Global Wildlife Discovery Museum

Initial Study/Mitigated Negative Declaration

Lead Agency:

City of Rancho Mirage

69-825 Highway 111

Rancho Mirage, California 92270

Prepared by:

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August, 2025

ENVIRONMENTAL INITIAL STUDY
Global Wildlife Discovery Museum

Project Title:	Global Wildlife Discovery Museum
City Project No:	Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan PDP25-0003
Lead Agency Name and Address:	City of Rancho Mirage 69-825 Highway 111 Rancho Mirage, California 92270 Phone: (760) 328-2266
Applicant:	Nicole Williams, Prest Vuksic Greenwood Architects
Contact Person:	Lezlee Perez, Assistant Planner
Phone Number:	(760) 328-2266 EXT 257
Project Location:	69934 California Highway 111,
Accessor Parcel Number:	689-040-023, 689-040-025, & 689-040-028
General Plan Designation:	General Commercial (C-G)
Zoning Designation:	General Commercial (C-G)

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CHAPTER 1: PROJECT DESCRIPTION

Project Description

The Proposed Global Wildlife Discovery Museum (Project) is a 21,967 square-foot (sf) museum facility sited on three parcels in the south portion of the Atrium Center on State Highway 111. In total, the parcels (689-040-023, 689-040-025, 689-040-028) encompass 6.78 acres including a rock outcrop that rises 100± feet to an elevation of 370 feet.

Global Wildlife Discovery Museum will include an exhibit building with a lobby, a coffee shop, a gift shop, storage spaces, office spaces, restrooms, an outdoor plaza with a fountain, a main parking lot and an overflow parking lot with a separate access from Mirage Cove Drive. Please see Exhibits 1 – 7.

Project Location

The Project site is located on the east side of Highway 111, north of Mirage Cove Drive, south of Braemar Drive, and west of Golden State Lane. Formally, the Project site is within the East ½ of Section 3, Township 5 South, Range 5 East, San Bernardino Principal Meridian.

Access and Parking

Driveway access to the Project site is from an existing entrance to the Atrium Center from Highway 111 and would permit westbound traffic to enter the Project site and restrict outbound traffic to a right-turn only. A signalized access into the Atrium center is located 290 feet north of the Project driveway allowing both right and left turning onto Highway 111 and is easily accessible from the Project site.

The improved museum parking lot directly in front of the facility includes 89 parking spaces. Additionally, 16 spaces for buses and overflow parking are planned for APN 689-040-028 at the south end of the Project site with access from Mirage Cove Drive, where visitors would traverse a 480-foot-long walking path to reach the museum.

Existing Site Conditions

Utilities

In the City of Rancho Mirage, the utility services are delivered by the following providers:

Domestic Water Service: Coachella Valley Water District (CVWD)

Wastewater Service: Coachella Valley Water District (CVWD)

Solid Waste Service: Burrtec Waste and Recycling Services

Electricity Service: Southern California Edison (SCE)

Natural Gas: Southern California Gas Company (SoCalGas)

Telecommunication: Frontier Fiber, Spectrum, Verizon, others

Cable: Spectrum

Environmental Setting and Surrounding Land Uses

The Proposed Museum is consistent with the Project site's General Commercial land use designation which allows for a wide variety of uses ranging from commercial centers to specialty retail shops. Encompassing 6.78 acres, the Project site contains three currently vacant in-fill parcels. The largest of the three parcels (APN 689-040-023) comprises 5.48 acres, however, only 2.27 acres are able to be developed due a rock outcrop that occupies 3.21 acres. This parcel had been previously developed and was the site of the historic 1978 Chart House Restaurant, which was demolished in 2013 due damage from a fire in 2012. North of this parcel is APN 689-040-025, which contains 0.37 acres of vacant land and abuts the Atrium Center parking lot further north. South of parcel -023 is APN 689-040-028, which contains 0.93 acres and is bounded by Mirage Cove Drive along the southern edge.

Excepting the rocky hillside on the east side of the Project site, the terrain is mostly flat and consists of an aging parking lot and compacted, graded soils; the flat portions of the Project site are fully disturbed. Approximately 16 mature California fan palms and a several Mexican fan palms are scattered throughout the site both at the toe of the hill and within the Highway 111 parkway.

North: The Atrium Center shopping center and High Density Residential development.

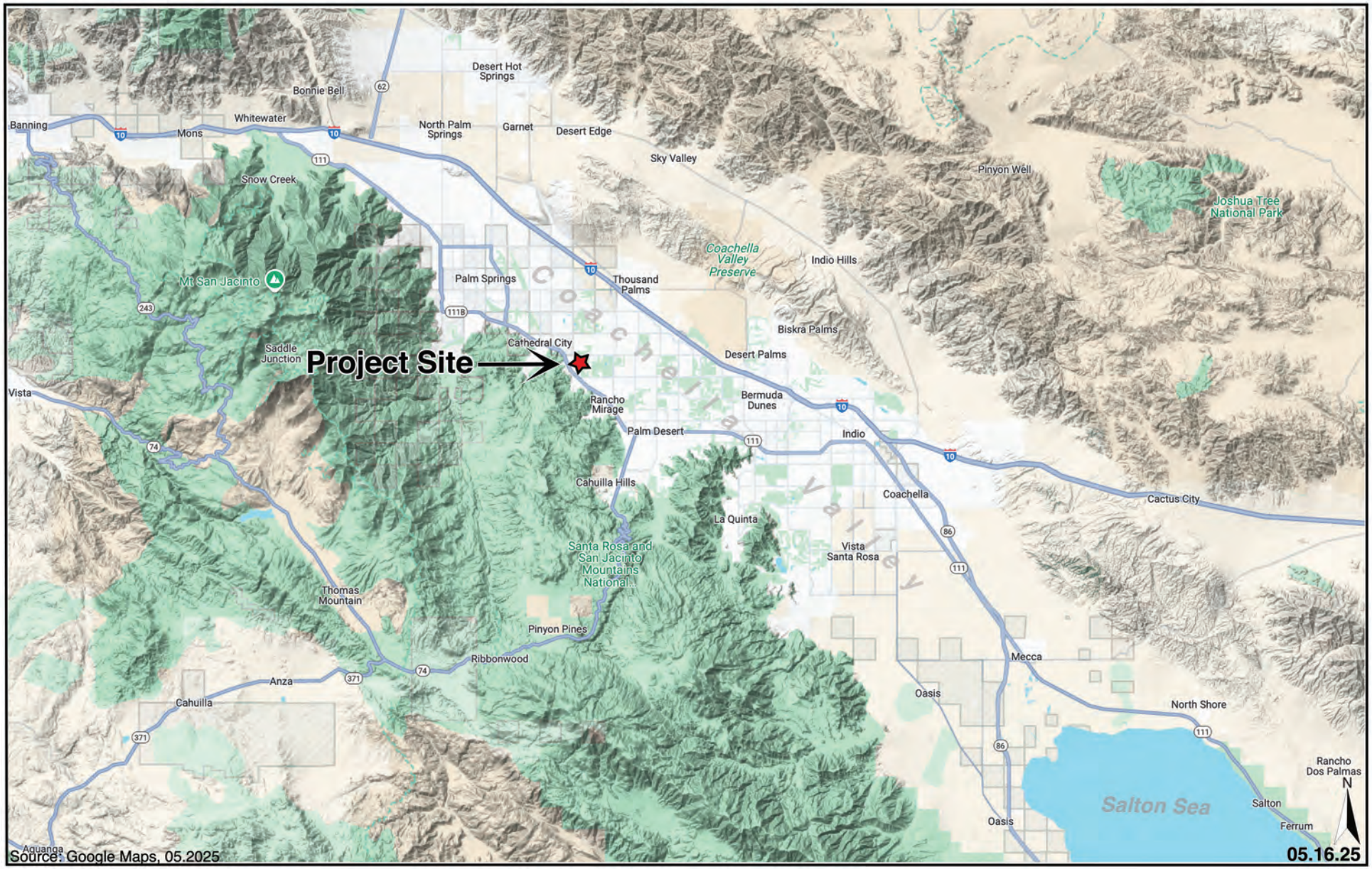
East: High Density Residential and Mobile Home Park development.

South: Mirage Cove Drive followed by one vacant undeveloped parcel.

West: Highway 111 followed by vacant, undeveloped land.

Other public agencies whose approval is required.

None



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Regional Location Map
Global Wildlife Discovery Museum
Rancho Mirage, California

Exhibit
1



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Project Vicinity Map
Global Wildlife Discovery Museum
Rancho Mirage, California

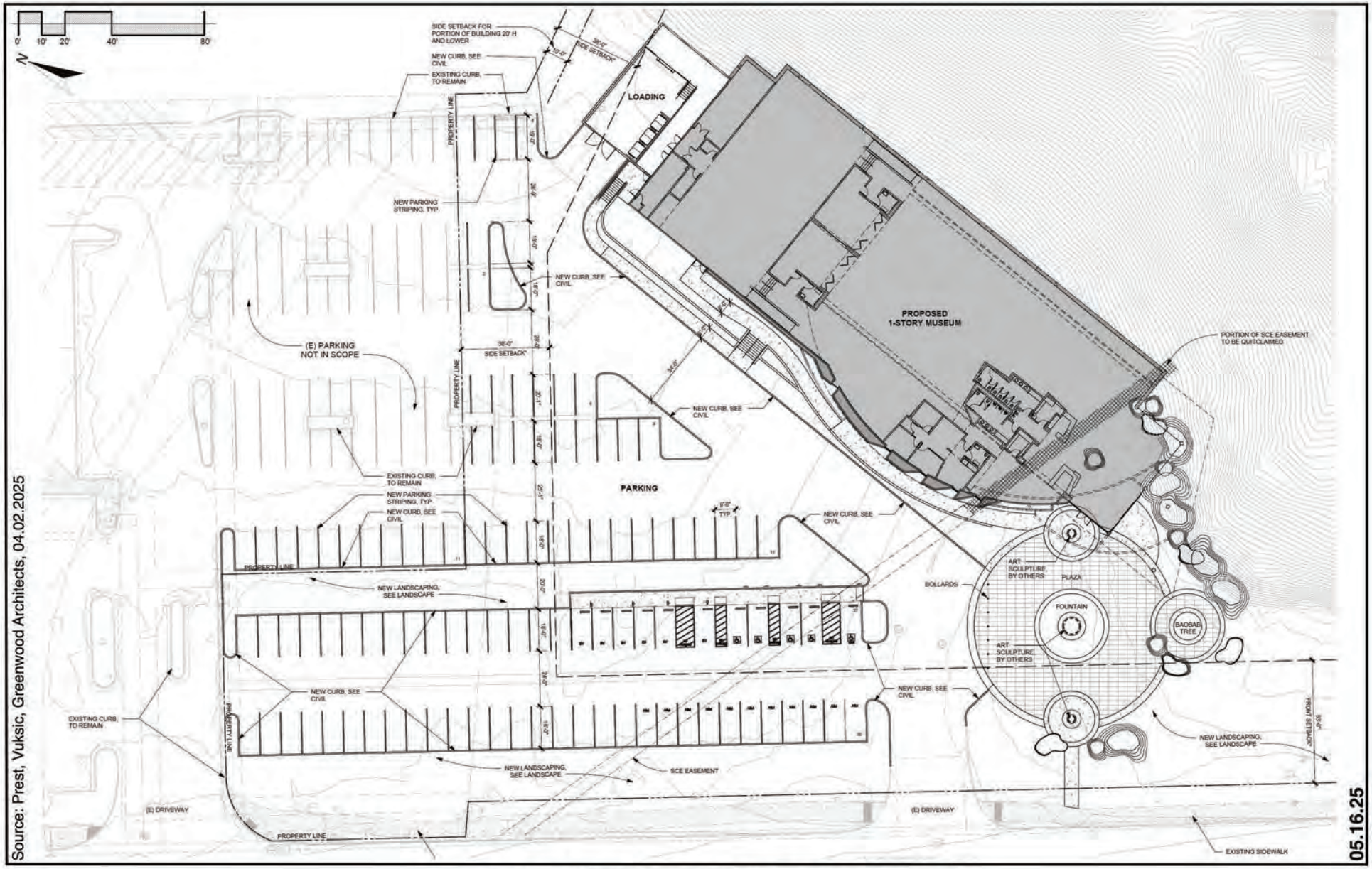
Exhibit
2



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Aerial View of the Project Parcels
Global Wildlife Discovery Museum
Rancho Mirage, California

Exhibit
3



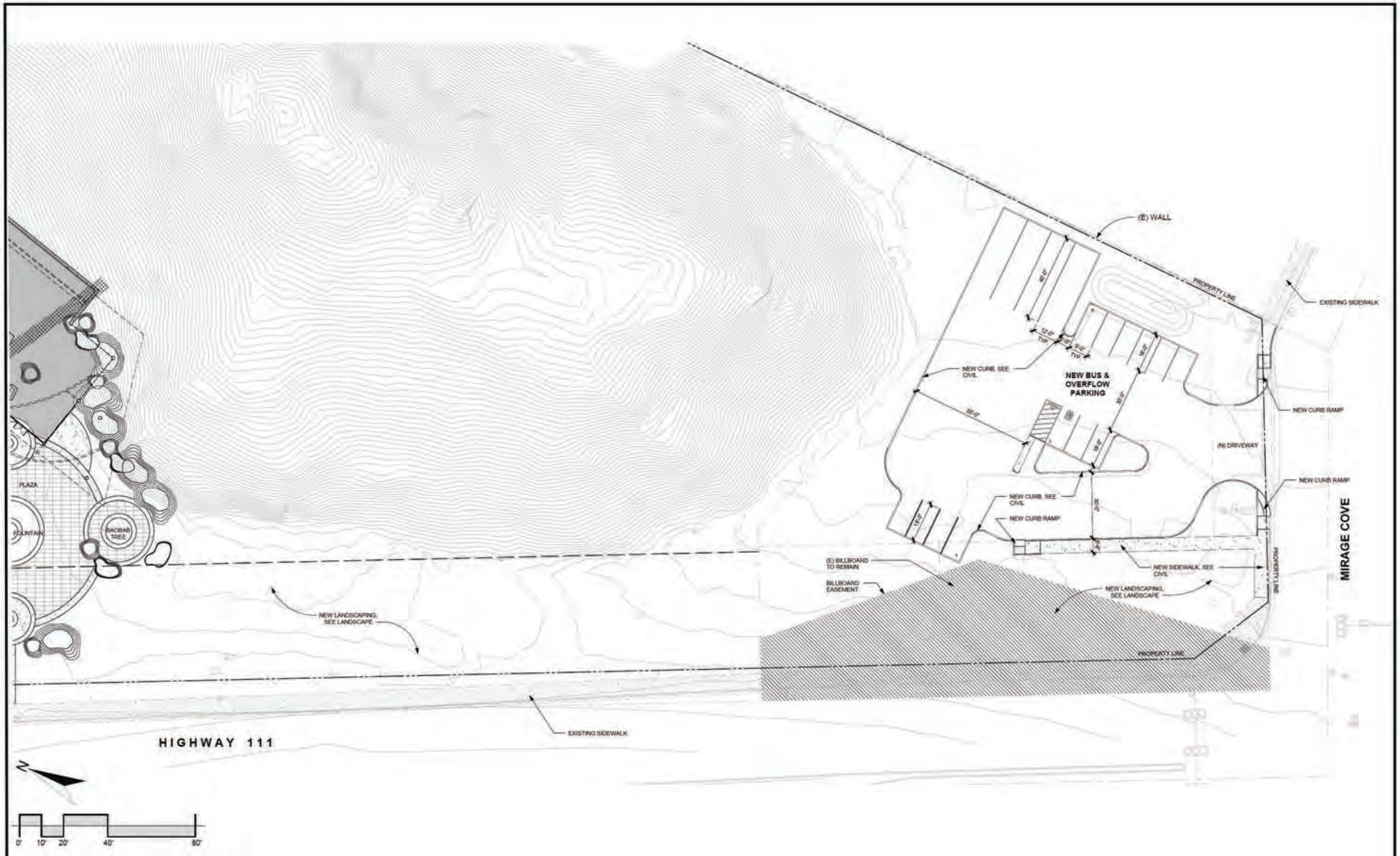
Source: Prest, Vuksic, Greenwood Architects, 04.02.2025

05.16.25

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Project Site Plan - Museum and Parking Lot
Global Wildlife Discovery Museum
Rancho Mirage, California

Exhibit
4



Source: Prest, Vuksic, Greenwood Architects, 04.02.2025

05.16.25

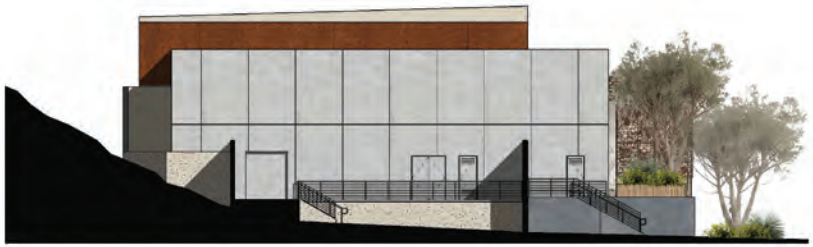
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Project Site Plan - Overflow Parking Lot
Global Wildlife Discovery Museum
Rancho Mirage, California

Exhibit
5



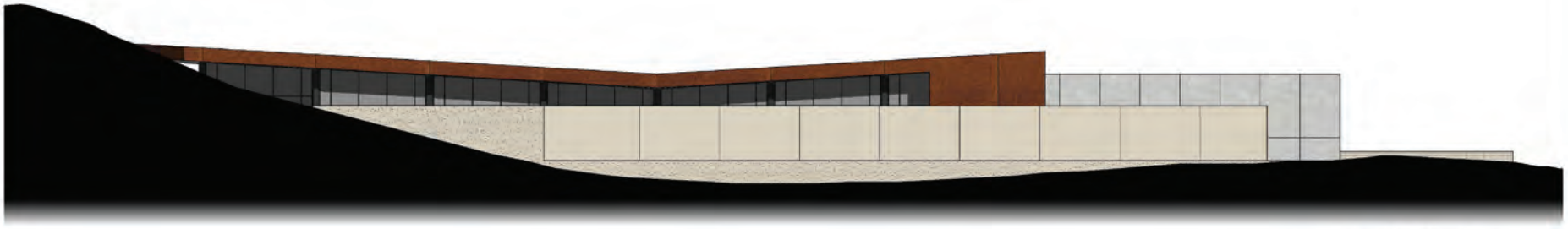
WEST ELEVATION



NORTH ELEVATION



SOUTH ELEVATION



EAST ELEVATION

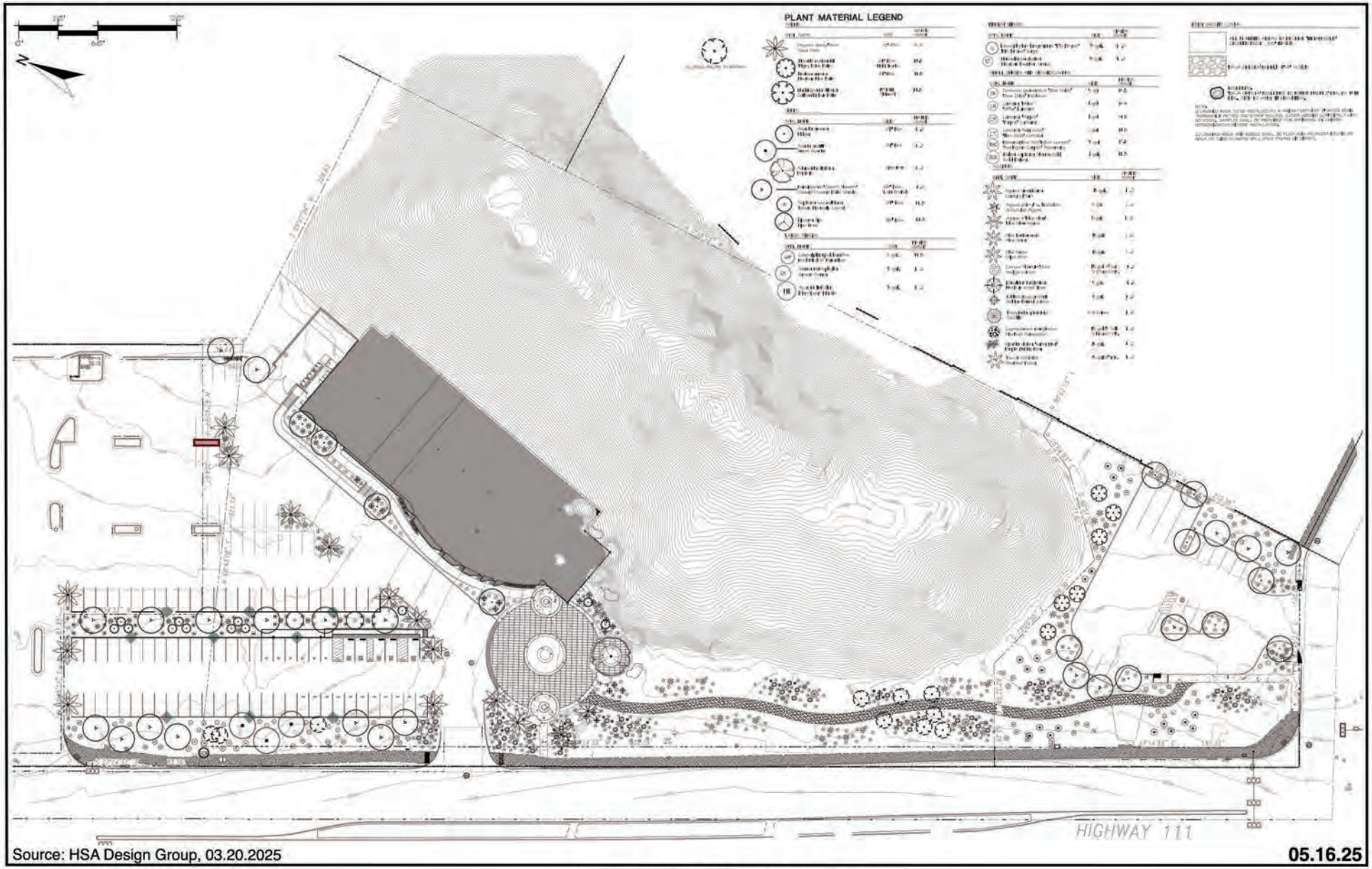
Source: Prest, Vuksic, Greenwood Architects, 04.02.2025

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Elevations
Global Wildlife Discovery Museum
Rancho Mirage, California

Exhibit
6



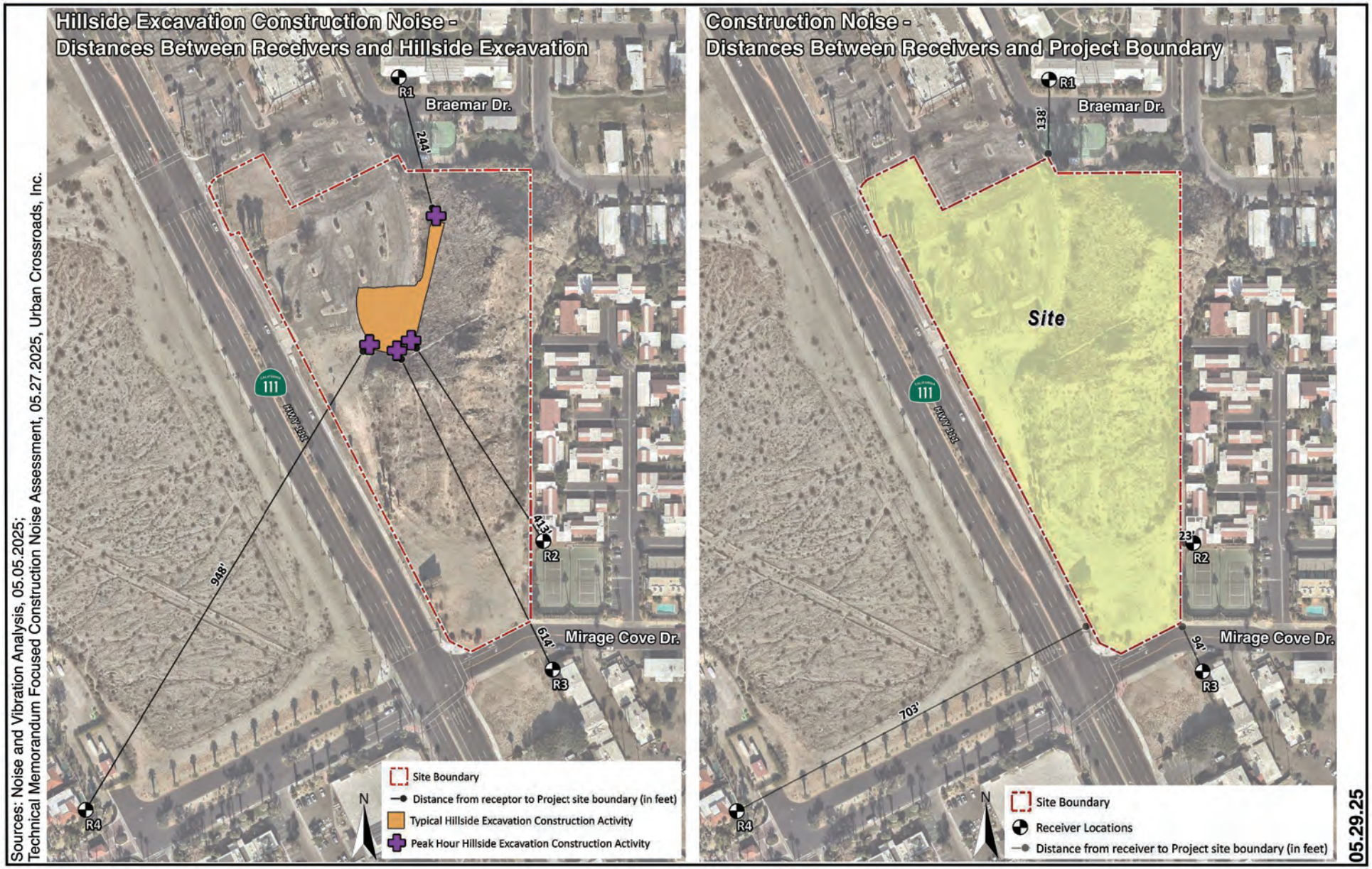
Source: HSA Design Group, 03.20.2025

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Preliminary Landscape Plan
Global Wildlife Discovery Museum
Rancho Mirage, California

Exhibit
7



Sources: Noise and Vibration Analysis, 05.05.2025;
Technical Memorandum Focused Construction Noise Assessment, 05.27.2025, Urban Crossroads, Inc.

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Noise Receiver Locations and Distances
Global Wildlife Discovery Museum
Rancho Mirage, California

Exhibit
8

CHAPTER 2: ENVIRONMENTAL ANALYSIS AND DETERMINATION

Environmental Factors Potentially Affected:

The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Energy
☐ Geology / Soils	☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials
☐ Hydrology / Water Quality	☐ Land Use / Planning	☐ Mineral Resources
☐ Noise	☐ Population / Housing	☐ Public Services
☐ Recreation	☐ Transportation	☐ Tribal Cultural Resources
☐ Utilities / Service Systems	☐ Wildfire	☐ Mandatory Findings of Significance

Evaluation of Environmental Impacts:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

a) Earlier Analysis Used. Identify and state where they are available for review.

b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify: a) the significance criteria or threshold, if any, used to evaluate each question; and b) the mitigation measure identified, if any, to reduce the impact to less than significance.

Determination: (To be completed by the Lead Agency) On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Lezlee Perez, Assistant Planner
City of Rancho Mirage

10/07/2025
Date:

Environmental Checklist and Discussion:

The following checklist evaluates the Proposed Project's potential adverse impacts. For those environmental topics for which a potential adverse impact may exist, a discussion of the existing site environment related to the topic is presented followed by an analysis of the Project's potential adverse impacts. When the Project does not have any potential for adverse impacts for an environmental topic, the reasons why there are no potential adverse impacts are described.

1 - Aesthetics

AESTHETICS -- Would the project**:**	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

Sources: City of Rancho Mirage General Plan 2017 Update, Land Use Element, City Wide Land Uses, p. 16, November 17, 2017; City of Rancho Mirage Code of Ordinances §17.10.020; Global Wildlife Discovery Museum Site Plan.

1.1 Setting

The City of Rancho Mirage encompasses 24.8 square miles extending from the Interstate 10 freeway on the north to the Santa Rosa Mountains foothills on the south. The predominant land uses throughout Rancho Mirage consist of residential communities, desert resort and recreational uses including hotels, restaurants, and golf courses, commercial and retail centers, and regional

medical facilities. Of high importance to the City is the preservation of the natural desert environment. In-fill development is heavily encouraged along with low-impact, high-quality design standards that preserve scenic viewsheds.[1]

The Proposed 22,000± square-foot Global Wildlife Discovery Museum and parking lot would be sited on a General Commercial (C-G) in-fill lot along Highway 111 between Frank Sinatra Drive to the north and Mirage Cove Drive to the south. Surrounded by existing General Commercial (C-G) land uses, High Density Residential, and Mobile Home Park. The Project site would be consistent with the City's goals of encouraging high-quality commercial development on an in-fill lot in the midst of existing General Commercial (C-G) land uses. The existing parking lot on the site would be reconstructed and expanded across the adjoining 0.37-acre parcel (APN 689-040-025). The graded barren portion of the Project site closest to the west edge of the rock outcrop would contain the Museum building, very similar to the way the earlier restaurant was situated on the site. The proposed single structure would not exceed 34 feet. The proposed building design incorporates the rock outcrop and requires removal of a small portion of the adjoining hillside, which was previously modified to accommodate the previous restaurant.

1.2 Discussion of Impacts:

a) LESS THAN SIGNIFICANT IMPACT:

As noted above, the Project site includes a 100±-foot hill, an outlying spur of the foothills to the west, which serves as a backdrop for the developable portion of the site. Currently, westbound travelers on Highway 111 have distant, low-lying views across the Atrium development of the San Bernardino Mountains and Mt. San Gorgonio. If constructed, the proposed project would impact these views to the same degree as the previous restaurant did. These northwest views are not prominent for travelers and proposed project construction and landscaping are not expected to result in a substantial adverse impact on this viewshed.

The view across the Project site for eastbound Highway 111 travelers is dominated by the remnant hill on the Project site, which will rise approximately 65 feet above the top of the proposed museum building. The on-site elevated terrain also shields the development portion of the site from viewsheds enjoyed by residents to the east and northeast. The Project will not affect views of the surrounding mountains enjoyed by surrounding land uses.

Scenic vista views of the mountains from the rest of the Atrium Center north of the Project site would not be impacted, nor would views from existing commercial development to the south and southwest. Likewise, easterly scenic vistas of the Little San Bernardino Mountains would not be impacted by the Project, siting of the museum at the base of the rock outcrop backdrop. Project impacts to scenic vistas would be less than significant.

b) LESS THAN SIGNIFICANT IMPACT:

The existing elevated terrain and parkway and other landscaping are valuable scenic resources that enhance the scenic experience for travelers and others in the area. Substantial damage to scenic resources such as trees, rock outcroppings, and historic buildings within a state scenic highway would qualify as a significant impact. The Proposed

[1] City of Rancho Mirage General Plan 2017 Update, Land Use Element, City Wide Land Uses, p. 16, November 17, 2017.

Project is located on the east side of State Highway 111, which is an eligible state scenic highway, but has not been officially designated as such. While it does not contain historic buildings, the site does contain an isolated rock outcropping that stands 100± feet above the surrounding terrain. The site and adjoining parkway include approximately 20± mature California and Mexican fan palms, some of which may be lost or relocated within the site. Natural vegetation skirting the tow of slope of the on-site hill will be partially disturbed. The proposed landscape plan will introduce a variety of native and drought tolerant landscape material that will enhance the scenic resources of the site and will more than off-set the loss of existing vegetation.

The site plan proposes to situate the Museum building on the flat terrain adjacent to the base of west-facing side of the rock outcrop and incorporate the lower portion of the hillside into the eastside/backside of the building. This similar to the manner in which the previous restaurant was situated on the site. Construction of the proposed building will require the removal of a 220 feet long section of the rock outcrop up to a height of 19 feet high and up to 40 feet deep into the hillside. As noted on the Project preliminary grading plan (see Exhibit 6, Hillside Demolition Site Plan), the area of hillside removal would accommodate and be blocked by the new building that would abut this portion of the hillside. Most of the proposed hillside modifications would be shielded from view and, therefore, impacts to these scenic resources would be less than significant**.**

The adjoining segment of Highway 111 is a state-eligible scenic highway but has not been so designated. Therefore, the proposed project would not affect scenic resources along a state scenic highway. While the Project site once harbored a restaurant that was designated a historic resource by the City Council based on its architectural significance, this structure was destroyed by fire in 2012 and was subsequently removed. There are no other structures of historic significance that would be impacted by the proposed project.

In summary, the Project will not substantially damage scenic resources, including limited trees, rock outcroppings, and historic buildings within a state scenic highway. Impacts will be less than significant.

c) LESS THAN SIGNIFICANT IMPACT:

The Project is proposed for and complies with the General Commercial (C-G) land use designation along a major transportation corridor. At buildout, the Project will provide a Museum space of 21,967 sf with accompanying offices, a gift shop, a small café and a “flex space” in a one-story structure tucked against an existing 100-foot-tall rocky hillside. This development would comply with the City’s required development standards including appropriate setbacks, lighting and landscape design and architectural design. As mentioned above, the Museum will obstruct views of the proposed modifications to the hillside and leave the upper portion of the hillside undisturbed.

According to the City’s height standards, one-story buildings should be no higher than 20 feet from the finished grade to the highest point of the structure excluding chimneys and vents. An exception may be granted by the City if the setback is increased by a minimum distance of two feet for each foot of height exceedance. The additional setback applies to

the portion of the building that is taller than 20 feet.[2] The Proposed Museum building height reaches a height of 34 feet and appropriate additional setback allowances from the street and the north side are included in the Project site plan (see Exhibit 4).

The building materials for the Museum would incorporate neutral beige and gray concrete, and a dark rust color faux metal accent along the roofline. Dark glass windows would be visible from the front side at the south end around the south-facing wall. Across the front of the building decorative elements include a light gray/beige-toned wildlife mural next to a wall composed of beige-toned rock veneer supporting a dark brown laser-cut mesh aluminum sheet (see the Elevations Exhibit 6). The building design and decorative elements would deviate somewhat from the surrounding existing commercial and public buildings, but the color palette, the design element, and accompanying landscape design align with the aesthetic of the surrounding mountain hillsides that occur on the Project site and across Highway 111. Furthermore, the long roofline would not obstruct the rock outcrop directly behind the building, and as the building is tucked up against the rock outcrop, it would not interfere with views of surrounding vistas. The Project will not degrade the existing visual character or quality of public views. Impacts to the existing visual character and quality of public view will be less than significant.

d) LESS THAN SIGNIFICANT IMPACT:

Pursuant to the City's Ordinance Codes, §17.18.050 and § 17.26.120, exterior lighting, including security lighting, must be energy efficient and either recessed or shielded such that light, glare and reflection are directed downward and away from neighboring properties. All light fixtures should appropriately serve the immediate purpose and not emit light, glare, or reflection beyond the project's boundaries. Exterior lighting for the Proposed Project is subject to approval by the City prior to construction. Should the Museum require operation during the evening hours, light emanating from the interior would be largely shielded by the decorative wall positioned along the front side of the building. Light emanating from the back windows would be shielded by the rock outcrop directly behind the building. Adherence to the City's lighting ordinance codes would ensure that potential impacts resulting from lighting or glare would be less than significant.

1.3 Mitigation Measures: None required.

[2] City of Rancho Mirage Code of Ordinances, §17.20.100 General Property and Use Standards, January 2006.

2 - Agriculture and Forestry Resources

AGRICULTURE AND FORESTRY RESOURCES – In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of forest land, timberland, or timberland zoned Timberland Production?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	☐	☐	☐	☒

Sources: City of Rancho Mirage General Plan 2017 Update, November 17, 2017; City of Rancho Mirage Land Use and Zoning Map, August 2013; California Department of Conservation Farmland Mapping and Monitoring Program (accessed April 2025).

2.1 Setting

The City of Rancho Mirage contains no commercial agricultural uses but historically attracted date farmers during the mid-20th Century. These scattered date farms/gardens were converted to residential subdivisions and other development. Today, there are no lands designated for either agricultural, forestry, or timberland production use in the City and in City's Sphere of Influence.

The California Important Farmland Finder designates much of Rancho Mirage, the Project site included, as "Urban and Built-Up Land."[3]

2.2 Discussion of Impacts:

a-e) NO IMPACT:

Conversion of Farmland: The California Department of Conservation provides a mapping tool, the Important Farmland Finder, to identify significant or important agricultural lands throughout the state. The City of Rancho Mirage does not contain any farmland of any category including Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. The Project site and surrounding properties are categorized as Urban and Built-Up Land. The Project would not convert any farmland or result in the loss of any farmland. No impact to farmland would occur.

Williamson Act: The Project site is zoned for General Commercial development and is not under, nor has ever been under, a Williamson Act contract. Therefore, the Proposed development would not conflict with any agricultural designation. No impact to lands under a Williamson Act contract would occur.

Conflict with Forest or Timberland Production: Neither the General Plan nor the Land Use and Zoning map for Rancho Mirage includes any Forestry or Forest Production designations. The Project site is located 270 feet above sea level in the Sonoran Desert ecological region where summer temperatures can exceed 120º Fahrenheit and receives an average annual rainfall of three inches. As such, there would be no conversion of timberland zones and no impacts are expected.

Loss of Forest Land: As noted, the City has no Forestry or Forest Production designations or areas. There are no forests in the City or surrounding Sphere. Therefore, the Project would not impact or cause the loss of any forest lands.

Other Changes in the Existing Environment: Buildout of the Project includes a Museum and parking area on a lot that is surrounded by existing urban uses and on a site that was previously developed. As the City does not contain any agricultural lands, the Project would not impact any agricultural uses.

2.3 Mitigation Measures: None required.

[3] California Department of Conservation, California Important Farmland Finder, accessed April 24, 2025, https://maps.conservation.ca.gov/dlrp/ciff/.

3 - Air Quality

AIR QUALITY – Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Sources: CalEEMod Version 2022.1; City of Rancho Mirage General Plan 2017 Update, Land Use Element, November 16, 2017; EPA Greenbook; South Coast AQMD CEQA Handbook (1993), updated March 2023; SCAQMD Final 2022 Air Quality Management Plan, December 2022.

3.1 Setting

The state of California is divided into fifteen air basins, each defined by local topography, climate, and regional air quality issues. The City of Rancho Mirage occurs within the Coachella Valley Planning Area, which is an air quality management district (AQMD) subregion within the topographic boundary of the Salton Sea Air Basin (SSAB). The SSAB encompasses all of Imperial County and the central portion of Riverside County, where the Coachella Valley and the City are located.



Source: South Coast Air Quality Management District, Draft Final 2022

In the State of California, there are 35 air quality regulatory agencies that establish emission thresholds and monitor air quality the air basins. The South Coast Air Quality Management District (SCAQMD) is the regulatory agency that controls and monitors emissions from stationary sources within most of Riverside County, portions of San Bernardino County and Los Angeles County,

and all of Orange County. The SCAQMD monitors emissions via 37 permanent monitoring stations, conducts inspections, and drafts air quality management plans to guide governments and businesses in reducing emissions. The Coachella Valley Planning Area is subject to the 2022 SCAQMD Air Quality Management Plan. Three local monitoring stations in Palm Springs, Indio, and Mecca provide daily and annual emissions data throughout the Coachella Valley.

National ambient air quality standards (NAAQS) are a set of emissions thresholds designed to protect human health and environmental factors. An ambient air quality standard specifies the maximum amount of a pollutant that can be present in the air during a specific period of time and not cause harmful effects on the most sensitive members of the community and natural resources. If that pollutant's concentration in the air is at or below the threshold, then the area is said to be in attainment, while non-attainment areas experience pollution levels above the AAQS thresholds.

According to the Environmental Protection Agency, the Coachella Valley Planning Area is classified as a nonattainment zone for ozone (O_3) and particulate matter (PM_{10}). Ozone pollution in the Coachella Valley Planning Area can be traced primarily to the flow of photochemical smog contaminants from the South Coast Air Basin to the west. High levels of PM_{10} pollution result from the arid environment, the ubiquitous presence of sand and dust combined with agricultural activity concentrated in the southeastern end of the Coachella Valley. Due to this nonattainment status, the Coachella Valley Planning Area is subject to the 2003 Coachella Valley PM_{10} State Implementation Plan (CV PM_{10} SIP), in order to bring the Planning Area into compliance with the NAAQS PM_{10} threshold.

Ambient air quality standards for the SCAQMD are subject to federal NAAQS guidelines, as well as state guidelines referred to as California Ambient Air Quality Standards (CAAQS). Each set of AAQS focuses on certain criteria pollutants which together include the following list of pollutants. Table 1 explains properties of each criteria pollutant.

