19	57	57	197	-	382.00	-	0.00
2	10	0.49	147	147	197	-	382.00	-	0.00
3	15	0.49	147	147	197	-	382.00	-	0.00
4	20	0.49	147	147	197	-	382.00	-	0.00
5	25	0.49	147	147	197	-	382.00	-	0.00
6	30	0.79	236	236	197	39	382.00	39	0.00
7	35	0.79	236	275	197	78	382.00	78	0.00
8	40	0.79	236	314	197	117	382.00	117	0.00
9	45	0.79	236	353	197	156	382.00	156	0.00
10	50	0.79	236	392	197	195	382.00	195	0.00
11	55	0.79	236	431	197	234	382.01	234	0.01
12	60	1.09	326	559	197	362	382.01	362	0.01
13	65	1.09	326	688	197	491	382.01	491	0.01
14	70	1.09	326	816	197	619	382.01	619	0.01
15	75	1.09	326	945	197	748	382.02	748	0.02
16	80	1.09	326	1,073	197	876	382.02	876	0.02
17	85	1.09	326	1,202	197	1,005	382.02	1,005	0.02
18	90	1.09	326	1,330	197	1,133	382.03	1,133	0.03
19	95	1.09	326	1,459	197	1,262	382.03	1,262	0.03
20	100	1.09	326	1,587	197	1,390	382.03	1,390	0.03
21	105	1.09	326	1,716	197	1,519	382.03	1,519	0.03
22	110	1.09	326	1,844	197	1,647	382.04	1,647	0.04
23	115	1.09	326	1,973	197	1,776	382.04	1,776	0.04
24	120	1.38	415	2,191	197	1,994	382.05	1,994	0.05
25	125	1.09	326	2,319	197	2,122	382.05	2,122	0.05
26	130	1.38	415	2,538	197	2,340	382.05	2,340	0.05
27	135	1.38	415	2,756	197	2,558	382.06	2,558	0.06
28	140	1.38	415	2,974	197	2,776	382.06	2,776	0.06
29	145	1.38	415	3,192	197	2,995	382.07	2,995	0.07
30	150	1.38	415	3,410	197	3,213	382.07	3,213	0.07
31	155	1.38	415	3,628	197	3,431	382.08	3,431	0.08
32	160	1.38	415	3,846	197	3,649	382.08	3,649	0.08
33	165	1.68	505	4,154	197	3,956	382.09	3,956	0.09
34	170	1.68	505	4,461	197	4,264	382.10	4,264	0.10
35	175	1.68	505	4,769	197	4,572	382.10	4,572	0.10
36	180	1.68	505	5,076	197	4,879	382.11	4,879	0.11
37	185	1.68	505	5,384	197	5,187	382.12	5,187	0.12
38	190	1.98	594	5,781	197	5,584	382.13	5,584	0.13
39	195	1.98	594	6,178	197	5,981	382.14	5,981	0.14
40	200	1.98	594	6,576	197	6,378	382.15	6,378	0.15
41	205	2.28	684	7,062	197	6,865	382.16	6,865	0.16
42	210	2.58	773	7,639	197	7,441	382.17	7,441	0.17
43	215	2.88	863	8,304	197	8,107	382.19	8,107	0.19
44	220	2.88	863	8,970	197	8,773	382.20	8,773	0.20
45	225	3.18	953	9,726	197	9,529	382.22	9,529	0.22
46	230	3.18	953	10,481	197	10,284	382.24	10,284	0.24
47	235	3.47	1,042	11,326	197	11,129	382.26	11,129	0.26
48	240	3.47	1,042	12,171	197	11,974	382.27	11,974	0.27
49	245	3.77	1,132	13,106	197	12,909	382.30	12,909	0.30
50	250	4.07	1,221	14,130	197	13,933	382.32	13,933	0.32
51	255	4.37	1,311	15,243	197	15,046	382.35	15,046	0.35
52	260	4.67	1,400	16,447	197	16,250	382.37	16,250	0.37
53	265	4.97	1,490	17,739	197	17,542	382.40	17,542	0.40
54	270	4.97	1,490	19,032	197	18,835	382.43	18,835	0.43
55	275	5.27	1,580	20,415	197	20,217	382.46	20,217	0.46

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TKC JOB # C1443

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
56	280	5.56	1,669	21,887	197	21,689	382.50	21,689	0.50
57	285	5.86	1,759	23,448	197	23,251	382.53	23,251	0.53
58	290	5.86	1,759	25,009	197	24,812	382.57	24,812	0.57
59	295	6.16	1,848	26,660	197	26,463	382.61	26,463	0.61
60	300	6.46	1,938	28,401	197	28,204	382.65	28,204	0.65
61	305	7.95	2,386	30,589	197	30,392	382.70	30,392	0.70
62	310	9.44	2,833	33,226	197	33,028	382.76	33,028	0.76
63	315	10.34	3,102	36,130	197	35,933	382.82	35,933	0.82
64	320	11.24	3,371	39,304	197	39,107	382.90	39,107	0.90
65	325	12.73	3,819	42,925	197	42,728	382.98	42,728	0.98
66	330	15.42	4,625	47,353	197	47,156	383.08	47,156	1.08
67	335	4.37	1,311	48,466	197	48,269	383.10	48,269	1.11
68	340	1.38	415	48,684	197	48,487	383.11	48,487	1.11
69	345	0.49	147	48,634	197	48,437	383.11	48,437	1.11
70	350	0.19	57	48,494	197	48,297	383.10	48,297	1.11
71	355	0.09	27	48,323	197	48,126	383.10	48,126	1.10
72	360	0.06	18	48,144	197	47,947	383.09	47,947	1.10

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TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	15	0.03	28	28	592	-	382.00	-	0.00
2	30	0.05	42	42	592	-	382.00	-	0.00
3	45	0.05	42	42	592	-	382.00	-	0.00
4	60	0.06	56	56	592	-	382.00	-	0.00
5	75	0.05	42	42	592	-	382.00	-	0.00
6	90	0.05	42	42	592	-	382.00	-	0.00
7	105	0.05	42	42	592	-	382.00	-	0.00
8	120	0.06	56	56	592	-	382.00	-	0.00
9	135	0.06	56	56	592	-	382.00	-	0.00
10	150	0.06	56	56	592	-	382.00	-	0.00
11	165	0.08	70	70	592	-	382.00	-	0.00
12	180	0.08	70	70	592	-	382.00	-	0.00
13	195	0.08	70	70	592	-	382.00	-	0.00
14	210	0.08	70	70	592	-	382.00	-	0.00
15	225	0.08	70	70	592	-	382.00	-	0.00
16	240	0.09	84	84	592	-	382.00	-	0.00
17	255	0.09	84	84	592	-	382.00	-	0.00
18	270	0.11	98	98	592	-	382.00	-	0.00
19	285	0.11	98	98	592	-	382.00	-	0.00
20	300	0.12	112	112	592	-	382.00	-	0.00
21	315	0.09	84	84	592	-	382.00	-	0.00
22	330	0.11	98	98	592	-	382.00	-	0.00
23	345	0.12	112	112	592	-	382.00	-	0.00
24	360	0.12	112	112	592	-	382.00	-	0.00
25	375	0.14	126	126	592	-	382.00	-	0.00
26	390	0.14	126	126	592	-	382.00	-	0.00
27	405	0.16	140	140	592	-	382.00	-	0.00
28	420	0.16	140	140	592	-	382.00	-	0.00
29	435	0.16	140	140	592	-	382.00	-	0.00
30	450	0.12	108	108	592	-	382.00	-	0.00
31	465	0.30	268	268	592	-	382.00	-	0.00
32	480	0.48	428	428	592	-	382.00	-	0.00
33	495	0.81	727	727	592	136	382.00	136	0.00
34	510	0.83	746	882	592	291	382.01	291	0.01
35	525	1.01	906	1,196	592	605	382.01	605	0.01
36	540	1.18	1,064	1,669	592	1,077	382.02	1,077	0.02
37	555	1.51	1,363	2,441	592	1,849	382.04	1,849	0.04
38	570	1.69	1,522	3,371	592	2,780	382.06	2,780	0.06
39	585	1.87	1,680	4,460	592	3,869	382.09	3,869	0.09
40	600	2.04	1,839	5,707	592	5,116	382.12	5,116	0.12
41	615	0.97	876	5,992	592	5,400	382.12	5,400	0.12
42	630	0.99	894	6,294	592	5,702	382.13	5,702	0.13
43	645	1.79	1,612	7,314	592	6,722	382.15	6,722	0.15
44	660	1.81	1,629	8,351	592	7,760	382.18	7,760	0.18
45	675	1.67	1,506	9,266	592	8,675	382.20	8,675	0.20
46	690	1.69	1,523	10,198	592	9,606	382.22	9,606	0.22
47	705	1.40	1,260	10,866	592	10,275	382.24	10,275	0.24
48	720	1.57	1,417	11,692	592	11,100	382.25	11,100	0.25
49	735	2.68	2,414	13,514	592	12,923	382.30	12,923	0.30
50	750	2.86	2,571	15,493	592	14,902	382.34	14,902	0.34
51	765	3.19	2,867	17,769	592	17,177	382.39	17,177	0.39
52	780	3.36	3,023	20,200	592	19,609	382.45	19,609	0.45
53	795	4.15	3,739	23,348	592	22,757	382.52	22,757	0.52
54	810	4.17	3,755	26,511	592	25,920	382.59	25,920	0.60
55	825	2.48	2,229	28,149	592	27,557	382.63	27,557	0.63
56	840	2.49	2,244	29,801	592	29,210	382.67	29,210	0.67
57	855	3.13	2,819	32,029	592	31,437	382.72	31,437	0.72
58	870	2.99	2,694	34,132	592	33,540	382.77	33,540	0.77

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TKC JOB # C1443

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
59	885	3.01	2,709	36,248	592	35,657	382.82	35,657	0.82
60	900	2.87	2,583	38,240	592	37,648	382.86	37,648	0.86
61	915	2.73	2,457	40,105	592	39,513	382.91	39,513	0.91
62	930	2.59	2,330	41,844	592	41,252	382.95	41,252	0.95
63	945	1.98	1,784	43,036	592	42,444	382.97	42,444	0.97
64	960	2.00	1,797	44,241	592	43,649	383.00	43,649	1.00
65	975	0.06	56	43,706	592	43,114	382.99	43,114	0.99
66	990	0.06	56	43,170	592	42,578	382.98	42,578	0.98
67	1005	0.05	42	42,621	592	42,029	382.96	42,029	0.96
68	1020	0.05	42	42,071	592	41,479	382.95	41,479	0.95
69	1035	0.08	70	41,549	592	40,958	382.94	40,958	0.94
70	1050	0.08	70	41,028	592	40,436	382.93	40,436	0.93
71	1065	0.08	70	40,507	592	39,915	382.92	39,915	0.92
72	1080	0.06	56	39,971	592	39,379	382.90	39,379	0.90
73	1095	0.06	56	39,435	592	38,844	382.89	38,844	0.89
74	1110	0.06	56	38,900	592	38,308	382.88	38,308	0.88
75	1125	0.05	42	38,350	592	37,759	382.87	37,759	0.87
76	1140	0.03	28	37,787	592	37,195	382.85	37,195	0.85
77	1155	0.05	42	37,237	592	36,646	382.84	36,646	0.84
78	1170	0.06	56	36,702	592	36,110	382.83	36,110	0.83
79	1185	0.05	42	36,152	592	35,561	382.82	35,561	0.82
80	1200	0.03	28	35,589	592	34,997	382.80	34,997	0.80
81	1215	0.05	42	35,039	592	34,448	382.79	34,448	0.79
82	1230	0.05	42	34,490	592	33,898	382.78	33,898	0.78
83	1245	0.05	42	33,940	592	33,349	382.77	33,349	0.77
84	1260	0.03	28	33,377	592	32,785	382.75	32,785	0.75
85	1275	0.05	42	32,827	592	32,236	382.74	32,236	0.74
86	1290	0.03	28	32,264	592	31,672	382.73	31,672	0.73
87	1305	0.05	42	31,714	592	31,123	382.71	31,123	0.71
88	1320	0.03	28	31,151	592	30,559	382.70	30,559	0.70
89	1335	0.05	42	30,601	592	30,010	382.69	30,010	0.69
90	1350	0.03	28	30,038	592	29,446	382.68	29,446	0.68
91	1365	0.03	28	29,474	592	28,883	382.66	28,883	0.66
92	1380	0.03	28	28,911	592	28,319	382.65	28,319	0.65
93	1395	0.03	28	28,347	592	27,756	382.64	27,756	0.64
94	1410	0.03	28	27,784	592	27,192	382.62	27,192	0.62
95	1425	0.03	28	27,220	592	26,628	382.61	26,628	0.61
96	1440	0.03	28	26,656	592	26,065	382.60	26,065	0.60