Table 1
Ambient Air Quality Criteria Pollutants and Health Impacts

Criteria Pollutant	Emissions Sources	Health Effects
Oxides of Nitrogen (NO_x)	A yellow-brown colored gas that forms when nitric oxide, emitted primarily from burning of petroleum gas, combines with atmospheric oxygen.	- Lung damage - Breathing difficulties
Reactive/Volatile Organic Compounds (ROG/VOC)	Primary pollutants that form secondary pollutants such as Ozone, or photochemical smog, when they react with ultraviolet sunlight in the atmosphere.	- Eye, nose and throat irritation - Headaches - Dizziness, fatigue - Allergic skin reaction
Ozone (O_3)	A secondary pollutant resulting from hydrocarbons and oxides of nitrogen, emitted by cars, solvents, factories and pesticides, reacting in the presence of sunlight.	- Difficulty breathing, chest pains, aggravate lung diseases such as asthma, emphysema, and chronic bronchitis. - Shortness of breath, coughing, and lung damage with prolonged and chronic exposure.

Table 1
Ambient Air Quality Criteria Pollutants and Health Impacts

Criteria Pollutant	Emissions Sources	Health Effects
Particulate Matter (PM_{10}) and Fine Particulate Matter ($PM_{2.5}$)	Fugitive dust particles with a width of 10 microns down to 2.5 microns. Emitted from construction activity, vehicles driving on unpaved roads, industrial smokestacks, wildfires. Particles may occur as liquids or solids.	- Cause damage to the respiratory system. - Aggravate respiratory illnesses. - Symptoms: Coughing, asthma, heart attacks, premature death.
Oxides of Sulfur (SO_x)	Colorless and pungent gas emitted from coal and oil power plants, refineries, and diesel engines.	- Irritates eyes, nose, and airways. - Causes shortness of breath, tightness of chest. - Asthma patients are at high risk of developing more severe issues.
Carbon Monoxide (CO)	Colorless and odorless gas emitted from the incomplete combustion of all fossil fuels including oil, coal, and natural gas.	- Interrupts the delivery of oxygen to the brain. - Causes dizziness, headaches, and nausea.
Lead (Pb)	Emitted from metals processing facilities, combustion of leaded fuel, manufacturing of lead-acid batteries.	- Damages the nervous system, and kidneys. - Interferes with developmental and reproductive systems.
Hydrogen Sulfide (H_2S)	A rotten egg-smelling gas emitted from geothermal power plants, petroleum production, and sewage treatment plants.	- Causes headaches and skin irritation. - Damages the respiratory system.

Sources: South Coast AQMD CEQA Handbook (1993), updated March 2023; SCAQMD Final 2022 Air Quality Management Plan, Appendix 1: Health Effects (2022)

Table 2 below provides the maximum daily emissions thresholds for a project's construction and operation per the SCAQMD CEQA Handbook.

Table 2
South Coast AQMD Air Quality Significance Thresholds

Criteria Pollutant	Construction	Operation
Oxides of Nitrogen (NO_x)	100 lbs/day	55 lbs/day
Reactive/Volatile Organic Compounds (ROG/VOC)	75 lbs/day	55 lbs/day
Particulate Matter (PM_{10})	150 lbs/day	150 lbs/day
Fine Particulate Matter ($PM_{2.5}$)	55 lbs/day	55 lbs/day
Oxides of Sulfur (SO_x)	150 lbs/day	150 lbs/day
Carbon Monoxide (CO)	550 lbs/day	550 lbs/day
Lead (Pb)	3 lbs/day	3 lbs/day

Source: South Coast AQMD CEQA Handbook (1993), updated March 2023

Forecast modeling of construction and operational emissions for the Project was calculated using the California Emissions Estimator Model (CalEEMod) Version 2022.1, a modeling software application used in quantifying emissions associated with land development projects in California. The model calculates criteria pollutant emissions, including CO, PM_{10}, $PM_{2.5}$ and the ozone precursors ROG and NO_x, in addition to greenhouse gas equivalent emissions. Table 3 below provides a summary of the Project's land use data that was incorporated into the model. The detailed CalEEMod report for the Project is available in Appendix A.

Although the three parcels contain 6.78 acres, or 295,337 sf, the on-site rock outcrop covers roughly 158,360 sf leaving approximately 136,977 sf. Upon buildout, the Project would include a museum building totaling 21,967 sf., and two parking areas comprising 59,810 sf, and landscaped areas would cover 44,300 sf.

The proposed museum building would be comprised of a lobby, exhibit space, a coffee shop, a gift shop, a "flex space," storage spaces, office spaces, and restrooms. Site improvements would also include an outdoor fountain, a main parking lot and an overflow parking lot, and a landscaped trail connecting the overflow parking to the Museum site. Land uses applied to CalEEMod for analysis purposes included an educational facility, parking area and landscape/park area to account for the proposed landscaping in front of the museum and the landscaped trail between the overflow parking lot and the museum. The anticipated length of the construction phase is one year with completion occurring in late 2026. The site is currently vacant, but a demolition phase would entail the removal of the existing parking lot and the removal of a portion of the west-facing hillside (220 feet long, 19 feet high from the ground level and up to 40 feet deep into the hillside).

Table 3
Project Land Use Assumptions for CalEEMod

Project Land Use	Area Data
Total Project Site Area	6.78 acres (295,337 sf)
Land Uses	
Museum Building	21,967 square feet (sf)
Main Parking Lot	43,860 sf (89 spaces)
Overflow Parking Lot	13,150 sf (16 spaces)
Landscaped Area	44,300 sf
Earthwork	
Cut	1,035 cubic yards (cy)
Fill	1,485 cy
Net Import	450 cy
Export	350 cy
Daily Trips[1]	150

1. Daily Trips generated by the museum are based on the ITE Land Use Code 580.

3.2 Discussion of Impacts:

a) NO IMPACT:

A project's impacts on local air quality would be significant if the project does not conform to, or if it obstructs, an applicable Air Quality Management Plan. Within the Coachella Valley Planning Area, projects are subject to the 2022 SCAQMD Air Quality Management Plan (AQMP). SCAQMD works closely with local governments and actively cooperates with federal and state agencies to establish pollution emissions thresholds and guidelines for controlling emissions. The 2022 SCAQMD AQMP defines strategies to control and

reduce air pollution emissions from stationary and mobile sources. The 2022 AQMD was prepared with cooperation between SCAQMD, the California Air Resources Board (CARB) and the Southern California Association of Governments (SCAG) and is based in part on regional land use planning, population growth forecasting, and transportation modeling. In conformance with SB 375, SCAG prepares a Regional Transportation Plan/Sustainable Communities Strategy every four years to analyze regional development patterns and integrate policies and programs to reduce emissions. The most current report, Connect SoCal 2024, includes the most recent regional land use planning and forecast analyses, and projects that are consistent with these analyses are also consistent with the AQMP.

The land use and zoning designation on the Project site is Commercial General (C-G) which permits a variety of smaller-scale commercial centers, specialty retail shops, small department stores and may range from free-standing buildings to planned commercial centers. To expedite the use of in-fill lots and promote the growth of high-quality, conveniently located retail opportunities, the City encourages integrated development planning along the Highway 111 Corridor.[4] The Project incorporates a unique educational experience with a local small retail and coffee shop and a landscaped outdoor walking area on three in-fill parcels that had been previously developed. Utility services would not need to be expanded, and the public would not need to travel beyond this major City corridor to access the Project.

In conclusion, although the Project would result in air emissions, as discussed below, it would not conflict with or obstruct the implementation of an applicable air quality plan because its commercial characteristics are consistent with the City's adopted Land Use requirements and are included in the development of regional plans. No conflicts with or obstructions to the implementation of the applicable air quality plan are expected.

b) LESS THAN SIGNIFICANT IMPACT:

The Project will have a significant impact if it causes a considerable net increase of any criteria pollutant for which the Coachella Valley Planning Area is in nonattainment per federal or state ambient air quality standards. Currently, the Coachella Valley is designated as "extreme" nonattainment for the 2008 and 8-hour ozone standard, "severe" for the 2015 8-hour ozone standard, and "serious" for the 1987 PM_{10} standard.[5] In response to these designations the SCAQMD adopted a series of attainment plans beginning in 1987. The most current attainment plans are:

- Coachella Valley Attainment Plan for the 2008 8-Hour Ozone Standard, October 2024
- 2003 Coachella Valley PM_{10} State Implementation Plan

Construction Emissions:

For purposes of analysis, the construction phase was assumed to take place over one year with completion set for late 2026. The construction period includes all aspects of project development, including demolition of the existing parking lot, site preparation, removal of a portion of the west-facing side of the rock outcrop during grading, pad and foundation work, building construction, paving, and application of architectural coatings. Applicable standard requirements and best management practices include, but are not

[4] City of Rancho Mirage General Plan 2017 Update, Land Use Element, November 16, 2017.
[5] EPA Greenbook, California Nonattainment/Maintenance Status for Each County by Year, April 2025.

limited to, the implementation of a dust control and management plan in conformance with SCQAMD Rule 403.1, proper maintenance and limited idling of heavy equipment, and the use of low-polluting architectural paint and coatings per SCAQMD Rule 1113.

As shown in Table 4, given that criteria pollutant thresholds will not be exceeded, and standard best management practices will be applied during construction, impacts associated with air emissions during construction will be less than significant.

Table 4
Maximum Daily Construction-Related Emissions (pounds per day)

Construction Emissions	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
Daily Maximum[1]	22.148	17.089	16.454	0.0415	5.7249	2.3581
SCAQMD Thresholds	75	100	550	150	150	55
Exceeds?	No	No	No	No	No	No

1. Standard dust control measures have been applied to the PM emissions.
2. All other emissions are maximum daily unmitigated estimates.
Source: South Coast AQMD CEQA Handbook (1993), updated March 2023.

Operational Emissions:

Operational emissions are ongoing emissions that will occur over the life of the project. They include area source emissions, emissions from energy demand (electricity), and mobile source (vehicle) emissions. The ITE TripGen Web-based App estimates that the average daily total (ADT) number of trips that the Project would generate is 150.[6] Table 5 provides a summary of forecasted daily emissions during the operation of the proposed Project. As shown below, operational emissions will not exceed daily SCAQMD thresholds of significance for any criteria pollutants for operations. Impacts related to operational emissions are expected to be less than significant.

Table 5
Maximum Daily Operational-Related Emissions (pounds per day)

Operational Emissions	ROG	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
Daily Maximum[1]	1.386	1.144	10.451	0.0199	1.798	0.4765
SCAQMD Thresholds	75	100	550	150	150	55
Exceeds?	No	No	No	No	No	No

1. Standard dust control measures have been applied to the PM emissions.
2. All other emissions are maximum daily unmitigated estimates.
Source: South Coast AQMD CEQA Handbook (1993), updated March 2023.

Cumulative Contribution: Non-Attainment Criteria Pollutants

If a project indirectly induces additional criteria pollution emissions by encouraging an increase in the number of vehicles traveling along a new roadway, for example, and thus causes a cumulative net increase in emissions, then the project may cause a significant cumulative impact. Given the dispersing nature of pollutant emissions and aggregated

[6] Institute of Transportation Engineers Manual, 11th Ed., ITE TripGen Web-based App, Land Use Code 580, accessed May 2025.

impacts from nearby jurisdictions, cumulative air quality is evaluated on a regional scale. As previously mentioned, the Coachella Valley Planning Area is a nonattainment zone for PM_{10} and ozone. Any development resulting in emissions of PM_{10}, ozone, or ozone precursors will, to some extent, contribute to the existing regional non-attainment.

The SCAQMD does not currently provide thresholds of significance for the cumulative emissions of multiple projects. A project's potential cumulative contributions can instead be analyzed using the criteria for project-specific impacts. Assuming an individual development generates less than significant construction and operational emissions, then the project would not generate a cumulatively considerable increase in non-attainment criteria pollutants and its impacts would be regarded as less than significant. As shown in Tables 4 and 5, emissions resulting from the proposed Project's construction and operational phases are calculated to be well below the thresholds SCAQMD considers to be cumulatively considerable.

Mandatory standard best practices will be applied during construction, including dust control measures, in accordance with SCAQMD Rule 403, as well as the use of low VOC content in architectural coatings per SCAQMD Rule 1113. California Building Code requirements for energy efficiency and improving technology for automobiles will also reduce air emissions in the future. Therefore, while the Project will contribute to incremental increases in emissions, the impacts on regional PM_{10} and ozone levels are not anticipated to be cumulatively considerable.

Summary:

As shown above, both construction and operation of the proposed Project will result in criteria emissions that are below the SCAQMD significance thresholds, and neither phase would violate any air quality standard or contribute substantially to an existing or projected air quality violation. Overall, impacts related to construction and operation will be less than significant and are not cumulatively considerable from a non- attainment standpoint.

c) LESS THAN SIGNIFICANT IMPACT:

A Project will have a significant impact if it exposes sensitive receptors to substantial pollutant concentrations. Sensitive receptors are defined as members of the population who are potentially more sensitive to air pollutants due to age and health condition. Sensitive receptors include schools, playgrounds, childcare centers, retirement homes, hospitals and residences. SCAQMD provides a Localized Significance Thresholds (LST) analysis to determine whether a project will pose significant air quality impacts on nearby sensitive receptors. LST thresholds are provided for distances of 25, 50, 100, 200 and 500 meters between a project site and a sensitive receptor. Per the SCAQMD, LST analysis is designed for projects up to five acres in size or projects that involve up to five acres of daily disturbance during construction. While the proposed Project contains 6.78 acres, fewer than five acres would be disturbed as the rock outcrop consumes about one-half of the Project site and will not be developed.

The nearest sensitive receptors are the two residential neighborhoods that are adjacent to the Project site. One neighborhood occurs 64 meters to the north on Braemar Drive and the other neighborhood occurs 80 meters to the east on the north side of Mirage Cove Drive. This easterly neighborhood is protected from the Project construction activity by the intervening 100-foot-high rock outcrop. Based on the Project's size and proximity to the

nearest sensitive receptor, the 5-acre site table at a distance of 25 meters (nearest measurement option in LST table) was used for air quality analysis. Table 6 shows that on-site emission concentrations for Project construction will not exceed LST thresholds for carbon monoxide, nitrogen oxides, and particulate matter. Overall, the impacts will be less than significant.

Table 6
Localized Significance Thresholds Emissions (pounds per day)

Pollutant	CO	NOx	PM_{10}	$PM_{2.5}$
Construction				
Maximum Emissions	**16.454**	**17.089**	**5.7249**	**2.3581**
SCAQMD LST Threshold	2,292.00	304.00	14.00	8.00
Exceed?	**No**	**No**	**No**	**No**
Operation				
Maximum Emissions	**10.451**	**1.144**	**1.798**	**0.4765**
SCAQMD LST Threshold	2,292.00	304.00	4.00	2.00
Exceed?	**No**	**No**	**No**	**No**

Sources: CalEEMod model, version 2022.1; LST Threshold Source: LST Mass Rate Look-up Table, SCAQMD.

Health Impacts

The SCAQMD is the local implementing and enforcing agency for the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (commonly known as AB 2588), which established a statewide program for the inventory of air toxic emissions from specifically identified individual facilities as well as requirements for risk assessment and public notification of potential health risks. The SCAQMD requires the preparation of an operational HRA for “facilities” associated with high levels of toxic air contaminants. The eight categories of identified sources of TACs include high-traffic freeways and roads, distribution centers, rail yards, ports, refineries, chrome plating facilities, perchloroethylene dry cleaners, and large gas stations. The Project neither proposes the development of any such facilities, nor is it situated in proximity to any such facility.

As shown in Tables 4, 5, and 6, construction and operation of the proposed Project will result in criteria emissions that are well below the SCAQMD significance thresholds and would neither violate any air quality standard nor contribute substantially to an existing or projected air quality violation. In addition, localized emissions will be less than significant.

With today’s technology, it is not scientifically possible to calculate the degree to which exposure to various levels of criteria pollutant emissions will impact an individual’s health. There are several factors that make predicting a Project-specific numerical impact difficult:

- Not all individuals will be affected equally due to medical history. Some may have medical pre-dispositions and diet and exercise levels tend to vary across a population.
- Due to the dispersing nature of pollutants, it is difficult to locate and identify which group of individuals will be impacted, either directly or indirectly.
- There are currently no approved methodologies or studies to base assumptions on, such as baseline health levels or emission level-to-health risk ratios.

Due to the limitations described above, the extent to which the Project poses a health risk is uncertain but unavoidable. It is anticipated that impacts associated with carbon monoxide, nitrogen oxides and particulate matter will be less than significant overall, and that health effects will also be less than significant.

d) LESS THAN SIGNIFICANT IMPACT:

If the Project produced emissions of objectionable odors that adversely affect a substantial number of people, then the Project would have a significant impact. Land uses which are likely to generate odors, other than agricultural operations that are exempted, include chemical plants, composting operations, dairies, fiberglass molding, landfills, refineries, rail yards, and wastewater treatment plants.[7]

Short term odors associated with paving and construction activities could be generated by the Project's construction; however, any such odors would be quickly dispersed below detectable levels as distance from the construction site increases and would occur for short time periods during the construction phase only.

During the operational phase, odors produced by the Museum would result from vehicle emissions and potentially from the café. As the café is intended to be a coffee/sandwich shop rather than a full-service restaurant. Given the limited scope of food service provided by the café, and the distance from other businesses and residences, potential odors stemming from the Project site are expected to be less than significant.

3.3 Mitigation Measures: None required.

[7] SCAQMD Guidance Document, Chapter 2: Air Quality Issues Regarding Land Use.

4 - Biological Resources

BIOLOGICAL RESOURCES – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☒	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☒	☐

Sources: Biological Resources Assessment and Coachella Valley Multiple Species Habitat Conservation Plan Consistency Analysis Report – APNs 689-040-023 and 689-040-028," WSP USA Environment and Infrastructure, Inc., March 10, 2025; City of Rancho Mirage Code of Ordinances, §3.29.147 Coachella Valley Multiple Species Habitat Conservation Plan/Natural Community Conservation Plan Local Development Mitigation Fee, May 2019.

4.1 Setting

The Coachella Valley occurs within the Colorado Desert, a warmer and drier ecological subregion of the larger Sonoran Desert ecoregion. The Colorado Desert subregion is bounded by the Colorado River to the east, the Mojave Desert ecoregion to the north, and the San Bernardino, San Jacinto, and Santa Rosa Mountain ranges to the west. Much of the Colorado Desert sits between -275 feet and 3,000 feet in elevation, while the highest elevations are found at the top of Mt. San Jacinto (10,835 feet) and Mt. San Gorgonio (11,499 feet). The City of Rancho Mirage occurs at approximately 270 feet above sea level at the foot of the Santa Rosa Mountains along the northwestern edge of the Coachella Valley.

Wide temperature variation is a key characteristic of the desert southwest, and in Rancho Mirage, temperatures can range from 46° Fahrenheit (F) in December to 115+°F in July, with an average annual rainfall of two to four inches. These environmental extremes have led to the evolution of highly specialized desert species, some of which are endemic to the region. Development throughout the Coachella Valley is guided by regulations meant to protect remaining habitats for diminishing and endangered biological resources embodied in the Coachella Valley Multiple Species Habitat Conservation Plan, as described below.

Coachella Valley Multiple Species Habitat Conservation Plan

The City and the Project site are located within the boundaries of the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP), a regional plan that streamlines the permitting process for economic development in a manner that also preserves 27 different natural communities and protects 27 native species across 1.2 million acres of the Coachella Valley. As a signatory and "Permittee", the City is subject to the payment of requisite development fees for development of projects on heretofore vacant and undeveloped lands. The CVMSHCP establishes specific conservation areas where habitat, ecological processes, and/or wildlife corridors are protected from development activity. About 0.15 miles west of the Project site is the Santa Rosa and San Jacinto Mountains Conservation Area.

The following discussion of impacts is based on the March 2025 Biological Resources Assessment and CVMSHCP Consistency Analysis Report[8] (BRAR). The BRAR is available in Appendix B of this Initial Study. For the BRAR, biologists conducted an exhaustive literature review to identify special status plant and animal species that are known to occur within a five-mile radius of the Project site. Additionally, a pedestrian field assessment of the Project site and a 500-foot radius around the site was conducted on foot on January 27, 2025. All site conditions including weather, topography and soil, signs of animal activity, and resident plant species were recorded.

[8] "Biological Resources Assessment and Coachella Valley Multiple Species Habitat Conservation Plan Consistency Analysis Report – Assessor's Parcel Numbers 689-040-023 and 689-040-028," WSP USA Environment and Infrastructure, Inc., March 10, 2025.

4.2 Discussion of Impacts:

a) LESS THAN SIGNIFICANT IMPACT WITH MITIGATION:

The Project will pose a significant impact if it results in a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

Vegetation Observed

The northwest section of the Project site contains an unimproved graded quadrangle with two clusters of palms including nine California fan palms and about seven Mexican fan palms, as well as an older parking lot with irrigated ornamental vegetation. Along the westerly portion and extending to the southerly parcel, the terrain is flat, graded, and sparsely vegetated except for ten mature California fan palms and one Mexican fan palm. Other representative perennial plant species observed within this section included, but are not limited to, creosote bush *(Larrea tridentata)*, white bursage (*Ambrosia dumosa*), brittlebush (*Encelia farinosa*), narrow leaved bedstraw (*Galium angustifolium*) and desert needle grass (*Stipa speciosa*). Nonnative species include Mediterranean grass (*Schismus barbatus*), Bermuda grass (*Cynodon dactylon*), and puncture vine (*Tribulus terrestris*).

Approximately 50% of the Project site is covered by a rock outcrop rising to 370 feet in elevation, which separates the site from the residential land uses to the east. Despite the presence of a few walking trails, the hillside has been left in a natural state and creosote scrub remains as the dominant plant community.

None of the observed plant species are considered to be special status species.

Wildlife Observed

During the field survey, 14 species of vertebrates which are common to the region were observed: one reptile species, the side-blotched lizard (*Uta stansburiana*), was observed on the Project site. Additionally, 11 bird species, and two mammal species were also noted during the survey. Bird species noted included mourning dove (*Zenaida macroura*), Costa's hummingbird (*Calypte costae*), Western blue bird (*Sialia mexicana*), Say's phoebe (*Sayornis saya*), red-shouldered hawk (*Buteo lineatus*), American kestrel (*Falco sparverius*), Northern mockingbird (*Mimus polyglottos*), common raven (*Corvus corax*), American crow (*Corvus brachyrhynchos*), house finch (*Haemorhous mexicanus*), and yellow-rumped warbler (*Setophaga coronata*). The two mammal species observed on site were Botta's pocket gopher (*Thomomys bottae*) and an unidentified species of wood rat (*Neotoma sp.)*

Of the observed wildlife, only the Costa's hummingbird (*Calypte costae*) is designated as a special status species. No candidate, sensitive, or other special status species were observed. It should be mentioned that one field survey presents a limited perspective of the wildlife that may occur on a given project site due to the seasonality of species movements and the fossorial (burrowing) behavior of many desert wildlife species.

Special Status Species

The literature review of the Project vicinity, which includes the Project site and a five-mile radius, generated a list of 103 special status species that occur in the Project vicinity, 19 of which have the potential to occur on the Project site, and only one of which, Costa's

hummingbird, was observed during the field survey. Table 7 provides a summary of the 19 special status species that have either a high, moderate, low, or very low potential to occur on the Proposed Project site, species that are presumed to be absent were omitted from Table 7. The complete list of the 103 species is available in the BRAR.

Of the 19 species with potential to occur on the Project site, five are fully covered and conserved under the CVMSHCP. The City is a signatory to the CVMSHCP and payment of the development fee is expected to mitigate potential impacts to these five species who are otherwise protected in established conservation areas.

Table 7
Special Status Species Potentially Occurring on the Project Site

Special Status Species	Probability to Occur on the Project Site
• Pink velvet mallow (*Horsfordia alata*)	• Low: Suitable habitat present on rocky hillside but not observed. • Not covered by the CVMSHCP
• Newberry's velvet mallow (*Horsfordia newberryi*)	• Low: Suitable habitat present on rocky hillside but not observed. • Not covered by the CVMSHCP
• Winged crypantha (Johnstonella holoptera)	• Low: Suitable habitat present on rocky hillside but not observed. • Not covered by the CVMSHCP
• Narrow-leaf sandpaper plant (*Petalonyx linearis*)	• Low: Suitable habitat present on rocky hillside but not observed. • Not covered by the CVMSHCP
• Desert fan palm oasis woodland	• Absent: California fan palms occur on the site, but they were planted as landscaping and are found along the eastern edge by Hwy 111. • Fully covered by CVMSHCP
• Monarch butterfly (*Danaus plexippus*)	• Low: Larval host plants (milkweeds) not observed but may been dormant at time of survey. Winter roost site no present. Adults may occasionally fly through and could breed/reproduce if mildweek was present. • Not covered by CVMSHCP
• Northern red diamond rattlesnake (*Crotalus ruber ruber*)	• Very Low: Rocky hillside suitable bus very small and isolated. Site is low quality for this species. • Not covered by CVMSHCP
• Cooper's Hawk (*Accipiter cooperii*)	• Absent: Nesting habitat lacking. • Moderate: Could forage on site if nesting nearby. • Not covered by CVMSHCP
• Golden eagle (*Aquila chrysaetos*)	• Absent: Nesting habitat lacking. • Low: Could forage on site if nesting nearby. • Not covered by CVMSHCP
• Costa's hummingbird (*Calypte costae*)	• Moderate: Suitable nesting habitat. • High: Observed foraging. • Not covered by CVMSHCP

Table 7
Special Status Species Potentially Occurring on the Project Site

Special Status Species	Probability to Occur on the Project Site
• Prairie falcon (*Falco mexicanus*)	• Absent: Nesting habitat lacking. • Low: Foraging habitat is low, but nearby Santa Rosa Mtns offer refuge. • Not covered by CVMSHCP
• Loggerhead shrike (*Lanius ludovicianus*)	• Absent**:** Suitable nesting habitat lacking. • Low: May forage if nesting nearby. • Not covered by CVMSHCP
• Black-tailed gnatcatcher (*Polioptila melanura*)	• Absent**:** Suitable nesting habitat lacking. • Low: May forage or move through from nearby areas. • Not covered by CVMSHCP
• Vermilion flycatcher (*Pyrocephalus rubinus*)	• Absent**:** Suitable nesting habitat lacking. • Low: May forage if nesting nearby. • Not covered by CVMSHCP
• Lawrence's goldfinch (*Spinus lawrencei*)	• Absent**:** Suitable nesting habitat lacking. • Very Low: May forage or move through during migration. • Not covered by CVMSHCP
• Crissal thrasher (Toxostoma crissale)	• Absent**:** Suitable nesting habitat lacking. • Very Low: May forage if nesting nearby. • Fully covered by CVMSHCP
• Le Conte's thrasher (Toxostoma lecontei)	• Absent**:** Suitable nesting habitat lacking. • Very Low: May forage if nesting nearby. • Fully covered by CVMSHCP
• Least Bell's vireo (*Vireo bellii pusillus*)	• Absent**:** Suitable nesting habitat lacking. • Low: May forage during migration. • Fully covered by CVMSHCP
• Western yellow bat (Lasiurus xanthinus)	• Moderate: Could roost in palm fronds of the palms on site. • Moderate: Will forage if roosting on or near site. • Fully covered by CVMSHCP
• Pocketed free-tailed bat (Nyctinomops femorosaccus)	• Low: Could roost on the rocky hillside but prefers higher cliffsides. • Low: may forage if roosting on or near site. • Not covered by CVMSHCP

Summary

The Project site is an isolated remnant of the Santa Rosa foothills and is separated from these foothills by State Highway 111, and developed and vacant lands. The site was previously developed with a restaurant and parking lot, but as the restaurant was destroyed by fire in 2012 and subsequently removed, the site is vacant. Development of the proposed Project would result in the permanent alteration of approximately three acres of land which currently contains a parking lot, graded compact soil, 20± palms, and sparse vegetation. A small portion of the lower west-facing side of the rock outcrop will be scraped with machinery (mechanical ripping; no blasting is planned) to accommodate the museum building, but the hillside will largely remain intact. Because most of the rock outcrop will

remain in its current state, the special status species listed in the above Table 7 that are associated with the rocky hillside habitat would be less than significantly impacted by the Project.

The purpose of the CVMSHCP is to facilitate the development permitting process in exchange for the mitigation of impacts to covered species via assembly of conservation lands and the payment of the development fee. Hence, payment of the required fee for development on lands outside CVMSHCP-designated Conservation Areas is found to sufficiently mitigate impacts to species potentially occurring on the proposed Project site with exception of the western yellow bat.

The western yellow bat is covered by the CVMSHCP, however, the species is also considered to be imperiled and is a California species of special concern. The pocketed free-tailed bat is also a California species of special concern. Fan palms are the preferred roost habitat for western yellow bats and crevices in rocky hillsides are the preferred roosting habitat for the pocketed free-tailed bat. Pre-construction bat surveys must be conducted prior to the removal of any palms, and prior to the disturbance to the rock outcrop. BIO-1 Mitigation Measure provides details of bat clearance surveys.

Virtually all resident and migratory bird species are protected by the Migratory Bird Treaty Act (MBTA). Many of these are further protected by the California Department of Fish and Wildlife (CDFW), California Fish and Game Commission (FGC), and the US Fish and Wildlife Service (USFWS). To avoid impacts to bird species, Project-related disturbances including vegetation removal, grading, operation of heavy equipment, construction, etc.) should be scheduled outside of nesting season (February 1 through August 31). If such scheduling is not possible, then a nesting bird clearance survey to be conducted by a qualified ornithologist or biologist immediately prior to site disturbance is required to reduce impacts to less than significant. See BIO-2 Mitigation Measure.

Monarch butterflies (*Danaus plexippus*) are not covered by the CVMSHCP and are re considered to have a low potential to occur on the Project site. However, if any milkweed plants occur on the site, then monarch butterflies may be attracted to the site as milkweed species are the sole larval host plants for the monarch butterfly. In January 2025 when the field survey was conducted, milkweed was not observed, but the timing was outside of the blooming season when the plants are dormant and more difficult to identify. To mitigate potential impacts to monarch butterflies that may occur on the Project site, the on-site biologist conducting the nesting bird survey and/or the bat survey, should also check the Project site for milkweed prior to any vegetation removal (BIO-3 Mitigation Measure).

Payment of the requisite CVMSHCP developer fee and implementation of the three mitigation measures will reduce potential impacts to less than significant to the any species identified as a candidate, sensitive, special status species, or otherwise protected species that may occur on the Project site.

b, c) NO IMPACT:

There are no riparian habitats, protected wetlands, marshes, vernal pools, or other sensitive communities that are protected by US fish and Wildlife Service or the California Department of Fish and Wildlife occurring on the Project site. There would be no impact to any such natural community by this Project.

d) LESS THAN SIGNIFICANT IMPACT WITH MITIGATION:
If the proposed Project interferes substantially with the movement of any native resident wildlife species or with established native resident or migratory wildlife corridors, or if it impedes the use of native wildlife nursery sites, then the Project would have significant impacts. Project site is not considered to be a known wildlife nursery nor is it considered to be a part of any established wildlife corridor. Urban land uses surround the site on three sides and a major transportation corridor, Highway 111, occurs on the fourth side. Although the Project site is near the Santa Rosa and San Jacinto Mountains Conservation Area, Highway 111 impedes terrestrial access between the Project site and the mountains. Flighted species would be able to access the Project site, and for this reason, three mitigation measures, BIO-1, BIO-2, BIO-3, are described below for the purpose of identifying and protecting potentially occurring sensitive and protected wildlife prior to construction activities. Adherence to survey protocols would reduce potential impacts to nesting birds, roosting bats, and endangered butterfly larvae to less than significant levels.

e, f) LESS THAN SIGNIFICANT IMPACT:
The Project would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Likewise, the Project would not conflict with an adopted habitat conservation plan, natural community conservation plan, or any other approved local, regional, or state habitat conservation plan.

The City of Rancho Mirage is a signatory to the CVMSHCP and therefore disturbance of at least a portion of the Project site is subject to the payment of a Local Development Mitigation Fee (LDMF), which would mitigate potential Project impacts to CVMSHCP-covered species.[9] Currently, the western yellow bat is the only species covered by the CVMSHCP that has a high potential to occur on the Project site. The Santa Rosa and San Jacinto Mountains Conservation Area occurs 0.15 miles to west of the Project site. No known CVMSHCP designated wildlife corridors or biological linkages occur on the Project site.

Adherence to the mitigation measures described below and payment of the LDMF would ensure that the Project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Impacts would be less than significant.

4.3 Mitigation Measures:

BIO-1 Bat Clearance Surveys: Western yellow bats roost on the undersides of California and Mexican fan palm fronds, particularly the dead fronds where they can blend in more easily. If there are no dead fronds, they may choose to roost in the live fronds. Bat clearance surveys are recommended for the Western yellow bat if the Project entails the removal of any palm trees from the site. Each palm that is scheduled to be removed must be inspected by a qualified biologist for the presence of roosting western yellow bats.

Pocketed free-tailed bats roost in rock crevices of hillsides, therefore, to avoid significant impacts, a pre-construction bat clearance survey of the rock outcrop must be conducted prior to any disturbance to the rock outcrop. The appropriate level and extent of the survey

[9] City of Rancho Mirage Code of Ordinances, §3.29.147 Coachella Valley Multiple Species Habitat Conservation Plan/Natural Community Conservation Plan Local Development Mitigation Fee, May 2019.

shall be commensurate with the level of disturbance to the rock outcrop. If roosting bats are identified, the biologist shall provide guidance as to the appropriate avoidance measures that should be taken.

BIO-2 **Nesting Bird Survey:** To avoid impacts to resident and migratory nesting birds, all vegetation clearing, ground disturbance, and construction activity should be scheduled between September 1 and January 31 if possible. If construction occurs during the nesting season, February 1 through August 31, a qualified ornithologist or biologist must conduct a pre-construction nesting bird survey (NBS) immediately prior to scheduled construction activity. If active nests are identified, the biologist will demarcate a no-work buffer zone(s) around the active nest(s) and check the nest site(s) weekly until the young birds fledge and the nest(s) become inactive. The buffer zone size would be based on the nesting species, its sensitivity to disturbance, nesting stage and the expected intensity and duration of disturbance. No ground or vegetation disturbance shall occur within the nest site buffer zone(s) until the qualified biologist determines that the young have successfully fledged, and the nest is inactive. Per CDFW recommendations, a buffer of 500 feet shall be set for listed species and birds of prey, and a buffer of 100 to 300 feet shall be set for unlisted songbirds.

BIO-3 **Milkweed Survey:** During the NBS, the biologist should scan the Project site for milkweed plants supportive of Monarch butterflies. Monarch butterflies have a low potential to occur on the Project site as no milkweed plants were observed during the January field survey. However, the milkweed bloom from April to July, and if any milkweed plants are observed during this timeframe, the plants should be inspected for monarch pupae. If any pupae are identified, the host plant(s) should be marked, and, at the biologist's discretion, a no-work buffer zone around each plant should be established until the pupae complete the metamorphosis and leave the plant.

Mitigation Monitoring:

BIO.A The Project biologist shall supply the City with reports of findings regarding nesting birds, roosting Western yellow bats, roosting pocketed free-tailed bats, and monarch butterfly pupae. The reports shall be attached to the grading permit for the Project.

Responsible Parties: Project Biologist, City Engineer, Planning Department

Timeline: Prior to issuance of any permits that result in ground disturbance

5 - Cultural Resources

CULTURAL RESOURCES – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐

Sources: Phase 1 Historical/Archaeological Resources Survey for Global Wildlife Discovery Museum Project Assessor's Parcel Nos 689-040-023, -025, -028, City of Rancho Mirage, California," CRM TECH, April 10, 2025; California Code of Regulations, Title 14 §15064.5; Guidelines for Determining the Significance of and Impact to Cultural Resources: Archaeological, Historic, and Tribal Cultural Resources, Society for California Archaeology, April 2020.

5.1 Setting

Under CEQA, the term, "cultural resources," encompasses a broad range of artifacts spanning prehistoric and historic eras that are comprised of traces or remains of humans and human cultures who lived in California. Sites may contain archaeological artifacts belonging to indigenous cultures and non-indigenous cultures. Archaeological resources may include items such as tools, carvings, structures, and sites, that are associated with scientifically recognized important prehistoric or historic events or cultures and that contain important scientific research value. Cultural resources also include "historic" resources, which are associated with the more recent built environment such as old houses, structures, roads, walls, etc. In addition, cultural resources include traditional cultural places, objects, records and manuscripts. "Tribal resources" refer to a specific class of cultural resources that are significant to California Native American Tribes. These resources are discussed further in the Tribal Cultural Resources Section 18.[10]

Per CEQA, cultural resources that are significant are labeled as "historical" resources and warrant a certain level of protection from a project's impacts. An historical resource may be prehistoric or historic in age and may be archaeological and/or significant to a California Native American Tribe. The lead agency may consider resources to be historically significant if they meet criteria for listing in the California Register of Historical Resources, which contains all resources listed in the National Register of Historic Resources. Section 15064.5 of the CEQA Guidelines defines a historical resource as the following[11]:

[10] "Guidelines for Determining the Significance of and Impact to Cultural Resources: Archaeological, Historic, and Tribal Cultural Resources," Society for California Archaeology, April 2020.

[11] "Determining the Significance of Impacts to Archaeological and Historical Resources," California Code of Regulations, Title 14 §15064.5.

1) A resource that is listed in or determined to be eligible by the State Historical Resources Commission for listing in the California Register of Historical Resources is historically significant.

2) A resource is considered to be historically significant if is included in a local register of historical resources, as defined in section 5020.1(k) of the Public Resources Code or identified as significant in an historical resource survey meeting the requirements of section 5024.1(g) of the Public Resources Code.

3) Any object, building, structure, site, place, record, or manuscript which a lead agency determines to be historically significant in the architectural engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be a significant historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

4) Finally, a lead agency may determine that a resource is historically significant even if it has not been previously listed in or determined to be eligible for listing in the California Register of Historical Resources and is not already included in a local register of historical resources or previously identified in a historical resources survey.

The following discussion of the Project area and potential impacts is based on the "Phase 1 Historical/Archaeological Resources Survey for Howard World Wildlife Museum Project" prepared by CRM TECH (referred to as "Cultural Resources Report").[12] A copy of the Cultural Resource Report is provided in Appendix C of this IS. For the analysis, archeologists conducted an historical and archaeological records search, initiated a Native American Sacred Lands File search, contacted pertinent Native American representatives, researched historical background data, and performed an intensive-level field survey.

The City of Rancho Mirage is located near the northwestern portion of the Coachella Valley, a low-lying desert region at the west extent of the Colorado Desert and surrounded by mountain ranges. Wide elevation ranges from -230 up to 11,000 feet, temperature extremes from 46° Fahrenheit (F) in December to 106+°F in July and an average annual rainfall between two and four inches characterize the region. The City and the surrounding Coachella Valley have been the central home of the Desert Cahuilla People.

Prehistoric Setting

The Cahuilla People have inhabited the Coachella Valley and surrounding mountains for thousands of years. According to the Cultural Resources Report, the earliest evidence of prehistoric human activities dates from the Paleoindian Era (10,000 to 8,000 years ago) and consists of "very simple stone tools, 'cleared circles, rock rings, [and] some geoglyph types.'"[13] The Early Archaic Period (8,000 to 4,000 years ago), and Late Archaic Period (4,000 to 1.500 years ago) are identified by "groundstone artifacts." The Late Prehistoric Era (1,500 to 250 years ago) provides the most amount of early human civilization. Ceramics are frequently recorded from this era.

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12 "Phase 1 Historical/Archaeological Resources Survey for Howard World Wildlife Museum Project, Assessor's Parcel Nos 689-040-023, -025, -028, City of Rancho Mirage, California," CRM TECH, April 10, 2025.

13 Schaefer, Jerry, "The Challenge of Archaeological Research in the Colorado Desert: Recent Approaches and Discoveries," Journal of California and Great Basin Anthropology, Vol. 16, Issue 1,1994.

Cahuilla life in the Coachella Valley during the Holocene Epoch, a geologic timeframe beginning at the end of the last ice age about 11,700 years ago, was influenced by the intermittent presence of Ancient Lake Cahuilla (a terminal lake) toward the eastern portion of the Coachella Valley. Periodically, the lake would fill the Salton Basin when the Colorado River would temporarily turn northward from its usual course to the Gulf of California. Lakeshore mineral deposits along the lower Santa Rosa foothills up to 42 feet above sea level suggest the high stand of the most recent inundation approximately 500 years ago. Artifacts from Cahuilla presence around the ancient lakeshore include "brown and buff ware ceramics, stone grinding tools, and projectile point types, ornaments, and cremation remains."[14] As the Lake would dry, Native people moved away from the receding shoreline toward streams, rivers, and higher elevations in the nearby mountains.

Ethnohistoric Setting

Cahuilla are a Takic-speaking people whose traditional territory extends from the San Bernardino Mountains to the north down across the Santa Rosa Mountains to the Borrego Desert to the south, and from the City of Riverside to the west over to the Colorado River. The Cahuilla relied on hunting and gathering of local wildlife and plants for food, medicine, and materials needed for clothing, cooking, shelter, and hunting. Acorns, mesquite beans, cacti, pinyon nuts, yucca, agave, and fan palms were commonly used.

Anthropologists identify three regional groups of Cahuilla: Desert Cahuilla, Western (or, Pass) Cahuilla, and Mountain Cahuilla. However, Cahuilla associate with one of two moieties, the Tuktum (Wildcat) or the Istam (Coyote) and were further organized into clans along patrilineal lines. Today, nine bands of Cahuilla are federally recognized. While actual population data is difficult to establish, the Cahuilla may have numbered between 3,600 to 10,000 living in many villages throughout the Coachella Valley, Pass area, and the mountain ranges.