IV RETENTION BASIN INFILTRATION STUDY

The project runoff volume generated during the 100 year design storm event and stored in the on-site retention system will be designed to infiltrate into the soil to eliminate the presence of standing water and risk of vector control issues within a period of 72 hours in accordance with the City of Coachella Municipal Code. Since infiltration will occur within unpaved retention basin areas, the surface volume of the basin areas will be tabulated so that the allowable infiltration rate can be applied over this surface area

Retention basin calculations in Section III of this report show that the total volume of runoff stored on-site during 100 year storm event over the three separate subareas is **247,322** cu.ft. Assuming the maximum infiltration allowed by City of Coachella (10 gal/s.f./day), the time required to evacuate the stored volume of runoff during the 100 year storm event is:

Maximum allowable infiltration rate:

10 gal/s.f./day = 1.34 cu.ft/s.f./day = 4.02 cu.ft/s.f./72 hours

Total area contributing to infiltration:

42,516 s.f. (SUBAREA A) + 42,380 s.f. (SUBAREA B) + 2,664 s.f. (SUBAREA C)
= **87,560 s.f.**

(4.02 cu.ft/s.f./72 hours) X (87,560 s.f.) = 351,991 cu.ft / 72 hours

The retention basin and adjacent pervious area has the capacity to evacuate 351,991 cu.ft. of runoff volume within a 72 hour period which excess the amount of stored volume during the 100 year storm event (247,322 cu.ft.)

V APPENDIX

1 IN = 0.25 MI

The Altum Group

Project Vicinity

Coachella Airport Business Park

THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCEL MAY NOT COMPLY WITH LOCAL LOT-SPLIT OR BUILDING SITE ORDINANCES.

SEC. 15 T.6S, R.8E

CITY OF COACHELLA

TRA 012-048
012-049

763-33

25-39-1

N89-51-15E 2614.29

15

478.04

634.78

L=742.81

L=947.16

L=861.76

645.60

456.05

186.05

310.17

132.38

219.84

451.47

771.92

59.30

30

1324.96

S89-52-00S

383.01

871.00

1583.27

1828.61

1318.98

306.17

740.38

185.63

415.84

215.12

421.46

L=259.48

300.83

399.01

EX

EX

717.02

311.81

L=530.43

L=496.15

1474.76

315.86

80.76

53.13

144.75

220.10

259.92

434.80

30

C.V.C.W.D. STORMWATER CHANNEL

STATE HWY 86

FILLMORE ST

56TH AVE (AIRPORT BLVD)

TRA 012-049

TRA 012-048

13
21.56 AC ML

25
68.00 AC ML

26
15.00 AC ML

28
23.89 AC ML

29
11.18 AC ML

18
9.62 AC ML

30
3.14 AC ML

06
3.57 AC ML

14

22

23

N
W E
S

1 " = 400 '

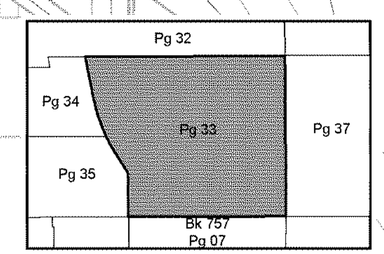
Legend

- Lot Lines
- Right-Of-Way
- Old Lot Lines
- Reference R.O.W
- Other Easements
- Lease Area
- Subdivision Tic Mark

Date	Old Number	New Number
4/1/1987	350-8	7
4/1/1987	3	8
4/1/1987	7, 8	9
4/1/1987	9	10, 11
3/1/1991	1	12, 13, ST
3/1/1991	4	14, ST
3/1/1991	5	15, ST
3/1/1991	11	16, 17, ST
8/1/1991	10	18, ST
2/1/2005	14	19, 20
2/1/2005	15	21, 22
2/1/2005	16	23, 24
12/1/2005	2, 12	25
12/1/2005	19, 21, 23	26
12/1/2005	20, 22, 24	27
12/1/2009	27	28, ST
5/1/2018	17	29, 30

Data

RS 15/56, 16,56, 17/18, MB 4/53
MB 22/20-21, RS 5/18, CVCWD R/W
R/W XI-RIV-187-F
60' RDS. PER INST. 32692 4/59
RS 11/30, MB 4/69, 4/78, 9/21
LLA 2390, RS 78/46



ASSESSOR'S MAP BK763 PG. 33
Riverside County, Calif.

jasantos

May 2018

Get Latitude and Longitude

Latitude and Longitude are the units that represent the *coordinates at geographic coordinate system*. To make a search, use the name of a place, city, state, or address, or click the location on the map to **find lat long coordinates**.

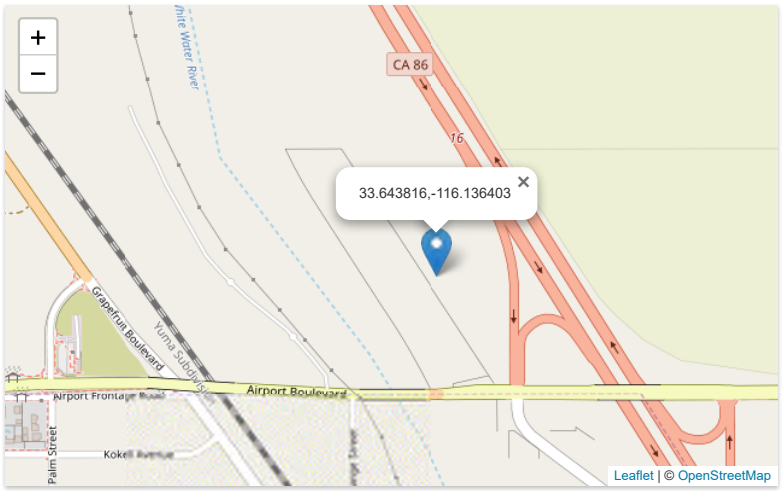
Place Name

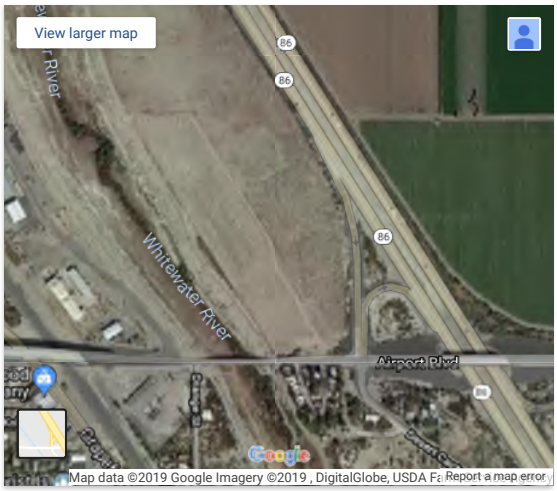
Type A Place Name

Find

Add the country code for better results. Ex: London, UK

Latitude	Longitude
33.643816	-116.136403





Lat Long	GPS Coordinates
(33.643816, -116.136403)	33° 38' 37.7376'' N 116° 8' 11.0508'' W

Share this location link

<a href="https://www.latlong.net/c/?lat=33.643816&long=-116.136403" target="_blank">

Location page url

https://www.latlong.net/c/?lat=33.643816&long=-116.136403

Copy and paste the html code above in your website to share.

What is Latitude and Longitude?

Just like every actual house has its address (which includes the number, the name of the street, city, etc), every single point on the surface of earth can be specified by the *latitude and longitude coordinates*. Therefore, by using latitude and longitude we can specify virtually any point on earth.