The Spanish Mission System began in California in 1776, however, due to the remoteness of their territories in the mountains and deserts, many of the Cahuilla remained out of reach of the Mission System until 1819 when an outpost, or Asistencia, of the San Gabriel Mission was built in Redlands area. Thus began the forced transition of many Cahuilla from their traditional homelands and lifestyles to Spanish Mission lifestyle and labor. The late 1800s saw the arrival of the railroad and non-Native agriculturalists and who were given traditional Cahuilla lands by the federal government to convert into farmland.

Historic Setting

The earliest European explorers arrived in the Coachella Valley in 1823 seeking a route to Yuma, Arizona. The hot and arid desert climate precluded most non-Native people from exploring the low desert until more established trails, and eventually the Southern Pacific Railroad (1876), were constructed. During the 1870s, the railroads brought farmers and other land prospectors to the West to claim land under the Homestead Act of 1862 and the Desert Land Act of 1877. The availability of land and the presence of plentiful groundwater launched agriculture as the dominant economic engine of central Riverside County and Imperial County.

[14] "Phase 1 Historical/Archaeological Resources Survey for Howard World Wildlife Museum Project, Assessor's Parcel Nos 689-040-023, -025, -028, City of Rancho Mirage, California," CRM TECH, April 10, 2025.

Records Search

A records search was conducted on February 27, 2025 at the South Coastal Information Center (SCIC) of the California Historical Resources Information System (CHRIS) which is located at San Diego State University. Additionally, the City's archival records were researched. The search produced a compilation of previously documented resources and existing cultural resources reports of the Project site and buffer radius of one mile. The records search found that within the one-mile buffer, 28 previous studies had been completed between 1978 and 2017 which had led to the documentation of two historic period sites and one prehistoric period site. One of the documented historic sites was a 1930s vernacular wood-frame house that was part of the Peterson Ranch, and the second historic resource was a small refuse deposit. The pre-historic resource consisted of trail segments and rock cairns occurring along the slopes of the San Jacinto Mountains. These three sites were located over 0.25 miles from the Project site and require no further analysis here.

The City's records showed that from 1978 to 2013, a building designed by Kendrick Bangs Kellogg for the Chart House restaurant chain, had occupied the Project site. Kellogg's building was considered to be a quintessential example of Organic Modern architecture. While the building did not meet the 50-year threshold for listing in the National Register of Historic Places, prior to its removal the City of Rancho Mirage in 2004 designated it as a local historic resource, and therefore a significant resource. In 2012, the building was severely damaged in a fire and restoration was not feasible, which led to the removal of the building from the site.

Native American Consultation

The Native American Heritage Commission (NAHC) stated in a letter dated February 3, 2025 that the results of the Sacred Lands File search found that no Native American resources had ever been documented on the Project site, but recommended contacting local tribes for more information. The NAHC provided a list of 22 contacts affiliated with 11 Native American groups. CRM TECH sent a letter dated February 14, 2025 to the Agua Caliente Band of Cahuilla Indians (ACBCI), the group nearest to the Project site. Their cultural resources analysts identified the Project site as occurring within the tribe traditional use area and subsequently participated in the archaeological field survey. ACBCI cultural resources analysts followed up by requesting copies of all cultural resource documentation pertaining to this Project and the presence of an ACBCI tribal monitor on the Project site during ground-disturbing construction activities. A copy of ACBCI correspondence is provided in the Cultural Resources Report.

In addition to the consultation conducted by the Project archaeologist, Assembly Bill 52 (AB 52) instructs lead agencies to consult with any local California Native American tribe who is traditionally and culturally affiliated with the geographic area of the Proposed Project if the tribe has requested formal notification.[15] AB 52 has established guidelines for completing consultation process and incorporating tribal requests. In a letter dated May 19, 2025 (see Appendix D), the City initiated the AB 52 consultation for the Proposed World Wildlife Museum with 11 local tribes who have 30 days to respond with their consultation requests. As described in Section 18, Tribal Cultural Resources, the City received responses from three tribes. One, the Fort Yuma Queshan Indian Tribe, declined consultation. The ACBCI and the Morongo Band of Mission Indians both requested consultation. After meeting with both tribes, it was determined that the ACBCI's request

[15] California Public Resources Code §21080.3.1, January 1, 2015.

for ACBCI monitors would take precedence, and that the Morongo would monitor only if ACBCI failed to do so. In order to assure that impacts to archaeological and tribal resources are maintained at less than significant levels, mitigation measures have been provided below.

Historical Background Research

The historical background research provides evidence that the Project site occurs adjacent to an historic and prehistoric travel corridor known as the Bradshaw Trail that connected lands to the west with the gold fields of Arizona. Less than one-half mile north of the Project site a mid-19th century trail resulting from early US government land surveys was located, and later a branch of this trail was modified and aligned within 200 feet of the Project site's northeast corner. In the early 20th century, an old wagon road (Bradshaw Trail) transitioned to an automobile highway which is today known as State Highway 111. During this entire time, the Project site remained undeveloped until the period between 1921 and 1954 when a large building was present at the corner of Highway 111 and Mirage Cove Drive. Between 1972 and 1975 this building was removed, and in 1978, the Kellogg-designed Chart House restaurant was constructed on the northeast portion of the site. By 2003, the Chart House company had left the location and other restaurant businesses occupied the building until the fire incident in 2012 and the subsequent removal of the Kellogg building in 2013. The Project site has remained in its present condition since 2013.

Field Survey

Project archaeologists in tandem with a Native American ACBCI monitor conducted an intensive-level field survey of the Project site. No resources of cultural, prehistoric or historic significance were identified during the field survey. The only trace of the former Kellogg Chart House structure was the adjacent parking lot that was not removed. At the south end of the site where the large building from the mid-20th century stood, only a concrete slab remains, and it is not considered to be historically significant. Finally, scattered debris such as bottle fragments, cans, paper, and plastic scraps were observed across the Project site, and none of the items were deemed to be of historical or archaeological interest.

5.2 Discussion of Impacts:

a) NO IMPACT:
The Cultural Resources Report found that presently there are no historical resources on the Project site and the Project will not cause a substantial adverse change to any historical resources. CRM TECH suggested that the applicant may consider establishing a commemorative display of the former Kellogg Chart House restaurant to recognize the architectural significance of the building. Otherwise, no impacts to historical resources are expected.

b) LESS THAN SIGNIFICANT IMPACT WITH MITIGATION:
No historic or prehistoric cultural or archaeological resources were identified on the Project site during the field survey and during the cultural/archaeological records search. Per the Cultural Resources Report, no further investigation is necessary unless the site plans change and include areas that were not studied by the Report. However, as a result of tribal consultation described above, the ACBCI requested monitoring during all earth moving activities. The mitigation measures provided below would avoid adverse effects and reduce impacts to less than significant.

c) LESS THAN SIGNIFICANT IMPACT:
No human remains or cemeteries were identified as occurring on the Project site. Should any human remains be found during the construction phase, California Health and Safety Code § 7050.5 requires that all excavation activity must stop, and the County Coroner must inspect the site. If the remains are identified as those of a Native American individual by the Coroner, the NAHC is informed and required to contact the Most Likely Descendant. The descendant will recommend the appropriate next step. This state law requirement would ensure that the Project would not impact any potentially occurring human remains.

5.3 Mitigation Measures:

CUL-1 A qualified archaeologist and ACBCI tribal monitors shall be on-site during all ground disturbing activities. The monitors shall be empowered to stop or redirect equipment if resources are identified. The monitors shall quickly identify the resource, determine its significance, and determine if any additional investigation is necessary. The archaeologist and tribal monitor shall determine when monitoring activities can be suspended.

CUL-2 If resources are identified during monitoring activities, the qualified archaeologist and ACBCI tribal monitor shall determine whether they should be reburied on site, or curated with the ACBCI.

The following mitigation measures will only be implemented if ACBCI does not provide monitoring for the Project:

CUL-3 Prior to the issuance of grading permits, the applicant shall enter into a Tribal Monitoring Agreement with the Morongo Band of Mission Indians for the project. The provisions of CUL-1 and CUL-2 shall otherwise apply.

CUL-4 The Project archaeologist shall prepare a Cultural Resource Management Plan (CRMP) and/or Archaeological Monitoring and Treatment Plan (AMTP) to address the details, timing, and responsibilities of all archaeological and cultural resource activities that occur on the project site for submittal to the Morongo Band. The CRMP and/or AMTP shall include provisions for a pre-construction meeting with the Project contractor, disposition of identified resources, and reburial or curation with the ACBCI.

Mitigation Monitoring:

CUL-A The Project archaeologist will provide a report of findings within 30 days of completion of monitoring activities. If resources are found, the report shall include a description of their disposition. The final report shall be provided to the City and monitoring tribe, and filed with South Coastal Information Center.

Responsible Parties: Project applicant, Project archaeologist, City Planning Department

6 - Energy

ENERGY – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

Sources: CalEEMod 2022.1; Rancho Mirage Energy Authority; SCE 2022 Power Content Label; CPUC "Fuel Consumption Rate Factors, Table D-21"; Carl Moyer Program Guidelines, Volume I: Program Overview, California Environmental Protection Agency Air Resources Board, June 20, 2017; City of Rancho Mirage Energy Action Plan, Chapter V, Rancho Mirage Municipal and Community Energy Usage, March 2013.

6.1 Setting

Electricity

Southern California Edison (SCE) is the electric power provider to most of the City of Rancho Mirage. Imperial Irrigation District (IID) provides electricity to the region of the City north of Gerald Ford Drive and east of Bob Hope. SCE provides electricity to the City through an agreement with the Rancho Mirage Energy Authority (RMEA). Under Assembly Bill 117, which permits Community Choice Aggregation (CCA), the RMEA was established in 2017 as a City-owned provider that procures electricity from various generators and contracts with SCE to deliver the electricity to customers through its power grid. Customers pay the RMEA a slightly lower rate for the same service they would receive from SCE. Customers have the option to purchase electricity from a mix of renewable and nonrenewable sources or purchase 100% of their energy from renewable sources. Table 8 summarizes the energy mix provided by RMEA and SCE.

Table 8
RMEA 2019 Power Content and 2022 SCE Power Content

Energy Source	RMEA[4]		SCE[5]	State Power Mix
Specific Purchases	Base Choice	Premium Renewable Choice		
	Percent of Total Retail Sales (kWh)			
Eligible Renewables[1]	35%	100%	33.2%	35.8%
Biomass & Biowaste	19.5%	31%	0.1%	2.1%
Geothermal	8.6%	0%	5.7%	4.7%
Eligible Hydroelectric[2]	0%	0%	0.5%	1.1%

Table 8
RMEA 2019 Power Content and 2022 SCE Power Content

Energy Source	RMEA[4]		SCE[5]	State Power Mix
Specific Purchases	Base Choice	Premium Renewable Choice		
	Percent of Total Retail Sales (kWh)			
Solar	0.6%	0%	17.%	17.0%
Wind	6.3%	69%	9.8%	10.8%
Coal	0%	0%	0.0%	2.1%
Large Hydroelectric	18.4%	0%	3.4%	9.2%
Natural Gas	0%	0%	24.7%	36.4%
Nuclear	0%	0%	8.3%	9.2%
Other	0%	0%	0.1%	0.1%
Unspecified Power[3]	46.6%	0%	30.3%	7.1%
TOTAL	100%	100%	100%	100%

[1] Eligible renewable percentage does not refer to the RPS compliance.
[2] Large hydroelectric plants generate more than 30MW. Small hydro plants generate under 30MW and qualify as "renewable energy" under the RPS.
[3] Unspecified power is electricity purchased through open market transactions and cannot be traced to a specific source of electricity.
[4] Represents SCE 2022 Power Content Label.
[5] Represents RMEA 2019 power generation data retrieved from the California Public Utilities Commission (CPUC), May 2025.
Sources: Rancho Mirage Energy Authority; SCE 2022 Power Content Label; CPUC

Natural Gas

Natural gas is provided to the City by Southern California Gas (SoCalGas) and is used for home heating, water heating, laundry dryers and gas stoves. More than 90% of the natural gas consumed in California is sourced from Texas and New Mexico, and the SoCalGas transmission network consists of storage facilities and pipelines. Southern California Gas is committed to reducing greenhouse gas emissions by supporting the development of renewable natural gas (RNG) resources. Unused methane that is released from landfills, composted food waste, dairies, and wastewater treatment plants can be captured and transported along existing SoCalGas gas pipelines. SoCalGas offers assistance to individual methane generators, such as wastewater treatment plant and landfills, to convert its by-products into methane for use at its own site.

California State Standards

To reduce energy consumption and pollution emissions, the State of California has enacted several laws and building codes to guide the construction and operations of commercial and residential development. The California Code of Regulations (CCR) Title 24, Part 6, "California's Energy Efficiency Standards for Residential and Nonresidential Buildings," (Energy Code, or Title 24) was established in 1978 and is updated regularly. In 2007, Title 24, Part 11, also known as the Green Building Standards Code (CALGreen) was added to the CCR. Together the Energy Code and CALGreen address all stages of building construction from the planning process to the end use, and set standards for reducing energy and water use, for materials recovery and conservation, and for reducing construction and operational impacts on the local environment.

The Renewable Portfolio Standard required electricity providers to derive 33% of their electricity from renewable sources by 2020. Senate Bill 100 furthered this target by requiring 60% of electricity to be derived from renewable sources by 2030 and 100% by 2045.

Senate Bill 375 established new planning processes to facilitate coordination between land use planning, regional transportation plans and funding priorities with the goal of reducing regional vehicle miles traveled (VMT) and thus reducing transportation energy use and greenhouse gas emissions.

6.2 Discussion of Impacts:

a) LESS THAN SIGNIFICANT IMPACT:

Construction Energy Consumption

The California Emissions Estimator Model (CalEEMod) provides land use-specific estimates of the amount of electricity and natural gas the Project would consume based on the following land use inputs: "library" land use, city park, and parking lot. CalEEMod provides a limited number of land uses and those with the most similar characteristics were applied to the Project model for purposes of analysis. The "library" land use most closely resembles a museum, and the "city park" land use most closely resembled the landscaped portion of the containing the walking path.

During construction, the Project would use energy during demolition, site preparation, grading, building construction, paving, and architectural coating. Electricity would be used to operate a temporary construction office which would require lighting, climate control, and electricity to power office equipment. To operate construction equipment and worker transportation, the primary sources of energy would consist of petroleum fuels including gasoline and diesel fuels. Table 9 provides fuel consumption estimates for the construction phasing timeline of the Project. Construction equipment schedules, equipment power ratings, and load factors were programmed into CalEEMod. The aggregate fuel consumption rate for all equipment is estimated at 18.5 horsepower hour per gallon (hp-hr-gal.) per the California Air Resource Board's (CARB's) Carl Moyer Program Guidelines (2017).[16] CalEEMod assumes all construction equipment is diesel powered. Total diesel fuel consumption for construction activities is estimated to be 25,686 gallons.

Table 9
Project Construction Equipment Fuel Consumption Estimates

Phase	Duration (Days)	Equipment	HP Rating	Qty	Usage Hours	Load Factor	HP-hrs/day	Fuel Consumption
Demolition	10	Rubber Tired Dozers	367	1	8	0.4	1,174	653
		Tractors/Loaders/Backhoes	84	3	8	0.37	746	403
		Concrete/Industrial Saws	33	1	8	0.76	193	104
Site Preparation	10	Tractors/Loaders/Backhoes	84	1	7	0.37	218	118
		Scrapers	423	1	8	0.48	1,624	878
		Graders	148	1	8	0.41	485	262

[16] "Fuel Consumption Rate Factors, Table D-21," Carl Moyer Program Guidelines, Volume I: Program Overview, California Environmental Protection Agency Air Resources Board, June 20, 2017, https://ww2.arb.ca.gov/sites/default/files/classic/msprog/moyer/guidelines/2017/2017_cmpgl.pdf.

Table 9
Project Construction Equipment Fuel Consumption Estimates

Phase	Duration (Days)	Equipment	HP Rating	Qty	Usage Hours	Load Factor	HP-hrs/day	Fuel Consumption
Grading	15	Graders	148	1	8	0.41	485	394
		Rubber Tired Dozers	367	1	8	0.4	1,174	952
		Tractors/Loaders/Backhoes	84	2	7	0.37	435	353
		Rubber Tired Dozers	367	1	8	0.4	1,174	6,348
Building Construction	205	Forklifts	82	2	8	0.2	262	2,908
		Cranes	367	1	8	0.29	851	9,435
		Welders	46	3	8	0.45	497	5,505
		Generator Sets	14	1	8	0.74	83	918
		Tractors/Loaders/Backhoes	84	1	6	0.37	186	2,066
Paving	10	Pavers	81	1	8	0.42	272	147
		Paving Equipment	89	1	8	0.36	256	139
		Rollers	36	2	8	0.38	219	118
		Tractors/Loaders/Backhoes	84	1	8	0.37	249	134
Architectural Coating	10	Air Compressors	37	1	6	0.48	107	58
TOTAL Construction Equipment Fuel Demand (Gallons Diesel Fuel)								**25,686**

- The aggregate fuel consumption rate for all equipment is estimated at 18.5 horsepower hour per gallon (hp-hr-gal.), per the California Air Resource Board's (CARB's) Carl Moyer Program Guidelines (2017), Table D-21 Fuel Consumption Rate Factors. (The Carl Moyer Program Guidelines Volume I: Program Overview, Program Administration and Project Criteria, approved by the California Environmental Protection Agency Air Resource Board on April 27, 2017. https://ww2.arb.ca.gov/sites/default/files/2020-06/2017_cmpgl.pdf)
- CalEEMod outputs provide Phase, Duration, Equipment, HP Rating, Quantity (number of equipment), Usage Hours, and Load Factor.
- Fuel consumption = [(Usage Hours x Qty.) x Load Factor] x HP Rating/18.5 x Number of Days

The estimated amount of fuel consumed by construction worker trips is provided below in Table 10. Construction phase duration, trip type, number of worker trips per day and average trip lengths are provided by the CalEEMod tool. The U.S. Department of Energy Alternative Fuels Data Center provides the average vehicle fuel economy estimates.[17] For this analysis, it was assumed that the majority of worker trips would be by car (24.4 mpg), hauling trips by Class 8 trucks (6.45 mpg, diesel), and vendor trips by delivery trucks (7.7 mpg, diesel). The total amount of fuel that will potentially be consumed by construction workers, vendors, and haulers traveling to the Project site during construction is 4,316.8 gallons.

Table 10
Construction Worker Fuel Consumption Estimates

Phase	Duration (Days)	Trip Type	Worker Trips/ Day	Trip Length (Miles)	VMT	Avg. Fuel Economy (mpg)	Fuel Consumption (gallons)
Demolition	10	Worker	13	18.5	2,405	24.4	98.57
		Vendor	1	10.2	102	7.7	13.25
		Hauling	37	20.0	7,400	6.4	1,156
Site Preparation	10	Worker	8	18.5	1,480	24.4	60.66
		Vendor	1	10.2	102	7.7	13.25
Grading	15	Worker	10	18.5	2,775	24.4	113.73
		Vendor	1	10.2	153	7.7	19.87
		Hauling	4	20.0	1,200	6.4	187.50

[17] U.S. Department of Energy, "Average Fuel Economy by Major Vehicle Category," Alternative Fuels Data Center, updated January 2024, https://afdc.energy.gov/data/10310?page=2.

Table 10
Construction Worker Fuel Consumption Estimates

Phase	Duration (Days)	Trip Type	Worker Trips/ Day	Trip Length (Miles)	VMT	Avg. Fuel Economy (mpg)	Fuel Consumption (gallons)
Building Construction	205	Worker	9	18.5	34,132.5	24.4	1,398.87
		Vendor	4	10.2	8,364	7.7	1,086.23
Paving	10	Worker	15	18.5	2,775	24.4	113.73
		Vendor	3	10.2	306	7.7	39.74
Architectural Coating	10	Worker	25	18.5	370	24.4	15.16
TOTAL Construction Worker Vehicle Fuel Demand (Gallons of Gasoline)							**1,800.72**
TOTAL Construction Vendor Vehicle Fuel Demand (Gallons of Diesel)							**2,516.09**
Total							**4,316.8**

- The average vehicle fuel economy estimates were derived from the U.S. Department of Energy Alternative Fuels Data Center. For purposes of this analysis, it is assumed that the majority of worker trips are by cars (24.4 miles per gallon (mpg), gasoline), hauling trips are by Class 8 trucks (6.4 mpg, diesel), and vendor trips are by delivery trucks (7.7 mpg, diesel). (Average Fuel Economy by Major Vehicle Category, last updated January 2024. U.S. Department of Energy. https://afdc.energy.gov/data/10310)
- CalEEMod outputs provide Phase, Duration, Trip Type, Worker trips/day, Trip Length.

In total, the Project is estimated to use 30,002.8 gallons of fuel during the construction phase. To offer context, the Project's total fuel consumption during the construction phase may be compared to the total amount of fuel consumed by VMT generated within the SCAQMD Salton Sea Air Basin as provided by the CARB Emission Factor (EMFAC). Based on the EMFAC Scenario Analysis, the average daily VMT within the Salton Sea Air Basin in 2024 was 11,751,811.4,[18] which would've consumed approximately 286,744,198 gallons of gasoline and diesel combined, assuming that the average fuel economy was 24.4 mpg. The Project's construction fuel demand would equate to 0.01% of the daily fuel consumption within the entire Air Basin.

The construction phase is temporary and the fuel demand represents a "single-event" and does not pose an on-going demand. Compliance with CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation will help to reduce impacts on energy consumption by the Project's construction activities.[19] The regulation aims to reduce idling, retire older less fuel-efficient equipment, encourage greater use of renewable diesel, and standardize additional fuel reduction tactics. The temporary duration of the construction phase and mandatory compliance with California Air Resources Board's (CARB) Off-Road Regulation of diesel-fueled equipment ensures that the Project will have a less than significant impact on energy consumption relating to the wasteful use of resources.

Operational Energy Consumption

During the operational phase, the Project would consume energy from the use of the heating/ventilation and air conditioning (HVAC) system, lighting, electronics, appliances, and irrigation. The Project will be constructed in compliance with the 2022 California

[18] California Air Resources Board, EMFAC Scenario Analysis, 2024 Total Daily VMT, accessed April 2025.
[19] California Air Resources Board, In-Use Off-Road Diesel-Fueled Fleets Regulation, 2024.

Building Energy Efficiency Standards (or the Building Code in effect at the time that building permits are issued) which include mandatory guidelines per the California Energy Code, Title 24, Part 6. The California Green Building Code, Title 24, Part 11 (CALGreen), defines mandatory and voluntary energy efficiency standards for nonresidential building projects. CALGreen standards apply to all aspects of a project from the choice of project location, choices of building materials, appliances, on-site renewable energy production, landscaping, shade, waste disposal/reuse, and more. The proposed Project would be subject to the mandatory standards. CALGreen also includes water efficiency standards for indoor and outdoor water demand.

Table 11 summarizes the annual amount of electricity and natural gas the Project would be expected to consume during operation. As described above, three land uses were applied to the Project CalEEMod calculations. The proposed museum is expected to use 260,854 kilowatt hours of electricity per year (kWh/yr) and 946,410 kilo British thermal units per year (kBTU/yr) of natural gas. CalEEMod estimates that lighting in the parking lot would use 50,020 KWh/yr. The Project's annual consumption is compared to the City's 2010 energy consumption data, which is provided by the City's Energy Action Plan, the most recent City energy consumption data available.[20]

Table 11
Project Operational Annual Electricity Consumption

Land Use	Electricity Use (kWh/yr)	Natural Gas (kBTU/yr)
Museum ("Library" CalEEMod land use)	210,854	946,410
Parking Lot Lighting	50,020	0.00
Total Operational Energy Demand[1]	**260,874**	**946,410**
City of Rancho Mirage 2010 Commercial Consumption[2]	1,870,966	217,790,000
Project's % of City 2010 Commercial Consumption	14%	0.43%

Source:
1. CalEEMod 2022.1 (Full report is available in Appendix A).
2. City of Rancho Mirage Energy Action Plan, Chapter V, Rancho Mirage Municipal and Community Energy Usage, March 2013.

Summary

The construction and operation of the proposed Project would generate a new demand for energy in the City, albeit one that existing at the site prior to the loss of the Charthouse restaurant. The construction phase of the new development will be temporary and does not constitute a permanent impact. The operational phase will be governed by the State's stringent CALGreen energy efficiency standards for buildings and appliances, which have demonstrated a net savings of billions of dollars, and millions of metric tons of carbon

[20] City of Rancho Mirage Energy Action Plan, Chapter V, Rancho Mirage Municipal and Community Energy Usage, March 2013.

emissions.[21] The energy efficiency standards ensure that the Project would not result in wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.

b) NO IMPACT:

The Project will comply with the State's renewable energy and energy efficiency plans and the City's Energy Action Plan, all of which guide municipal operations in reducing energy consumption and increasing public awareness of energy use. The Community Design Element of City's General Plan 2017 Update incorporates goals and policies aimed at encouraging the use of alternative and renewable energy sources and directs new development to incorporated CALGreen Building Standards such as active and passive solar design, the use of water permeable surfaces, net zero energy designs, and LEED certification for public buildings.[22] Furthermore, commitments by SoCalGas and the RMEA/SCE partnership to bolster sources of renewable energy, would restrict the potential impacts on energy use by the Project. The Project will not conflict with or obstruct a state or local plan for renewable energy or energy efficiency. In this regard, there would be no impact.

6.3 Mitigation Measures: None required.

[21] Office of Energy Efficiency and Renewable Energy, "Why Building Energy Codes?", Building Energy Codes Program, accessed June 12, 2024, https://www.energycodes.gov/why-building-energy-codes#:~:text=Building%20energy%20codes%20represent%20a,of%20avoided%20CO2%20emissions

[22] City of Rancho Mirage General Plan 2017 Update, Community Design Element, Architecture, Policy CD 8.2, November 16, 2017.

7 - Geology and Soils

GEOLOGY AND SOILS – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☒	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☒	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☒	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risk to life or property?	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

Sources: Geotechnical Investigation, Proposed Howard World Wildlife Museum, Sladden Engineering, March 31, 2025; California Department of Conservation's Earthquake Hazards Zone Application.

7.1 Setting

Seismicity and Faulting

The Coachella Valley lies within the northwestern portion of a larger topographic feature known as the Salton Trough (also referred to as the Salton Sink, and the Salton Basin), which is a northwest-southeast trending structural depression extending from the Banning Pass to the Gulf of California. The Salton Trough is approximately 130 miles long by 70 miles wide and is dominated by the underlying Southern San Andreas Fault (SSAF) system running along the eastern/northeastern edge of the Coachella Valley and through the east shore of the Salton Sea. From west to east, regional faulting has created the San Bernardino Mountains, Little San Bernardino Mountains and the Indio Hills, which form the north/northeast boundary of the Coachella Valley. The San Jacinto Mountains and the Santa Rosa Mountains extend along the west and southwest side of the Valley. For over 20 million years, the Salton Trough has been spreading and subsiding while sediment eroding from the adjacent mountain ranges has deposited a sequence of 20,000 feet thick and more onto the floor of the subsiding Coachella Valley.

Most earthquakes that occur in southern California result from the strike-slip motion between the North American and Pacific tectonic plates. At a rate of about two inches per year, the North American plate is sliding southwest while the Pacific plate is sliding northwest. The San Andreas Fault, an 800-mile fault extending from Bombay Beach on the east shore of the Salton Sea to Cape Mendocino on the northern California coast, facilitates about 70% of this tectonic movement between the North American and Pacific plates. Portions of the San Andreas Fault zone are made up of multiple fault strands splintering off the main fault. In the Coachella Valley, the SSAF zone splits into strands known as the Banning Fault, the Mission Creek Fault, and the San Jacinto Fault Zones. According to a 2023 paper by the Scripps Institution of Oceanography, the SSAF experienced a major earthquake approximately every 180 years over the last 1,000 years. However, the last major earthquake in the Coachella Valley region of the SSAF was 300 years ago, leading analysts to assume that accumulated stress between the plates could result in a magnitude 7.8 earthquake.[23]

The Project site occur in a region that is highly seismic due to the influence of several active and potentially active fault systems. Per the Geotechnical Investigation, the State defines an active fault as one that has experience surface displacement within the Holocene epoch (last 11,000 years), and a potentially active fault has experience movement within the Pleistocene era (between 11,000 and 1.6 million years ago). Recent seismic events that were recorded within the surrounding seismically active region include the following locations, years and earthquake magnitudes:

- North Palm Springs, 1986, M6.0
- Joshua Tree, 1992, M6.1
- Landers, 1992, M7.3
- Big Bear, 1992, M6.2
- Hector Mine, 1999, M7.1
- Ridgecrest, 2019, M7.1

[23] "California's Salton Sea May Be Staving off Earthquakes As It Disappears," Scripps Institutions of Oceanography, University of California San Diego, June 7, 2023.

Soils

Soils in Rancho Mirage are comprised of a mix of eroded granitic sediments from the surrounding mountain ranges that have been deposited onto the Valley floor by water, also known as alluvium. Soils in the City also contain lake sediments from the intermittent presence of Ancient Lake Cahuilla and minor amounts of marine deposits. Soils on the Project site contain disturbed fill soil and native alluvium consisting of silty sand and sandy silt. The granular soils are dry, medium dense and grayish brown in color. The cohesive layers are dry to slightly moist, medium stiff, dark grayish brown with low plasticity characteristics. Finally, the bedrock is moderately hard, moderately strong, and highly weathered metamorphite that breaks down to a poorly graded SM/SP soil type.

Liquefaction

Liquefaction occurs when seismic ground shaking causes groundwater pressure to increase and fully saturate the the upper layers of soil causing the soil to become a fluid-like mass and lose stability or bearing strength. This occurs within the upper 50 feet of the ground surface in loose fine-grained to medium-grained sandy/silty soils. Ramifications can include damage to buildings and structures and subsurface infrastructure. Liquefaction leads to other ground failure conditions such as lateral spreading, flow failure, ground oscillation, and ground lurching. Three geologic conditions need to be met for liquefaction to occur: long duration of ground shaking; the presence of young, loose, unconsolidated sediments; and the presence of groundwater within 50 feet of the surface. The depth to groundwater under the Project site exceeds 50 feet.

The Project site is located in a Riverside County zone designated as having a “moderate” liquefaction potential. However, the groundwater table under the Project site is greater than 50 feet below the surface. The presence of shallow seated bedrock at this location also reduces the potential for liquefaction to occur.

Ground Subsidence

The gradual settling or sinking of the ground surface can occur as smaller local collapses or broader regional lowering of the ground occurs. A diverse range of causes commonly stem from both natural phenomenon such as earthquakes, and human activities such as construction, water and mineral extraction, as is common in southern California. Ground subsidence in the Coachella Valley has been associated with excessive groundwater pumping and the greatest extent has occurred in the central portions of the valley between Indian Wells and the Lake Cahuilla reservoir in southern La Quinta. The Coachella Valley Water District and the Desert Water Agency are primarily responsible for addressing the over-pumping and overdraft condition that has caused ground subsidence. A program of groundwater recharge has been underway for several decades and has slowed or overdraft and has slowed or stopped subsidence in most areas where it had occurred. The replenishment sites have seen an increase groundwater in storage. The Geotechnical Investigation reports that so surficial evidence of subsidence was observed either on or near the Project site.

Paleontological Resources

Paleontological resources are the fossilized remains of prehistoric plant and animal life dating more than 10,000 years ago, near the end of the last Pleistocene glaciation period and the beginning of the Holocene epoch. Fossil remains including bones, teeth, shells, and plant leaves are typically discovered in the geologic deposits where they were buried, although erosion can expose fossils to the surface.

Analysis of the impacts stemming from geologic and soil conditions rely primarily upon the project-specific Geotechnical Investigation for the proposed Project, prepared in March 2025 by Sladden Engineering (see Appendix E). The Geotechnical Investigation conducted subsurface exploration, laboratory testing on soil samples, a literature review, investigation of ground-motion potential, and engineering analyses to determine recommendations for site preparation and foundation design.

7.2 Discussion of Impacts:

a, i) LESS THAN SIGNIFICANT IMPACT:
A fault rupture occurs when movement on a fault breaks through the surface of the Earth. Fault ruptures can range from one inch to fifty miles or more. While the Rancho Mirage Planning Area is near the SSAF, which could potentially generate a magnitude 7.8 earthquake, there are no active faults on or near the Project site. According to the California Department of Conservation's Earthquake Hazards Zone Application (EQ Zapp), the Project site is located 6.51 miles southwest of the Banning Strand of the SSAF. The Geotechnical Report states that no signs of active surface faulting or fault rupture were identified in either site non-stereo digitized photographs of the Project site or during the field investigation and therefore the risks associated with surface ground rupture re low. Since there are no signs of active surface fault rupture nor any secondary seismic effects on the Project site or within the vicinity, the risks of potential fault rupture are considered to be less than significant.

a, ii) LESS THAN SIGNIFICANT IMPACT WITH MITIGATION:
The Project is located in a seismically active region and the active SSAF fault system occurs 6.51 miles to the northeast. The close proximity of the Project site to the SSAF includes the risk of experiencing strong seismic ground shaking during the design life of the Project. Based on the ground motion parameters prepared for the Project site, the Geotechnical Investigation finds that the Project site could be subjected to a peak ground acceleration on the order of 0.788g (G=force of gravity).[24] The Project Structural Engineer shall verify that the Project design includes all necessary modifications to withstand the peak ground acceleration. As described in the GEO-1 Mitigation Measure below, the Geotechnical Investigation outlines recommendations for engineered fill compaction, design parameters of the shallow spread footings and slabs-on-grade and retaining walls. Adherence to these recommendations are necessary to ensure that the impacts associated from strong seismic ground shaking would be less than significant.

a, iii) LESS THAN SIGNIFICANT IMPACT:
The Project is located in a Riverside County zone designated as having "moderate" liquefaction potential. As noted above, due to the presence of shallow seated bedrock under the Project site and the fact that the groundwater depth exceeds 50 feet, the risks of seismic-related liquefaction and associated hazards are deemed by the Geotechnical Investigation to be "negligible." Impacts resulting from liquefaction-induced ground failure are expected to be less than significant.

a, iv) LESS THAN SIGNIFICANT IMPACT WITH MITIGATION:
The portion of the Project site where the building and parking areas are planned is relatively flat. The project geologists did not observe signs of past landslides and rock falls on or near the Project site. Moreover, the rock outcrop, also defined as an ascending

[24] Op. cit. Sladden 2025.

bedrock slope, is characterized by the Project geologists as being in a stable configuration that has a low risk of failure. Nevertheless, areas of perched or highly fractured rock occurring on the slope above the proposed building should be further assessed and stabilized as necessary to preclude hazards from landslides or rock falls in the event of strong ground shaking. GEO-1 Mitigation Measure requires the adherence to the Geotechnical Investigation recommendations for retaining walls and the associated back drain system to mitigate the potential impacts resulting from rockfalls. Implementation of the recommendations set forth in the Project Geological Investigation would reduce impacts associated with landslide or rockfall hazards to less than significant.

b) LESS THAN SIGNIFICANT IMPACT:

The development of the proposed Project is not expected to result in substantial soil erosion or the loss of topsoil. Much of the site is comprised of exposed bedrock with pockets of shallow soils. As noted in the Project geotechnical report, field investigations identified disturbed/fill soil across the site to a depth of less than approximately three (3) feet. These soils are identified as moderately susceptible to wind and water erosion but easily managed with standard soils preparation and management during and following construction. Underlying the disturbed/fill soil, native alluvium overlying bedrock was encountered. As signs of on-site flooding or erosion were not observed during the geotechnical research and field survey, associated impacts are expected to be less than significant.

c) LESS THAN SIGNIFICANT IMPACT WITH MITIGATION:

The Project site has a very low potential for landslide events and liquefaction. Subsidence has been documented regionally in the Coachella Valley and is attributed to the extraction of groundwater. Areas experiencing subsidence are not in the immediate vicinity of the Project site, and surficial evidence of subsidence such as fissures are not present on the Project site. Furthermore, as noted above, the there is a very low potential for liquefaction to occur due to the depth of groundwater being greater than 50 feet and the shallow seated bedrock lying below the Project site. The Geotechnical Investigation provides detailed recommendations for remediating potentially unstable soil including the design of conventional shallow spread footings and the slabs-on-grade. Mitigation Measure GEO-1 provides the Geotechnical Investigation recommendations for soil stabilization that should be applied to the Project design. Adherence to the recommendations would stabilize the soil ensure that impacts associated with lateral spreading and subsidence would be less than significant.

d) LESS THAN SIGNIFICATN IMPACT:

Clay minerals can expand in size as the amount of moisture increases in the soil. Expansion can cause the ground to swell (expansive soils), which can result in damage to buildings, structures, roadways, and other surface features. Presently, the near-surface soils consist of silty sand and have a very low potential for expansion. Recommended remedial grading will include overexcavation of the first 3± feet of artificial fill and mixing, blending and recompacting surface soil (see GEO-1 Mitigation Measure). As such, the Geotechnical Investigation recommends that the expansion potential be reevaluated after grading activities as clay minerals are present in the region. Based on the present condition of the near-surface soil, impacts associated with expansive soils would be less than significant.

e) NO IMPACT:
The Project will be connected to the Coachella Valley Water District sewer system which currently serves the Project site and will not require the use of a septic tank. Therefore, there will be no impacts associated with use of on-site septic tanks or leach fields.

f) NO IMPACT:
The potential for discovery of paleontological resources on the Project site is low as there are no records of any such discoveries in the nearby vicinity of the City's Planning Area. On site soils and rock formations are not associated with paleontological resources. The Project is not expected to directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. There would no impact.

7.3 Mitigation Measures:

GEO-1 Per the Geotechnical Investigation, specific guidelines are provided to mitigate potential impacts resulting from site-specific poorly graded soil, seismic-related unstable soil, seismic ground shaking, and hazards from rock falls induced by seismic activity. In addition, the Geotechnical Investigation provides recommendations regarding utility trench backfill, exterior concrete flatwork, on-site pavement design, soil corrosion potential, and drainage.

Development of the Project shall adhere to the recommendations provided by the Geotechnical Investigation as required by the City prior to issuance of grading and building permits.

Earthwork and Grading Recommendations

Site Clearing: Guidelines describe the removal of all vegetation, underground utilities, debris and old fill. Any voids must be properly backfilled and compacted.

Preparation of Building Areas: Over-excavation and re-compaction of the surface soil and bedrock throughout the building area and extending laterally for five feet beyond the building envelope are recommended.

Cut/Fill Slopes: The Geotechnical Investigation describes the necessary removal of weak soil on slopes steeper than five horizontal to one vertical (5H:1V) and the associated keyway design requirements.

Compaction: To ensure soil stability, specific recommendations pertaining to compaction of the engineered fill are provided in the Geotechnical Investigation. All fill material should be placed in thin lifts, not exceeding six inches in loose condition at near optimum moisture contents and compacted to a minimum of 90% relative compactions.

For the asphalt concrete sections, compact the top 12 inches to at least 95% compaction at near optimum moisture content.

Shrinkage and Subsidence: The shrinkage of the replacement fill should be anticipated and should not exceed 10% to 20%. Subsidence of the scarified and compacted surfaces should be between 1/10 and 3/10 of a foot.

Conventional Shallow Spread Footings

The Geotechnical Investigation provides specific design recommendations for the footings including but not limited to embedment depth, minimum widths and bearing pressures. The lateral load resistance provided by the footings is described in the Investigation.

Slabs-On-Grade

The recommended placement, thickness, reinforcement, and treatment of moisture-sensitive surfaces of the concrete slabs-on-grade are described in the Geotechnical Investigation.

Retaining Walls

To stabilize the slope behind the building, the Geotechnical Investigation provides details for designing cantilever retaining walls and an accompanying back drain system behind the retaining walls.

Mitigation Monitoring:
GEO-A The City shall review the Geotechnical Investigation for the Proposed Project prepared by Sladden Engineering, March 31, 2025 to ensure that the Project development plans adhere to the recommendations.

Responsible Parties: Project applicant, construction manager, Planning Department, City Engineer.

8 – Greenhouse Gas Emissions

GREENHOUSE EMISSIONS – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Sources: CalEEMod Version 2022.1; City of Rancho Mirage General Plan 2017 Update, Land Use Element, November 16, 2017; Overview of Greenhouse Gases, Environmental Protection Agency, accessed March 2025, https://www.epa.gov/ghgemissions/overview-greenhouse-gases; Global Warming Potentials, IPCC Fourth Assessment Report, 2007.

8.1 Setting

The lower troposphere of the Earth's atmosphere contains a mix of gases that sustain life. Greenhouse gases (GHGs) comprise a small percentage, 0.04%, of these tropospheric gases and trap just enough heat to maintain a relatively constant and livable air temperature. Even small alterations in this air chemistry are well documented via proxy and direct climate measurements. Human activities including the burning of fossil fuels, clearing native vegetation, altering landscapes to accommodate hardscapes and built environments all emit additional GHGs and reduce the Earth's ability to cycle and sequester carbon resulting in exponential net increase in atmospheric GHG levels. While no one development project can have a globally significant impact on greenhouse gas increases, the cumulative impacts of regional development can result in locally significant environmental changes, which in turn contribute to wider climatic changes. Hence, the state and local jurisdictions have adopted policies and thresholds that cap GHG emissions and mandate mitigations when needed to ensure new land uses minimize their impacts.