NOAA Atlas 14, Volume 6, Version 2
Location name: Coachella, California, USA*
Latitude: 33.6438°, Longitude: -116.1364°
Elevation: -118.92 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	**0.061** (0.051-0.074)	**0.098** (0.081-0.118)	**0.148** (0.123-0.180)	**0.192** (0.158-0.235)	**0.254** (0.203-0.322)	**0.305** (0.238-0.395)	**0.360** (0.274-0.478)	**0.419** (0.310-0.573)	**0.504** (0.357-0.719)	**0.575** (0.393-0.849)
10-min	**0.087** (0.073-0.106)	**0.140** (0.117-0.169)	**0.212** (0.177-0.258)	**0.275** (0.227-0.336)	**0.364** (0.290-0.462)	**0.438** (0.341-0.567)	**0.516** (0.392-0.685)	**0.601** (0.444-0.821)	**0.723** (0.512-1.03)	**0.824** (0.563-1.22)
15-min	**0.106** (0.088-0.128)	**0.169** (0.141-0.205)	**0.257** (0.214-0.312)	**0.332** (0.274-0.407)	**0.441** (0.351-0.559)	**0.529** (0.413-0.685)	**0.624** (0.475-0.828)	**0.726** (0.537-0.993)	**0.874** (0.619-1.25)	**0.997** (0.681-1.47)
30-min	**0.147** (0.123-0.178)	**0.235** (0.196-0.285)	**0.358** (0.297-0.434)	**0.463** (0.381-0.567)	**0.614** (0.489-0.778)	**0.737** (0.575-0.954)	**0.869** (0.661-1.15)	**1.01** (0.748-1.38)	**1.22** (0.862-1.74)	**1.39** (0.949-2.05)
60-min	**0.207** (0.172-0.250)	**0.330** (0.275-0.400)	**0.501** (0.417-0.609)	**0.649** (0.535-0.795)	**0.861** (0.686-1.09)	**1.03** (0.806-1.34)	**1.22** (0.927-1.62)	**1.42** (1.05-1.94)	**1.71** (1.21-2.43)	**1.95** (1.33-2.88)
2-hr	**0.285** (0.238-0.345)	**0.429** (0.358-0.519)	**0.640** (0.532-0.778)	**0.832** (0.686-1.02)	**1.13** (0.896-1.43)	**1.38** (1.07-1.78)	**1.66** (1.26-2.21)	**1.99** (1.47-2.71)	**2.48** (1.76-3.53)	**2.91** (1.99-4.29)
3-hr	**0.348** (0.290-0.420)	**0.510** (0.425-0.617)	**0.756** (0.629-0.918)	**0.984** (0.812-1.21)	**1.34** (1.07-1.70)	**1.66** (1.30-2.15)	**2.03** (1.54-2.69)	**2.45** (1.81-3.35)	**3.12** (2.21-4.44)	**3.71** (2.54-5.48)
6-hr	**0.461** (0.385-0.558)	**0.666** (0.556-0.807)	**0.983** (0.818-1.19)	**1.28** (1.06-1.57)	**1.77** (1.41-2.24)	**2.20** (1.72-2.85)	**2.71** (2.06-3.60)	**3.32** (2.45-4.53)	**4.28** (3.03-6.11)	**5.17** (3.53-7.63)
12-hr	**0.545** (0.455-0.659)	**0.801** (0.668-0.970)	**1.19** (0.993-1.45)	**1.56** (1.29-1.92)	**2.15** (1.72-2.73)	**2.68** (2.09-3.47)	**3.30** (2.51-4.38)	**4.02** (2.97-5.50)	**5.17** (3.66-7.37)	**6.21** (4.25-9.18)
24-hr	**0.693** (0.613-0.799)	**1.05** (0.925-1.21)	**1.58** (1.39-1.83)	**2.07** (1.81-2.41)	**2.82** (2.39-3.40)	**3.49** (2.90-4.29)	**4.24** (3.44-5.34)	**5.11** (4.04-6.61)	**6.46** (4.90-8.69)	**7.65** (5.62-10.6)
2-day	**0.785** (0.695-0.906)	**1.21** (1.07-1.39)	**1.82** (1.60-2.11)	**2.37** (2.07-2.76)	**3.19** (2.70-3.84)	**3.89** (3.23-4.77)	**4.66** (3.78-5.86)	**5.52** (4.36-7.14)	**6.82** (5.18-9.17)	**7.93** (5.82-11.0)
3-day	**0.846** (0.748-0.975)	**1.31** (1.16-1.51)	**1.97** (1.73-2.28)	**2.55** (2.23-2.97)	**3.41** (2.89-4.10)	**4.12** (3.43-5.07)	**4.91** (3.98-6.17)	**5.78** (4.56-7.46)	**7.06** (5.36-9.49)	**8.14** (5.97-11.3)
4-day	**0.897** (0.794-1.03)	**1.39** (1.23-1.60)	**2.08** (1.84-2.41)	**2.69** (2.35-3.14)	**3.58** (3.03-4.31)	**4.32** (3.59-5.31)	**5.12** (4.16-6.44)	**6.01** (4.74-7.76)	**7.30** (5.54-9.81)	**8.38** (6.15-11.6)
7-day	**0.962** (0.851-1.11)	**1.47** (1.30-1.70)	**2.19** (1.93-2.54)	**2.82** (2.46-3.29)	**3.73** (3.16-4.49)	**4.48** (3.72-5.50)	**5.29** (4.29-6.65)	**6.18** (4.88-7.98)	**7.47** (5.67-10.0)	**8.54** (6.27-11.9)
10-day	**0.995** (0.881-1.15)	**1.52** (1.34-1.75)	**2.25** (1.98-2.60)	**2.88** (2.52-3.36)	**3.81** (3.23-4.58)	**4.57** (3.79-5.61)	**5.38** (4.37-6.77)	**6.28** (4.96-8.11)	**7.57** (5.74-10.2)	**8.64** (6.35-12.0)
20-day	**1.07** (0.947-1.23)	**1.64** (1.45-1.89)	**2.43** (2.15-2.82)	**3.12** (2.73-3.64)	**4.11** (3.48-4.95)	**4.92** (4.08-6.04)	**5.78** (4.69-7.27)	**6.72** (5.31-8.69)	**8.08** (6.13-10.9)	**9.20** (6.76-12.8)
30-day	**1.14** (1.01-1.32)	**1.77** (1.56-2.04)	**2.64** (2.33-3.06)	**3.39** (2.96-3.95)	**4.47** (3.79-5.38)	**5.35** (4.44-6.57)	**6.29** (5.10-7.91)	**7.31** (5.77-9.44)	**8.78** (6.66-11.8)	**9.99** (7.33-13.9)
45-day	**1.25** (1.11-1.44)	**1.97** (1.74-2.27)	**2.96** (2.61-3.43)	**3.82** (3.34-4.45)	**5.04** (4.27-6.07)	**6.04** (5.02-7.42)	**7.11** (5.77-8.94)	**8.26** (6.53-10.7)	**9.92** (7.53-13.3)	**11.3** (8.29-15.7)
60-day	**1.32** (1.17-1.52)	**2.10** (1.86-2.42)	**3.18** (2.81-3.68)	**4.11** (3.60-4.80)	**5.45** (4.61-6.56)	**6.53** (5.42-8.02)	**7.69** (6.24-9.67)	**8.94** (7.06-11.6)	**10.7** (8.15-14.4)	**12.2** (8.97-17.0)

[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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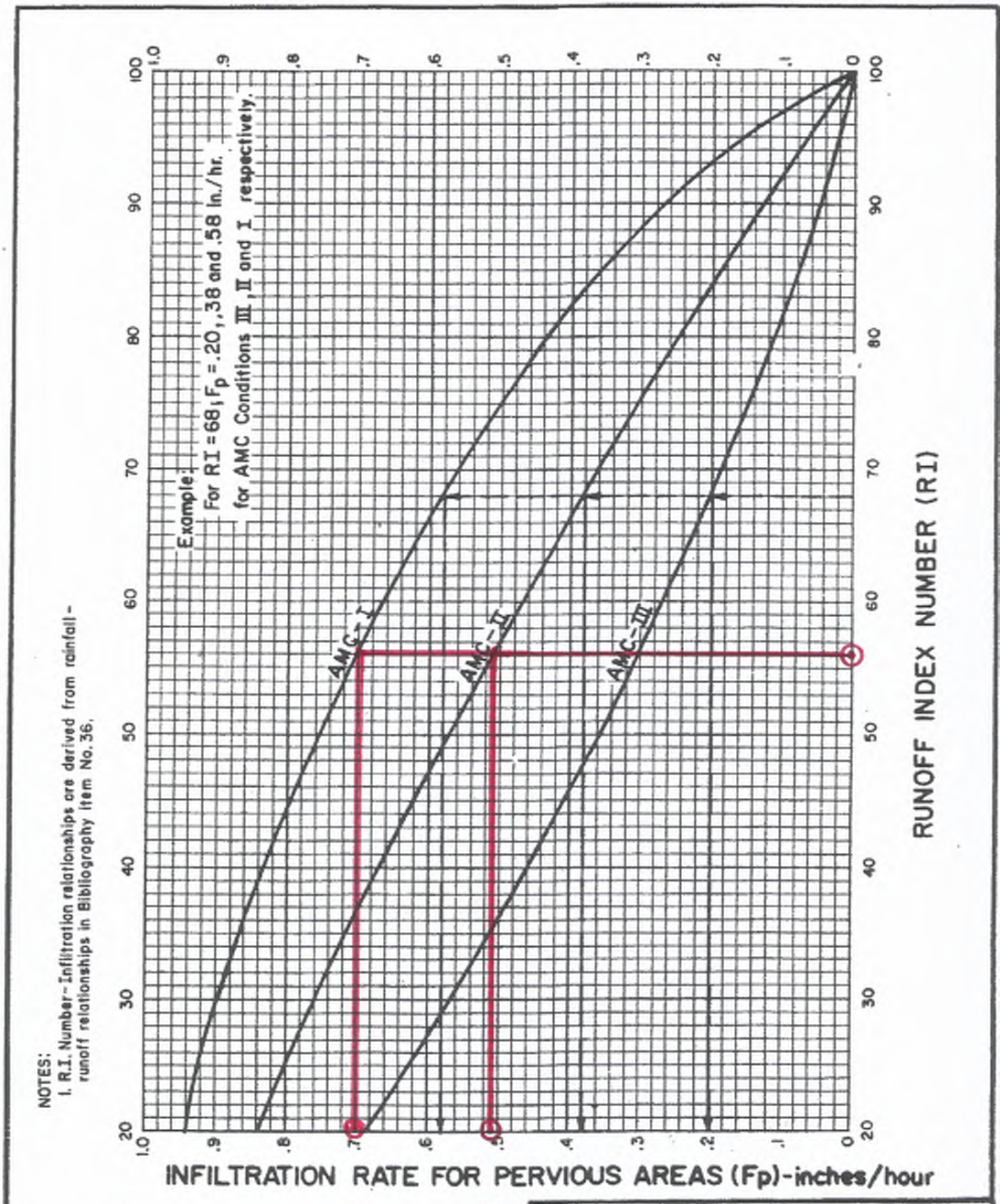
PF graphical