The major greenhouse gases present in the atmosphere and increased by human activities are described in Table 12.

Table 12
Description of Major Greenhouse Gases

Greenhouse Gas	Emissions Sources	Global Warming Potential	Atmospheric Lifetime
Carbon Dioxide (CO_2)	Next to water vapor, carbon dioxide is the most abundant GHG. Human activities emit CO_2 when burning fossil fuels and burning and removing forests and other vegetation. Looking back 800,000 years prior to the Industrial Revolution, the level of CO_2 in the atmosphere never climbed above 300 parts per million. Today we measure CO_2 at 419.81 parts per million.	1	1,000s of years

Table 12
Description of Major Greenhouse Gases

Greenhouse Gas	Emissions Sources	Global Warming Potential	Atmospheric Lifetime
Methane (CH_4)	Methane is the third most abundant GHG in the atmosphere. It is released during the extraction, refining, and burning of fossil fuels, and the burning and clearing of native vegetation. Raising of livestock, decay of organic waste, and landfills also emit methane.	25	About 10 years
Nitrous Oxide (N_20)	Like carbon dioxide and methane, nitrous oxide naturally occurs in the atmosphere. It is also released by agricultural activities and agricultural chemicals, fossil fuel combustion, wastewater treatment and industrial processes.	298	More than 100 years
Fluorinated Greenhouse Gases	Chlorofluorocarbons (CFCs), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF_6) Together these 30 different gases are referred to as fluorinated GHGs. F-GHGs are solely emitted as by-products of industrial processes such as aluminum and semi-conductor manufacturing and used as refrigerants and aerosol propellants.	Between 12 and 22,800	Tens to thousands of years

Sources: CalEEMod, 2022.1; Overview of Greenhouse Gases, Environmental Protection Agency, accessed March 2025, https://www.epa.gov/ghgemissions/overview-greenhouse-gases; Global Warming Potentials, IPCC Fourth Assessment Report, 2007; Interim CEQA GHG Significance Thresholds for Stationary Sources, Rules and Plans, adopted December 5, 2008.

State, Regional, and City Emissions Reductions Setting

The 2016 Senate Bill 32 (SB 32) requires California to reduce overall greenhouse gas emissions by 40% below 1990 levels by the year 2030. This bill furthers the mandates of the prior 2006 Assembly Bill 32 which required the state the reduce GHG emissions to 1990 levels by 2020. Going beyond SB 32 is the 2022 Scoping Plan proposed by the California Air Resources Board (CARB) which sets forth a plan to achieve statewide 100% carbon neutrality by 2045.

In March 2013 the City adopted a Sustainability Action Plan, which was linked to the City's 2010 Greenhouse Gas Inventory. Driven by the State AB 32 GHG reduction target in place at the time, the Sustainability Action Plan put forth 82 measures that guided the City's efforts in reducing greenhouse gas emissions. Emissions reductions would stem from sectors including, but not limited to greater energy efficiency achievements, reduction of solid waste, installation of renewable energy systems, increase the amount of open space and shade vegetation, and the growth of alternative transportation systems. The City's Sustainability Action Plan has not been updated since its initial adoption.

SCAQMD Greenhouse Gas Thresholds

The City of Rancho Mirage is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD), the regional agency that determines pollution emissions standards from stationary sources. Since each GHG affects the atmosphere differently, for purposes of Project analysis, GHG emissions are converted to carbon dioxide equivalencies (CO_2e) and measured in metric tons ($MTCO_2e$). When evaluating potential GHG emissions from proposed non-industrial

projects, SCAQMD applies a tiered approach. If a project does not conform to at least one of the tiers described below, the project's impacts would be considered significant.[25]

Tier 1: Consider whether the project qualifies for any applicable exemption under CEQA. If the project qualifies for an exemption, then the project is not significant, and no other action is required.

Tier 2: Consider whether the project complies with a local greenhouse gas reduction plan that is at minimum consistent with AB 32.

Tier 3: Consider whether the project is below an absolute threshold of either 10,000 $MTCO_2e$/year for industrial projects or 3,000 $MTCO_2e$/year for residential projects.

Tier 4: Consider whether the project is below a set performance threshold. This threshold is yet to be set and is not recommended for analysis at this time.

Tier 5: Consider whether off-site mitigation would reduce the project's GHG emission impacts to less than the proposed screening level.

8.2 Discussion of Impacts:

a, b) LESS THAN SIGNIFICANT IMPACT:
If the Project generates greenhouse gas emissions in excess of the established thresholds, either directly or indirectly, then the Project's impact would be significant. As stated above, project-based impacts are compared against the SCAQMD tiered greenhouse gas emissions thresholds. For the Proposed Project, emissions are measured against Tier 3, 3,000 $MTCO_2e$/year for residential and commercial projects.

It should first be noted that the Project site was previously developed with a sit-down restaurant, which was destroyed by fire in 2012. The subject Project proposes construction of a natural history museum, the Global World Wildlife Discovery Museum, which will consist of 21,967 square-feet, two parking lots, outdoor plaza, and landscaped areas. The museum building would be comprised of a lobby, exhibit space, a coffee shop, a gift shop, a flexible-use event space, storage and office spaces, restrooms, an outdoor plaza with a fountain, a main parking lot and an overflow parking lot.

CalEEMod Version 2022.1 was used to forecast GHG emissions generated by the construction and operational phases of the Project. Table 3 in the Air Quality Section provides a detailed summary of the Project data that was input to CalEEMod. Appendix A provides a full copy of the CalEEMod report.

Project Construction and Operation

Since SCAQMD does not provide GHG construction thresholds for projects, the total amount of CO_2e emissions from the construction phase of the Project is amortized over 30 years to estimate the CO_2e emissions over a one-year operational cycle. Upon buildout, six emissions source categories would contribute either directly or indirectly to operational greenhouse gas emissions including area emissions (pavement and architectural coating off-gassing) building energy usage, mobile energy usage, solid waste disposal, water

[25] Interim CEQA GHG Significance Thresholds for Stationary Sources, Rules and Plans, adopted December 5, 2008.

usage, and refrigeration. Table 13 shows annual construction and operational greenhouse gas emissions from the Project and then compares the Project's total annual emissions, 442.8 $MTCO_2e$, to the SCAQMD Tier 3 threshold. The Project would not exceed the 3,000 MT/YR CO2e standard for residential and commercial projects.

Table 13
Projected GHG Emission Summary
(Metric Tons per Year)

Construction	CO_2e (MT/YR)
1 Year	295.8
30-Year Amortized*	9.86
Operation	**CO_2e (MT/YR)**
Area	0.323
Energy	113.54
Mobile	309.58
Waste	6.33
Water	3.17
Total Operational	432.94
Total Annual Operational (30-Year amortized + Operational)	**442.8**
SCAQMD Annual Threshold	3,000
Exceeds?	No

*Buildout construction emissions were amortized over 30 years then added to buildout operational GHG emissions.
Source: CalEEMod 2022.1

As shown in the above Table 13, greenhouse gas emissions resulting from the Project's construction and operational activities are expected to be lower than the established threshold. Compliance with the State's greenhouse gas reduction goals, CARB's 2022 Scoping Plan, and the City's Sustainability Action Plan is requisite and will ensure that the Project will align with adopted GHG reduction plans and policies. By these parameters, the Project would have a less than significant impact on greenhouse gas emissions.

8.3 Mitigation Measures: None required.

9 - Hazards and Hazardous Materials

HAZARDS AND HAZARDOUS MATERIALS – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

Sources: City of Rancho Mirage General Plan 2017 Update, Circulation Element; City of Rancho Mirage Local Hazard Mitigation Plan Update, 2023; California Department of Toxic Substances Control (DTSC), Envirostor; State Water Resource Control Board, GeoTracker; Riverside County Department of Environmental Health; CalFire Fire Hazard Severity Zones Map Viewer.

9.1 Setting

The California Health and Safety Code defines a hazardous material as a substance or waste that poses a risk of endangering human health or safety and, or, a risk of degrading the environment. Criteria for identifying hazardous substances are based on whether the substance, due do "quantity, concentration, or physical, chemical or infectious characteristics, may:

1. Cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness.
2. Pose a substantial present or potential hazard to human health or the environment, due to factor including, but not limited to, carcinogenicity, acute toxicity, chronic toxicity, bioaccumulative properties, or persistence in the environment, when improperly treated, stored, transported, or disposed of, or otherwise managed."[26]

In the 1970s, the state of California began to adopt formal policies and protocols to manage the handling, processing and disposal of hazardous waste. Past and current landmark investigations led to numerous legislative actions and to the establishment of the California Environmental Protection Agency (CalEPA) in 1991 and its associated departments including the Department of Toxic Substances Control (DTSC). On a regional and local level, county environmental health departments, such as the Riverside County Department of Environmental Health, implement federal and state public health and safety programs throughout local jurisdictions. Specifically, the Hazardous Materials Management Branch of the Department of Environmental Health serves as the County's Certified Unified Program Agency (CUPA) which coordinates six state hazardous waste and materials regulatory management programs. The City of Rancho Mirage is subject to these program policies.

The discussion of impacts from hazards and hazardous materials is based on the characteristics of the proposed project and the City's 2023 Local Hazard Mitigation Plan (LHMP), the Department of Toxic Substances Control (DTSC) EnviroStor, the State Water Resource Control Board (SWRCB) GeoTracker, and the Riverside County Department of Environmental Health.

9.2 Discussion of Impacts*:*

a, b) LESS THAN SIGNIFICANT IMPACT:

Project Construction Phase: The Project proposes to construct 21,966± square-foot museum, an outdoor plaza and two parking lots. Construction would necessitate the transporting of potentially hazardous materials such as fuels, paints, solvents, concrete and asphalt. The use of heavy equipment which would consume limited quantities of diesel fuel and oil would be required. During construction, an on-site staging area would be identified where equipment and construction supplies would be stored. Should any spillage or leakage of hazardous substances occur, it would occur in this staging area where it could be contained and cleaned. The construction phase is temporary, and the use of hazardous materials would not be in quantities that would pose significant risks to public health or environmental health. Impacts from the transport, handling and disposal of hazardous materials related to construction are expected to be less than significant. The use of Best Management Practices (BMPs) and associated containment of construction-related hazardous materials to a staging area where an accidental release of a hazardous substance to the environment would be quickly remediated reduces potential impacts to less than significant levels.

[26] California Health and Safety Code, HSC §25141, January 1, 2023.

Project Operational Phase: The proposed museum is anticipated to use and dispose of a limited amount of toxic and hazardous materials such as cleaners, landscaping chemicals, paints, oil, batteries, light bulbs and electronic waste. The amount of chemicals stored on site would be in small quantities and would not pose a health risk to the public or the environment. For purposes of proper disposal, businesses must comply with federal and state laws by classifying their waste products and follow guidelines for the appropriately sized very small or small quantity generator.

State and County regulatory oversight regarding the transport, handling, and disposal of hazardous materials ensure that the construction and operational phases of the Project would generate less than significant impacts. The use of hazardous materials in small quantities during construction and operational phases and the use of a construction staging area and application of standard BMPs would contain potential accidental releases to the environment and reduce their impacts to less than significant levels.

c) NO IMPACT:
The nearest school, Rancho Mirage Elementary School, is 2.4 miles southeast of the Project site. While the proposed Project is not expected to emit hazardous materials or acutely hazardous substances or produce waste that would jeopardize a school, the Project is also not located within one-quarter mile of a school. No impact would occur.

d) NO IMPACT:
Government Code Section 65962.5 is also known as the Hazardous Waste and Substances Sites, or the Cortese List. The California Environmental Protection Agency (CalEPA) annually compiles this list of hazardous materials release sites based on data from the DTSC, the California Department of Health Care Services (DHCS), and the State Water Resources Control Board (WRCB). There are no hazardous materials or waste sites on or within 1,000 feet of the proposed Project site. The Project site is not included in the Cortese List. Thus, the Project site would not pose any impacts associated with hazardous materials sites.

e) NO IMPACT:
The Project site is located 4.5 miles southeast of the Palm Springs International Airport, and 1.3 miles southeast of the Airport Influence Area boundary. Due to this distance, the Project area is not in an airport safety hazard zone and would not pose a safety hazard for people living or working at the Project site. There would be no impacts associated with the nearby airport.

f) NO IMPACT:
The Project is proposed for the north side of Highway 111, a major arterial roadway, between Frank Sinatra Drive to the north and Mirage Cove Drive to the south. Vehicle access to the Museum and the main parking lot would be facilitated by an existing 33-foot-wide driveway on Highway 111. Approximately 100 feet north, a fully signalized intersection of Highway 111 and Atrium Way) permits controlled access to the Atrium retail center parking lot which is connected to the Project's parking lot. The overflow parking lot will be accessible via a 34-foot-wide driveway on Mirage Cove Drive. These Project access points on will not alter the City's current circulation pattern or interfere with the City's emergency response and evacuation plans.

Project review by the Police and Fire Departments will be necessary to assure that the Project's site layout, driveways and streets would accommodate emergency vehicles and building access. Traffic management during the Project's construction will be implemented so that the Project will not interfere with the City's emergency response plan or emergency evacuation plan. The Project is not expected to impact the implementation of, or physically interfere with, the City's emergency response plan or emergency evacuation plan.

g) NO IMPACT:

Overall, the City has a moderate risk of wildfire due to the wildland urban interface (WUI) along the slopes of the adjacent Santa Rosa Mountains. However, according to the CalFire Fire Hazard Severity Zone (FHSZ) Viewer, there are no designated FHSZs along the mountain slopes facing the Project site or on the west side of Highway 111. Furthermore, the Project is located in an urban section of the City along a major evacuation route and is not within an FHSZ. The risk of a wildland fire occurring at the Project site is very low. The City maintains a coordinated emergency response plan for natural and manmade disasters, and should a wildfire occur in the WUI near the City's western boundary, the estimated response time of the CalFire air attack based at the Hemet/Ryan airport is fifteen minutes.[27] The Project is not expected to expose people or structures to a significant risk of loss, injury or death due to wildland fires. No impact is anticipated. Wildland fire is discussed more thoroughly below in Section XX, Wildfire.

9.3 Mitigation Measures: None required.

[27] City of Rancho Mirage Local Hazards Mitigation Plan, Plan Update 2023, Section 4.4.2 Wildfires, adopted 2024.

10 - Hydrology and Water Quality

HYDROLOGY AND WATER QUALITY – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would: i) Result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?	☐	☐	☒	☐
iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
iv) Impede or redirect flood flows?	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

Sources: City of Rancho Mirage General Plan 2017 Update, Conservation and Open Space Element, November 16, 2017; City of Rancho Mirage Code of Ordinances; Preliminary Water Quality Management Plan, Howard World Wildlife Museum, The Altum Group, March 27, 2025; World Wildlife Museum, Rancho Mirage, CA, Preliminary Hydrology Report, The Altum Group, March 27, 2025; Coachella Valley Water District, 2023-24 Annual Review, March 2025; FEMA National Flood Hazard Layer Viewer.

10.1 Setting

Regional Climatic Conditions

The Coachella Valley climate may be described as a subtropical desert where summer temperatures can exceed 120°F and winter temperatures can drop below 35°F. The arid climatic conditions result from both the latitudinal setting as well as the rainshadow effect formed by the the San Jacinto and Santa Rosa Mountains, which block much of the moist and cool coastal air masses flowing from the west. The Coachella Valley is part of the West Basin of the Colorado River Watershed, where water drains from the higher elevations at the west end towards into the Salton Trough and ultimately to the terminal lake, the Salton Sea, in the eastern end of the valley. The Project site occurs along the southern edge of the valley floor at the foot of the Santa Rosa Mountains.

Rainstorms tend to occur during the summer monsoon season between August and September as more intense downpour events, and also during the winter season when rainfall tends to be more frequent but less intense. The average annual rainfall is under five inches. Although dry much of the year, the Coachella Valley is susceptible to flood events especially when high intensity rainfall saturates the ground surface thus reducing the ability of the water to percolate. The alluvial fans are particularly prone to flooding and associated soil erosion/deposition, also known as fluvial transport. Flooding events from rainstorms are important components of the low desert hydrology.

Water Quality

As water flows over the land in rivers, streams, springs, and lakes and collects in groundwater basins, both naturally occurring contaminants and those emitted from human activities can end up in water supply systems. Water districts, like the Coachella Valley Water District (CVWD), the water purveyor for the City, and regulatory agencies consistently test water supplies for contaminant levels and mitigate as needed. Contaminants include microorganisms, inorganic salts and metals, pesticides and herbicides, organic chemicals, and radioactive particles. According to the Coachella Valley Water District 2023-24 Annual Review, there were no federal or State water quality exceedances of detected contaminants.[28] Currently, water quality does not constrain or otherwise affect water supply reliability in the CVWD service area.

To protect surface and groundwater resources from pollution contamination, states must comply with standards set by the federal Clean Water Act of 1972 (CWA) and the National Environmental Policy Act of 1969 (NEPA). In accordance with the Clean Water Act, the EPA administers a pollutant permit system via the National Pollutant Discharge Elimination System (NPDES), whereby development activities must implement Water Quality Management Plans (WQMP) “to effectively prohibit non-storm water discharge into the storm drains and require controls to reduce the discharge of pollutants from storm water systems to water the United States to the maximum extent possible.” In the State of California, federal law governing water quality regulation is administered by the Porter-Cologne Water Quality Control Act, which established the State water Resources Control Board and nine Regional Water Quality Control Boards; Region 7, Colorado River Basin Regional Water Qualtiy Control board, has jurisdiction in Rancho Mirage and the Proposed Project.

[28] Ibid.

Floodplain and Stormwater Management

The Coachella Valley lies within the Whitewater River Watershed, the regional drainage feature that extends from the slopes of Mount San Gorgonio and the San Bernardino Mountains to the Salton Sea. The Whitewater River is the valley's main drainage feature and is fed by mountain streams along its course. In the higher elevations of the Whitewater River, the river has water generally year-round, but is ephemeral in the low desert stretch, and has been channelized throughout much of the valley to control stormwater flows. The CVWD and Riverside County Flood Control maintain major tributary facilities that guide stormwater flows into the Whitewater River/Coachella Valley Stormwater Channel (Stormwater Channel).

Within the Whitewater River Watershed, urban runoff flowing through the existing development in the Coachella Valley is regulated under the Whitewater River Region Municipal Separate Storm Sewer System Permit (MS4 Permit), which is aimed at reducing pollutants stemming from construction, municipal, commercial and industrial land uses. Entities responsible for administering the MS4 Permit within their specific jurisdictions are the Riverside County Flood Control District and Water Conservation District, Riverside County, CVWD, and the incorporated cities within the Whitewater River Basin. The City of Rancho Mirage defines a broad range of stormwater management and discharge control requirements Chapter 7.03 of the City's Code of Ordinances. The City's stormwater drainage is facilitated by a combination of on-site retention, gutters, pipes, culverts, and channels which transport stormwater to regional drainage facilities.

Domestic Water Service

The Coachella Valley Groundwater Basin is the main source of municipal, or domestic, water for the entire Coachella Valley. Local rainwater and snowmelt have filled the basin over several million years, but human activity during the 20th and 21st centuries have until recently extracted more water than was being naturally recharged. Groundwater overdraft has been eliminated in portions of the basin. Six different water agencies utilize the basin: Mission Springs Water District (MSWD), Desert Water Agency (DWA), Coachella Valley Water District (CVWD), Myoma Dunes Mutual Water Company (MDMWC), Indio Water Authority (IWA), and the Coachella Water Authority (CWA). CVWD and DWA are state water contractors and have primary responsibility for managing the basin and supplementing natural recharge with imported Colorado River water into the basin via four replenishment facilities.[29] Both agencies also supplement irrigation water with recycled wastewater.

The Coachella Valley Groundwater Basin is technically comprised of several subbasins which are divided by geologic faults. Water for the Project site is supplied by the Indio Subbasin, and domestic water service is provided by CVWD, the largest water district in the Coachella Valley. The CVWD serves a population of 270,000 and manages 114,196 accounts. In 2023-2024 the average daily freshwater demand within CVWD's service area was 75.9 mgd, and the total amount of water delivered was 85,014 af.[30]

[29] Coachella Valley Water District, Groundwater Replenishment and Imported Water, History of Groundwater Management, https://www.cvwd.org/162/Groundwater-Replenishment-Imported-Water, accessed May 2025.

[30] Coachella Valley Water District, 2023-24 Annual Review, CVWD 2024 Domestic Water Quality Summary, March 2025.

Wastewater Treatment

According to the 2023 CVWD Annual Report, the District's wastewater treatment facilities serve a population of 250,000 people and 105,203 active accounts. Sewer lines totaling 1,173 miles and 30 lift stations convey approximately 17.11 million gallons per day (mgd) of wastewater to five different wastewater reclamation plants (WRPs). CVWD's average daily wastewater demand is 17.11 mgd while its total capacity is 33.1 mgd. The Project site would be served by Wastewater Reclamation Plant (WRP) 10 located on 43000 Cook Street in Palm Desert. WRP 10 is a tertiary level treatment facility with a capacity to treat 15 mgd.

10.2 Discussion of Impacts:

a) LESS THAN SIGNIFICANT IMPACT:

At build out, the Project site will include a new 21,966-square-foot museum building connected to a re-designed main parking lot on the north (adjacent to the Atrium Center) and new overflow parking lot located on the south bordering Mirgae Cove Drive. The Project is required to comply with the Clean Water Act, the State's Porter-Cologne Water Quality Control Act, Regional Water Quality Control Plans, Safe Drinking Water Act, and recycled water regulations. Impacts would be significant if the Project were to violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality. In compliance with the National Pollutant Discharge Elimination System (NPDES) regulations to minimize the pollutant load associated with urban and development activities, a Project-Specific Preliminary Water Quality Management Plan (Preliminary WQMP) dated March 27, 2025 was prepared for the Project by The Altum Group (see the full Preliminary WQMP in Appendix F).[31]

Pollutants potentially discharged from the Project site may include bacteria/viruses, nutrients, toxic organic compounds, trash and debris, oil and grease, and toxaphene(2), and dieldren. Per City requirements as prescribed in Chapter 7.03 of the Rancho Mirage Code of Ordinances, Stormwater Management and Discharge Control, the Project will implement permanent Site Design Best Management Practices (BMPs), Source Control, Low Impact Development/Site Design (LID), and Treatment Control BMPs where necessary.

To accommodate this requirement, the Preliminary WQMP outlines a list of source control BMPs that will be implemented including but not limited to the minimization of urban runoff by minimzing the impervious footprint, conserving natural areas and natural drainage and depressional storage feature on site, planting additonal native/drought tolerant trees and large shrubs, installing landscape buffer areas, incorporating self-treating and self-retaining areas, and an infiltration type retention basin in the overflow parking lot, properly designed loading docks and trash storage areas, litter control and street sweeping, and activity restrictions.

For construction drainage, the Project would be required to prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) to ensure that construction activities do not contaminate surface or groundwater quality. The SWPPP would reduce the potential for pollutant discharge as well as provide practical monitoring and reporting processes

[31] Preliminary Water Quality Management Plan, Howard World Wildlife Museum, The Altum Group, March 27, 2025.

and other strategies to ensure any pollutant discharge does not adversely impact water quality.

Adherence to these water quality requirements ensures that the Project will not violate any water quality standards or waste discharge requirements, or otherwise substantially degrade surface or ground water quality. Any potential impacts will remain at less than a significant levels.

b) LESS THAN SIGNIFICANT IMPACT:

Project operational domestic water demand calculations are based on the building's square footage and use, and on the type and square footage of the landscaped area. The indoor water demand estimate is derived from the American Water Works Association demand factor which estimates that commercial and institutional buildings demand 15 gallons of water per square foot per day. To assess the Project's outdoor water use, CVWD provides the outdoor water demand calculation for a landscaped area which incorporates localized evapotranspiration and evapotranspiration adjustment factors.

According to the 2023-2024 CVWD Annual Review, CVWD customers generate an average daily water demand of 75.9 mgd. The total amount of water delivered in 2023-2024 was 85,014 acre-feet (af); an acre-foot equates to 327,000± gallons. The Project's total estimated water demand for both indoor and outdoor uses is 3.44 af per year, which would account for 0.004% of the total domestic water demand supplied by CVWD during the 2023-2024 year. Table 14 recaps the Project's estimated annual water demand compared to the most recent CVWD annual water delivery data.

Table 14
Project Operational Water Demand

Indoor Use	**Total Building Area (ft^2)**	**Indoor Demand Factor (gal/SF/year)**	**Indoor Daily Demand (gpd)**	**Total Indoor Demand (acre-feet/yr)**
Commercial/ Institutional	21,967	15[1]	903	1.01
Outdoor Use[2]	**Landscape Area (ft^2)**	**Outdoor ETo (in/yr) x ETAF x Outdoor Conversion Factor**	**Outdoor Daily Demand (gpd)**	**Total Outdoor Demand (acre-feet/yr)**
Landscape	44,300	64 x 0.45 x 0.62	2,167.18	2.43
		Total Project Annual Water Demand		**3.44 af**
		2023-2024 CVWD Average Daily Demand[3]		**75.9 mgd**
		Project's Percentage of 2023-2024 CVWD Average Daily Demand		**0.0029%**
		2023-2024 CVWD Total Water Delivery[3]		**85,014 af**
		Project's Percentage of 2023-2024 CVWD Total Water Delivery		**0.004%**

[1] The water demand factor is derived from AWWA Commercial and Institutional End Uses of Water, 2000. Office use = 15 gal/SF/year.
[2]Outdoor water demand calculations based on CVWD Evapotranspiration (ETo), Evapotranspiration Adjustment Factor (ETAF), and Conversion Factor (CVWD Landscape Ordinance No. 1302.5, Appendix C).
[3] CVWD 2023-2024 Annual Review, Domestic Drinking Water Service Information, June 2024.

As noted above, CVWD operates five wastewater reclamation plants (WRP), and the Project would be served by WRP 10 on Cook Street in Palm Desert. According to the most recent Annual Report for the Indio Subbasin, WRP 10 treated 9,366 af of wastewater, and

it has a total daily capacity of 15 million gallons. About 85% of this effluent was recycled and the remainder was routed to percolation recharge ponds.[32]

To estimate the amount of wastewater generated by the Project, the CVWD Equivalent Dwelling Unit (EDU) calculation for office/warehouse projects was applied for analysis purposes. Per this calculation, each restroom in an office/warehouse is equivalent to one dwelling unit (EDU), and each EDU, or restroom, would generate 250 gallons of wastewater per day (gpd). The proposed Project includes three restrooms, which would comprise 0.018% of the total daily capacity of WRP 10 and represents 0.009% of the total amount of wastewater treated during 2023-2024. Please see Table 15 for a summary of the calculations.

Table 15
Project Operational Wastewater Generation

Land Use	Daily Wastewater Generation	Annual Wastewater Generation	Annual Wastewater Generation
Office/Warehouse	750 gpd	273,750 gallons	**0.84 af**
		Total Daily Capacity of WRP 10	**15,000,000 mgd**
		Project's Percentage of Total Daily Capacity WRP 10	**0.018%**
		Total 2023-2024 Acre-Feet Treated at WRP 10	**9,366 af**
		Project's Percentage of 2023-2024 Acre-Feet Treated at WRP 10	**0.009%**

Source: Office/Warehouse wastewater demand factor is derived from CVWD Regulations Governing Sanitation Service, Table A-1 Equivalent Dwelling Unit p. A-2, February 2021, https://cvwd.org/ArchiveCenter/ViewFile/Item/860.
1 Restroom = 1 Equivalent Dwelling Unit (EDU) = 250 gpd.

The Project would be consistent with the City's water conservation policies outlined the General Plan 2017 Update by using native and drought tolerant landscaping and low water-use appliances.[33] Water demand by the Project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge. Likewise, the Project's water demand would not impede sustainable groundwater management of the Basin. Project water demand impacts would be less than significant.

ci-iv) LESS THAN SIGNIFICANT IMPACT:
Project impacts would be significant if development of the property substantially alters an existing drainage pattern, increases the rate or amount of runoff, contributes runoff that exceeds the existing local drainage system, and results in substantial erosion, or impedes or redirects flood flows. The Project site encompass 6.78± acres; however, an isolated spur of the Santa Rosa foothills occupies approximately 50% of the site leaving 3.1 developable acres. The developable area is flat and covered by graded unimproved natural surface and an existing parking lot that served the former Charthouse restaurant. The restaurant was destroyed by a fire and has been demolished, but the parking lot remains and would be reconfigured for the proposed Project. The main parking lot redesign would include an additional 0.5-acre area that is currently unpaved, and a new entrance plaza, and the overflow parking lot on the southerly portion of the site would be paved thereby increasing the impermeable surface area by ±1.2 acres. The museum

[32] Indio Subbasin Annual Report for Water Year 2023-2024, Table 5-10 WY 2023-2024 Wastewater Treatment, Reuse, and Disposal in the Indio Subbasin, March 2025.
[33] City of Rancho Mirage General Plan 2017 Update, Conservation and Open Space Element, Goal COS 7, November 16, 2017.

building will be sited on a portion of the existing parking lot and will not add to the overall impermeable area. To accommodate the new building, a portion of the west side of the rock outcrop will be scraped. As discussed in Section 7, Geology and Soils, retaining walls and a back drainage system will be incorporated to guide flows descending from the hillside toward the new on-site drainage system.

Proposed Drainage System

A Preliminary Hydrology Report was prepared for the Project by The Altum Group (Appendix G) which, along with the Project grading and drainage plan, describes the Project's drainage system and explains how it complies with the design criteria required by Rancho Mirage and the Coachella Valley Water District.[34] Within the City, development projects to the south and southwest of the Coachella Valley Stormwater Channel must comply with the MS4 permit but are not required to retain 100-year storm event runoff.[35]

Storm runoff occurring on the north portion of the Project site where the museum and large parking lot are planned will utilize the existing flow pattern and route the water toward a low point in the northeasterly portion of the parking lot and into a new combination collection basin and underground storage system. Storm runoff on the overflow parking lot will be directed eastward to a new on-site surface retention basin. Flows that exceed the Project storage capacity will be directed off-site and will be routed toward the Stormwater Channel located approximately 0.4 mile to the east.[36]

To ensure that the Project design would meet the City's stormwater control requirements, the Preliminary Hydrology Report analyzed WQMP Design Capture Volume (DCV) for the Project using Riverside County Flood Control District parameters ranging from a 2-year and 100-year, one hour precipitation events. According to the analysis, the Project will be capable of collecting, storing and treating the DCV such that flowrates, velocities and volumes leaving the site do not exceed those of the existing condition. Thus, as proposed the Project would not substantially increase the rate or amount of surface runoff in a manner which would result in flooding either on- or offsite. Nor would the Project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. Furthermore, the Project would use the existing flow pattern and would not impede or redirect flood flows. The expected impacts to associated with stormwater flows would be less than significant.

Compliance with Required Erosion Control and Pollution Mitigation

The proposed Project will be required to comply with Chapter 7.03 of Rancho Mirage Code of Ordinances, Stormwater Management and Discharge Control, and §15,64.570 et al, Erosion Control Plan. Included in the requirements are the approvals of a SWPPP, a project-specific final hydrology study, and a final WQMP prior to the issuance of building permits. In compliance with the National Pollutant Discharge Elimination System (NPDES) the Project will mitigate silt and other contaminant runoff from Project-induced erosion and

[34] World Wildlife Museum, Rancho Mirage, CA, Preliminary Hydrology Report, prepared for Prest Vuksic Greenwood Architects, The Altum Group, March 27, 2025.
[35] Project Specific Preliminary Water Quality Management Plan, Howard World Wildlife Museum, Project Description, prepared by The Altum Group, March 27, 2025.
[36] Ibid.

runoff through the implementation of BMPs prescribed in the PWQMP. Implementation of required BMPs will also reduce pollutants of concern that may otherwise enter nearby receiving waters and will help reduce short and long-term water quality impacts caused by the construction and operation of the proposed Project. Approval of and compliance with the final WQMP, SWPPP, and the required BMPs will reduce Project impacts to surface waters by reducing erosion and siltation in storm flows. With the implementation of these standard requirements, the Project would not result in substantial erosion or siltation either on- or off-site and impacts would be less than significant.

d) **NO IMPACT:**
According to the FEMA National Flood Hazard Layer Viewer, the Project site is designated as Flood Zone X, an area of minimal flood hazard and low flood risk. The Stormwater Channel, which occurs 0.4 miles east of the Project site, is the backbone of the Coachella Valley stormwater flood control system and is constructed to convey approximately 80,000 cubic feet of water per second, which is greater than a 100-year storm event. Given the Project's proximity to the Stormwater Channel and the Flood Zone X designation, impacts from flood hazards are not expected to occur. The City of Rancho Mirage is also not located near the Pacific Ocean or other large water body and there will be no impacts from either seiche or tsunami hazards.

e) **NO IMPACT:**
As described above, the Proposed Project will comply with all applicable water quality requirements and will implement a SWPPP and a WQMP subject to approval by the City and the Regional Water Quality Control Board for both construction activities and the long-term operation of the site. The WQMP will incorporate grading, hydrology, and BMPs to achieve requisite water quality standards. The Project design will continue to retain the stormwater flows per the existing standards via a new stormwater collection and underground retention system and a new surface retention basin in the overflow parking lot.

Operational water demand is projected to align with the approved water demand for the designated Project site land use. Project water demand will be constrained by water conservation standards established by CVWD and approved by the City which include drought-tolerant landscaping and water efficient appliances. Estimated annual operational water demand will be 0.004% of the 2023-2024 CVWD total water delivery, which is a small fraction of the local water supply. It should also be noted that the Project does not constitute new demand because it is a re-establishment of previous water demand established by the former Charthouse restaurant that once occupied the site.

In summary, the Project would not obstruct the implementation of the City's water quality control plan or the region's sustainable groundwater management plan. There would be no impacts.

10.3 Mitigation Measures: None required.

11 - Land Use and Planning

LAND USE AND URBAN PLANNING – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

Sources: City of Rancho Mirage General Plan 2017 Update; City of Rancho Mirage Municipal Code.

11.1 Setting

The Land Use Element of the City's General Plan 2017 Update (General Plan) guides all development within the City by defining how and where each type of project may be built. Rancho Mirage uses a single map system whereby the designated land uses mirror the zoning designations. In total, there are seven different commercial land uses defined in the Land Use Element as the City places substantial emphasis on hosting a variety of "high-quality" commercial uses that "conveniently and appropriately distributed." A variety of commercial land uses occur along the Highway 111 Corridor such as Neighborhood Commercial (C-N), General Commercial (C-G), and Mixed Use M-U). Two residential uses, Very Low Density (RL-2) and Hillside Reserve (H-R), along with Private Open Space (OS-PV), the Fire Station (P-FS) and City Hall (P-CH) are also found on Highway 111 in the Project vicinity.

11.2 Discussion of Impacts:

a) NO IMPACT:
The subject museum Project is proposed for a General Commercial (C-G) land use area which abuts C-G lands to the south and west, and Commercial Neighborhood lands to the northeast. The nearest residential uses are High Density Residential (R-H) neighborhoods located east of the Project site on the far side of the rocky hillside and to the northeast. These neighborhoods are built out and well-established. The Project site is separate from surrounding neighborhoods and will not adversely affect these land uses and will not divide an established community. There will be no impacts in this regard.

b) NO IMPACT:
The General Plan defines the Project site's designated General Commercial (C-G) land use and zone as and one that includes a variety of commercial centers, specialty retail shops, small department stores and may range from free-standing buildings to planned commercial centers.[37] This offers some leeway in the specific type of commercial use

[37] Rancho Mirage General Plan Update, 2017, Land Use Element, Table 1 Land Use Designations, November 16, 2017.

which accommodates a small natural history museum and gift shop. The museum building, parking area and landscape design are consistent with the City's General Plan and Land Use and Zoning regulations.

Rancho Mirage participates in the regional Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP), and the subject parcel is within a fee mitigation area established by the CVMSHCP. Heretofore undeveloped portions of the Project site may be subject to development impact fee associated with the CVMSHCP. The location of the Project site is not in a designated conservation area per the CVMSHCP and will not impact the efficacy of the CVMSHCP. There are no environmental conflicts with respect to the land use policy or adopted environmental mitigation policy. No Project impacts are expected.

11.3 Mitigation Measures: None required.

12 - Mineral Resources

MINERAL RESOURCES – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Sources: City of Rancho Mirage General Plan EIR, 2005; California Department of Conservation, Geological Survey, Mineral Land Classification; Riverside County General Plan, Multipurpose Open Space Element, Mineral Resource Zones, December 2015; Special Report 159: Mineral Land Classification: Aggregate Materials in the Palm Springs Production-Consumption Region, California Department of Conservation, Division of Mines and Geology, 1988.

12.1 Setting

The City of Rancho Mirage occurs within the Palm Springs Production Consumption Region, which is classified as an Aggregate Materials production area. The City's SOI north of Interstate 10 is designated as Mineral Zone 2 (MRZ-2) and contains significant mineral resources. The Project site on the east side of Highway 111 is in Mineral Resource Zone 1 (MRZ-1), a zone containing no significant mineral resources.[38]

12.2 Discussion of Impacts:

a, b) NO IMPACT:

The Project site occurs in an area designated as MRZ-1, an area where the presence of significant mineral resources is unlikely due to the geologic formation.[39] Extraction of mineral resources from the site or the vicinity is also precluded by existing urban development and major transportation corridors. It should also be noted that the Coachella Valley has nearly a dozen permitted aggregate operations, which contain approximately 272 million tons of mineable aggregate.[40] These reserves are expected to meet the demand and provide adequate supply at current rates of consumption for approximately 130 years.

Since there are no mineral resources of value to the state, region or the local area in the MRZ 1 in which the Project is located, the Project will not result in any loss of availability of valuable mineral resources. There will be no impacts.

12.3 Mitigation Measures: None required.

[38] Special Report 159: Mineral Land Classification: Aggregate Materials in the Palm Springs Production-Consumption Region, California Department of Conservation, Division of Mines and Geology, 1988
[39] Ibid.
[40] Ibid.

13 - Noise

NOISE – Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Generation of excessive ground-borne vibration or ground-borne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

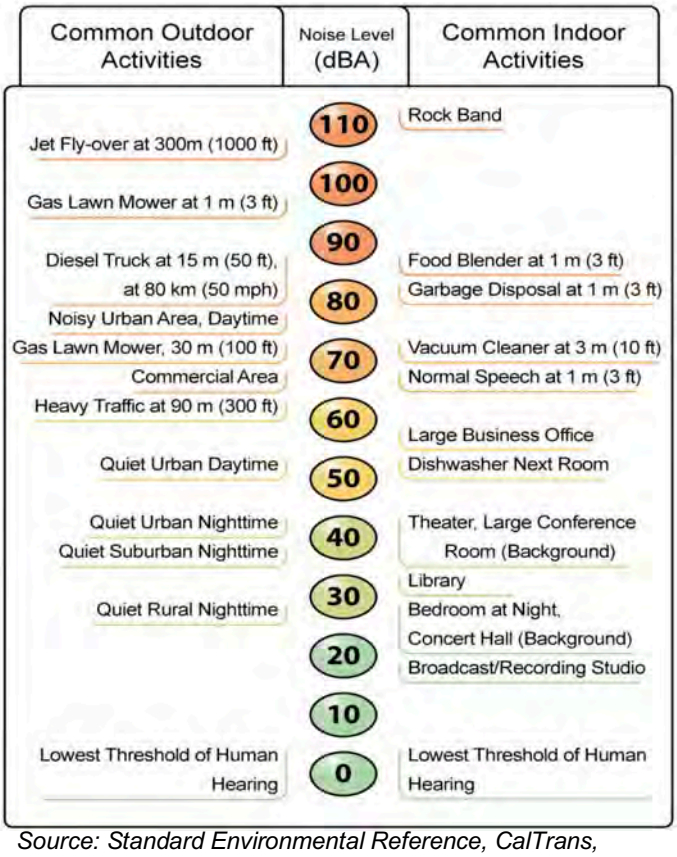
Sources: Howard World Wildlife Museum Noise and Vibration Analysis, Urban Crossroads, May 5, 2025; Howard World Wildlife Museum Focused Construction Noise Assessment Technical Memorandum, Urban Crossroads, May 27, 2025.City of Rancho Mirage General Plan 2017 Update, Noise Element; City of Rancho Mirage Municipal Code.

13.1 Setting

Noise

Ambient noise is comprised of background sounds emitted from a variety of sources and can either be unintrusive sounds from wind, wildlife, and neighborhood activity, or intrusive sounds from construction equipment, traffic, landscaping equipment, mechanical equipment such as HVAC systems and so forth. Noise levels are expressed as decibels (dB). The A-weighted decibel scale (dBA) filters out very high and very low frequencies such that the scale correlates to the sound a human ear would detect. Noise at a 25 dBA level is a very quiet sound such as a rural nighttime environment, while 50 dBA is the noise level of a refrigerator running, 80 dBA is the noise level of a tractor idling, and 105 dBA would be a louder sound such as a jet flying overhead. The chart below identifies sources and levels of community noise. Exposure to 70 dBA noise level and higher over certain periods of time can damage a person's hearing.

To measure noise for city planning purposes, the Community Noise Equivalent Level (CNEL) scale is applied as it measures the average intensity of a sound over a 24-hour period. CNEL scale measures sound levels by assigning heavier dBA weights, or adding decibel "penalties," to existing sound dBA levels if those sounds occur in either certain sensitive zones or during unpermitted times. Table 17 below provides the City's acceptable CNEL for residential land uses.