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 AREA



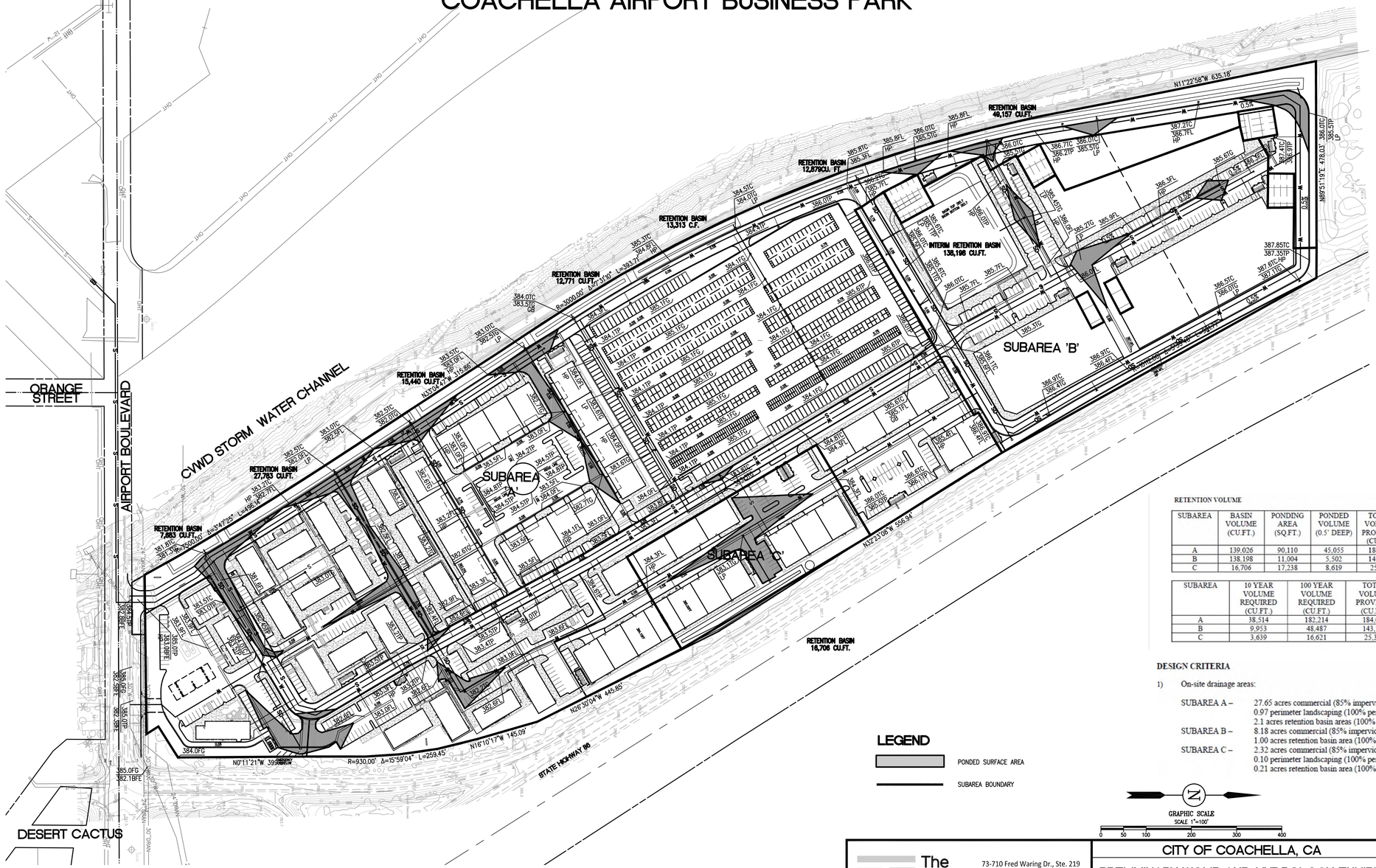
RCFC & WCD 10 YR 100 YR
HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS RUNOFF INDEX NUMBERS