Source: Standard Environmental Reference, CalTrans, February 2018.

Vibration

Ground-borne vibrations can be characterized as rumbling sounds which travel through the ground. Typically, ground-borne vibrations from human activity such as construction activity, heavy traffic, or jet planes flying overhead are felt indoors and are rarely a problem outdoors. Construction equipment may be categorized as either continuous vibration (excavation and grading equipment), low-rate repeated impact vibration (blasting, drop balls, impact pile drivers), or high-rate repeated impact vibration (jackhammers, hoe rams). The duration and amplitude of ground-borne vibration from construction equipment varies. A blast would emit a high amplitude over a short duration, but grading equipment would emit a low amplitude vibration over a longer duration.[41] Ground-borne vibration as it relates to disturbance to people is measured in vibration decibels (VdB). Vibration velocity level of 65 VdB is considered to be barely perceptible by humans and a lower vibration velocity would be undetectable.

Ground vibration is not as prevalent issue as noise disturbance. Typically, vibration levels occur well below the threshold of human perception, approximately 0.02 inches per second. Plus, the duration of these events is typically short and occurs over an extended time; thereby reducing the times of perceived disturbance. Table 16 below summarizes average human response to groundborne vibration.

[41] Transportation and Construction Vibration Guidance Manual, California Department of Transportation, April 2020.

Table 16
Human Response to Groundborne Vibration

Average Human Response	PPV (in/sec)
Barely to distinctly perceptible	0.02 to 0.10
Distinctly to strongly perceptible	0.10 to 0.50
Strongly perceptible to mildly unpleasant	0.50 to 1.00
Mildly to distinctly unpleasant	1.00 to 2.00
Distinctly unpleasant to intolerable	2.00 to 10.00

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, April 2020.

"Sensitive receptors" is a CEQA designation assigned to land uses where there are people in the community who may be particularly sensitive to noise such as residential areas, schools, libraries, churches, nursing homes, health care facilities. There are two high density residential neighborhoods and a mobile home park in proximity to the Project. The nearest neighborhood is 205 feet north of the Project site and behind the Atrium commercial center. The next nearest is 245 feet east of the Project site and the 100-foot rock outcrop that forms a natural barrier between these residences and the Project. Lastly, the mobile home park is 335 feet northeast of the Project parking lot and is also somewhat shielded by the on-site hill.

The Noise Element of the City General Plan provides goals and policies for ensuring that noises are maintained at appropriate levels for the various land uses. Within single- and multi-family residential land uses, ambient 55-65 CNEL dBA exterior noise levels are acceptable, and 65-70 dBA noise levels are conditionally acceptable for other land uses. Noise levels above 70 CNEL dBA are considered unacceptable. The City Noise Ordinance provides guidance for controlling incompatible noise levels. Construction activities are exempted from the City Noise Ordinance with the condition that construction occurs within acceptable hours of the day.[42]

The construction phase for the Proposed Project includes the construction of the Museum building and entrance plaza, a redesign of the existing parking lot, and the construction of an overflow parking lot. In addition, partial excavation of hillside where the Museum is planned will be required. The following analysis of potential noise and ground-borne impacts is primarily based on the Howard World Wildlife Museum Noise and Vibration Analysis prepared by Urban Crossroads.[43] To specifically analyze construction noise impacts from the hillside excavation activities, an additional Technical Memorandum entitled, "Howard World Wildlife Museum Focused Construction Noise Assessment" was prepared.[44] The Noise and Vibration Analysis and the Construction Noise Assessment are provided in Appendices H and I respectively.

13.2 Discussion of Impacts:

a) LESS THAN SIGNIFICANT IMPACT:
For each land use and zoning designation, the City has established noise level standards that are permitted within specific daytime periods. As construction activity may exceed noise level standards, the City restricts the permitted hours for such activity. Table 17 provides the City's timeframes for acceptable operational exterior noise level standards and the acceptable temporary construction noise standard.

[42] City of Rancho Mirage Code of Ordinances, Noise Code 8.45.050, 1995.
[43] Howard World Wildlife Museum Noise and Vibration Analysis, Urban Crossroads, May 5, 2025.
[44] Howard World Wildlife Museum Focused Construction Noise Assessment Technical Memorandum, Urban Crossroads, May 27, 2025.

Table 17
Operational and Construction Noise Standards

Land Use[1]	Zones	Time Period	Exterior Noise Level Standard (dBA L_{eq})[2]
Residential: (Medium and High Density) Hospital, Open Space	R-M, R-H, MHP, P/H, OS	Daytime (7:00am – 6:00pm)	60
		Evening (6:00pm – 10:00pm)	55
		Nighttime (10:00pm – 7:00am)	50
Construction Activity[3]	*Sensitive Receptors*	*7:00am – 7:00pm (No activity on Sundays and holidays)*	*80 dBA L_{eq}*

1. City of Rancho Mirage Municipal Code, §8.45.030, Exterior Noise Level Limits.
2. L_{eq} represents a steady state sound level containing the same total energy as a time varying signal over a given sample period.
3. Represents the acceptable exterior noise level for construction noise near sensitive receptors per FTA, Transit Noise and Vibration Impact Assessment Manual, September 2018.

Construction Noise

Even with the restricted period, construction may still impose a nuisance when occurring near sensitive receptors. Since the City has not established maximum acceptable noise standards for construction noise near sensitive receptors, the numerical threshold of 80 dBA L_{eq}, as provided by the Federal Transit Administration's (FTA), Transit Noise and Vibration Impact Assessment Manual, has been applied to the analysis of the Project's impacts on nearby sensitive receptors. The FTA considers this noise level for exterior construction to be reasonable for sensitive receptors in close proximity.[45]

Analysis of potential impacts from the Project's construction phase is first based on the noisiest pieces of equipment which would involve the equipment needed to perform the hillside excavation. As explained in the Project's Focused Construction Noise Assessment, the noise level analysis applies reference construction equipment noise levels provided by the Federal Highway Administration's (FHWA) Roadway Construction Noise Model. Table 18 summarizes the noise levels for the construction equipment that would be used to excavate the hillside, and the combined noise level assuming all pieces of equipment are operating simultaneously, which presents a conservative model. The reference power level data shows the combined noise level of the equipment independent of distance and other surrounding noise that may reduce equipment noise.

[45] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, Table 7-2 General Assessment Construction Noise Criteria (p. 179), September 2018.

Table 18
Hillside Excavation Reference Noise Levels for Construction Equipment

Construction Stage	Reference Construction Equipment[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Composite Reference Noise Level (dBA L_{eq})[2]	Reference Power Level (dBA L_W)[3]
Excavation	2 Backhoes	74	87.9	119.6
	Dump Truck	72		
	Front End Loader	75		
	2 Air Compressors	74		
	3 Jack Hammers	82		

1. Federal Highway Administration Construction Noise Model.
2. Represents the combine noise level for all equipment operating simultaneously.
3. The total amount of acoustical energy produced by a sound source independent of distance or surroundings.

Urban Crossroads, Inc. employed its Computer Aided Noise Abatement (CadnA) noise prediction model, which analyzes noise sources within a spatially accurate Project site plan. Spatial accuracy is derived from georeferenced aerial imagery, topography, and includes noise barriers such as buildings. CadnA calculates noise levels at specific receiver locations based on distances from the noise sources, ground absorption and barrier attenuation. Four receiver locations were identified in accordance with the FHWA guidelines which represent sensitive receptors and other locations where unwanted sounds could adversely affect the use of the land. Other actual sensitive receptor locations are at distances greater than the four receiver locations and thus will experience noise levels lower than those modeled for this analysis. The four receiver locations and their representative sensitive receptors are as follows (See Exhibit 8, Noise Receiver Locations):

R1: Represents the existing high-density residences within the Desert Braemar community to the north of the Project site.

R2: Represents the existing high-density residences within the Small Mountain Private Condominium community on the north side of Mirage Cove Drive and east of the overflow parking lot.

R3: Represents the existing residence at Palms Street south of the Project site and on the south side of Mirage Cove Drive.

R4: Represents the single-family residence on Vista Loma Drive south of Mirage Cove Drive.

Table 19
Hillside Excavation Construction Reference Noise Levels

Construction Stage	Reference Construction Equipment[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Composite Reference Noise Level (dBA L_{eq})[2]	Reference Power Level (dBA L_W)[3]
Excavation	2 Backhoes	74	87.9	119.6
	Dump Truck	72		
	Front End Loader	75		
	2 Air Compressors	74		
	3 Jack Hammers	82		

1. Federal Highway Administration Construction Noise Model.
2. Represents the combine noise level for all equipment operating simultaneously.
3. The total amount of acoustical energy produced by a sound source independent of distance or surroundings.

The Focused Construction Noise Analysis conducted calculations of hillside excavation construction noise using the reference noise levels provided in Table 19, the peak hour hillside construction noise source activities shown in Exhibit 8, the CadnA noise prediction model, the typical $L_{eq(8hr)}$ and the peak hour equipment $L_{eq(1hr)}$ construction noise levels shown below in Table 20.

Table 20
Hillside Excavation Construction Noise Impacts on Four Receiver Locations

Receiver Location[1]	Receiver Distance (feet)		Typical Construction Noise Levels (8-Hour)[2]	Peak Construction Noise Levels (1-Hour)[3]	Threshold[4]	Threshold Exceeded?
	From Hillside	From Project Boundary				
R1	244’	138’	66.0	72.5	80	No
R2	413’	23’	39.0	45.4	80	No
R3	614’	94’	37.2	44.5	80	No
R4	948’	703’	55.4	61.8	80	No

1. Construction Equipment noise source and receiver location are shown in Exhibit 8.
2. Typical construction equipment noise level calculations are included in Appendix 1 of the Focused Construction Noise Assessment.
3. Peak Hour Construction equipment noise level calculations are included in Appendix 2 of the Focused Construction Noise Assessment.
4. Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.

The Focused Construction Noise Assessment found that the highest noise levels from both typical and peak hour during the hillside excavation activities would reach a high of 72.5 dBA L_{eq}. Since the noise levels from the loudest construction equipment did not exceed 80 dBA the construction activities and equipment noise generated by the hillside excavation were considered to have a less than significant impact.

To assess general construction noise from the construction of the building and parking lots, the Noise and Vibration Analysis applied the FTA's 80 dBA threshold as a baseline of maximum acceptable construction noise. If the Project's construction noise level contributes an additional 20 dBA during the daytime causing an exceedance of the City's acceptable noise level standard, then the impact would be significant. Project construction noise levels were combined with the existing ambient noise levels recorded at the four receiver locations and the differences between the combined noises (Project construction and ambient) and the existing ambient noise level form the basis of the impacts analysis. At all four receiver locations, the Project construction increased the noise levels but did not cause an exceedance of the FTA's reasonable noise level standard of 80 dBA. Therefore, the Project construction activity is considered to have a less than significant impact.

Operational Noise
Analysis of potential impacts from the operational phase of the Project is based the amount of noise level increase above the existing ambient noise level of the land use. If the existing ambient noise level is below 60 dBA, then an increase of 5 dBA generated by the Project would be a significant impact. If the ambient noise level is between 60 and 65 dBA, then an increase of 3 dBA would be significant, and if the ambient noise level is over 65 dBA, then an increase of 1.5 dBA would be significant.

To assess the extent to which the Project's day-to-day operations would increase the City's acceptable noise standards for the Project site land use and for the nearby sensitive receptor land uses, the Noise and Vibration Analysis recorded measurements of existing ambient noise levels for the residential neighborhoods and for the Project site for the four receptor locations listed above in the Construction Impacts discussion.

To assess the level of additional noise resulting from the Project's operational phase, four reference noise sources at specific heights and at a distance of 50 feet from each source formed the basis of the analysis. The four reference noise sources and associated heights are listed here:

- Loading dock activity, 8 feet high
- Trash enclosure activity, 5 feet high
- Roof-top air conditioning units, five feet high
- Parking lot vehicle movements, five feet high

The Noise and Vibration Analysis concluded that the combined Project operational noise and the existing ambient noise during the daytime, evening, and nighttime would range between 0.0 and 3.1 dBA at the sensitive receptor noise receiver locations. The combined Project operational noise level and ambient noise level would not exceed the City's noise standards. The Project's operational noise would result in a less than significant impacts.

Project traffic would increase the level of traffic noise, but this increase is expected to be an incremental increase and is not expected to generate even a barely perceptible increase of the traffic noise level, which would be less than significant.[46]

Summary
Construction noise analysis performed for the proposed Project determined that equipment noise would not exceed 80 dBA. Furthermore, the combined noise levels of the existing ambient noise and the modeled construction noise that would be received at four different locations representing the nearby sensitive receptors will not exceed 80 dBA.

Operational noise impacts associated with Project traffic, HVAC units, trash enclosure and loading dock activity will not result in an increase of the ambient noise level that would exceed the City's standard noise level for either the Project site's General Commercial land or the adjacent High Density Residential and Mobile Home Park land uses.

While the Project's construction and operational activities would generate temporary and permanent increases in ambient noise levels in the vicinity, the increases would not be substantial and would not exceed the noise level standards established in the City's General Plan for the Project site land use or for the adjacent residential land uses. Impacts would be less than significant.

b) LESS THAN SIGNIFICANT IMPACT:
According to the Rancho Mirage Municipal Code 17.18.080, no vibration associated with any use which is discernable beyond the project boundary is permitted. The City does not provide a permissible vibration standard for temporary construction activity, hence, the vibration damage threshold provided by the Caltrans Transportation and Construction Vibration Guidance Manual, is applied to the analysis of the Project's potential impacts.[47] According to the Noise and Vibration Analysis, the nearby sensitive receptors, which are "older residential structures," have a maximum acceptable continuous vibration threshold of 0.3 PPV inches/second (in/sec).

The four receiver locations representing nearby off-site sensitive receptors are between 23 feet and 703 feet from the Project boundary during the construction phase. Construction vibration velocity levels at these receiver locations are estimated to range from 0.001 to 0.177 PPVin/sec. As the anticipated velocity levels are under 0.3 PPV in/sec, the Project's construction activities are not expected to generate excessive ground-borne vibration or noise level, and the impact that would be less than significant.

c) NO IMPACT:
The Project site occurs 4.5 miles southeast of the Palm Springs International Airport, and 1.3 miles southeast of the Airport Influence Area boundary. The Project area is not in the vicinity of a private airstrip or airport and is further than two miles from a public use airport. People residing or working at the Project site would not be exposed to excessive airport noise levels. There would be no impact.

13.3 Mitigation Measures: None required.

[46] Op. cit. Urban Crossroads, 2025.
[47] Caltrans, Transportation and Construction Vibration Guidance Manual, Table 19 Guideline Vibration Damage Potential Threshold Criteria (p. 38), April 2020.

14 - Population and Housing

POPULATION AND HOUSING – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Sources: City of Rancho Mirage General Plan 2017 Update, Land Use Element, November 16, 2017; US Census Bureau, 2023 ACS Demographic and Housing Estimates, Table DP05.

14.1 Setting

Among the nine incorporated cities of the Coachella Valley, Rancho Mirage is the second smallest in population. As of 2023, the population in the City of Rancho Mirage is estimated to be 17,375,[48] and according to the General Plan 2017 Update, the maximum population could reach 25,573. Until 2012, the Charthouse restaurant occupied the Project site and was a substantial employment generator.

14.2 Discussion of Impacts:

a) LESS THAN SIGNIFICANT IMPACT:
The proposed Project will provide a form of retail recreation and natural history education along the Highway 111 Corridor. The Project is conservatively estimated to support up to 73 full and part-time jobs (based on 1 job/300 sf), comparable to employment that would have been associated with the earlier restaurant on this site. Based on the relatively limited jobs creation potential and the site's prior history as a job creator, the proposed Project is not expected to induce substantial unplanned population growth in the City's. Likewise, the project does not require the extension of roads or other infrastructure. Most of the Project's employees are expected to be existing local residents. To the limited extent the Project could attract new residents to the City, this could result in an incremental population increase. Impacts would be less than significant.

b) NO IMPACT:
The proposed Project will occur on currently vacant but previously developed lands within a well-established shopping center within a General Commercial (C-G) designation. Adjacent commercial land uses occur to the northwest, west and south. Residents living in the two existing High Density Residential neighborhoods located to the northeast and

[48] US Census Bureau, 2023 ACS Demographic and Housing Estimates, Table DP05.

to the east will not be displaced by this Project, nor will the Project necessitate the construction of housing elsewhere. There will be no impacts with regard to the displacement of local residents or housing.

14.3 Mitigation Measures: None required.

15 - Public Services

PUBLIC SERVICES – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
i) Fire protection?	☐	☐	☒	☐
ii) Police protection?	☐	☐	☒	☐
iii) Schools?	☐	☐	☒	☐
iv) Parks?	☐	☐	☒	☐
v) Other public facilities?	☐	☐	☒	☐

Sources: City of Rancho Mirage General Plan 2017 Update, Safety Element, Fire Protection Services, November 16, 2017; City of Rancho Mirage Development Impact Fee Annual and Five-Year Report, November 7, 2024

15.1 Setting

The proposed Project is a commercial museum and associated uses, which will generate a limited but incremental increased demand for public services, which are each addressed below. It again should be noted that prior to 2012, the subject property was occupied by the Charthouse restaurant, which was fully serviced by local public service providers. As discussed below, the proposed Project will result in no or a de minimus increase in public services and resources.

Fire Protection Services

The City maintains a cooperative agreement with the State of California (CalFire) and the Riverside County Fire Department (RCFD) for fire protection services. RCFD operates two stations in Rancho Mirage with Station 50 at 70801 Highway 111, located 1.9 miles south, being the nearest to the Project site. At all times, this station is equipped with one medic engine, or fire truck, two firefighters and one firefighter/paramedic. Should additional resources be required, the RCFD operates five other stations close to Rancho Mirage available to assist as needed.

Police Protection Services

The Riverside County Sheriff's Department, operating out of the Palm Desert Sheriff's Station on Gerald Ford Drive, provides law enforcement services to Rancho Mirage through a contractual agreement. The Sheriff's Department employs 16 deputy sheriffs for patrol, traffic enforcement, and emergency response. Additional support services are provided by clerical staff, special enforcement team, crime prevention and investigative personnel.

Schools

The City of Rancho Mirage occurs within two school districts, the Palm Springs Unified School District (PSUSD) and the Desert Sands Unified School District (DSUSD). In the City, there is one public elementary school and one public high school, both of which are included in the PSUSD.

Parks

The City hosts five different parks and five local trails. The City's parks are further described below in Section 16, Recreation.

15.2 Discussion of Impacts:

a,i) LESS THAN SIGNIFICANT IMPACT:
Since the Project occurs within the three-mile and five-minute response parameter as recommended by the National Fire Insurance Organizations and the National Fire Protection Association, the construction of a new fire department facility will not be required.[49] To offset the increase in the demand for fire protection services, new non-residential commercial projects in the City are subject to the Fire Facilities and Equipment development impact fee (DIF) of $313 per 1,000 square feet.[50] The DIF is applied toward constructing, improving, and maintaining fire service equipment and facilities. The payment of the requisite DIF by the applicant would ensure that any impact resulting from the Project's incremental increase in the need for fire protection services is reduced to less than significant.

a,ii) LESS THAN SIGNIFICANT IMPACT:
In 2016, the ratio of police personnel to City residents was one officer per 786 residents, which was above the commonly accepted ratio of one officer per 1,000 residents. The average response time in 2015 was 5.9 minutes for Priority 1 calls. The proposed Project is a commercial entertainment and educational venue that would be open during typical business hours. Although the Project could increase the demand for law enforcement services, this increase would be incremental, very limited and would not induce the need for additional facilities. Project impacts on the City's police protection services would be less than significant.

a,iii) LESS THAN SIGNIFICANT IMPACT:
The Project generate a de minimis potential increase in new residents or generate additional school enrollments. A combination of part and full-time jobs will be created, comparable to the jobs generated by the previous restaurant at this site. Development

[49] City of Rancho Mirage General Plan 2017 Update, Safety Element, Fire Protection Services, November 16, 2017.
[50] City of Rancho Mirage Development Impact Fee Annual and Five-Year Report, November 7, 2024.

impact fees are not applied to commercial projects. No impacts to the local school services are anticipated.

a,iv) LESS THAN SIGNIFICANT IMPACT:
As the proposed Project is a commercial museum venue, it would not result in a substantial increase in the City's population and thus would not lead to a significant increased use of the City's parks or other public facilities, nor would the Project induce the need to development new or additional park and/or recreation facilities. Less than significant impacts to parks and/or recreational facilities will occur.

a,v LESS THAN SIGNIFICANT IMPACT:
A variety of other public facilities may serve the proposed Project and/or its future employees, including general governmental services and library services. Prior to its destruction in 2012, the Charthouse restaurant that operated on this site generated and contributed to the overall city demand for such services. The proposed project will generate comparable demand for such services and demand is expected to be limited and less than significant.

15.3 Mitigation Measures: None required.

16 - Recreation

RECREATION – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	☐	☐	☐	☒

Source: City of Rancho Mirage General Plan 2017 Update, Conservation and Open Space Element, November 16, 2017.

16.1 Setting

The City provides a range of park experiences for residents and visitors. Mini parks are less than one acre in size and may accommodate a small children's tot lot or a passive seating area. There are two mini parks in the City. Local parks are between five and ten acres in size and provide additional amenities such as walking paths, ball fields, picnic tables, children's playgrounds, and dog parks. The City has three local parks. Community parks, 20 to 40 acres in size, offer even larger scale recreational amenities such as multiple ball fields, tennis complexes, swimming pool, and a recreation building for events and activities. Currently, City residents may access community parks outside of the City which are funded through a multi-city agreement.

Per the 1965 Quimby Act, the cities who participate are required to provide three acres of parkland per 1,000 residents. Currently, the Land Use Element of the General Plan 2017 Update allocates 55 acres of parkland, and at build out, the City would need to provide at least 93 acres.

16.2 Discussion of Impacts:

a, b) NO IMPACT:

The purpose of the proposed Project would provide a commercial entertainment and educational experience at the site that once hosted the Charthouse restaurant. As the Project is not a residential development, it is not expected to result in no or a de minimis increase the City's population. Moreover, employees of the Project would primarily be local residents. Therefore, an increase in the use of existing parks or other facilities would be less than significant.

The Project includes an outdoor plaza area and a landscaped walkway between the Museum and the overflow parking lot. These outdoor amenities would be under the maintenance responsibility of the Project. There would be no need to expand the City's recreational facilities.

In summary, The Project would not result in any substantial impacts associated with demand for park facilities or the physical deterioration of park resources or other public facilities. Likewise, there would be no need to expand existing park facilities and thus no or less than significant environmental impacts would occur.

16.3 Mitigation Measures: None required.

17 - Transportation

TRANSPORTATION – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐

Source: City of Rancho Mirage General Plan 2017 Update, Circulation Element, November 16, 2017; City of Rancho Mirage Resolution 2021-06 VMT Analysis; Institute of Transportation Engineers (ITE), TripGen Web-based App.

17.1 Setting

The transportation system throughout the City of Rancho Mirage is comprised of five roadway classifications from local two-lane roadways to six-lane major arterials such as Highway 111, along which the Project site occurs. Regional access to the City is provided by US Interstate 10, Highway 111 and Highway 74. Multiple jurisdictions including the federal government, California Department of Transportation, Riverside County Transportation Department, and the City manage different components of the transportation system.

The Circulation Element of the General Plan 2017 Update emphasizes the need to maintain safe, efficient, and economical circulation network. The City applies a Level of Service (LOS) metric when assessing the performance of the transportation network and intersection delays. LOS provides a ranked measurement of roadway operating conditions, that ranges from “A” (free flow, best conditions) to “F” (worst conditions, serious delays, and system failure). LOS D is the minimum acceptable level of service for Rancho Mirage. LOS is not a metric under CEQA.

Senate Bill 743 (2013) updates the methodology for analyzing transportation impacts by projects to more accurately measure and correlate transportation-related air pollutants and greenhouse gas emissions with land use patterns, and to more effectively reduce emissions via the development of multimodal transportation networks and diversification of land uses. CEQA Guidelines section 15064.3 describes the use of Vehicle Miles Traveled (VMT) as the metric by which to measure project transportation impacts. However, certain projects are exempt from preparing a VMT analysis based on project size and proximity to high quality transit. In 2021 the

City adopted a VMT analysis policy, Resolution 2021-06, in compliance with SB 743, which guides the following Project impacts discussion.

Public Transit

SunLine Transit Agency provides bus routes throughout the Coachella Valley ranging from Desert Hot Springs to the west and North Shore Community near the Salton Sea to the southeast. Sunline Bus Route 1WV provides the nearest stop on the east side of Highway 111 just 120 feet north of Mirage Cove Drive adjacent to the Project's proposed overflow parking lot. Route 2 provides the nearest stop, 0.34 miles northwest at City Hall, to the Project site at Date Palm Drive and Highway 111.

As discussed below, the proposed Project will not alter, adversely affect or conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities. No project related impacts to alternative transportation are anticipated.

17.2 Discussion of Impacts:

a, b) LESS THAN SIGNIFICANT IMPACT:

If a project conflicts with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities, then its impacts would be significant. Furthermore, if a project conflicts or is inconsistent with CEQA Guidelines section 15064.3, subdivision (b), its impacts would be significant. Analysis of the Project's impacts on the circulation system programs, plans and policies is based on Riverside County's Transportation Analysis Guidelines and ITE references.

The proposed Project is a private museum and education facility planned for a site that had been previously occupied by a restaurant for nearly 40 years. The Project will utilize the existing 33-foot-wide driveway leading from Highway 111 into the main parking lot as primary access. A second, signalized access drive into the subject shopping center is located approximately 320 feet north of the Project's main driveway. The Project also proposes an overflow parking lot on the south portion of the site at the northeast corner of Highway 111 and Mirage Cove Drive.

Project Level of Service

The Project's anticipated impact on circulation level of service was analyzed by forecasting the Project's daily trip generation or traffic attracted to the Project. Based on the Institute of Transportation Engineers (ITE) "Museum" land use code, 580, the ITE TripGen Web-Based Application was used to estimate the number of daily trips generated. The Project would potentially generate an average total of 150 trips daily (average daily trips or ADT), with the highest volume occurring during the Saturday peak hour. Table 21 provides the ITE TripGen data.

Table 21
Project Daily Trip Generation

Land Use	ITE Land Use Code	Building SF	Saturday Peak Hour Trips	Total Daily Trips
Museum/Institutional	580	21,967	15	150
Source: Institute of Traffic Engineers (ITE), TripGen Web-based App				

Pursuant to the County's Transportation Analysis Guidelines, if a project generates fewer than 100 peak hour trips, then a detailed traffic analysis is not required, and the project's impacts on level of service are expected to be less than significant. The proposed Project is anticipated to generate fewer than 15 trips during the Saturday peak hour and during the weekday AM and PM peak hours. ADT and peak hour trip volumes will be less than significant. No further LOS analysis is required for the Project.

Exemptions from VMT Analysis

City of Rancho Mirage Resolution 2021-06 aligns the City's methodology for measuring project impacts on local traffic patterns with SB 743. However, projects that meet the City's screening criteria are exempt from preparing VMT analyses, thus, detailed CEQA assessments are not required for land uses associated with the exempt projects. Exempting certain projects avoids unnecessary analyses as those projects are deemed to result in less than significant impacts. The proposed Project meets the following Screening Criteria and therefore is exempt from conducting an extensive VMT analysis:

- Small Project – Projects that emit under 3,000 metric tons of CO_2e annually per the County's Greenhouse Gas Emissions Screening Tables are exempt due to having low trip generation. Such projects include retail buildings with areas up to 60,000 sf, general office buildings with areas up to 165,000 sf, general light industrial buildings with areas up 179,000 sf, warehouse (unrefrigerated) buildings with areas up to 208,000 sf.

Given that the Project meets this screening criteria, the Project is consistent with CEQA Guidelines section 15064.3 (b) and impacts with regard to VMTs would be less than significant.

In summary, the proposed Project will result in increased traffic volumes, however, this increase would be very limited (~150 ADT). It should also be noted that for several decades and until 2012, the Charthouse restaurant occupied the subject property and generated a similar volume of vehicle traffic. The proposed Project's daily traffic volume will not conflict with any program, plan, ordinance or policy addressing the circulation system as it will not cause a decrease in the level of service. As the Project qualifies as a "small project" per the City's screening criteria, traffic impacts associated with the Project VMT would not conflict with or be inconsistent with CEQA Guidelines § 15064.3. Project impacts would be less than significant.

c, d) LESS THAN SIGNIFICANT IMPACT:

As described above, primary access to the proposed Project will be provided via an existing 33-foot driveway on Highway 111 that directly serves the existing development site parking. Secondary access will be available from the signalized Atrium Center driveway/intersection 320 feet to the north. The Project does not propose to construct a hazardous geometric design, modify existing roadways or include uses that are incompatible with the City's Land Use Plan. Prior to construction, both the Fire Department and Police Department will review the Project site plan to ensure safety measures are addressed, including emergency access. Therefore, the proposed Project will have a less than significant impact on emergency access and will not increase hazards due to a geometric design feature.

17.3 Mitigation Measures: None required.

18 - Tribal Cultural Resources

TRIBAL CULTURAL RESOURCES – Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section5020.1(k), or	☐	☒	☐	☐
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code § 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

Sources: Phase 1 Historical/Archaeological Resources Survey for Howard World Wildlife Museum Project, Assessor's Parcel Nos 689-040-023, -025, -028, City of Rancho Mirage, California," by CRM TECH, April 10, 2025; Agua Caliente Band of Cahuilla Indians, "Culture; We Are the Cahuilla," 2021-2022; Guidelines for Determining the Significance of and Impact to Cultural Resources: Archaeological, Historic, and Tribal Cultural Resources, Society for California Archaeology, April 2020.

18.1 Setting

California state law requires a government-to-government consultation process between project lead agencies and California Native American tribes who have an interest in protecting cultural resources in a project area. The consultation process must begin prior to the release of an environmental impact report, mitigated negative declaration, or negative declaration. Native American tribes participating in the consultation process are those who have requested notice of all proposed projects within the jurisdiction of the lead agency.

Assembly Bill 52

Public Resources Code (PRC) 21074(a) states that if a project has the potential to cause a substantial adverse change or impairment to a tribal cultural resource (TCR), then the project may cause an adverse effect on the environment. The passage of Assembly Bill 52 in 2014 created a

new CEQA category of resources called, Tribal Cultural Resources, whereby a formal consultation process was established between lead agencies and impacted California Native American tribes to address concerns regarding a project's potential impacts to tribal cultural resources. Tribal Cultural Resources include California Native American archaeological sites, cultural landscapes and sacred places.[51]

Public Resources Code (PRC) § 21074(a) defines tribal cultural resources as:

1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:
   a. Included or determined to be eligible for inclusion in the California Register of Historical Resources.
   b. Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.
2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of the paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

Analysis of tribal cultural resources potentially occurring on the Project site is based on the archaeological report entitled, "Phase 1 Historical/Archaeological Resources Survey for Howard World Wildlife Museum Project, Assessor's Parcel Nos 689-040-023, -025, -028, City of Rancho Mirage, California," prepared on April 10, 2025 by CRM TECH (referred to as "Cultural Resources Report"). Appendix C contains a copy of the Report. The historical background research, intensive-level field survey, and Native American Sacred Lands File Search are described in Section V, Cultural Resources.

Ethnohistoric Setting
Cahuilla are a Takic-speaking people whose traditional territory extends from the San Bernardino Mountains to the north down across the Santa Rosa Mountains to the Borrego Desert to the south, and from the City of Riverside to the west over to the Colorado River. Anthropologists identify three regional groups of Cahuilla: Desert Cahuilla, Western (or, Pass) Cahuilla, and Mountain Cahuilla. However, Cahuilla associate with one of two moieties, the Tuktum (Wildcat) or the Istam (Coyote) and were further organized into clans along patrilineal lines. Today, nine bands of Cahuilla are federally recognized.

The Spanish Mission System began in California in 1776, however, due to the remoteness of their territories in the mountains and deserts, many of the Cahuilla remained out of reach of the Mission System until 1819 when an outpost, or Asistencia, of the San Gabriel Mission was built in Redlands area. Thus began the forced transition of many Cahuilla from their traditional homelands and lifestyles to Spanish Mission lifestyle and labor. The late 1800s saw the arrival of the railroad and non-Native agriculturalists and who were given traditional Cahuilla lands by the federal government to convert into farmland.

[51] Guidelines for Determining the Significance of and Impact to Cultural Resources: Archaeological, Historic, and Tribal Cultural Resources, Society for California Archaeology, April 2020.

Native American Consultation

As part of the preparation of the Cultural Resources Report, a written request to the State of California Native American Heritage Commission (NAHC) for a Sacred Lands File records search was submitted by CRM TECH on January 24, 2025. CRM TECH contacted the Agua Caliente Band of Cahuilla Indians (ACBCI), the tribe who is nearest to the Project site, and invited the tribe to participate in the archaeological fieldwork. In response, Luz Salazar and Loriea Gregory, Cultural Resources Analysts at the Agua Caliente Tribal Historical Preservation Office, identified the Project site as occurring within the tribe's traditional use area and participated in the archaeological field survey. ACBCI cultural resources analysts followed up by requesting copies of all cultural resource documentation pertaining to this Project and the presence of an ACBCI tribal monitor on the Project site during ground-disturbing construction activities. A copy of ACBCI correspondence is included in the Cultural Resources Report.

In addition to the consultation conducted by the Project archaeologist, Assembly Bill 52 (AB 52) instructs lead agencies to consult with any local California Native American tribe who is traditionally and culturally affiliated with the geographic area of the Proposed Project if the tribe has requested formal notification.[52] AB 52 has established guidelines for completing consultation process and incorporating tribal requests.

The NAHC provided a list of 22 contacts representing 11 local tribes to contact for further evaluation of the presence of potential cultural resources. In a letter dated May 19, 2025 (see Appendix D), the City initiated the AB 52 consultation for the proposed Museum with 11 local tribes. The 30-day consultation period was between May 19, 2025, to June 18, 2025. Three responses were received. The Quechan Indian Tribe of the Fort Yuma Reservation declined consultation and deferred to the local tribes for comment.

The Morongo Band of Mission Indians responded on June 12, 2025. The letter stated the project is located within the ancestral territory and traditional use area of the Cahuilla and Serrano people of the Morongo Band of Mission Indians. Project materials, cultural resource documentation, and survey reports were requested and provided by the City. The Tribal Historic Preservation Office initiated government to government consultation and had a virtual meeting with the City on July 2, 2025.

The Agua Caliente Band of Cahuilla Indians (ACBCI) responded on June 16, 2025, during the AB 52 process. The letter states the site is not within the Tribe's reservation boundary, however; it is part of their Traditional Use Area. The tribe requested cultural resource documentation and survey reports, which were provided by the City. Government to government consultation was initiated and a virtual meeting was held on June 30th, 2025. Dialogue continued between the City and the tribe, particularly relating to the Morongo Band's requests. The City and ACBCI concluded consultation at the end of August, 2025.

18.2 Discussion of Impacts:

a i,ii) LESS THAN SIGNIFICANT IMPACT WITH MITIGATION:

Per the Cultural Resources Report, and as described in Section V, the Project site contains no tribal cultural resources that are listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources identified on the Project site. However, the ACBCI has confirmed that the Project site is within the tribe's Traditional

[52] California Public Resources Code §21080.3.1, January 1, 2015.

Use Area. As noted above, the City completed AB 52 Tribal Consultation. The City received consultation requests from both the ACBCI and the Morongo Band. Following consultation meetings with both tribes, and follow-up discussions with ACBCI, the ACBCI coordinated directly with the Morongo Band, and notified the City that it would provide monitoring for the Project. The Morongo Band separately informed the City that it would conduct monitoring if the ACBCI failed to do so. Mitigation Measures CUL-1 and CUL-2 provide for the monitoring requested by both tribes. Mitigation Measures CUL-3 and CUL-4 are provided at the Morongo Band's request, and will be implemented only if ACBCI fails to provide monitoring on the Project site. As a result of these mitigation measures, potential impacts to Tribal Cultural Resources will be reduced to less than significant levels.

18.3 Mitigation Measures:

Please see Section 5, Cultural Resources for the required mitigation measures.

19 - Utilities and Service Systems

UTILITIES AND SERVICE SYSTEMS – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the projects projected demand in addition to the providers existing commitments?	☐	☐	☒	☐
d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e) Comply with federal, state, and local management and reduction statues and regulations related to solid waste?	☐	☐	☒	☐

Sources: City of Rancho Mirage General Plan 2017 Update, Conservation and Open Space Element, November 16, 2017; 2020 Coachella Valley Regional Urban Water Management Plan; 2023-2024 Coachella Valley Water District Annual Review; CalRecycle, Solid Waste Information System (SWIS).

19.1 Setting

The proposed Project is located within the development area of the existing Atrium commercial center, which has existed at this site form several decades. The subject property is located in the southerly-most portion of the Atrium site and until 2012 hosted a well know restaurant, which was destroyed by fire. The site and other uses at the Atrium are fully services with water, sewer and other utilities.

Domestic Water

The Coachella Valley Groundwater Basin is the main source of municipal, or domestic, water for the entire Coachella Valley. The basin is comprised of several subbasins which are divided by tectonic faults; the Indio Subbasin provides domestic water for the Project site. Six different water agencies utilize and manage portions of the basin throughout the Coachella Valley, including and principally CVWD, which provides domestic water service to the subject property. Local rainwater and snowmelt have filled the basin over several million years, but human activities continue to extract more water than can be naturally recharged. In response to past and current basin overdraft, CVWD and DWA supplement natural recharge by importing and percolating Colorado River water into the basin via four replenishment facilities. Both agencies also supplement irrigation water with recycled wastewater. CVWD is also a state water project contractor.

CVWD, the largest water district in the Coachella Valley, manages the domestic water infrastructure in the City. CVWD serves a population of 270,000 and manages 114,196 accounts, via 97 production wells, 2,000 miles of pipeline, and 133 million gallons of storage in 68 enclosed reservoirs.[53]

Wastewater

According to the 2023 CVWD Annual Report, the District' sanitary sewer facilities serve a population of 250,000 and 105,203 active accounts. Sewer lines totaling 1,173 miles and 30 lift stations convey on average approximately 17.11 million gallons per day (mgd) of wastewater to five different wastewater reclamation plants (WRPs). CVWD's total daily wastewater treatment capacity is 33.1 mgd.[54] The Project site would be served by WRP-10.

Solid Waste

The City contracts with Burrtec Waste and Recycling Services to provide solid waste collection, recycling, and green waste disposal services. Pursuant to the State's recycling and landfill diversion regulations, Burrtec processes recyclable materials and green waste separately from solid waste. Recyclable materials are sorted at a Burrtec Materials Recovery Facility (MRF). Green waste may be composted or applied as alternative daily landfill cover. The Project's solid waste will be taken to the Coachella Valley Transfer Station located on Edom Hill where it will then be transferred to the Lamb Canyon Landfill in Beaumont. Lamb Canyon Landfill has a remaining capacity of 14,540,000 cubic yards (36.64% of total capacity) with a maximum daily throughput of 5,000 cubic yards.

19.2 Discussion of Impacts:

a) LESS THAN SIGNIFICANT IMPACT:
The Project site is located within a largely built-up urban area of Rancho Mirage, is located within a well-established commercial center and has been previously developed; hence, the Project has direct access to existing utility services. The Highway 111 right-of-way contains a 12-inch water line, a fire hydrant, an SCE electric line and electric vault and transformer, an 8-inch natural gas line, and a telecommunications line which all occur along the Project frontage. Mirage Cove Drive, which bounds the Project on the south,

[53] 2020 Coachella Valley Regional Urban Water Management Plan, Chapter 4, Coachella Valley Water District System Description, June 30, 2021.
[54] 2023-2024 Coachella Valley Water District Annual Review, Wastewater Service Information, June 30, 2024.

also contains an 8-inch water line, a 2-inch gas line, an SCE electric line, a telecommunications line, and an 8-inch sewer line. Another 8-inch sewer line occurs at the northeast corner of the Project site and would directly serve the proposed museum building. While Project-serving connections would need to be reestablished, the Project would not require the construction or expansion of utility services that would cause significant environmental impacts. Impacts associated with the connections to existing utility services would be less than significant.

b) LESS THAN SIGNIFICANT IMPACT:

Project operational domestic water demand calculations are based on the building's use and square footage, and the square footage of the landscaped area. The indoor water demand estimate is derived from the American Water Works Association demand factor which assumes that commercial and institutional buildings demand 15 gallons of water per square foot per day. To assess the Project's outdoor water use, CVWD provides the outdoor water demand calculation for a landscaped area which incorporates localized evapotranspiration and related adjustment factors.

As noted in the 2023-2024 CVWD Annual Review, CVWD customers generate an average daily water demand of 75.9 million gallons (or 232± acre-feet) per day (mgd). The total amount of water delivered in 2023-2024 was 85,014 acre-feet (af).[55] The Project's total estimated water demand for both indoor and outdoor uses is 3.44 af per year, which would account for 0.004% of the total freshwater demand supplied by CVWD during the 2023-2024 year. Table 22 summarizes the Project's estimated annual water demand compared to the most recent CVWD annual water delivery data.