PLATE E-6.2

IN THE CITY OF COACHELLA, STATE OF CALIFORNIA

PRELIMINARY WQMP AND HYDROLOGY EXHIBIT
COACHELLA AIRPORT BUSINESS PARK



RETENTION VOLUME

SUBAREA	BASIN VOLUME (CU.FT.)	PONDING AREA (SQ.FT.)	PONDED VOLUME (0.5' DEEP)	TOTAL VOLUME PROVIDED (CU.FT.)
A	139,026	90,110	45,055	184,081
B	138,198	11,004	5,502	143,700
C	16,706	17,238	8,619	25,325

SUBAREA	10 YEAR VOLUME REQUIRED (CU.FT.)	100 YEAR VOLUME REQUIRED (CU.FT.)	TOTAL VOLUME PROVIDED (CU.FT.)
A	38,514	182,214	184,081
B	9,953	48,487	143,700
C	3,639	16,621	25,325

DESIGN CRITERIA

1) On-site drainage areas:

SUBAREA A – 27.65 acres commercial (85% impervious)
0.97 perimeter landscaping (100% pervious)
2.1 acres retention basin areas (100% impervious)

SUBAREA B – 8.18 acres commercial (85% impervious)
1.00 acres retention basin area (100% impervious)

SUBAREA C – 2.32 acres commercial (85% impervious)
0.10 perimeter landscaping (100% pervious)
0.21 acres retention basin area (100% impervious)

LEGEND

PONDED SURFACE AREA

SUBAREA BOUNDARY

GRAPHIC SCALE
SCALE 1"=100'
0 50 100 200 300 400

The Altum Group
73-710 Fred Waring Dr., Ste. 219
Palm Desert, CA 92260
t.760.346.4750 f.760.340.0089
TheAltumGroup.com
ENGINEERING | PLANNING | SURVEY | ENVIRONMENTAL

CITY OF COACHELLA, CA

PRELIMINARY WQMP AND HYDROLOGY EXHIBIT
COACHELLA AIRPORT BUSINESS PARK
BEING A PORTION OF THE SOUTH HALF OF SECTION 15, T6S, R8E, SBM

FOR: HAAGEN COMPANY, LLC

SHEET NO. 1 OF 1

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

Recording requested by:
City of Coachella

After Recordation Return To
And Mail Tax Statements To:
City of Coachella
City Clerk
1515 6th Street
Coachella, CA. 92236

Attn: City Clerk

For Recorder's Office Use Only

CITY OF COACHELLA

WQMP Covenant and Agreement

Water Quality Management Plan and Urban Runoff BMP Transfer, Access and Maintenance Agreement.

Recorded at the request of:

City of COACHELLA

After recording, return to:

City of COACHELLA

City Clerk _____

OWNER: HAAGEN COMPANY, LLC

PROPERTY ADDRESS: AIRPORT BOULEVARD

COACHELLA, CA 92236

APN: 763-330-013, 763-330-018, 763-330-029

THIS AGREEMENT is made and entered into in

_____, California, this _____ day of _____ ,

by and between HAAGEN COMPANY, LLC., herein after referred to as "Owner" and the CITY OF COACHELLA, 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 Coachella, County of Riverside, State of California, legally 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

COACHELLA AIRPORT BUSINESS PARK 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 Best Management Practices(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 signed 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, replacement obligations and 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 or 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 BMPs, 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 the Owner, or its successors or assignees, fails to accomplish the necessary maintenance detailed 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 assignees, including administrative costs, attorneys' 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 stated 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 City's Public Works 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 the 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 assignees of the title to said Property of the obligations herein set forth, and also a lien in such amount as will fully reimburse the City, including interest as set forth above, 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 assignees, then the Owner and its successors or assignees 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 assignees of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assignees. 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:**
CITY OF COACHELLA	CHRISTOPHER FAHEY
1515 6TH STREET	HAAGEN COMPANY, LLC
COACHELLA, CA 92236	12302 EXPOSITION BOULEVARD
	LOS ANGELES, CA 90064

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

APPROVED AS TO FORM:

_____
City Attorney

_____
CITY OF COACHELLA

_____
Name

_____
Title

ATTEST:

_____
City Clerk Date

OWNER:

CHRISTOPHER FAHEY
Name

CHIEF OPERATING OFFICER
Title

OWNER:

_____
Name

_____
Title

EXHIBIT A
(Legal Description)

BEING A PORTION OF THE SOUTHWEST QUARTER AND THE SOUTHEAST QUARTER OF SECTION 15, TOWNSHIP 6 SOUTH, RANGE 8 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

EXHIBIT B
(Map/Illustration)

THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCEL MAY NOT COMPLY WITH LOCAL LOT-SPLIT OR BUILDING SITE ORDINANCES.

SEC. 15 T.6S, R.8E

CITY OF COACHELLA

TRA 012-048
012-049

763-33

25-39-1

N89-51-15E 2614.29

15

478.04

634.78

L=742.81

L=947.16

L=861.76

645.60

456.05

186.05

310.17

132.38

219.84

451.47

771.92

59.30

30

1324.96

S89-52-00S

383.01

871.00

1583.27

1828.61

1318.98

306.17

740.38

185.63

415.84

215.12

421.46

L=259.48

300.83

399.01

EX

EX

717.02

311.81

L=530.43

L=496.15

1474.76

315.86

80.76

53.13

144.75

220.10

259.92

434.80

30

C.V.C.W.D. STORMWATER CHANNEL

STATE HWY 86

FILLMORE ST

56TH AVE (AIRPORT BLVD)

TRA 012-049

TRA 012-048

13
21.56 AC ML

25
68.00 AC ML

26
15.00 AC ML

28
23.89 AC ML

29
11.18 AC ML

18
9.62 AC ML

30
3.14 AC ML

06
3.57 AC ML

14

22

23

N
W E
S

1 " = 400 '

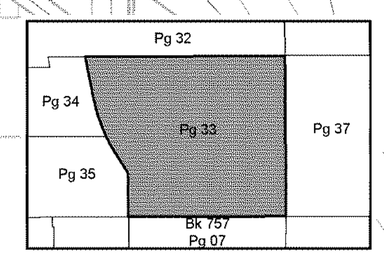
Legend

- Lot Lines
- Right-Of-Way
- Old Lot Lines
- Reference R.O.W
- Other Easements
- Lease Area
- Subdivision Tic Mark