Table 22
Project Operational Water Demand

Indoor Use	**Total Building Area (ft²)**	**Indoor Demand Factor (gal/SF/year)**	**Indoor Daily Demand (gpd)**	**Total Indoor Demand (acre-feet/yr)**
Commercial/ Institutional	21,967	15[1]	903	1.01
Outdoor Use[2]	**Landscape Area (ft²)**	**Outdoor ETo (in/yr) x ETAF x Outdoor Conversion Factor**	**Outdoor Daily Demand (gpd)**	**Total Outdoor Demand (acre-feet/yr)**
Landscape	44,300	64 x 0.45 x 0.62	2,167.18	2.43
			Total Project Annual Water Demand	**3.44 af**
			2023-2024 CVWD Average Daily Demand[3]	**75.9 mgd**
			Project's Percentage of 2023-2024 CVWD Average Daily Demand	**0.0029%**
			2023-2024 CVWD Total Water Delivery[3]	**85,014 af**
			Project's Percentage of 2023-2024 CVWD Total Water Delivery	**0.004%**

[1] Warehouse water demand factor is derived from AWWA Commercial and Institutional End Uses of Water, 2000. Office use = 15 gal/SF/year.
[2] Outdoor water demand calculations based on CVWD Evapotranspiration (ETo), Evapotranspiration Adjustment Factor (ETAF), and Conversion Factor (CVWD Landscape Ordinance No. 1302.5, Appendix C).
[3] CVWD 2023-2024 Annual Review, Domestic Drinking Water Service Information, June 2024.

[55] 2023-2024 Coachella Valley Water District Annual Review, Domestic Drinking Water Service Information, June 30, 2024.

In compliance with the 2014 Sustainable Groundwater Management Act, the Coachella Valley water agencies who rely on the Coachella Valley Groundwater Basin collectively published a Regional Urban Water Management Plan to set forth guidelines for cooperative water conservation measures and water shortage contingency plans.[56] The CVWD outlined reductions in water withdrawals and increased water conservation actions that would be necessary during a multi-year drought.

The Project would be consistent with the water conservation policies prescribed by CVWD and the City's General Plan 2017 Update by including native and drought tolerant landscaping and low water-use appliances.[57] Project water demand would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge. Likewise, the Project's water demand would not impede sustainable groundwater management of the Basin. Project water demand impacts would be less than significant.

c) LESS THAN SIGNIFICANT IMPACT:

As noted above, CVWD operates five wastewater reclamation plants (WRP), and the Project effluent would be treated at WRP-10 on Cook Street in Palm Desert. According to the most recent Annual Report for the Indio Subbasin, WRP-10 annually treated 9,366 af of wastewater, and has a total daily capacity of 15 million gallons. About 85% of this effluent was recycled and the remainder was routed to percolation recharge ponds.[58]

To estimate the amount of wastewater generated by the Project, the CVWD Equivalent Dwelling Unit (EDU) calculation for office/warehouse projects was applied. Per this calculation, each restroom in an office/warehouse is equivalent to one dwelling unit (EDU), and each EDU, or restroom, would generate 250 gallons of wastewater per day (gpd). The proposed museum includes three restrooms, which would comprise 0.018% of the total daily capacity of WRP 10 and represents 0.009% of the total amount of wastewater treated during 2023-2024. Please see Table 23 for a summary of the calculations.

Table 23
Project Operational Wastewater Demand

Land Use	Daily Wastewater Demand	Annual Wastewater Demand	Annual Wastewater Demand
Commercial Office/Warehouse	750 gpd	273,750 gallons	**0.84 af**
		Total Daily Capacity of WRP 10	**15,000,000 mgd**
		Project's Percentage of Total Daily Capacity WRP 10	**0.018%**
		Total 2023-2024 Acre-Feet Treated at WRP 10	**9,366 af**
		Project's Percentage of 2023-2024 Acre-Feet Treated at WRP 10	**0.009%**

Source: Office/Warehouse wastewater demand factor is derived from CVWD Regulations Governing Sanitation Service, Table A-1 Equivalent Dwelling Unit p. A-2, February 2021, https://cvwd.org/ArchiveCenter/ViewFile/Item/860.
1 Restroom = 1 Equivalent Dwelling Unit (EDU) = 250 gpd.

[56] 2020 Coachella Valley Urban Water Management Plan, June 30, 2021.
[57] City of Rancho Mirage General Plan 2017 Update, Conservation and Open Space Element, Goal COS 7, November 16, 2017.
[58] Indio Subbasin Annual Report for Water Year 2023-2024, Table 5-10 WY 2023-2024 Wastewater Treatment, Reuse, and Disposal in the Indio Subbasin, March 2025.

Based on the most recent data from CVWD, the Project's wastewater generation would be less than 0.05% of the daily capacity of WRP 10, which would not constitute a significant impact on CVWD's ability to provide services to its customers. The impact associated with the Project's wastewater demand would be less than significant.

d, e) LESS THAN SIGNIFICANT IMPACT:

As described above, Burrtec Waste and Recycling Services provides solid waste, recycling, and green waste disposal services to the City of Rancho Mirage. Burrtec processes recyclable materials and green waste separately from solid waste and helps the City achieve the mandatory 50% diversion rate. Recyclable materials would be processed at a Burrtec MRF and then shipped to industries who purchase the commodities. Green waste may be composted or applied as alternative daily landfill cover. The remaining solid waste would be delivered to the Coachella Valley Transfer Station from which the waste would be transferred to the Lamb Canyon Sanitary Landfill in Beaumont, California. Lamb Canyon Landfill has maximum permitted capacity of 39,681,513 cubic yards and a remaining capacity of 14,540,000 cubic yards (36.64% of total capacity) with a maximum daily throughput of 5,000 cubic yards.[59] See Table 24 for a summary of the Project's impacts on the local landfill.

The Project's estimated solid waste generation rate is based on the commercial retail waste generation rate of 2.5 pounds per 1,000 square feet per day as provided by CalRecycle's Commercial Sector Generation Rates.

Table 24
Project Estimated Solid Waste Generation

Land Use	Generation Rate[1]	Proposed Development	Daily Total	Annual Total
Commercial Retail	2.5 lbs/1,000 sf/ day	21,967 sf	55.0 lbs	20,075 lbs 10.0 tons
		With 50% solid waste diversion	**28 lbs**	**5.11 tons**
		Conversion to cubic yards[2]	**0.186 c.y.**	**68.13 c.y.**
		Percent of landfill capacity[3]	**0.0037% of daily throughput**	**0.00047% of remaining cap.**

1. Estimated Solid Waste Generation Rates for Commercial Retail (April 1992), CalRecycle, accessed May 2025, https://www2.calrecycle.ca.gov/wastecharacterization/general/rates.
2. National Recycling Coalition Measurement Standards and Reporting Guidelines, 2006. Estimates that 150 pounds of uncompacted municipal solid waste material is equal to 1 cubic yard of waste.
3. Landfill daily throughput (or intake) is 5,000 cubic yards, and remaining capacity is 14,540,000 cubic yards, CalRecycle SWIS Facility/Site Activity Details, https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/2246?siteID=2368, accessed May 2025.

At buildout, the Project's daily solid waste generation will contribute less than 0.01% of the Lamb Canyon Landfill daily throughput of 5,000 cubic yards, and less than 0.001% of the remaining capacity on an annual basis. Commingled recyclable materials (e.g., paper, plastic, glass, cardboard, aluminum) will be transported to Burrtec's material recovery facilities for recycling and reuse.

[59] CalRecycle, Solid Waste Information System (SWIS) Facility/Site Activity Details, Lamb Canyon Sanitary Landfill, accessed May 2025, https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/2246?siteID=2368.

Burrtec assumes responsibility for maintaining standards that assure that all waste would be handled in a manner that meets local, state and federal standards. Adherence to the requirements will ensure that Project impacts associated with solid waste disposal remain less than significant.

19.3 Mitigation Measures: None required.

20 - Wildfire

WILDFIRE – Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☒	☐
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☒	☐

Sources: City of Rancho Mirage General Plan 2017 Update, Safety Element, updated May 15, 2025; City of Rancho Mirage Local Hazard Mitigation Plan, 2023; CalFire Fire Hazard Severity Zones Map Viewer.

20.1 Setting

In the Coachella Valley, the potential for wildfire predominantly occurs in the surrounding brush-covered hillsides where slope, dry vegetation and high winds form ideal wildfire conditions. Zones where the cities of the Coachella Valley transition to the outlying hillsides form Wildland Urban Interfaces (WUI), which are particularly susceptible to wildfire risk. The California Department of Forestry and Fire Protection (CalFire) provides the Fire Hazard Severity Zone (FHSZ) Viewer, an online map application that displays the 2024 adopted State Responsibility Area (SRA) FHSZ boundaries where CalFire takes the responsibility for wildland fire protection, and the Local Responsibility Area (LRA) where the Riverside County Fire Department is responsible for wildland fire protection.

Although there is no record of any significant wildfire occurring in Rancho Mirage, the City is considered to have a moderate risk of wildfire. Moderate LRA FHSZs occur on the lower and upper slopes of the Santa Rosa and San Jacinto Mountains including the slopes across Highway 111 west of the Project site. These slopes are undeveloped and included in the Bighorn Sheep habitat area. The City contracts with the Riverside County Fire Department in cooperation with the CalFire for the provision of fire protective services. CalFire operates air attack equipment based at the Hemet/Ryan airport west of the Coachella Valley. If ever a wildfire occurred on these mountain slopes, the response time from the Hemet/Ryan airport would be approximately 15 minutes.[60] The City's emergency responses and evacuation procedures are coordinated with appropriate agencies, which are also discussed in Section 9, Hazards and Hazardous Materials.

20.2 Discussion of Impacts:

a) NO IMPACT:
In preparation for emergencies and natural disasters, Rancho Mirage has adopted the 2023 Local Hazard Mitigation Plan (LHMP) which outlines potential wildfire risks and assigns responsibilities to the appropriate agencies to ensure accurate and coordinated responses to wildfires. The City also participates in Riverside County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) and also coordinates with the Riverside County Fire Department, the California Department of Forestry, the Sheriff's Department, and the American Red Cross to receive a wide range of emergency response services. The City's Emergency Preparedness Commission provides resources and emergency preparation education to residents and business to reduce potential impacts of natural disasters.

Two main evacuation routes for the City include US Interstate 10 and State Highway 111. The Project is located on Highway 111 and therefore has direct access to an evacuation route via two existing access drives, one of which is signalized. The Project will not change on-site circulation or highway access. The Project is also subject to evaluation and approval by the Riverside County Fire Department to certify that it will not substantially impair an adopted emergency response or an evacuation route, and therefore, impacts are expected to be less than significant.

b, c) LESS THAN SIGNIFICANT IMPACT:
The Project is not located within or near either an SRA or an LRA FHSZ. The Project site itself is a relatively flat parcel, except for the 100-foot rock outcrop on the eastern portion of the site, and is located along Highway 111, a major six-lane thoroughfare. Highway 111 would act as a fuel break between the Project site and the Santa Rosa foothills to the west of Highway 111. Vegetation on the on-site rock outcrop is very thin due to the lack of soil formation and is not a significant fuel source. All utilities including water sources, power lines, and fuel breaks are already available to the Project site, hence installation of new infrastructure would not be required. Maintenance of existing infrastructure would not exacerbate fire risk as the Project site occurs in an urban built-up portion of the City and is not within an FHSZ. The Project is designed to facilitate firefighting around the entire proposed building through provision of minimum hose runs. The Project would not exacerbate wildfire risks or expose occupants to pollutant concentrations or the uncontrolled spread of a wildfire. Impacts are expected to be less than significant.

[60] City of Rancho Mirage Local Hazard Mitigation Plan Update, Section 4.0 Hazard Identification and Risk Assessment, 2023.

d) LESS THAN SIGNIFICANT IMPACT:
The Project site does not occur in a flood risk zone, nor does it occur in an FHSZ. Furthermore, the developable portion of the site is flat and the rock outcrop is considered to be stable and not susceptible to landslides or post-fire instability. The Project encroaches into the on-site rock outcrop but provides facilities between the proposed building and slope to capture and route hillside runoff around the building and into on-site drainage facilities. The Project does not pose a risk of exposing people or structure to significant risks such as downslope or downstream flooding, landslides, post-fire slope instability, or drainage changes. Impacts are expected to be less than significant.

20.3 Mitigation Measures: None required.

21 - Mandatory Findings of Significance

MANDATORY FINDINGS OF SIGNIFICANCE	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

21.1 Discussion of Impacts:

a) LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATION:

Biological Resources

The Project site is not located within a CVMSHCP-designated conservation area and does not contain any wildlife corridors or biological linkage areas. The site was previously developed with a restaurant, which was destroyed by fire in 2012. Vegetation on the site is very sparse; however, existing on-site vegetation and the rock outcrop could support wildlife. Two bat species may be attracted to the Project site due to roosting opportunities in the mature fan palms and the rocky hillside. Fan palms are a preferred roosting habitat of the western yellow bat, which is a species that is covered by the CVMSHCP but is also considered to be imperiled and is a California species of special concern.

The Project would remove approximately 350 cubic yards of the lower portion of rock outcrop to accommodate the museum building. Rock crevices in rocky hillsides are the preferred roosting habitat for the pocketed free-tailed bat, which is also a California species of special concern. Pre-construction bat surveys of any palms that are scheduled to be removed and of the western lower edge of the rock outcrop where the disturbance is planned are recommended and explained in the BIO-1 Mitigation Measure.

The vegetative scrub and mature fan palms on the Project site could also be potentially used by resident and migratory nesting birds, many of which are not special status species, but all are protected under the Migratory Bird Treaty Act (MBTA) and the California Fish and Game Code (FGC). A pre-construction survey will be required to avoid impacts to nesting birds covered by the MBTA. Mitigation Measure BIO-2 provides details for conducting the nesting bird survey.

Monarch butterflies (Danaus plexippus) are not covered by the CVMSHCP but are considered to have a low potential to occur on the Project site. However, if any milkweed plants occur on the site monarch butterflies may be attracted to the site as milkweed species are the sole larval host plants for the monarch butterfly. Mitigation Measure BIO-3 explains the steps that should be taken to avoid impacts to the species if it occurs on the Project site.

Finally, as the City is a signatory to the CVMSHCP, heretofore undeveloped portions of the Project may be subject to payment of the Development Mitigation Fee to mitigate potential impacts to covered species under the CVMSHCP.

The Proposed Project will not significantly reduce fish or wildlife habitat or otherwise adversely impact a fish or wildlife species. The construction of the Project has the potential to impact nesting birds, but the mitigation measures included in this document and payment of the CVMSHCP Development Mitigation Fee (if required) and implementation of the three mitigation measures set forth in Section 4, Biological Resources, will reduce potential impacts to less than significant levels for any species identified as a candidate, sensitive, special status species, or otherwise protected species that may occur on the Project site.

Cultural Resources

The Project site was evaluated by a qualified professional archaeologists and resource monitors of the Agua Caliente Band of Cahuilla Indians. It was determined that the Project site has a low potential for resources as no surface deposits or other sign were discovered during the field survey. However, the potential for buried resources, including Tribal resources, requires the implementation of mitigation to ensure that impacts are less than significant should any subsurface resources be discovered. Mitigation Measure CUL-1 provides details for the investigation and care of discovered resources, which would reduce impacts to less than significant.

Geology and Soils

The Geotechnical Investigation for the Proposed Project prepared by Sladden Engineering, March 31, 2025, provides recommendations to ensure that impacts associated with ground shaking, unstable soil and rock falls resulting from seismic activity are less than significant. Development of the Project shall adhere to the recommendations prior to issuance of grading and building permits.

b) LESS THAN SIGNIFICANT IMPACT:

The Project is consistent with the City's General Plan 2017 Update land use and zoning designations assigned to the property and would therefore not generate any greater impacts than those expected from the buildout of the General Plan. Cumulative impacts are expected to be less than significant with the implementation of the prescribed mitigation measures.

c) LESS THAN SIGNIFICANT IMPACT:

The proposed Project is planned for a site that for several decades was occupied by a restaurant for nearly 40 years, which was destroyed by fire in 2012. The proposed Project will not significantly impact people in any direct or indirect way. Traffic impacts, air quality, GHG, hazardous materials and noise impacts have been determined to be less than significant in the discussions above.

Table 25 Mitigation Monitoring and Reporting Program			
Mitigation Measure	**Responsible Agency**	**Timing**	**Verification (Date and Initials)**
AESTHETICS			
AGRICULTURAL RESOURCES			
AIR QUALITY			
BIOLOGICAL RESOURCES			
BIO-1 **Bat Clearance Surveys:** Western yellow bats roost on the undersides of California and Mexican fan palm fronds, particularly the dead fronds where they can blend in more easily. If there are no dead fronds, they may choose to roost in the live fronds. Bat clearance surveys are recommended for the Western yellow bat if the Project entails the removal of any palm trees from the site. Each palm that is scheduled to be removed must be inspected by a qualified biologist for the presence of roosting western yellow bats. Pocketed free-tailed bats roost in rock crevices of hillsides, therefore, to avoid significant impacts, a pre-construction bat clearance survey of the rock outcrop must be conducted prior to any disturbance to the rock outcrop. The appropriate level and extent of the survey shall be commensurate with the level of disturbance to the rock outcrop. If roosting bats are identified, the biologist shall provide guidance as to the appropriate avoidance measures that should be taken.	Planning Department	Prior to any earth moving activity	
BIO-2 **Nesting Bird Survey:** To avoid impacts to resident and migratory nesting birds, all vegetation clearing, ground disturbance, and construction activity should be scheduled between September 1 and January 31 if possible. If construction occurs during the nesting season, February 1 through August 31, a qualified ornithologist or biologist must conduct a pre-construction nesting bird survey (NBS) immediately prior to scheduled construction activity. If active nests are identified, the biologist will demarcate a no-work buffer zone(s) around the active nest(s) and check the nest site(s) weekly until the young birds fledge and the nest(s) become inactive. The buffer zone size would be based on the nesting species, its sensitivity to disturbance, nesting stage and the expected intensity and duration of disturbance. No ground or vegetation disturbance shall occur within the nest site buffer zone(s) until the qualified biologist determines that the young have successfully fledged, and the nest is inactive. Per CDFW recommendations, a buffer of 500 feet shall be set for listed species and birds of prey, and a buffer of 100 to 300 feet shall be set for unlisted songbirds.			

BIO-3 **Milkweed Survey:** During the NBS, the biologist should scan the Project site for milkweed plants supportive of Monarch butterflies. Monarch butterflies have a low potential to occur on the Project site as no milkweed plants were observed during the January field survey. However, the milkweed bloom from April to July, and if any milkweed plants are observed during this timeframe, the plants should be inspected for monarch pupae. If any pupae are identified, the host plant(s) should be marked, and, at the biologist's discretion, a no-work buffer zone around each plant should be established until the pupae complete the metamorphosis and leave the plant.			
CULTURAL RESOURCES			
CUL-1 A qualified archaeologist and ACBCI tribal monitors shall be on-site during all ground disturbing activities. The monitors shall be empowered to stop or redirect equipment if resources are identified. The monitors shall quickly identify the resource, determine its significance, and determine if any additional investigation is necessary. The archaeologist and tribal monitor shall determine when monitoring activities can be suspended. **CUL-2** If resources are identified during monitoring activities, the qualified archaeologist and ACBCI tribal monitor shall determine whether they should be reburied on site, or curated with the ACBCI. **The following mitigation measures will only be implemented if ACBCI does not provide monitoring for the Project:** **CUL-3** Prior to the issuance of grading permits, the applicant shall enter into a Tribal Monitoring Agreement with the Morongo Band of Mission Indians for the project. The provisions of CUL-1 and CUL-2 shall otherwise apply. **CUL-4** The Project archaeologist shall prepare a Cultural Resource Management Plan (CRMP) and/or Archaeological Monitoring and Treatment Plan (AMTP) to address the details, timing, and responsibilities of all archaeological and cultural resource activities that occur on the project site for submittal to the Morongo Band. The CRMP and/or AMTP shall include provisions for a pre-construction meeting with the Project contractor, disposition of identified resources, and reburial or curation with the ACBCI.	Project Archaeologist and Planning Department	During ground disturbance activities	
GEOLOGY AND SOILS			
GEO-1 Per the Geotechnical Investigation, specific guidelines are provided to mitigate potential impacts resulting from site-specific poorly graded soil, seismic-related unstable soil, seismic ground shaking, and hazards from rock falls induced by seismic activity. In addition, the Geotechnical Investigation provides recommendations regarding utility trench backfill, exterior concrete flatwork, on-site pavement design, soil corrosion potential, and drainage. Development of the Project shall adhere to the recommendations provided by the Geotechnical Investigation as required by the City prior to issuance of grading and building permits.	Project applicant, construction manager, Planning Department, City Engineer	Prior to issuance of building permit.	
GREENHOUSE GAS EMISSIONS			
HAZARDS AND HAZARDOUS MATERIALS			

HYDROLOGY AND WATER QUALITY			
LAND USE AND PLANNING			
MINERAL RESOURCES			
NOISE			
POPULATION AND HOUSING			
PUBLIC SERVICES			
RECREATION			
TRANSPORTATION/TRAFFIC			
TRIBAL CULTURAL RESOURCES			
See Cultural Resources.			
UTILITIES AND SERVICE SYSTEMS			

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Appendix A

CalEEMod Detailed Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	World Wildlife Museum
Construction Start Date	10/1/2025
Operational Year	2026
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	3.30
Precipitation (days)	10.0
Location	33.76616825853843, -116.44383815268458
County	Riverside-Salton Sea
City	Rancho Mirage
Air District	South Coast AQMD
Air Basin	Salton Sea
TAZ	5621
EDFZ	11
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Library	22.0	1000sqft	0.51	22,035	0.00	0.00	—	—

Parking Lot	57.1	1000sqft	1.31	0.00	0.00	0.00	—	—
City Park	1.02	Acre	1.02	0.00	44,300	44,300	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-2*	Limit Heavy-Duty Diesel Vehicle Idling
Water	W-5	Design Water-Efficient Landscapes

* Qualitative or supporting measure. Emission reductions not included in the mitigated emissions results.

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.47	1.23	10.3	12.6	0.02	0.36	0.22	0.52	0.33	0.05	0.37	—	2,479	2,479	0.10	0.04	0.97	2,495
Mit.	1.47	1.23	10.3	12.6	0.02	0.36	0.22	0.52	0.33	0.05	0.37	—	2,479	2,479	0.10	0.04	0.97	2,495
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	22.2	22.1	17.1	16.5	0.04	0.65	5.11	5.72	0.60	1.79	2.36	—	5,232	5,232	0.13	0.44	0.16	5,366
Mit.	22.2	22.1	17.1	16.5	0.04	0.65	5.11	5.72	0.60	1.79	2.36	—	5,232	5,232	0.13	0.44	0.16	5,366
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Unmit.	1.34	1.22	5.11	6.21	0.01	0.18	0.28	0.37	0.17	0.11	0.19	—	1,225	1,225	0.05	0.02	0.18	1,232
Mit.	1.34	1.22	5.11	6.21	0.01	0.18	0.28	0.37	0.17	0.11	0.19	—	1,225	1,225	0.05	0.02	0.18	1,232
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.24	0.22	0.93	1.13	< 0.005	0.03	0.05	0.07	0.03	0.02	0.04	—	203	203	0.01	< 0.005	0.03	204
Mit.	0.24	0.22	0.93	1.13	< 0.005	0.03	0.05	0.07	0.03	0.02	0.04	—	203	203	0.01	< 0.005	0.03	204
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Exceeds (Daily Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	75.0	100	550	150	—	—	150	—	—	55.0	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—
Mit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	75.0	100	550	150	—	—	150	—	—	55.0	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—
Mit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3,000
Unmit.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	No
Mit.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	No

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	1.47	1.23	10.3	12.6	0.02	0.36	0.22	0.52	0.33	0.05	0.37	—	2,479	2,479	0.10	0.04	0.97	2,495
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	1.88	1.57	17.1	16.5	0.04	0.65	5.11	5.72	0.60	1.79	2.36	—	5,232	5,232	0.13	0.44	0.16	5,366
2026	22.2	22.1	10.3	12.3	0.02	0.36	0.16	0.52	0.33	0.04	0.37	—	2,459	2,459	0.09	0.04	0.02	2,474
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.30	0.25	2.27	2.45	< 0.005	0.09	0.28	0.37	0.08	0.11	0.19	—	548	548	0.02	0.02	0.13	554
2026	1.34	1.22	5.11	6.21	0.01	0.18	0.08	0.26	0.17	0.02	0.19	—	1,225	1,225	0.05	0.02	0.18	1,232
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.05	0.05	0.41	0.45	< 0.005	0.02	0.05	0.07	0.02	0.02	0.04	—	90.7	90.7	< 0.005	< 0.005	0.02	91.8
2026	0.24	0.22	0.93	1.13	< 0.005	0.03	0.02	0.05	0.03	< 0.005	0.03	—	203	203	0.01	< 0.005	0.03	204

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	1.47	1.23	10.3	12.6	0.02	0.36	0.22	0.52	0.33	0.05	0.37	—	2,479	2,479	0.10	0.04	0.97	2,495
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	1.88	1.57	17.1	16.5	0.04	0.65	5.11	5.72	0.60	1.79	2.36	—	5,232	5,232	0.13	0.44	0.16	5,366
2026	22.2	22.1	10.3	12.3	0.02	0.36	0.16	0.52	0.33	0.04	0.37	—	2,459	2,459	0.09	0.04	0.02	2,474

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.30	0.25	2.27	2.45	< 0.005	0.09	0.28	0.37	0.08	0.11	0.19	—	548	548	0.02	0.02	0.13	554
2026	1.34	1.22	5.11	6.21	0.01	0.18	0.08	0.26	0.17	0.02	0.19	—	1,225	1,225	0.05	0.02	0.18	1,232
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.05	0.05	0.41	0.45	< 0.005	0.02	0.05	0.07	0.02	0.02	0.04	—	90.7	90.7	< 0.005	< 0.005	0.02	91.8
2026	0.24	0.22	0.93	1.13	< 0.005	0.03	0.02	0.05	0.03	< 0.005	0.03	—	203	203	0.01	< 0.005	0.03	204

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.82	1.39	1.08	10.5	0.02	0.03	1.77	1.80	0.03	0.45	0.48	12.3	2,687	2,699	1.69	0.08	5.66	2,771
Mit.	1.82	1.39	1.08	10.5	0.02	0.03	1.77	1.80	0.03	0.45	0.48	12.3	2,676	2,688	1.69	0.08	5.66	2,761
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	—	—	—	< 0.5%
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.53	1.10	1.14	6.67	0.02	0.03	1.77	1.80	0.03	0.45	0.48	12.3	2,433	2,445	1.69	0.09	0.23	2,513
Mit.	1.53	1.10	1.14	6.67	0.02	0.03	1.77	1.80	0.03	0.45	0.48	12.3	2,422	2,435	1.69	0.08	0.23	2,502
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	—	—	—	< 0.5%
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.65	1.22	1.12	8.02	0.02	0.03	1.75	1.79	0.03	0.44	0.47	12.3	2,534	2,546	1.69	0.08	2.49	2,615
Mit.	1.65	1.22	1.12	8.02	0.02	0.03	1.75	1.79	0.03	0.44	0.47	12.3	2,523	2,535	1.69	0.08	2.49	2,605
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	—	—	—	< 0.5%

Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.30	0.22	0.20	1.46	< 0.005	0.01	0.32	0.33	0.01	0.08	0.09	2.04	419	421	0.28	0.01	0.41	433
Mit.	0.30	0.22	0.20	1.46	< 0.005	0.01	0.32	0.33	0.01	0.08	0.09	2.04	418	420	0.28	0.01	0.41	431
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	< 0.5%	< 0.5%	< 0.5%	< 0.5%	—	< 0.5%
Exceeds (Daily Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	55.0	55.0	550	150	—	—	150	—	—	55.0	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—
Mit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	55.0	55.0	550	150	—	—	150	—	—	55.0	—	—	—	—	—	—	—
Unmit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—
Mit.	—	No	No	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3,000
Unmit.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	No
Mit.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	No

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.06	0.65	0.82	9.28	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,986	1,986	0.40	0.08	5.57	2,024
Area	0.73	0.72	0.01	0.96	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.94	3.94	< 0.005	< 0.005	—	3.96
Energy	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	684	684	0.05	< 0.005	—	686
Water	—	—	—	—	—	—	—	—	—	—	—	1.32	13.4	14.7	0.14	< 0.005	—	19.1
Waste	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Total	1.82	1.39	1.08	10.5	0.02	0.03	1.77	1.80	0.03	0.45	0.48	12.3	2,687	2,699	1.69	0.08	5.66	2,771
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.94	0.53	0.89	6.46	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,736	1,736	0.40	0.08	0.14	1,770
Area	0.56	0.56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	684	684	0.05	< 0.005	—	686
Water	—	—	—	—	—	—	—	—	—	—	—	1.32	13.4	14.7	0.14	< 0.005	—	19.1
Waste	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Total	1.53	1.10	1.14	6.67	0.02	0.03	1.77	1.80	0.03	0.45	0.48	12.3	2,433	2,445	1.69	0.09	0.23	2,513
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.97	0.56	0.86	7.34	0.02	0.01	1.75	1.77	0.01	0.44	0.45	—	1,835	1,835	0.40	0.08	2.41	1,870
Area	0.65	0.64	< 0.005	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.94	1.94	< 0.005	< 0.005	—	1.95
Energy	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	684	684	0.05	< 0.005	—	686
Water	—	—	—	—	—	—	—	—	—	—	—	1.32	13.4	14.7	0.14	< 0.005	—	19.1
Waste	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Total	1.65	1.22	1.12	8.02	0.02	0.03	1.75	1.79	0.03	0.44	0.47	12.3	2,534	2,546	1.69	0.08	2.49	2,615
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Mobile	0.18	0.10	0.16	1.34	< 0.005	< 0.005	0.32	0.32	< 0.005	0.08	0.08	—	304	304	0.07	0.01	0.40	310
Area	0.12	0.12	< 0.005	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.32	0.32	< 0.005	< 0.005	—	0.32
Energy	0.01	< 0.005	0.05	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	113	113	0.01	< 0.005	—	114
Water	—	—	—	—	—	—	—	—	—	—	—	0.22	2.22	2.44	0.02	< 0.005	—	3.17
Waste	—	—	—	—	—	—	—	—	—	—	—	1.82	0.00	1.82	0.18	0.00	—	6.36
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01
Total	0.30	0.22	0.20	1.46	< 0.005	0.01	0.32	0.33	0.01	0.08	0.09	2.04	419	421	0.28	0.01	0.41	433

2.6. Operations Emissions by Sector, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.06	0.65	0.82	9.28	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,986	1,986	0.40	0.08	5.57	2,024
Area	0.73	0.72	0.01	0.96	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.94	3.94	< 0.005	< 0.005	—	3.96
Energy	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	684	684	0.05	< 0.005	—	686
Water	—	—	—	—	—	—	—	—	—	—	—	1.32	2.70	4.02	0.14	< 0.005	—	8.38
Waste	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Total	1.82	1.39	1.08	10.5	0.02	0.03	1.77	1.80	0.03	0.45	0.48	12.3	2,676	2,688	1.69	0.08	5.66	2,761
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.94	0.53	0.89	6.46	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,736	1,736	0.40	0.08	0.14	1,770
Area	0.56	0.56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	684	684	0.05	< 0.005	—	686
Water	—	—	—	—	—	—	—	—	—	—	—	1.32	2.70	4.02	0.14	< 0.005	—	8.38
Waste	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4

Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Total	1.53	1.10	1.14	6.67	0.02	0.03	1.77	1.80	0.03	0.45	0.48	12.3	2,422	2,435	1.69	0.08	0.23	2,502
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.97	0.56	0.86	7.34	0.02	0.01	1.75	1.77	0.01	0.44	0.45	—	1,835	1,835	0.40	0.08	2.41	1,870
Area	0.65	0.64	< 0.005	0.47	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.94	1.94	< 0.005	< 0.005	—	1.95
Energy	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	684	684	0.05	< 0.005	—	686
Water	—	—	—	—	—	—	—	—	—	—	—	1.32	2.70	4.02	0.14	< 0.005	—	8.38
Waste	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Total	1.65	1.22	1.12	8.02	0.02	0.03	1.75	1.79	0.03	0.44	0.47	12.3	2,523	2,535	1.69	0.08	2.49	2,605
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.18	0.10	0.16	1.34	< 0.005	< 0.005	0.32	0.32	< 0.005	0.08	0.08	—	304	304	0.07	0.01	0.40	310
Area	0.12	0.12	< 0.005	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.32	0.32	< 0.005	< 0.005	—	0.32
Energy	0.01	< 0.005	0.05	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	113	113	0.01	< 0.005	—	114
Water	—	—	—	—	—	—	—	—	—	—	—	0.22	0.45	0.67	0.02	< 0.005	—	1.39
Waste	—	—	—	—	—	—	—	—	—	—	—	1.82	0.00	1.82	0.18	0.00	—	6.36
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01
Total	0.30	0.22	0.20	1.46	< 0.005	0.01	0.32	0.33	0.01	0.08	0.09	2.04	418	420	0.28	0.01	0.41	431

3. Construction Emissions Details

3.1. Demolition (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.75	1.47	13.9	15.1	0.02	0.57	—	0.57	0.52	—	0.52	—	2,494	2,494	0.10	0.02	—	2,502
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	—	1.70	1.70	—	0.26	0.26	—	—	—	—	—	—	—
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.04	0.38	0.41	< 0.005	0.02	—	0.02	0.01	—	0.01	—	68.3	68.3	< 0.005	< 0.005	—	68.5
Dust From Material Movement	—	—	—	—	—	—	0.07	0.07	—	0.04	0.04	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.07	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	11.3	11.3	< 0.005	< 0.005	—	11.3
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	0.01	0.01	—	—	—	—	—	—	—

Demoliti	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.05	0.07	0.68	0.00	0.00	0.16	0.16	0.00	0.04	0.04	—	158	158	0.01	0.01	0.02	160
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.7	31.7	< 0.005	< 0.005	< 0.005	33.0
Hauling	0.08	0.05	3.06	0.68	0.02	0.05	0.68	0.73	0.05	0.17	0.22	—	2,549	2,549	0.02	0.41	0.14	2,671
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.63	4.63	< 0.005	< 0.005	0.01	4.69
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.90
Hauling	< 0.005	< 0.005	0.08	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	69.8	69.8	< 0.005	0.01	0.07	73.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.78
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.14	0.14	< 0.005	< 0.005	< 0.005	0.15
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	11.6	11.6	< 0.005	< 0.005	0.01	12.1

3.2. Demolition (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.75	1.47	13.9	15.1	0.02	0.57	—	0.57	0.52	—	0.52	—	2,494	2,494	0.10	0.02	—	2,502
Dust From Material Movement	—	—	—	—	—	—	2.56	2.56	—	1.31	1.31	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	—	1.70	1.70	—	0.26	0.26	—	—	—	—	—	—	—
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.04	0.38	0.41	< 0.005	0.02	—	0.02	0.01	—	0.01	—	68.3	68.3	< 0.005	< 0.005	—	68.5
Dust From Material Movement	—	—	—	—	—	—	0.07	0.07	—	0.04	0.04	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	—	0.05	0.05	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.07	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	11.3	11.3	< 0.005	< 0.005	—	11.3
Dust From Material Movement	—	—	—	—	—	—	0.01	0.01	—	0.01	0.01	—	—	—	—	—	—	—

Demoliti	—	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.05	0.07	0.68	0.00	0.00	0.16	0.16	0.00	0.04	0.04	—	158	158	0.01	0.01	0.02	160
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.7	31.7	< 0.005	< 0.005	< 0.005	33.0
Hauling	0.08	0.05	3.06	0.68	0.02	0.05	0.68	0.73	0.05	0.17	0.22	—	2,549	2,549	0.02	0.41	0.14	2,671
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.63	4.63	< 0.005	< 0.005	0.01	4.69
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.90
Hauling	< 0.005	< 0.005	0.08	0.02	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	—	69.8	69.8	< 0.005	0.01	0.07	73.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.77	0.77	< 0.005	< 0.005	< 0.005	0.78
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.14	0.14	< 0.005	< 0.005	< 0.005	0.15
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	11.6	11.6	< 0.005	< 0.005	0.01	12.1

3.3. Site Preparation (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.42	1.19	10.9	11.0	0.03	0.47	—	0.47	0.43	—	0.43	—	2,717	2,717	0.11	0.02	—	2,726
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.30	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	—	74.4	74.4	< 0.005	< 0.005	—	74.7
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.05	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	12.3	12.3	< 0.005	< 0.005	—	12.4
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.04	0.41	0.00	0.00	0.10	0.10	0.00	0.02	0.02	—	94.8	94.8	< 0.005	< 0.005	0.01	96.0
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.7	31.7	< 0.005	< 0.005	< 0.005	33.0
Hauling	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	2.78	2.78	< 0.005	< 0.005	< 0.005	2.81
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.90
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.46	0.46	< 0.005	< 0.005	< 0.005	0.47
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.14	0.14	< 0.005	< 0.005	< 0.005	0.15
Hauling	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

3.4. Site Preparation (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.42	1.19	10.9	11.0	0.03	0.47	—	0.47	0.43	—	0.43	—	2,717	2,717	0.11	0.02	—	2,726
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.03	0.30	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	—	74.4	74.4	< 0.005	< 0.005	—	74.7
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Roa Equipment	0.01	0.01	0.05	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	12.3	12.3	< 0.005	< 0.005	—	12.4
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.03	0.03	0.04	0.41	0.00	0.00	0.10	0.10	0.00	0.02	0.02	—	94.8	94.8	< 0.005	< 0.005	0.01	96.0
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.7	31.7	< 0.005	< 0.005	< 0.005	33.0
Hauling	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	2.78	2.78	< 0.005	< 0.005	< 0.005	2.81
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.90
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.46	0.46	< 0.005	< 0.005	< 0.005	0.47
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.14	0.14	< 0.005	< 0.005	< 0.005	0.15
Hauling	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

3.5. Grading (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.80	1.51	14.1	14.5	0.02	0.64	—	0.64	0.59	—	0.59	—	2,455	2,455	0.10	0.02	—	2,463
Dust From Material Movement	—	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.58	0.60	< 0.005	0.03	—	0.03	0.02	—	0.02	—	101	101	< 0.005	< 0.005	—	101
Dust From Material Movement	—	—	—	—	—	—	0.11	0.11	—	0.05	0.05	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.11	0.11	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	16.7	16.7	< 0.005	< 0.005	—	16.8
Dust From Material Movement	—	—	—	—	—	—	0.02	0.02	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.06	0.54	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	126	126	0.01	< 0.005	0.01	128
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.7	31.7	< 0.005	< 0.005	< 0.005	33.0
Hauling	0.01	< 0.005	0.31	0.07	< 0.005	0.01	0.07	0.07	0.01	0.02	0.02	—	259	259	< 0.005	0.04	0.01	271
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	5.55	5.55	< 0.005	< 0.005	0.01	5.62
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.30	1.30	< 0.005	< 0.005	< 0.005	1.36
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	10.6	10.6	< 0.005	< 0.005	0.01	11.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.92	0.92	< 0.005	< 0.005	< 0.005	0.93
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.22	0.22	< 0.005	< 0.005	< 0.005	0.22
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.76	1.76	< 0.005	< 0.005	< 0.005	1.85

3.6. Grading (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.80	1.51	14.1	14.5	0.02	0.64	—	0.64	0.59	—	0.59	—	2,455	2,455	0.10	0.02	—	2,463
Dust From Material Movement	—	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.06	0.58	0.60	< 0.005	0.03	—	0.03	0.02	—	0.02	—	101	101	< 0.005	< 0.005	—	101
Dust From Material Movement	—	—	—	—	—	—	0.11	0.11	—	0.05	0.05	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.01	0.11	0.11	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	16.7	16.7	< 0.005	< 0.005	—	16.8
Dust From Material Movement	—	—	—	—	—	—	0.02	0.02	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.06	0.54	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	126	126	0.01	< 0.005	0.01	128
Vendor	< 0.005	< 0.005	0.04	0.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.7	31.7	< 0.005	< 0.005	< 0.005	33.0
Hauling	0.01	< 0.005	0.31	0.07	< 0.005	0.01	0.07	0.07	0.01	0.02	0.02	—	259	259	< 0.005	0.04	0.01	271
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	5.55	5.55	< 0.005	< 0.005	0.01	5.62
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.30	1.30	< 0.005	< 0.005	< 0.005	1.36
Hauling	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	10.6	10.6	< 0.005	< 0.005	0.01	11.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.92	0.92	< 0.005	< 0.005	< 0.005	0.93
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.22	0.22	< 0.005	< 0.005	< 0.005	0.22
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.76	1.76	< 0.005	< 0.005	< 0.005	1.85

3.7. Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.49	1.24	10.6	11.9	0.02	0.40	—	0.40	0.37	—	0.37	—	2,201	2,201	0.09	0.02	—	2,209
Onsite truck	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

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.10	0.89	1.00	< 0.005	0.03	—	0.03	0.03	—	0.03	—	185	185	0.01	< 0.005	—	186
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.16	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	—	30.7	30.7	< 0.005	< 0.005	—	30.8
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.05	0.50	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	117	117	0.01	< 0.005	0.01	118
Vendor	0.01	0.01	0.17	0.07	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	146	146	< 0.005	0.02	0.01	152
Hauling	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	10.5	10.5	< 0.005	< 0.005	0.02	10.7
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	12.3	12.3	< 0.005	< 0.005	0.01	12.8
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.74	1.74	< 0.005	< 0.005	< 0.005	1.76
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.03	2.03	< 0.005	< 0.005	< 0.005	2.12
Hauling	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

3.8. Building Construction (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.49	1.24	10.6	11.9	0.02	0.40	—	0.40	0.37	—	0.37	—	2,201	2,201	0.09	0.02	—	2,209
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.10	0.89	1.00	< 0.005	0.03	—	0.03	0.03	—	0.03	—	185	185	0.01	< 0.005	—	186
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.16	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	—	30.7	30.7	< 0.005	< 0.005	—	30.8
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.05	0.50	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	117	117	0.01	< 0.005	0.01	118
Vendor	0.01	0.01	0.17	0.07	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	146	146	< 0.005	0.02	0.01	152
Hauling	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	10.5	10.5	< 0.005	< 0.005	0.02	10.7
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	12.3	12.3	< 0.005	< 0.005	0.01	12.8
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.74	1.74	< 0.005	< 0.005	< 0.005	1.76
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.03	2.03	< 0.005	< 0.005	< 0.005	2.12
Hauling	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

3.9. Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.41	1.18	10.1	11.8	0.02	0.36	—	0.36	0.33	—	0.33	—	2,201	2,201	0.09	0.02	—	2,208
Onsite truck	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Roa Equipment	1.41	1.18	10.1	11.8	0.02	0.36	—	0.36	0.33	—	0.33	—	2,201	2,201	0.09	0.02	—	2,208
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Roa d Equipm ent	0.68	0.56	4.83	5.62	0.01	0.17	—	0.17	0.16	—	0.16	—	1,051	1,051	0.04	0.01	—	1,055
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Roa d Equipm ent	0.12	0.10	0.88	1.02	< 0.005	0.03	—	0.03	0.03	—	0.03	—	174	174	0.01	< 0.005	—	175
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.04	0.04	0.82	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	135	135	0.01	< 0.005	0.43	136
Vendor	0.01	0.01	0.15	0.06	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	143	143	< 0.005	0.02	0.38	150
Hauling	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.05	0.46	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	115	115	< 0.005	< 0.005	0.01	116
Vendor	0.01	< 0.005	0.16	0.07	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	143	143	< 0.005	0.02	0.01	149
Hauling	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.02	0.02	0.02	0.28	0.00	0.00	0.06	0.06	0.00	0.01	0.01	—	58.5	58.5	< 0.005	< 0.005	0.09	59.2
Vendor	< 0.005	< 0.005	0.07	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	68.4	68.4	< 0.005	0.01	0.08	71.3
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	9.68	9.68	< 0.005	< 0.005	0.01	9.80
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	11.3	11.3	< 0.005	< 0.005	0.01	11.8
Hauling	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

3.10. Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.41	1.18	10.1	11.8	0.02	0.36	—	0.36	0.33	—	0.33	—	2,201	2,201	0.09	0.02	—	2,208
Onsite truck	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.41	1.18	10.1	11.8	0.02	0.36	—	0.36	0.33	—	0.33	—	2,201	2,201	0.09	0.02	—	2,208
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road	0.68	0.56	4.83	5.62	0.01	0.17	—	0.17	0.16	—	0.16	—	1,051	1,051	0.04	0.01	—	1,055
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.10	0.88	1.02	< 0.005	0.03	—	0.03	0.03	—	0.03	—	174	174	0.01	< 0.005	—	175
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.04	0.04	0.82	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	135	135	0.01	< 0.005	0.43	136
Vendor	0.01	0.01	0.15	0.06	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	143	143	< 0.005	0.02	0.38	150
Hauling	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.05	0.46	0.00	0.00	0.12	0.12	0.00	0.03	0.03	—	115	115	< 0.005	< 0.005	0.01	116
Vendor	0.01	< 0.005	0.16	0.07	< 0.005	< 0.005	0.04	0.04	< 0.005	0.01	0.01	—	143	143	< 0.005	0.02	0.01	149
Hauling	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.02	0.28	0.00	0.00	0.06	0.06	0.00	0.01	0.01	—	58.5	58.5	< 0.005	< 0.005	0.09	59.2
Vendor	< 0.005	< 0.005	0.07	0.03	< 0.005	< 0.005	0.02	0.02	< 0.005	0.01	0.01	—	68.4	68.4	< 0.005	0.01	0.08	71.3
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.05	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	9.68	9.68	< 0.005	< 0.005	0.01	9.80
Vendor	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	11.3	11.3	< 0.005	< 0.005	0.01	11.8

Hauling	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

3.11. Paving (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.79	0.67	5.88	8.19	0.01	0.25	—	0.25	0.23	—	0.23	—	1,244	1,244	0.05	0.01	—	1,248
Paving	0.34	0.34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.16	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	—	34.1	34.1	< 0.005	< 0.005	—	34.2
Paving	0.01	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.64	5.64	< 0.005	< 0.005	—	5.66
Paving	< 0.005	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.07	0.07	1.33	0.00	0.00	0.20	0.20	0.00	0.05	0.05	—	218	218	0.01	0.01	0.70	221
Vendor	0.01	< 0.005	0.11	0.05	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	105	105	< 0.005	0.01	0.27	110
Hauling	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	5.44	5.44	< 0.005	< 0.005	0.01	5.50
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.88	2.88	< 0.005	< 0.005	< 0.005	3.00
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.90	0.90	< 0.005	< 0.005	< 0.005	0.91
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.48	0.48	< 0.005	< 0.005	< 0.005	0.50
Hauling	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

3.12. Paving (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.79	0.67	5.88	8.19	0.01	0.25	—	0.25	0.23	—	0.23	—	1,244	1,244	0.05	0.01	—	1,248
Paving	0.34	0.34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.02	0.16	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	—	34.1	34.1	< 0.005	< 0.005	—	34.2
Paving	0.01	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.64	5.64	< 0.005	< 0.005	—	5.66
Paving	< 0.005	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.07	0.07	1.33	0.00	0.00	0.20	0.20	0.00	0.05	0.05	—	218	218	0.01	0.01	0.70	221
Vendor	0.01	< 0.005	0.11	0.05	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	105	105	< 0.005	0.01	0.27	110
Hauling	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

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	5.44	5.44	< 0.005	< 0.005	0.01	5.50
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	2.88	2.88	< 0.005	< 0.005	< 0.005	3.00
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.90	0.90	< 0.005	< 0.005	< 0.005	0.91
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.48	0.48	< 0.005	< 0.005	< 0.005	0.50
Hauling	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

3.13. Architectural Coating (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	0.12	0.86	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	22.0	22.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.66	3.66	< 0.005	< 0.005	—	3.67
Architectural Coatings	0.60	0.60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.61	0.61	< 0.005	< 0.005	—	0.61
Architectural Coatings	0.11	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.09	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	22.9	22.9	< 0.005	< 0.005	< 0.005	23.2
Vendor	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
Hauling	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.67	0.67	< 0.005	< 0.005	< 0.005	0.68

Vendor	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
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.11	0.11	< 0.005	< 0.005	< 0.005	0.11
Vendor	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
Hauling	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

3.14. Architectural Coating (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	0.12	0.86	1.13	< 0.005	0.02	—	0.02	0.02	—	0.02	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	22.0	22.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	0.02	0.03	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.66	3.66	< 0.005	< 0.005	—	3.67

Architectural	0.60	0.60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.61	0.61	< 0.005	< 0.005	—	0.61
Architectural Coatings	0.11	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.01	0.09	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	22.9	22.9	< 0.005	< 0.005	< 0.005	23.2
Vendor	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
Hauling	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.67	0.67	< 0.005	< 0.005	< 0.005	0.68
Vendor	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
Hauling	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.11	0.11	< 0.005	< 0.005	< 0.005	0.11
Vendor	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
Hauling	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

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	1.06	0.65	0.82	9.28	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,986	1,986	0.40	0.08	5.57	2,024
Parking Lot	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
City Park	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
Total	1.06	0.65	0.82	9.28	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,986	1,986	0.40	0.08	5.57	2,024
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.94	0.53	0.89	6.46	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,736	1,736	0.40	0.08	0.14	1,770
Parking Lot	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
City Park	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
Total	0.94	0.53	0.89	6.46	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,736	1,736	0.40	0.08	0.14	1,770
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.18	0.10	0.16	1.34	< 0.005	< 0.005	0.32	0.32	< 0.005	0.08	0.08	—	304	304	0.07	0.01	0.40	310
Parking Lot	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
City Park	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

Total	0.18	0.10	0.16	1.34	< 0.005	< 0.005	0.32	0.32	< 0.005	0.08	0.08	—	304	304	0.07	0.01	0.40	310

4.1.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	1.06	0.65	0.82	9.28	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,986	1,986	0.40	0.08	5.57	2,024
Parking Lot	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
City Park	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
Total	1.06	0.65	0.82	9.28	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,986	1,986	0.40	0.08	5.57	2,024
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.94	0.53	0.89	6.46	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,736	1,736	0.40	0.08	0.14	1,770
Parking Lot	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
City Park	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
Total	0.94	0.53	0.89	6.46	0.02	0.01	1.77	1.78	0.01	0.45	0.46	—	1,736	1,736	0.40	0.08	0.14	1,770
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.18	0.10	0.16	1.34	< 0.005	< 0.005	0.32	0.32	< 0.005	0.08	0.08	—	304	304	0.07	0.01	0.40	310
Parking Lot	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
City Park	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
Total	0.18	0.10	0.16	1.34	< 0.005	< 0.005	0.32	0.32	< 0.005	0.08	0.08	—	304	304	0.07	0.01	0.40	310

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	307	307	0.02	< 0.005	—	308
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	72.9	72.9	< 0.005	< 0.005	—	73.2
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	380	380	0.02	< 0.005	—	382
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	307	307	0.02	< 0.005	—	308
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	72.9	72.9	< 0.005	< 0.005	—	73.2
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	380	380	0.02	< 0.005	—	382
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	50.9	50.9	< 0.005	< 0.005	—	51.1
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	12.1	12.1	< 0.005	< 0.005	—	12.1
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	63.0	63.0	< 0.005	< 0.005	—	63.2

4.2.2. Electricity Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	307	307	0.02	< 0.005	—	308
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	72.9	72.9	< 0.005	< 0.005	—	73.2
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	380	380	0.02	< 0.005	—	382
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	307	307	0.02	< 0.005	—	308
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	72.9	72.9	< 0.005	< 0.005	—	73.2
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	380	380	0.02	< 0.005	—	382
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	50.9	50.9	< 0.005	< 0.005	—	51.1
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	12.1	12.1	< 0.005	< 0.005	—	12.1
City Park	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	63.0	63.0	< 0.005	< 0.005	—	63.2

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	303	303	0.03	< 0.005	—	304
Parking Lot	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
City Park	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
Total	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	303	303	0.03	< 0.005	—	304
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	303	303	0.03	< 0.005	—	304
Parking Lot	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
City Park	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
Total	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	303	303	0.03	< 0.005	—	304
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.01	< 0.005	0.05	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	50.2	50.2	< 0.005	< 0.005	—	50.4
Parking Lot	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
City Park	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
Total	0.01	< 0.005	0.05	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	50.2	50.2	< 0.005	< 0.005	—	50.4

4.2.4. Natural Gas Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	303	303	0.03	< 0.005	—	304
Parking Lot	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
City Park	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
Total	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	303	303	0.03	< 0.005	—	304
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	303	303	0.03	< 0.005	—	304
Parking Lot	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
City Park	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
Total	0.03	0.01	0.25	0.21	< 0.005	0.02	—	0.02	0.02	—	0.02	—	303	303	0.03	< 0.005	—	304
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	0.01	< 0.005	0.05	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	50.2	50.2	< 0.005	< 0.005	—	50.4
Parking Lot	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
City Park	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
Total	0.01	< 0.005	0.05	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	50.2	50.2	< 0.005	< 0.005	—	50.4

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.50	0.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	0.06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.17	0.16	0.01	0.96	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.94	3.94	< 0.005	< 0.005	—	3.96
Total	0.73	0.72	0.01	0.96	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.94	3.94	< 0.005	< 0.005	—	3.96
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.50	0.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	0.06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.56	0.56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.09	0.09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.01	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Landscape	0.02	0.01	< 0.005	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.32	0.32	< 0.005	< 0.005	—	0.32
Total	0.12	0.12	< 0.005	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.32	0.32	< 0.005	< 0.005	—	0.32

4.3.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.50	0.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	0.06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.17	0.16	0.01	0.96	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.94	3.94	< 0.005	< 0.005	—	3.96
Total	0.73	0.72	0.01	0.96	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.94	3.94	< 0.005	< 0.005	—	3.96
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.50	0.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	0.06	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	0.56	0.56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Consum Products	0.09	0.09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.01	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.02	0.01	< 0.005	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.32	0.32	< 0.005	< 0.005	—	0.32
Total	0.12	0.12	< 0.005	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.32	0.32	< 0.005	< 0.005	—	0.32

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	1.32	4.76	6.08	0.14	< 0.005	—	10.4
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00	8.67	8.67	< 0.005	< 0.005	—	8.70
Total	—	—	—	—	—	—	—	—	—	—	—	1.32	13.4	14.7	0.14	< 0.005	—	19.1
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	1.32	4.76	6.08	0.14	< 0.005	—	10.4
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00

City Park	—	—	—	—	—	—	—	—	—	—	—	0.00	8.67	8.67	< 0.005	< 0.005	—	8.70
Total	—	—	—	—	—	—	—	—	—	—	—	1.32	13.4	14.7	0.14	< 0.005	—	19.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	0.22	0.79	1.01	0.02	< 0.005	—	1.73
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00	1.43	1.43	< 0.005	< 0.005	—	1.44
Total	—	—	—	—	—	—	—	—	—	—	—	0.22	2.22	2.44	0.02	< 0.005	—	3.17

4.4.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	1.32	4.76	6.08	0.14	< 0.005	—	10.4
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00	-2.06	-2.06	> -0.005	> -0.005	—	-2.07
Total	—	—	—	—	—	—	—	—	—	—	—	1.32	2.70	4.02	0.14	< 0.005	—	8.38
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	1.32	4.76	6.08	0.14	< 0.005	—	10.4
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00	-2.06	-2.06	> -0.005	> -0.005	—	-2.07
Total	—	—	—	—	—	—	—	—	—	—	—	1.32	2.70	4.02	0.14	< 0.005	—	8.38

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	0.22	0.79	1.01	0.02	< 0.005	—	1.73
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.00	-0.34	-0.34	> -0.005	> -0.005	—	-0.34
Total	—	—	—	—	—	—	—	—	—	—	—	0.22	0.45	0.67	0.02	< 0.005	—	1.39

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	10.9	0.00	10.9	1.09	0.00	—	38.3
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.05	0.00	0.05	< 0.005	0.00	—	0.16
Total	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	10.9	0.00	10.9	1.09	0.00	—	38.3
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.05	0.00	0.05	< 0.005	0.00	—	0.16
Total	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	1.81	0.00	1.81	0.18	0.00	—	6.33
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.01	0.00	0.01	< 0.005	0.00	—	0.03
Total	—	—	—	—	—	—	—	—	—	—	—	1.82	0.00	1.82	0.18	0.00	—	6.36

4.5.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	10.9	0.00	10.9	1.09	0.00	—	38.3
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.05	0.00	0.05	< 0.005	0.00	—	0.16
Total	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	10.9	0.00	10.9	1.09	0.00	—	38.3
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.05	0.00	0.05	< 0.005	0.00	—	0.16
Total	—	—	—	—	—	—	—	—	—	—	—	11.0	0.00	11.0	1.10	0.00	—	38.4
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	1.81	0.00	1.81	0.18	0.00	—	6.33

Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
City Park	—	—	—	—	—	—	—	—	—	—	—	0.01	0.00	0.01	< 0.005	0.00	—	0.03
Total	—	—	—	—	—	—	—	—	—	—	—	1.82	0.00	1.82	0.18	0.00	—	6.36

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
City Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
City Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01
City Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01

4.6.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
City Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
City Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.09	0.09
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Library	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01
City Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.01	0.01

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.7.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Remove	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Demolition	Demolition	10/1/2025	10/14/2025	5.00	10.0	—
Site Preparation	Site Preparation	10/15/2025	10/28/2025	5.00	10.0	—
Grading	Grading	10/29/2025	11/18/2025	5.00	15.0	—
Building Construction	Building Construction	11/19/2025	9/1/2026	5.00	205	—
Paving	Paving	9/2/2026	9/15/2026	5.00	10.0	—
Architectural Coating	Architectural Coating	10/16/2026	10/29/2026	5.00	10.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Demolition	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37

Site Preparation	Graders	Diesel	Average	1.00	8.00	148	0.41
Site Preparation	Scrapers	Diesel	Average	1.00	8.00	423	0.48
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	7.00	84.0	0.37
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Tractors/Loaders/Backhoes	Diesel	Average	2.00	7.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	8.00	367	0.29
Building Construction	Forklifts	Diesel	Average	2.00	7.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	6.00	84.0	0.37
Building Construction	Welders	Diesel	Average	3.00	8.00	46.0	0.45
Paving	Cement and Mortar Mixers	Diesel	Average	1.00	8.00	10.0	0.56
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Demolition	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Demolition	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37
Site Preparation	Graders	Diesel	Average	1.00	8.00	148	0.41

Site Preparation	Scrapers	Diesel	Average	1.00	8.00	423	0.48
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	7.00	84.0	0.37
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Tractors/Loaders/Backhoes	Diesel	Average	2.00	7.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	8.00	367	0.29
Building Construction	Forklifts	Diesel	Average	2.00	7.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	6.00	84.0	0.37
Building Construction	Welders	Diesel	Average	3.00	8.00	46.0	0.45
Paving	Cement and Mortar Mixers	Diesel	Average	1.00	8.00	10.0	0.56
Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	12.5	18.5	LDA,LDT1,LDT2
Demolition	Vendor	1.00	10.2	HHDT,MHDT
Demolition	Hauling	37.4	20.0	HHDT

Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	7.50	18.5	LDA,LDT1,LDT2
Site Preparation	Vendor	1.00	10.2	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	10.0	18.5	LDA,LDT1,LDT2
Grading	Vendor	1.00	10.2	HHDT,MHDT
Grading	Hauling	3.80	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	9.25	18.5	LDA,LDT1,LDT2
Building Construction	Vendor	4.61	10.2	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	0.00	—	HHDT
Paving	—	—	—	—
Paving	Worker	15.0	18.5	LDA,LDT1,LDT2
Paving	Vendor	3.38	10.2	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	1.85	18.5	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	10.2	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	12.5	18.5	LDA,LDT1,LDT2
Demolition	Vendor	1.00	10.2	HHDT,MHDT
Demolition	Hauling	37.4	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	7.50	18.5	LDA,LDT1,LDT2
Site Preparation	Vendor	1.00	10.2	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	10.0	18.5	LDA,LDT1,LDT2
Grading	Vendor	1.00	10.2	HHDT,MHDT
Grading	Hauling	3.80	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	9.25	18.5	LDA,LDT1,LDT2
Building Construction	Vendor	4.61	10.2	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	0.00	—	HHDT
Paving	—	—	—	—
Paving	Worker	15.0	18.5	LDA,LDT1,LDT2
Paving	Vendor	3.38	10.2	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	1.85	18.5	LDA,LDT1,LDT2

Architectural Coating	Vendor	—	10.2	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	0.00	0.00	33,053	11,018	3,426

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Ton of Debris)	Acres Paved (acres)
Demolition	0.00	592	5.00	1,199	—
Grading	450	350	6.00	0.00	—
Paving	0.00	0.00	0.00	0.00	1.31

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Library	0.00	0%
Parking Lot	1.31	100%
City Park	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2025	0.00	532	0.03	< 0.005
2026	0.00	532	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Library	150	150	150	54,750	2,296	2,296	2,296	838,125
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.9.2. Mitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Library	150	150	150	54,750	2,296	2,296	2,296	838,125
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
City Park	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.1.2. Mitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	33,053	11,018	3,426

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.10.4. Landscape Equipment - Mitigated

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Library	210,854	532	0.0330	0.0040	946,410
Parking Lot	50,020	532	0.0330	0.0040	0.00
City Park	0.00	532	0.0330	0.0040	0.00

5.11.2. Mitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Library	210,854	532	0.0330	0.0040	946,410
Parking Lot	50,020	532	0.0330	0.0040	0.00
City Park	0.00	532	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Library	689,451	0.00
Parking Lot	0.00	0.00
City Park	0.00	1,847,370

5.12.2. Mitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Library	689,451	0.00
Parking Lot	0.00	0.00
City Park	0.00	-439,034

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Library	20.3	—
Parking Lot	0.00	—

City Park	0.09	—

5.13.2. Mitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Library	20.3	—
Parking Lot	0.00	—
City Park	0.09	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Library	Household refrigerators and/or freezers	R-134a	1,430	0.02	0.60	0.00	1.00
Library	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
Library	Stand-alone retail refrigerators and freezers	R-134a	1,430	< 0.005	1.00	0.00	1.00
Library	Walk-in refrigerators and freezers	R-404A	3,922	< 0.005	7.50	7.50	20.0
City Park	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
City Park	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00

5.14.2. Mitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced

Library	Household refrigerators and/or freezers	R-134a	1,430	0.02	0.60	0.00	1.00
Library	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
Library	Stand-alone retail refrigerators and freezers	R-134a	1,430	< 0.005	1.00	0.00	1.00
Library	Walk-in refrigerators and freezers	R-404A	3,922	< 0.005	7.50	7.50	20.0
City Park	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0
City Park	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.15.2. Mitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	20.9	annual days of extreme heat
Extreme Precipitation	0.85	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	1.26	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	0	0	0	N/A

Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	1	1	2
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	1	1	1	2
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	88.7
AQ-PM	6.45
AQ-DPM	10.4
Drinking Water	48.5
Lead Risk Housing	15.5
Pesticides	12.6
Toxic Releases	2.00
Traffic	71.1
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	0.00
Haz Waste Facilities/Generators	8.76
Impaired Water Bodies	0.00
Solid Waste	0.00
Sensitive Population	—
Asthma	22.9
Cardio-vascular	19.9
Low Birth Weights	45.9
Socioeconomic Factor Indicators	—
Education	38.1
Housing	60.9
Linguistic	24.8
Poverty	52.4
Unemployment	52.5

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	47.69665084
Employed	6.274862056
Median HI	34.1973566
Education	—
Bachelor's or higher	60.87514436
High school enrollment	100
Preschool enrollment	83.27986655
Transportation	—
Auto Access	58.83485179
Active commuting	32.27255229
Social	—
2-parent households	87.34761966
Voting	71.03811113
Neighborhood	—
Alcohol availability	85.0891826
Park access	27.34505325
Retail density	44.12934685
Supermarket access	31.64378288
Tree canopy	18.95290645
Housing	—
Homeownership	53.93301681
Housing habitability	71.28191967
Low-inc homeowner severe housing cost burden	68.00975234
Low-inc renter severe housing cost burden	44.18067496
Uncrowded housing	84.29359682
Health Outcomes	—

Insured adults	32.06723983
Arthritis	0.0
Asthma ER Admissions	85.4
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	42.3
Cognitively Disabled	48.3
Physically Disabled	38.4
Heart Attack ER Admissions	75.7
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	92.9
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	97.3
Elderly	1.5

English Speaking	79.2
Foreign-born	26.9
Outdoor Workers	71.4
Climate Change Adaptive Capacity	—
Impervious Surface Cover	51.4
Traffic Density	35.3
Traffic Access	23.0
Other Indices	—
Hardship	37.1
Other Decision Support	—
2016 Voting	89.4

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	14.0
Healthy Places Index Score for Project Location (b)	47.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Construction: Dust From Material Movement	Based on the grading plan, 350 cu would be exported and 450 cy would be imported as a result of cutting into the rocky hillside. Existing parking lot will be removed. It is assumed the old asphalt would be removed from the site. (47,960 sf x 0.33333 = 15,986.5 / 27 = 592 cubic yards)
Operations: Vehicle Data	The Museum ("library") is the only land use that would generate the trips. 150 daily trips is based on ITE Land Use where the peak number of trips is 15. Peak trips is @ 10% of daily total.
Operations: Fleet Mix	The museum (Library) generates the traffic.
Construction: Trips and VMT	Paving haul trips. 57101 sf to be paved x 0.33333 = 19003 cu ft / 27 = 703 cu yds / 16 cy per truck = 44 total trucks / 10 days = 4 trucks or trips per day.
Construction: Construction Phases	Reduced demolition to 10 since it involves removal of parking lot. Added days to grading since it involves removal of rick hillside. Removed 15 days from building construction.

Appendix B

Biological Resources Assessment
And
CVMSHCP Consistency Analysis Report

DRAFT BIOLOGICAL RESOURCES ASSESSMENT & COACHELLA VALLEY MULTIPLE SPECIES HABITAT CONSERVATION PLAN CONSISTENCY ANALYSIS REPORT

HOWARD WILDLIFE MUSEUM PROJECT

City of Rancho Mirage, Riverside County, CA

Assessor's Parcel Numbers 689-040-023, 689-040-025, and 689-040-028 (~7.20 acres)



Submitted to:
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10 March 2025

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1.0 INTRODUCTION

At the request of Terra Nova Planning & Research, this biological resources assessment report (BRAR) and Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) consistency analysis was prepared by WSP USA, Inc. (WSP) for the proposed Howard Wildlife Museum project in Rancho Mirage, Riverside County, California. Information contained herein is intended to be used for compliance with the CVMSHCP, the California Environmental Quality Act (CEQA) and other relevant environmental regulations.

2.0 PROJECT SITE / PROJECT DESCRIPTION

The 7.20-acre project site is generally located north of Country Club Drive, south of Ramon Road, east of Highway 111, and west of Bob Hope Drive (Figure 1). The project site is located within Section 2, Township 5 East, Range 5 South, United States Geological Survey (USGS) 7.5' Cathedral City, Calif. Topographic Quadrangle (Figure 2). Elevations range between approximately 86.0 to 112.5 meters (m) (282 to 370 feet [ft]) above mean sea level. The project is more specifically located south of Braemar Dr., east of Highway 111, north of Mirage Cover Dr., and west of Golden State St. in the city of Rancho Mirage, Riverside County, California. The Assessor's Parcel Numbers (APNs) are APN 689-040-023, 689-040-025, and 689-040-028.

The proposed project includes the development of a 22,012 square foot wildlife museum and associated infrastructure.

3.0 REGULATORY FRAMEWORK

3.1 Federal Endangered Species Act

The United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service are the designated federal agencies accountable for administering the federal Endangered Species Act (FESA). The FESA defines species as "endangered" or "threatened" and provides regulatory protection at the federal level.

- Section 9 of the FESA prohibits the "take" of listed (i.e., endangered or threatened) species. The FESA definition of take is "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct." Recognizing that take cannot always be avoided, Section 10(a) includes provisions for take that is incidental to, but not the purpose of, otherwise lawful activities. Specifically, Section 10(a)(1)(A) permits (authorized take permits) are issued for scientific purposes Section 10(a)(1)(B) permits (incidental take permits) are issued for the incidental take of listed species that does not jeopardize the species.

- Section 7 (a)(2) requires federal agencies to evaluate the proposed project with respect to listed or proposed listed, species and their respective critical habitat (if applicable). Federal agencies must employ programs for the conservation of listed species and are prohibited from authorizing, funding, or carrying out any action that would jeopardize a listed species or destroy or modify its “critical habitat.” As defined by the FESA, “individuals, organizations, states, local governments, and other nonfederal entities are affected by the designation of critical habitat only if their actions occur on federal lands, require a federal permit, license, or other authorization, or involve federal funding.
- Section 10(a) of the FESA authorizes the issuance of incidental take permits and establishes standards for the content of habitat conservation plans (HCP). The CVMSHCP is an HCP, see discussion below.

3.2 Federal Migratory Bird Treaty Act

Treaties signed by the United States, Great Britain, Mexico, Japan and the countries of the former Soviet Union make it unlawful to pursue, capture, kill, and/or possess, or attempt to engage in any such conduct to any migratory bird, nest, egg or parts thereof listed in this document. The Secretary of the Interior can issue permits for incidental take of migratory bird species. The Migratory Bird Treaty Act (MBTA) also allows the Secretary of the Interior to grant permits for specific actions for the incidental take of these protected migratory bird species, but this rarely occurs.

3.3 Clean Water Act

Waters of the United States

On August 29, 2023, the U.S. Environmental Protection Agency and the Department of the Army issued a final rule amending the "Revised Definition of 'Waters of the United States," initially published in the Federal Register on January 18, 2023. This amendment aligns the definition of "waters of the United States" (WOTUS) with the U.S. Supreme Court's decision in the case of Sackett v. Environmental Protection Agency on May 25, 2023. The Supreme Court deemed certain parts of the January 2023 Rule invalid based on its interpretation of the CWA in the Sackett decision. Consequently, the agencies have modified key elements of the regulatory text to comply with the Court's ruling. The conforming rule, titled "Revised Definition of 'Waters of the United States'; Conforming," was published in the Federal Register and became effective on September 8, 2023.

Furthermore, due to ongoing litigation, the January 2023 Rule is currently not in effect in certain states and for certain parties. The agencies are applying the January 2023 Rule, as amended by the conforming rule, in 23 states, the District of Columbia, and the U.S. Territories. In the remaining 27 states and for specific parties, the agencies are interpreting WOTUS in accordance with the

pre-2015 regulatory framework and the Supreme Court's decision in Sackett until further notice. To summarize some of the most applicable highlights, the agencies' new rule defines WOTUS as:

Categories of Jurisdictional Waters

1) Waters which are:

(i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(ii) The territorial seas; or

(iii) Interstate waters;

(2) Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section;

(3) Tributaries of waters identified in paragraph (a)(1) or (2) of this section that are relatively permanent, standing or continuously flowing bodies of water;

(4) Wetlands adjacent to the following waters:

(i) Waters identified in paragraph (a)(1) of this section; or

(ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3) of this section and with a continuous surface connection to those waters;

(5) Intrastate lakes and ponds, streams, or wetlands not identified in paragraphs (a)(1) through (4) of this section that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3) of this section.

Eight exclusions from the definition of WOTUS are codified at paragraph (b), and key terms are defined at paragraph (c). "Adjacent" is defined at (c)(2) as "having a continuous surface connection."

3.3.1 Regional Water Quality Control Board

The Regional Water Quality Control Board (RWQCB) regulates activities pursuant to Section 401(a)(1) of the CWA. Section 401 of the CWA specifies that certification from the State is required for any applicant requesting a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities that may result in any discharge into navigable waters. Through the Porter Cologne Water Quality Control Act, the RWQCB asserts jurisdiction

over Waters of the State of California (WSC) which is generally the same as WUS but may also include isolated waterbodies. The Porter Cologne Act defines WSC as “surface water or ground water, including saline waters, within the boundaries of the state.”

3.3.2 California Environmental Quality Act

The basic goal of the CEQA is to maintain a high-quality environment now and in the future and the specific goals are for California's public agencies to:

1) Identify the significant environmental effects of their actions; and, either

2) Avoid those significant environmental effects, where feasible; or

3) Mitigate those significant environmental effects, where feasible.

The CEQA applies to "projects" proposed to be undertaken or requiring approval by State and local government agencies. Projects are activities which have the potential to have a physical impact on the environment and may include the enactment of zoning ordinances, the issuance of conditional use permits and the approval of tentative subdivision maps. Where a project requires approvals from more than one public agency, the CEQA requires one of these public agencies to serve as the "lead agency."

A "lead agency" must complete the environmental review process required by the CEQA. The most basic steps of the environmental review process are:

1) Determine if the activity is a "project" subject to the CEQA;

2) Determine if the "project" is exempt from the CEQA;

3) Perform an Initial Study to identify the environmental impacts of the project and determine whether the identified impacts are "significant". Based on its findings of "significance", the lead agency prepares one of the following environmental review documents:

   a) Negative Declaration if it finds no "significant" impacts;

   b) Mitigated Negative Declaration if it finds "significant" impacts but revises the project to avoid or mitigate those significant impacts;

   c) Environmental Impact Report (EIR) if it finds "significant" impacts.

While there is no ironclad definition of "significance", Article 5 of the CEQA Guidelines provides criteria to lead agencies in determining whether a project may have significant effects.

The purpose of an EIR is to provide State and local agencies and the general public with detailed information on the potentially significant environmental effects which a proposed project is likely

to have and to list ways in which the significant environmental effects may be minimized and indicate alternatives to the project.

3.3.3 Section 2081 of the State Fish and Game Code

Under Section 2081 of the California Fish and Game Code (FGC), the California Department of Fish and Wildlife (CDFW) authorizes individuals or public agencies to import, export, take, or possess state endangered, threatened, or candidate species in California through permits or memoranda of understanding. These acts, which are otherwise prohibited, may be authorized through permits or "memoranda of understanding" if (1) the take is incidental to otherwise lawful activities, (2) impacts of the take are minimized and fully mitigated, (3) the permit is consistent with regulations adopted in accordance with any recovery plan for the species in question, and (4) the applicant ensures suitable funding to implement the measures required by the CDFW. The CDFW shall make this determination based on the best scientific information reasonably available and shall include consideration of the species' capability to survive and reproduce.

3.3.4 Sections 3503, 3505.5, & 3513 of the State Fish and Game Code

Section 3503 of the FGC makes it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3505.5 makes it unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds-of-prey, i.e.: owls, hawks, eagles, etc.) or to take, possess, or destroy the nest or eggs of any bird-of-prey. Section 3513 makes it unlawful to take or possess any migratory nongame bird as designated in the MBTA.

3.4 Regional

3.4.1 Coachella Valley Multiple Species Habitat Conservation Plan

Finalized in October 2008, the CVMSHCP is a comprehensive, regional plan that addresses the conservation needs of 27 species of native flora and fauna and 24 natural vegetation communities occurring throughout the Coachella Valley region of western Riverside County, California. Permits for the CVMSHCP were issued by the CDFW on September 9, 2008 and the United States Fish and Wildlife Service (USFWS) on October 1, 2008 (TE104604-0). The CVMSHCP serves two primary purposes: Balancing environmental protection and economic development objectives in the CVMSHCP area and simplifying compliance with endangered species related laws. The CVMSHCP accomplishes this by conserving unfragmented habitat to permanently protect and secure viable populations of the covered species. The covered species include those plants and animals that are either currently listed as threatened or endangered, are proposed for listing, or are believed by an appointed Scientific Advisory Committee, USFWS and CDFW, to have a high probability of being proposed for listing in the future if not provided protection by the CVMSHCP. The goal of the CVMSHCP is to meet the requirements of the state and federal endangered species acts, while at

the same time allowing for the economic growth (land development) within the plan area without significant delay or hidden costs. Under the CVMSHCP, land development/mitigation fees are collected from all new development projects occurring in the plan area. The purpose of this fee is to support the assembly of a preserve system for the covered species and natural vegetation communities within areas identified as having high conservation value.

4.0 METHODS

4.1 Literature Review

In preparation for the field surveys, a literature search was conducted to identify special status biological resources known from the vicinity of the project site. In the context of this report, and for the purpose of this assessment, vicinity is defined as areas within a 5-mile radius of the project site.

The literature search included a review of the following documents:

- California Natural Diversity Data Base (CNDDB) RareFind 5 (CDFW 2025a)
- Special Animals List (CDFW 2025b)
- California Native Plant Society's (CNPS) Inventory of Rare, Threatened, and Endangered Plants of California (CNPS 2025)
- Information for Planning and Consultation (IPaC) Resources List (USFWS 2025)
- CVMSHCP (Coachella Valley Conservation Commission “CVCC” 2025)
- United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). 2025. Web Soil Survey
- USGS 7.5’ *Cathedral City, La Quinta, Myoma, Palm View Peak, Rancho Mirage,* and *Palm Springs, Calif.* quadrangles (USGS 2018, USGS 2021a, USGS 2021b, USGS 2021c, USGS 2021d, USGS 2021e)

Scientific nomenclature for this document follows standard reference sources: For plant communities, CVMSHCP (CVCC 2025); for flora, Jepson eFlora (2025) and the USDA NRCS PLANTS Database (2025); for amphibians, reptiles, and mammals, CDFW (2016); and for birds, California Bird Records Committee (2025).

4.2 Field Assessment

The field assessment was conducted between the hours of 0845 and 1100 on 27 January 2025 by WSP biologist Emily R. Urquidi and WSP senior biologist Michael D. Wilcox. On-site suitable habitat was assessed based on the presence of constituent habitat elements (e.g., soils, vegetation and topography) characteristic of the potentially occurring special status biological resources determined by the literature review. The entire site and adjacent properties (where accessible) were assessed on foot to record pertinent field data and current site conditions. All on-site flora

and fauna observed or otherwise detected (e.g., vocalizations, presence of scat, tracks, and/or bones) during the assessment were recorded in field notes and are included in Appendices A and B. General weather and site conditions were also recorded at the beginning and end of the survey. Temperatures and wind speeds were recorded with a handheld Kestrel 3500 anemometer. Percent cloud cover was visually estimated.

5.0 RESULTS

The 7.20-acre project site currently consists of a combination of a parking lot, existing development, a rocky hillside with creosote bush scrub, and a largely barren area that has been graded/scraped and cleared of nearly all vegetation, with the exception of landscaped species. Soils are largely stabilized, compacted and disturbed. Existing site disturbances observed on-site included development, vegetation clearance, grading/scraping, dumping, minor dumping and accumulation of roadside trash (minor).

Commercial developments and modular home communities occur to the north. The lands to the east are developed with multifamily complexes and residential buildings. The lands to the south are developed with residential buildings, but beyond the development stands the Santa Rosa mountains. To the west there is mostly uninterrupted access (divided by Highway 111) to the Santa Rosa Mountains.

5.1 Weather Conditions

Weather conditions during the assessment included partly cloudy skies with cloud cover ranging between 30-90 percent. The temperatures ranged from 57 to 62 degrees Fahrenheit (°F). Winds were calm with speeds ranging 0 to 3 miles per hour (mph). There appeared to be a light rain prior to the site assessment.

5.2 Topography, Soils and Waters

Existing topography is largely flat, but increases in elevation up a rocky hillside which exists on the eastern side of the project site. The site ranges in elevation between 86.0 to 112.5 meters (m) (282-370 feet [ft]) above mean sea level. Mapped soils (USDA NRCS 2025) include: Coachella fine sand, 0-2% slopes (CpA) and a rock outcrop that roughly covers 50% of the site (Figure 3).

Coachella series soils are well-drained soils that are moderately rapidly permeable and occur in lacustrine basins at elevations from 230 feet below sea level to 800 feet above sea level. Although well drained, perched water tables are common in areas that are irrigated. Sediments originate largely from igneous rocks. Slopes are nearly level to gently sloping. The climate is arid with average annual rainfall ranging from 2 to 4 inches, occurring in light winter rains and/or high intensity summer monsoon thunderstorms (USDA NRCS 2025).

on-site soils are highly disturbed and artificially compacted, as they have been scraped, cleared and graded. The rock outcrop appears to have also been graded at the peak and several existing hiking trails occur throughout. No streams, washes, springs, active drifts, sand dunes, or natural clay lenses were observed.

5.3 Vegetation

The northwestern portion of the site is currently developed and contains an existing parking lot, sparse, irrigated ornamental vegetation and artificial lighting. The eastern portion of the site is dominated by a rocky hillside. Overall, the vegetative community on the rocky hillside would be described as *Larrea tridentata* shrubland alliance (creosote bush scrub), while the rest of the site could be described as disturbed/developed/urban (Figure 4). Vegetation on the hillside was sparse, and mainly composed of creosote bush , narrow leaved bedstraw (*Galium angustifolium*), and desert needle grass (*Stipa speciosa*). This rocky area covers approximately 1/2 of the site. The remaining western and southern portions of the site are flat and consist of a hard, compacted soil that has been graded of vegetation, and ornamental species planted along the roadside. The dominant perennial plant species on-site was creosote bush. Other notable, but sparse native perennials included California fan palm (*Washingtonia filifera*), brittlebush (*Encelia farinosa*), and white bursage (*Ambrosia dumosa*). Dominant native herbaceous species included narrow leaved bedstraw and desert needle grass. Nonnative herbaceous plants included Mediterranean grass (*Schismus barbatus*), Bermuda grass (*Cynodon dactylon*), and puncture vine (*Tribulus terrestris*). A complete list of the plant species observed on-site is included in Appendix A.

No natural wetland, riparian or otherwise special-status vegetation communities were observed on-site. A full list of the plant species observed during the assessment, including common and scientific names, is appended to this report (Appendix A).

5.4 Wildlife

Vertebrate wildlife directly observed and/or detected otherwise (e.g., scat, bones, tracks, feathers, burrows, etc.) during the surveys was not diverse or abundant, limited to 14 species common to the region. This included one reptile, 11 birds and two mammals (Appendix B).

The one reptile species observed on-site include the side-blotched lizard (*Uta stansburiana*). Representative bird species observed on-site included but were not limited to: mourning dove (*Zenaida macroura*), red-shouldered hawk (*Buteo lineatus*), American kestrel (*Falco sparverius*), common raven (*Corvus corax),* northern mockingbird (*Mimus polyglottos*), house finch (*Haemorhous mexicanus*), Western blue bird (*Sialia mexicana*), Costa's hummingbird *(Calypte costae)*, Say's phoebe (*Sayornis saya*), yellow-rumped warbler (*Setophaga coronata*), and American crow (*Corvus brachyrhynchos*). The two mammals observed and/or detected on-site included

Botta's pocket gopher (*Thomomys bottae*) and wood rat (*Neotoma sp.*). A complete list of the vertebrate species observed or detected on-site is included as Appendix B.