Date	Old Number	New Number
4/1/1987	350-8	7
4/1/1987	3	8
4/1/1987	7, 8	9
4/1/1987	9	10, 11
3/1/1991	1	12, 13, ST
3/1/1991	4	14, ST
3/1/1991	5	15, ST
3/1/1991	11	16, 17, ST
8/1/1991	10	18, ST
2/1/2005	14	19, 20
2/1/2005	15	21, 22
2/1/2005	16	23, 24
12/1/2005	2, 12	25
12/1/2005	19, 21, 23	26
12/1/2005	20, 22, 24	27
12/1/2009	27	28, ST
5/1/2018	17	29, 30

Data

RS 15/56, 16,56, 17/18, MB 4/53
MB 22/20-21, RS 5/18, CVCWD R/W
R/W XI-RIV-187-F
60' RDS. PER INST. 32692 4/59
RS 11/30, MB 4/69, 4/78, 9/21
LLA 2390, RS 78/46



ASSESSOR'S MAP BK763 PG. 33
Riverside County, Calif.

jasantos

May 2018

Infiltration System
Inspection and Maintenance Checklist

Property Address: _____ Property Owner: _____

Treatment Measure No.: _____ Date of Inspection: _____ Type of Inspection: □ Monthly □ Pre-Wet Season
□ After heavy runoff (1" or greater)
Inspector(s): _____ □ End of Wet Season □ Other:_____

Defect	**Conditions When Maintenance Is Needed**	**Maintenance Needed? (Yes/No)**	**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)	**Results Expected When Maintenance Is Performed**
1. Standing Water	When water stands in the infiltration system between storms and does not drain within 3 days after rainfall.			There should be no areas of standing water once inflow has ceased. Any of the following may apply: sediment or trash blockages removed, improved grade from head to foot of infiltration system.
2. Trash and Debris Accumulation	Trash and debris accumulated in the infiltration system.			Trash and debris removed from infiltration system and disposed of properly.
3. Sediment	Evidence of sedimentation in system.			Material removed and disposed of properly so that there is no clogging or blockage.
4. Inlet/Outlet	Inlet/outlet areas clogged with sediment or debris, and/or eroded.			Material removed and disposed of properly so that there is no clogging or blockage in the inlet and outlet areas.
5. Overflow Spillway	Clogged with sediment or debris, and/or eroded.			Material removed and disposed of properly so that there is no clogging or blockage, and system is restored to design condition.
6. Miscellaneous	Any condition not covered above that needs attention in order for the infiltration system to function as designed.			Meet the design specifications.

Infiltration System Maintenance Plan
for

Routine Maintenance Activities

The principal maintenance objective is to prevent sediment buildup and clogging, which reduces pollutant removal efficiency and may lead to system failure. Routine maintenance activities, and the frequency at which they will be conducted, are shown in Table 1.

Table 1
Routine Maintenance Activities for Infiltration Systems

No.	Maintenance Task	Frequency of Task
1	Remove obstructions, debris and trash from infiltration system and dispose of properly. Drywells may cleaned by vacuuming the upper chamber with a vacuum truck.	Monthly, or as needed after storm events
2	Inspect system to ensure that it drains between storms, and within 3 days after rainfall. Check drywell/observation well 2-3 days after storm to confirm drainage.	Monthly during wet season, or as needed after storm events
3	For drywells, replace filter material (and screen if it is damaged). See City of Coachella Standard Drawing No. SD-4.2.	Monthly, or as needed after storm events
4	Monitor drywell/observation well to confirm that system has drained during dry season.	Annually, during dry season
5	Remove any trash, grass clippings and other debris in the streets, gutters or parking area, and near the system perimeter. Dispose of properly.	As needed
6	Inspect infiltration system using the inspection checklist.	Monthly, or after storm events 1” or greater, and after removal of accumulated debris or material

Mosquito Abatement

Standing water shall not remain in the treatment measures for more than three days, to prevent mosquito generation.

Inspections

The Infiltration System Inspection and Maintenance Checklist provided shall be used to conduct inspections monthly (or as needed), identify needed maintenance, and record maintenance that is conducted.

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 Preliminary WQMP Summary Data Form

Applicant Information	
Name and Title	Christopher Fahey – Chief Operating Officer
Company	Haagen Company, LLC
Phone	(310) 820-1200
Email	CFahey@Haagenco.com
Project Information	
Project Name (as shown on project application/project-specific WQMP)	Coachella Airport Business Park
Street Address	Noerthwesterly corner of Airport Boulevard at State Highway 86 Expressway
Nearest Cross Streets	State Highway 86 Expressway (to the East)
Municipality (City or Unincorporated County)	Coachella
Zip Code	92236
Tract Number(s) and/or Assessor Parcel Number(s)	763-330-013, 763-330-018, 763-330-029
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
	X	Commercial or Industrial ≥ 100,000 sq. ft.
		Automotive repair shop
		Retail Gasoline Outlet disturbing > 5,000 sq. ft.
		Restaurant disturbing > 5,000 sq. ft.
		Home subdivision ≥ 10 housing units
		Parking lot ≥ 5,000 sq. ft. or ≥ 25 parking spaces

Date Project-Specific Final WQMP Submitted	June 12, 2020
Size of Project Area (nearest 0.1 acre)	42.69 acres
Will the project replace more than 50% of the impervious surfaces on an existing developed site?	Yes
Project Area managed with LID/Site Design BMPs (nearest 0.1 acre)	42.69 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	Haagen Company, LLC
Contact Name	Christopher Fahey, Chief Operating Officer
Street or Mailing Address	12302 Exposition Boulevard
City	Los Angeles, CA
Zip Code	90064
Phone	(310) 820-1200
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 Final WQMP Approved:	
Data Entered by	**Name:** **Date:**

Other Comments	