It should be noted that relatively short-term biological studies of this nature are often limited by the seasonality of annual plants, the migratory habits of many birds, the fossorial and nocturnal habits of many mammals and reptiles, as well as the timing of field visit. A complete inventory of the wildlife on the site would require extensive year-round surveys for birds, amphibians, and reptiles, and additional surveys, such as placement of scent stations or tracking stations, for the detection of nocturnal mammals. Knowledge of habitat associations, natural history, seasonality, and distribution is essential in the assessment of the potential for occurrence of the various special status plants and animals known to occur throughout the Coachella Valley. For these reasons, other common and special status species that were not observed on-site may also have the potential to occur based on their geographic distribution, habitat preferences and the regional location of the site. The following section summarizes information on special status biological resources known to occur in the vicinity of the project site.

5.5 Coachella Valley Multiple Species Habitat Conservation Program

The project site is located within Rancho Mirage, which is a signatory to the CVMSHCP. The site is not within any CVMSHCP-designated conservation areas. The Santa Rosa and San Jacinto Mountains Conservation Area is located approximately 0.15 mi to the west of the site (Figure 5). The site does not contain CVMSHCP modeled habitats for any covered or special status species, however it is within one mile of critical Peninsular bighorn sheep habitat (Figure 6). The site is also within a mile of known records for flat-tailed horned lizard (*Phrynosoma mcallii*) and Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*) (Figure 7). No CVMSHCP-designated wildlife corridors or biological linkages are mapped on the project site.

5.6 Special Status Biological Resources

Plant or animal taxa may be considered "sensitive" or as having "special status" due to declining populations, vulnerability to habitat change, or because they have restricted ranges. Some are listed as threatened or endangered by the USFWS or by the CDFW and are protected by the federal and state Endangered Species acts. Others have been identified as sensitive or as special-status species by the USFWS, the CDFW, or by private conservation organizations, including the CNPS. Unlisted sensitive species do not have formal state or federal status but may nevertheless be considered significant under the CEQA. The CVMSHCP provides conservation for twenty-seven (27) imperiled plant and animal species (5 plants, 2 insects, 1 amphibian, 3 reptiles, 11 birds, and 5 mammals). These include federal and state-listed species, federal and California Species of Concern, and species on the CNPS sensitive species lists. CVMSHCP covered species are

designated on the tables below. The site is not within designated critical habitat for any special status plants or wildlife.

The review of the CNDDB, CNPS Online Inventory of Rare Plants and IPaC Resources List resulted in the identification of 103 special status biological resources known to occur in the vicinity (within an approximate 5-mile radius) of the project site. The 103 special status biological resources known from the vicinity included 62 plants, one vegetation communities, five invertebrates, one fish, four reptiles, 20 birds and 10 mammals. Tables 1 through 7 provide a complete list of the special status biological resources, their associated legal status, and their respective on-site occurrence potentials.

Tables 1 through 7 summarize information on all special status species that have been reported within the vicinity (5-mile radius) or that occur or are considered to have some potential to occur on-site based on geographic distribution, elevational parameters and/or presence of potentially suitable habitat. Occurrence probability is based on the best available information and the collective expertise of WSP biologists. These tables provide the names, legal or conservation status, general habitat associations, and the probability of occurrence for each of these species.

Table 1. Special Status Plants

Species	Status	Habitat	Probability
Abronia villosa var. *aurita* chaparral sand-verbena	F: None C: None CNPS: List 1B.1 State Rank: S2 CVMSHCP: No	Sandy areas in chaparral, coastal sage scrub & desert dune habitats. 80-1,600 m (262-5,249 ft); B: (Jan) Mar-Sept.	Absent Suitable habitat lacking. Sandy soils not present.
Acmispon haydonii pygmy lotus	F: None C: None CNPS: List 1B.3 State: Rank S3 CVMSHCP: No	Occurs in Sonoran desert scrub, pinyon and juniper woodland. 520-1200 m (1705-3935 ft); B: Jan-Jun.	Absent Suitable habitat lacking. Out of known elevation range. Only observation is from 1930.
Almutaster pauciflorus alkali marsh aster	F: None C: None CNPS: List 2B.2 State Rank: S1S2 CVMSHCP: No	Occurs in meadows and seeps. Foun din alkaline soils. 240-800 m (785-2625 ft); B: Jun-Oct.	Absent Suitable habitat lacking. Site is below elevational range of species.
Ambrosia monogyra singlewhorl burrobush	F: None C: None CNPS: List 2B.2 State Rank: S2 CVMSHCP: No	Occurs in chaparral, Sonoran desert scrub in sandy soils. 10-500 m (35-1640 ft); B: Aug-Nov.	Absent Habitat not suitable. Sandy soils not present.
Astragalus hornii var. *hornii* Horn's milk-vetch	F: None C: None CNPS: List 1B.1 State Rank: S1	Grows in meadows and seeps. Found in playas. 60-850 m (195-2790 ft); B: May-Oct.	Absent

Table 1. Special Status Plants

Species	Status	Habitat	Probability
	CVMSHCP: No		Suitable habitat lacking. Meadows and seeps are not present on-site.
Astragalus lentiginosus var. *borreganus* Borrego milk-vetch	F: None C: None CNPS List: 4.3 State Rank: S4 CVMSHCP: No	Mojavean desert scrub, Sonoran Desert scrub; sandy. 30-895 m (100-2,935 ft); B: Feb-May.	Absent Suitable habitat lacking. Sandy soils not present. on-site soils are compacted, disturbed, gravely, and graded.
Astragalus lentiginosus var. *coachellae* Coachella Valley milk-vetch	F: END C: None CNPS: 1B.2 State Rank: S1 CVMSHCP: Yes	Sonoran desert scrub; sandy flats, washes, outwash fans, sometimes on dunes. 40-665 m (131-2,182 ft); B: Jan–Sept.	Absent Suitable habitat lacking. Sandy soils not present. Site is not in critical habitat or CVMSHCP modeled habitat for this species.
Astragalus preussii var. *laxiflorus* Lancaster milk-vetch	F: None C: None CNPS: 1B.1 State Rank: S1 CVMSHCP: No	Chenopod scrub. 700 m (2,295 ft); B: Mar–May.	Absent Suitable habitat lacking. Site below known elevational range of species.
Astragalus tricarinatus triple-ribbed milk-vetch	F: END C: None CNPS: 1B.2 State Rank: S2 CVMSHCP: Yes	Joshua tree woodland & Sonoran desert scrub on hot, rocky slopes in canyons & along edge of boulder-strewn desert washes with *Larrea* and *Encelia*. 455-1,525 m (1,492-5,000 ft); B: Feb–May.	Absent Suitable habitat lacking. Site below known elevational range of species.
Atriplex parishii Parish's brittlescale	F: None C: None CNPS: List 1B.1 State Rank: S1 CVMSHCP: No	Found in habitats with vernal pools, chenopod scrub, and playas. Occurs on drying alkali flats with fine soils); 25-1900 m (80-6235 ft); B: Jun-Oct.	Absent Suitable habitat lacking.
Ayenia compacta California ayenia	F: None C: None CNPS: List 2B.3 State Rank: S3 CVMSHCP: No	Found in Mojavean desert scrub and Sonoran desert scrub. Occurs in sandy and gravely washes or dry canyons. 150-1095 m (490-3595 ft); B: Mar-Apr.	Absent Suitable habitat lacking. Soil on site is compact, graded, and disturbed. Sandy soils are limited. Out of known elevational range.
Boechera johnstonii Johnston's rockcress	F: None C: None CNPS: List 1B.2 State Rank: S1 CVMSHCP: No	Found in chaparral and low montane coniferous forests. Commonly in clay soils. 1350-2150 m (4430-7055 ft); B: Feb-Jun.	Absent Suitable habitat lacking. Project site is well below elevational range of species.
Calochortus palmeri var. *munzii* San Jacinto mariposa-lily	F: None C: None State Rank: S3 CNPS: 1B.2 CVMSHCP: No	Occurs in lower montane coniferous forest, chaparral, meadows and seeps. 855-2200 m (2805-7220 ft); B: Apr-Jul.	Absent Suitable habitat lacking. Out of known elevational range for species.

Table 1. Special Status Plants

Species	Status	Habitat	Probability
Caulanthus simulans Payson's jewelflower	F: None C: None CNPS: List 4.2 State Rank: S4 CVMSHCP: No	Found in chaparral and coastal scrub. Occurs in burned areas, stream beds, on rocky steep slopes. 90-2200 m (295-7218 ft); B: (Feb) Mar-May (Jun).	Absent Habitat not suitable. Chaparral and coastal scrub not present.
Chaenactis parishii Parish's chaenactis	F: None C: None CNPS: List 1B.3 State Rank: S3 CVMSHCP: No	Occurs in rocky areas in chaparral. 1300-2500 m (4265-8205 ft): B: May-Jul.	Absent Suitable habitat lacking. Project site out of known elevational range.
Chorizanthe leptotheca Peninsular spineflower	F: None C: None CNPS: 4.2 State Rank: S3 CVMSHCP: No	Chaparral, coastal scrub, lower montane coniferous forest. 300-1,900 m (985-6,230 ft); B: May-Aug.	Absent Suitable habitat lacking. Site below known elevation range of species.
Chorizanthe parryi var. *parryi* Parry's spineflower	F: None C: None CNPS: List 1B.1 State Rank: S2 CVMSHCP: No	Found in coastal scrub, chaparral, cismontane woodland, valley and foothill grassland. Sandy soils. 275-1200 m (900-4005 ft); B: Apr-Jun.	Absent Suitable habitat lacking. Work site is out of known elevational range of species.
Chorizanthe polygonoides var. *longispina* long-spined spineflower	F: None C: None State Rank: S3 CNPS: List 1B.2 CVMSHCP: No	Found in chaparral, coastal scrub, meadows, grasslands, and vernal pools. Associated with gabbroic clay. 30-1530 m (100-5020 ft); B: Apr-Jul.	Absent Suitable habitat lacking. Soil on-site is gravely, graded, and compact. No clay soil was observed in the project area.
Chorizanthe xanti var. *leucotheca* white-bracted spineflower	F: None C: None CNPS: List 1B.2 State Rank: S3 CVMSHCP: N	Found in Mojavean desert scrub, pinyon and juniper woodland, coastal scrub (alluvial fans). 300-1200 m (985-3935 ft): B: Apr-Jun.	Absent Suitable habitat lacking. Project site is out of elevational range.
Cuscuta californica var. *apiculate* pointed dodder	F: None C: None State Rank: S3? CNPS: List 3 CVMSHCP: No	Found in Mojavean and Sonoran desert scrub. Inhabits sandy soils. 0-500 m (0-1640 ft); B: Feb-Aug.	Absent Suitable habitat lacking. Soil on site is disturbed, compact, and gravely.
Deinandra mohavensis Mojave tarplant	F: None C: END CNPS: List 1B.3 State Rank: S3 CVMSHCP: No	Found in riparian scrub, coastal scrub and chaparral. Typically in riparian areas. 640-1600 m (2100-5250 ft); B: (Jan-May) Jun-Oct.	Absent Suitable habitat lacking. Out of known elevational range.
Ditaxis claryana glandular ditaxis	F: None C: None CNPS: 2B.2 State Rank: S2 CVMSHCP: No	Mojavean & Sonoran desert scrub. Sandy soils. 0-465 m (0-1,526 ft); B: Oct–Mar.	Absent Suitable habitat lacking. Sandy soils not present. Soils on-site are composed of gravel, compacted and disturbed.
Ditaxis serrata var. *californica* California ditaxis	F: None C: None CNPS: 3.2	Sonoran desert scrub. 30 to 1,000 m (98-3,281 ft); B: Mar-Dec.	Low Habitat exists on the rocky hillside. This species was not

Table 1. Special Status Plants

Species	Status	Habitat	Probability
	State Rank: S2? CVMSHCP: No		observed during the assessment.
Eremothera boothii var. *boothii* Booth's evening primrose	F: None C: None CNPS: 2B.3 State Rank: S3 CVMSHCP: No	Joshua tree woodland, pinyon & juniper woodland. 815-2,400 m (2,674-7,874 ft); B: Apr-Sep.	Absent Suitable habitat lacking. Site below known elevational range of species.
Erythranthe diffusa Palomar monkeyflower	F: None C: None CNPS: List 4.3 State Rank: S3 CVMSHCP: No	Found in chaparral and lower montane forests. 1200-1830 m (4005-6005 ft); B: Apr-Jun.	Absent Suitable habitat lacking. Below elevational range of species.
Eschscholzia androuxii Joshua Tree poppy	F: None C: None CNPS: 4.3 State Rank: S3 CVMSHCP: No	Mojavean desert scrub, Joshua tree woodland. 585-1,685 m (1,920-5,530 ft); B: Feb-May (Jun).	Absent Suitable habitat lacking. Site below known elevational range of species.
Euphorbia abramsiana Abrams' spurge	F: None C: None CNPS: 2B.2 State Rank: S2 CVMSHCP: No	Sandy sites in Mojave and Sonoran desert scrub. -5–1,450 m (-16-4,757 ft). B: (Aug) Sept-Nov.	Absent Suitable habitat lacking. Sandy soils not present on-site. Soils on site are very compacted, gravely and disturbed. Additionally, much of the site has been developed and/or graded of most vegetation.
Euphorbia arizonica Arizona spurge	F: None C: None CNPS: 2B.3 State Rank: S3 CVMSHCP: No	Sandy soils in Sonoran desert scrub; 50-300 m (200-1,000 ft); B: Mar-Apr.	Absent Suitable habitat lacking. Sandy soils not present on-site. Site contains hard compact/graded soil.
Euphorbia platysperma flat-seeded spurge	F: None C: None CNPS: 1B.2 State Rank: S1 CVMSHCP: No	Sandy Sonoran desert scrub, shifting dunes. In CA, potentially a waif; more common in AZ and MX. 65-100 m (215-330 ft); B: Feb-Sep.	Absent Suitable habitat lacking. Sandy soils not present on-site. Site contains hard compact/graded soil.
Galium angustifolium ssp. Gracillimum slender bedstraw	F: None C: None CNPS: List 4.2 State Rank: S4 CVMSHCP: No	Occurs in Joshua tree woodland and Sonoran desert scrub. Grows in rocky and granitic soils. 130- 1550 m (425-5085 ft); B: Apr-Jun (Jul).	Absent Suitable habitat lacking. Site is below known elevational range of species.
Heuchera hirsutissima shaggy-haired alumroot	F: None C: None CNPS: List 1B.3 State Rank: S3 CVMSHCP: No	Occurs in subalpine coniferous forest and upper montane coniferous forest. 1520-3500 m (4985-11485ft); B: (May) Jun-Jul.	Absent Suitable habitat lacking. Project site is out of elevational range.

Table 1. Special Status Plants

Species	Status	Habitat	Probability
Horsfordia alata pink velvet-mallow	F: None C: None CNPS: 4.3 State Rank: S4 CVMSHCP: No	Sonoran desert scrub (rocky). 100-500 m (330-1,640 ft); B: Feb-Dec.	Low Could potentially exist on the rocky hillside.
Horsfordia newberryi Newberry's velvet-mallow	F: None C: None CNPS: 4.3 State Rank: S4 CVMSHCP: No	Sonoran desert scrub (rocky). 8-300 m (26-984 ft); B: Feb-Dec.	Low Could potentially exist on the rocky hillside.
Hulsea vestita ssp. Callicarpha beautiful hulsea	F: None C: None CNPS: List 4.2 Sate Rank: S4 CVMSHCP: No	Chaparral, lower montane coniferous forest. Prefers granitic soil, but also grows in rocky/sandy soils. 915-3050 m (3000-10005ft); B: May-Oct.	Absent Suitable habitat lacking. Out of elevational range of species.
Imperata brevifolia California brevifolia	F: None C: None CNPS: List 2B.1 State Rank: S3 CVMSHCP: No	Found in coastal scrub, chaparral, riparian scrub, Mojavean desert scrub, meadows and seeps. 0-1215 m (0-3985 ft); B: Sep-May.	Absent Suitable habitat lacking. Documented observations were near streams.
Johnstonella costata ribbed cryptantha	F: None C: None CNPS: 4.3 State Rank: S4 CVMSHCP: No	Desert dunes, Mojavean desert scrub, Sonoran desert scrub; -60-500 m (-195-1,640 ft); B: Feb-May.	Absent . No sandy soils on-site, suitable habitat lacking.
Johnstonella holoptera winged cryptantha	F: None C: None CNPS: 4.3 State Rank: S4 CVMSHCP: No	Sonoran desert scrub, Mojavean desert scrub; sandy or rocky canyons. 100-1,690 m (328-5,545 ft); B: Mar-Apr.	Low Could potentially exist on the rocky hillside.
Juncus acutus ssp. leopoldii southwestern spiny rush	F: None C: None CNPS: 4.2 State Rank: S4 CVMSHCP: No	Coastal dunes (mesic), coastal scrub, meadows & seeps (alkaline), marshes & swamps (coastal salt) Mojavean desert scrub, Sonoran desert scrub; -3-900 m (-10-2,955 ft). B: Mar-Jun.	Absent Suitable habitat lacking
Juncus cooperi Cooper's rush	F: None C: None CNPS: 4.3 State Rank: S3 CVMSHCP: No	Meadows & seeps (mesic, alkaline or saline). -260-1,700 m (-855-5,805 ft); B: Apr-Aug.	Absent Suitable habitat lacking.
Lilium parryi lemon lily	F: None C: None CNPS: List 1B.2 State Rank: S3 CVMSHCP: No	Found in montane coniferous forest, meadows and seeps, riparian forest. 1220-2745 m (4005-9005 ft); B: Jul-Aug.	Absent Suitable habitat lacking. Out of elevational range.

Table 1. Special Status Plants

Species	Status	Habitat	Probability
Linanthus jaegeri San Jacinto linanthus	F: None C: None CNPS: List 1B.2 State Rank: S2 CVMSHCP: No	Occurs in subalpine coniferous forest and upper montane coniferous forest. Known elevational range. 2195-3050 m (6512-10007 ft); B: Jul-Sep.	Absent Suitable habitat lacking. Project site occurs out of known elevational range.
Linanthus maculatus ssp. maculates little San Bernardino mtns. linanthus	F: None C: None CNPS: List 1B.2 State Rank: S2 CVMSHCP: YES	Found in desert dunes, Sonoran desert scrub, Mojavean desert scrub, and Joshua tree woodland. Occurs in washes and sandy areas. 140-1220 m (443-4003 ft): B: Mar-May.	Absent Suitable habitat lacking. Soil is compact and graded. Sandy areas are limited. Out of known elevational range.
Lycium torreyi Torrey's box-thorn	F: None C: None CNPS: 4.2 State Rank: S3 CVMSHCP: No	Mojavean desert scrub, Sonoran desert scrub; Prefers rocky, sandy, streambanks and washes. -50 - 1220 m (-165–4,005 ft); B: (Jan-Feb) Mar-Jun (Sep-Nov).	Absent Suitable habitat lacking. Soil is gravely, compact, and disturbed. No stream bank or washes.
Marina orcuttii var. *orcuttii* California marina	F: None C: None CNPS: 1B.3 State Rank: S2? CVMSHCP: No	Chaparral, pinyon and juniper woodland, Sonoran desert scrub, rocky. 1,050-1,160 m (3,445–3,806 ft); B: May-Oct.	Absent Suitable habitat lacking. Site below known elevational range of species.
Matelea parvifolia spear-leaf matelea	F: None C: None CNPS: 2B.3 State Rank: S3 CVMSHCP: No	Mojavean desert scrub, Sonoran desert scrub, rocky. 440-1,095 m (1,445–3,595 ft); B: Mar-May (Jul).	Absent Suitable habitat lacking. Site below known elevational range of species.
Nemacaulis denudata var. *gracilis* slender cottonheads	F: None C: None CNPS: 2B.2 State Rank: S2 CVMSHCP: No	Sandy places in coastal dunes, desert dunes & Sonoran desert scrub. 50-400 m (164-1,315 ft); B: Mar–May.	Absent Suitable habitat lacking. No dunes or sandy soils occur on site. Soil is very compact.
Pelazoneuron puberulum var. *sonorense* Sonoran maiden fern	F: None C: None CNPS: List 2B.2 State Rank: S2 CVMSHCP: No	Found in meadows, seeps, and along rivers. 50-610 m (265-2000 ft); B: Jan-Sep.	Absent Suitable habitat lacking. Project site lacks rivers/water sources. Last observation was made in 1963 along Tahquitz creek.
Penstemon californicus California beardtongue	F: None C: None State Rank: S2 CNPS: List 1B.2 CVMSHCP: No	Found in chaparral, lower montane coniferous forest, pinyon and juniper woodland. 1170-2300 m (3840-7545 ft); B: May-Jun (Aug).	Absent Suitable habitat lacking. Out of known elevational range for species.
Penstemon clevelandii var. *conatus* San Jacinto beardtongue	F: None C: None	Chaparral, pinyon and juniper woodland, Sonoran desert	Absent

Table 1. Special Status Plants

Species	Status	Habitat	Probability
	State Rank: S3 CNPS: List 4.3 CVMSHCP: No	scrub. Grows in rocky soils. 400- 1500 m (1310-49201ft); B: Mar-May.	Suitable habitat lacking. Out of elevational range of species.
Pentachaeta aurea ssp. Aurea golden rayed pentachaeta	F: None C: None CNPS: List 4.2 State Rank: S3 CVMSHCP: No	Chaparral, Cismontane woodland, coastal scrub, lower montane coniferous forest, riparian woodland, valley and foothill grassland. 80-1850 m (260-6070ft); B: Mar-Jul.	Absent Suitable habitat lacking.
Petalonyx linearis narrow-leaf sandpaper-plant	F: None C: None CNPS: 2B.3 State Rank: S3? CVMSHCP: No	Sandy or rocky canyons in Mojavean desert scrub and Sonoran desert scrub; -25-1115 m (-80-3,660 ft); B: Mar-May (sometimes Jan-Dec).	Low Perennial sandpaper-plant (*Petalonyx spp.*) and *linearis* not observed. However suitable habitat exists on the rock hillside.
Pseudorontium cyanthiferum Deep Canyon snapdragon	F: None C: None CNPS: 2B.3 State Rank: S1 CVMSHCP: No	Sonoran desert scrub in rocky washes and on rocky slopes in the immediate vicinity of Deep Canyon. 0-800 m (0-2,625 ft); B: Feb-Apr.	Absent Suitable habitat lacking. Site not located within Deep Canyon.
Saltugilia latimeri Latimer's woodland-gilia	F: None C: None CNPS: List 1B.2 State Rank: S3 CVMSHCP	Found in chaparral, Mojavean desert scrub, pinyon and juniper woodland. 400-1900 m (1310-6235 ft); B: Mar-Jun.	Absent Suitable habitat lacking. Out of known elevational range of the species.
Selaginella eremophila desert spike-moss	F: None C: None CNPS: 2B.2 State Rank: S2S3 CVMSHCP: No	Chaparral, Sonoran desert scrub; shaded sites, gravelly soils, crevices or among rocks. 200-900 m (656-2,953 ft); B: May–Jul.	Absent Suitable habitat lacking. Site below known elevational range of species.
Senna covesii Cove's cassia	F: None C: None CNPS: 2B.2 State Rank: S3 CVMSHCP: No	Sonoran Desert scrub, dry, sandy desert washes & slopes. 225-1,295 m (740-4,250 ft); B: Mar–Jun (Aug).	Absent Suitable habitat lacking. Site below known elevational range of species.
Sidotheca caryophylloides chickweed oxytheca	F: None C: None CNPS: List 4.3 State Rank: S4 CVMSHCP: No	Sandy habitats in lower montane coniferous forest. 1114-2600 m (3655-8530 ft); B: Jul-Sep (Oct).	Absent Suitable habitat lacking. Out of known elevational range.
Sidotheca emarginata white-marginated oxytheca	F: None C: None State Rank: S3 CNPS: List 1B.3 CVMSHCP: No	Chapparal and lower montane coniferous forests. Also found in juniper woodlands. 1200-2500 m (3935-8205 ft); B: (Feb) Apr-Jul (Aug).	Absent Suitable habitat lacking. Out of known elevational range for species.
Stemodia durantifolia purple stemodia	F: None C: None CNPS: List 2B.1	Mesic sites on sandy soils in Sonoran desert scrub. 180-300	Absent

Table 1. Special Status Plants

Species	Status	Habitat	Probability
	State Rank: S2.1? CVMSHCP: No	m (590–980 ft); B: (Jan) Apr-Dec.	Suitable habitat lacking. Site below known elevational range of species.
Streptanthus campestris Southern jewelflower	F: None C: None CNPS: List 1B.3 State Rank: S3 CVMSHCP: No	Found in chaparral, lower montane coniferous forest, pinyon and juniper woodland. 900-2300 (2955-7545 ft.); B: (Apr) May-Jul.	Absent Suitable habitat lacking. Project site is below known elevational range of species.
Syntrichopappus lemmonii Lemmon's syntrichopappus	F: None C: None CNPS: List 4.2 State Rank: S3 CVMSHCP: No	Rocky sandy soils in washes, streambanks. Associated with Sonoran and Mojavean desert scrub. -50-1220 m (-165-4005 ft); B: (Jan-Feb) Mar-Jun (Sep-Nov)	Absent Suitable sandy habitat lacking.
Thysanocarpus rigidus rigid fringepod	F: None C: None State Rank: S2 CNPS: List 1B.2 CVMSHCP: No	Occurs in pinyon and juniper woodland. 600-2200 m (1970-7220 ft); B: Feb-May.	Absent Suitable habitat lacking. Project site out of known elevational range of species.
Xylorhiza cognata mecca-aster	F: None C: None CNPS: List 1B.2 State Rank: S2 CVMSHCP: Yes	Grows on steep canyon slopes on sandstone and clay substrates, 20-305 m (65-1,000 ft); B: Jan-Jun.	Absent Suitable habitat lacking. No sandstone or clay occur on-site.

Table 2. Special Status Vegetation Communities

Community	Status	Habitat	Probability
desert fan palm oasis woodland	F: None C: S3.2 State Rank: S3.2 CVMSHCP: Yes	Natural California fan palm (*Washingtonia filifera*)	Absent Although California fan palm is present on site, these trees have been planted and used as landscaping. The palms are scarce and occur mostly along site the outer end of the project site near the Highway 111.

Table 3. Special Status Invertebrates

Species	Status	Habitat	Probability
Bombus crotchii Crotch's bumble bee	F: None C: Candidate END S: S2 CVMSHCP: No	Range from coastal California, to sierra-casacade crest, and south into Mexico. Nectar on antirrhinum, phacelia, clarkia, erigonum, creosote. and eschscholzia.	Absent Although nectar sources occur on-site, the area is very disturbed. Nectar habitat exists on the rock hillside, but the area is not proposed to be disturbed.
Danaus plexippus monarch butterfly	F: FC C: None State Rank: S2S3 CVMSHCP: No	Western winter roost sites primarily occur along the coast from northern Mendocino to Baja California, Mexico, located in wind-protected tree groves (*Eucalyptus* species, Monterey pine (*Pinus radiata*), cypress), with nectar and water sources nearby. During breeding season, adults widespread but scarce in the desert. Larvae require milkweed	Low Larval host plants (milkweeds) not observed but may have been dormant at the time of the assessment. Winter roost sites not present. Adults may, however, occasionally fly through and if milkweed was present could breed/reproduce on-site.
Dinacoma caseyi Casey's June beetle	F: END C: None State Rank: S1 CVMSHCP: No	Appears to be entirely restricted to the mouth and alluvial floodplain of Palm Canyon Wash and Tahquitz Creek in Palm Springs, in association with deposits of fine silts, sands and gravels	Absent Suitable habitat lacking. Sandy soils not present. Site is compacted and disturbed. Site outside of known range of species. Site is not within designated critical habitat or USFWS recommended survey area for this species.
Macrobaenetes valgum Coachella giant sand treader cricket	F: None C: None State Rank: S1S2 CVMSHCP: Yes	Active sand dune hummocks and ridges, sites favorable to permanent habitation include spring-moistened sand.	Absent Suitable habitat lacking. Sandy soils, dunes and hummocks not present. Site is not within CVMSHCP modeled habitat for this species.
Oliarces clara cheeseweed owlfly	F: None C: None State Rank: S2 CVMSHCP: No	Known from lower Colorado River drainage, associated with creosote bush (*Larrea tridentata*) in desert scrub; creosote is suspected larval host. Found under rocks or in flight over streams.	Absent Suitable habitat lacking. No drainages or washes on the site.

Table 3. Special Status Invertebrates

Species	Status	Habitat	Probability
Stenopelmatus cahuilaensis Coachella Valley Jerusalem cricket	F: None C: None State Rank: S2 CVMSHCP: Yes	Resides in a small segment of sand dunes. Located in undulating dunes base of Mt San Jacinto.	Absent Suitable habitat lacking. Dune habitats not present.

Table 4. Special Status Fish

Species	Status	Habitat	Probability
Cyprinodon macularius desert pupfish	F: END C: END State Rank: S1 CVMSHCP: Yes	Desert ponds, springs, marshes and streams.	Suitable aquatic habitat lacking. Site is not within designated critical habitat or CVMSHCP modeled habitat for this species.

Table 5. Special Status Reptiles

Species	Status	Habitat	Probability
Crotalus ruber ruber northern red diamond rattlesnake	F: ND C: SSC State Rank: S3 CVMSHCP: No	Favors rocky areas and dense vegetation, shelters in rodent burrows, rock cracks, or surface cover. Known from the eastern slopes of the Peninsular Ranges, desert floor up to 5,000 feet	Very low Rocky hillside suitable but very small and isolated, surrounded by existing development and disturbance. Site is low-quality habitat for this species.
Crotalus ruber ruber northern red diamond rattlesnake	F: ND C: SSC State Rank: S3 CVMSHCP: No	Favors rocky areas and dense vegetation, shelters in rodent burrows, rock cracks, or surface cover. Known from the eastern slopes of the Peninsular Ranges, desert floor up to 5,000 feet	Very low Rocky hillside suitable but very small and isolated, surrounded by existing development and disturbance. Site is low-quality habitat for this species.
Gopherus agassizi desert tortoise	F: THR C: THR State Rank: S2 CVMSHCP: Yes	Creosote bush scrub, Joshua tree woodland, saltbush scrub); washes, arroyos, bajadas, rocky hillsides, open flat desert.	Absent Suitable habitat lacking. A portion of the site is developed, most native vegetation has been removed. The site is surrounded by existing development and residential buildings and immediately adjacent to Highway 111. Sign (burrows, scat, remains, etc.) not observed.

Phrynosoma mcallii flat-tailed horned lizard	F: None C: None State Rank: S3 CVMSHCP: Yes	Restricted to desert washes and desert flats. Species requires habitats with loose sand, as they burrow to avoid extreme temperatures.	Absent Suitable habitat lacking. Site is disturbed and lacks loose soil that this species requires for thermoregulation/shelter against high temperatures.
Uma inornata Coachella Valley fringe-toed lizard	F: THR C: END State Rank: S1 CVMSHCP: Yes	Requires fine, loose, windblown sand (dunes) interspersed with hardpan & widely spaced desert shrubs. Known only from the Coachella Valley.	Absent Suitable habitat lacking. Sandy, windblown sand not present. Site largely developed, disturbed and stabilized. Site is not within designated critical habitat or CVMSHCP modeled habitat for this species.

Table 6. Special Status Birds

Species	Status	Habitat	Probability
Accipiter cooperii Cooper's hawk	F: MBTA C: Watch List State Rank: S4 CVMSHCP: No	Woodland, chiefly of open, interrupted or marginal type, including residential areas. Nests in trees.	Nesting: Absent Suitable nesting habitat lacking. Foraging: Moderate Species could forage on site if nesting nearby.
Aechmophorus clarkii Clark's grebe	F: MBTA, BCC C: watch list State Rank: CVMSHCP: No	Nest in freshwater lakes and marshes. Forage in both freshwater and saltwater habitats.	Nesting: Absent Suitable habitat lacking. Wetland habitats not present. Foraging: Absent Suitable habitat lacking. Wetland habitats not present.
Aechmophorus occidentalis Western Grebe	F: MBTA, BCC C: None State Rank: CVMSHCP: No	Nest and forage in large lakes in shallow areas.	Nesting: Absent Suitable habitat lacking. Wetland habitats not present. Foraging: Absent Suitable habitat lacking. Wetland habitats not present.
Athene cunicularia burrowing owl	F: MBTA, BCC C: Candidate END State Rank: S2 CVMSHCP: Yes*	Open, dry annual or perennial grassland, deserts & scrublands characterized by low-growing vegetation. Burrow sites essential.	Nesting: Absent Suitable habitat lacking. Foraging: Absent Suitable habitat lacking in immediate area.

Aquila chrysaetos golden eagle	F: BGEPA, MBTA, BCC C: FP, WL State Rank: S3 CVMSHCP: No	Forages over rolling foothills, mountain areas, sage-juniper flats, and desert. Cliff-walled canyons used for nesting, sometimes large trees in open areas.	Nesting: Absent Suitable habitat lacking on-site. Foraging: Low Marginally suitable habitat present. Species ranges widely and could forage on-site.
Calypte costae Costa's hummingbird	F: MBTA, BCC C: None State Rank: S4 CVMSHCP: No	Desert and semi-desert, arid brushy foothills and chaparral in migration and winter also in adjacent mountains and in open meadows and gardens	Nesting: Moderate Suitable nesting habitat present. Foraging: Occurs Observed.
Cypseloides niger black swift	F: None C: SSC State Rank: S3 CVMSHCP: No	Coastal belt of Santa Cruz and Monterey counties, central and southern Nevada, San Bernardino and San Jacinto mountains. Resides near waterfalls in deep canyons and sea bluffs.	Nesting: Absent Suitable habitat lacking. Foraging: Absent No surrounding habitat.
Empidonax traillii extimus southwestern willow flycatcher	F: END, MBTA C: END State Rank: S1 CVMSHCP: Yes*	Breeds in dense riparian areas with running water.	Nesting: Absent Suitable habitat lacking. Riparian vegetation not present. Foraging: Very low Occurs in many habitats during migration. No suitable nesting habitat in surrounding area. Site is not within designated critical habitat for this species.
Falco mexicanus prairie falcon	F: MBTA, BCC C: SSC (nesting), FGC State Rank: S3 CVMSHCP: No	Inhabits dry, open terrain, either level or hilly. Breeding sites located on cliffs, but forages far afield.	Nesting: Absent Suitable habitat lacking. Steep cliffsides not present. Foraging: Low Site is surrounded by development and has few open areas suitable for foraging. The nearby Santa Rosa Mountains may offer refuge for the species. Known from vicinity.

Haliaeetus leucocephalus bald eagle	F: BGEPA, MBTA, BCC C: END, FP State: S3 CVMSHCP: No	Margins of lakes, rivers, and other bodies of water. In Southern California, nests at Big Bear Lake and Lake Silverwood in the San Bernardino Mountains and Lake Hemet in the San Jacinto Mountains.	Nesting: Absent Suitable habitat lacking. Foraging: Absent Suitable habitat lacking.
Lanius ludovicianus loggerhead shrike	F: MBTA, BCC C: SSC (nesting), FGC State Rank: S4 CVMSHCP: No	Open fields with scattered trees or shrubs, open country with short vegetation, pastures, old orchards, cemeteries, golf courses, riparian areas & open woodlands.	Nesting: Absent Suitable nesting habitat absent. Site has scarce vegetation and is surrounded by development. Foraging: Low May nest or winter nearby & forage on-site.
Polioptila californica californica coastal California gnatcatcher	F: THR C: SSC State Rank: S2 CVMSHCP: No	Obligate, permanent resident of coastal sage scrub below 2500 ft. Can be found in coastal sage scrub in arid washes.	Nesting: Absent Suitable habitat lacking. Coastal scrub vegetation not present. Foraging: Absent Specimens were observed and collected between 1916-1918. Likely black tailed gnatcatcher.
Polioptila melanura black-tailed gnatcatcher	F: ND C: ND State rank: S3S4 CVMSHCP: No	Nests in wooded desert wash habitat containing mesquite, palo verde, ironwood, and acacia. May also occur in areas with salt cedar, especially when adjacent to native wooded desert wash habitat. Also occurs in desert scrub habitat in winter.	Nesting: Absent Nesting Habitat lacking. Foraging: Low May forage or move through site from nearby areas.
Pyrocephalus rubinus vermilion flycatcher	F: MBTA C: SSC (nesting) State Rank: S2S3 CVMSHCP: No	During nesting, inhabits desert riparian adjacent to irrigated fields, irrigation ditches, pastures, & other open, mesic areas with nests in cottonwood, willow, mesquite, or other large desert riparian trees. Also known to nest in landscaped areas such as commercial and residential developments, golf courses and parks.	Nesting: Absent Nesting habitat lacking. Foraging: Low If nesting nearby.

Recurvirostra americana American avocet	F: MBTA, BCC C: None State Rank: CVMSHCP: No	Typically nest in shallow wetlands, islands, and dikes. Breed in shallow wetlands.	Nesting: Absent Suitable nesting habitat lacking. Wetland habitats not present. Foraging: Absent Suitable habitat lacking. Wetland habitats not present.
Spinus lawrencei Lawrence's Goldfinch	F: MBTA, BCC C: None State Rank: CVMSHCP: No	Reside in oak woodlands, chaparral, coastal scrub, juniper pine woodlands, Nest in dense vegetation near water sources.	Nesting: Absent Suitable nesting habitat lacking. Dense vegetation and water sources not present. Foraging: Very low Could move through site during migration.
Toxostoma crissale crissal thrasher	F: None C: SSC State Rank: S2 CVMSHCP: Yes*	Resident of SE deserts in desert riparian and wash habitats, nests in dense mesquite, ironwood, catclaw, arrowweed.	Nesting: Absent Suitable nesting habitat lacking. Foraging: Very low If nesting nearby. Site is not within CVMSHCP modeled habitat for this species.
Toxostoma lecontei Le Conte's thrasher	F: MBTA, BCC C: SSC (nesting), FGC State Rank: S3 CVMSHCP: Yes*	Desert resident; primarily of open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub habitats. Nest in dense, spiny shrub or densely branched cactus in desert wash habitat, usually 2-8 feet above ground.	Nesting: Absent Suitable nesting habitat lacking. Foraging: Low If nesting nearby. Suitable habitat not observed on adjacent lands, however. Site is not within CVMSHCP modeled habitat for this species.
Toxostoma redivivum California thrasher	F: MBTA, BCC C: None State Rank: CVMSHCP:	Prefer dense chaparral habitat	Nesting: Absent Suitable nesting habitat lacking. Chaparral vegetation not present. Foraging: Absent Suitable habitat not in surrounding area.
Vireo bellii pusillus least Bell's vireo	F: END C: END State rank: S2 CVMSHCP: Yes	Riparian woodland habitats along the riverine systems of Southern California, primarily in San Diego, Santa Barbara, and Riverside Counties. Needs dense shrub cover within 1 to 2 meters (3 to 6 feet) off the ground for nesting, and stratified canopy for foraging	Nesting: Absent Suitable habitat lacking. Riparian vegetation not present. Foraging: Low Migration only Site is not within designated critical habitat for this species.

* Species conserved under the CVMSHCP, but is still protected by the MBTA and FGC

Table 7. Special Status Mammals

Species	Status	Habitat	Probability
Chaetodipus fallax pallidus pallid San Diego pocket mouse	F: None C: SSC State Rank: S3S4 CVMSHCP: No	Desert border areas in desert wash, desert scrub, desert succulent scrub, pinon-juniper, etc. Sandy herbaceous areas usually in association with rocks or coarse gravel.	Absent Suitable habitat lacking. Sandy soils not present. Site largely disturbed and surrounded by developed areas.
Dipodomys merriami collinus Earthquake Merriam's (Aguanga) kangaroo rat	F: None C: SSC State Rank: S1S2 CVMSHCP: No	Known only from San Diego & Riverside Counties. Associated with Riversidean sage scrub, chaparral, & non-native grassland. Needs sandy loam substrates for digging of burrows.	Absent Suitable habitat lacking. Sage scrub, chaparral and non-native grasslands not present. The CNDDB records near site out of range and habitat for this subspecies. Presumably these records are in error and refer to a different subspecies.
Lasiurus xanthinus western yellow bat	F: None C: SSC State Rank: S3 WBWG: H CVMSHCP: Yes	Found in a variety of habitats: Valley foothill riparian, desert riparian, desert wash, and palm oasis habitats	Roosting: Moderate Species could potentially roost within the palm fronds of the palm trees on site. Foraging: Moderate If nesting roosting on/near site.
Neotoma lepida intermedia San Diego desert woodrat	F: None C: SSC State Rank: S3S4 CVMSHCP: No	Coastal scrub of southern California. Moderate to dense canopies preferred. Particularly abundant in rock outcrops & rocky cliffs & slopes.	Absent Although there are rocky outcrops present on-site; suitable coastal scrub vegetation is lacking. Site is largely developed, and the surrounding area is heavily developed. Woodrat sign detected on-site most likely desert woodrat (*N. l. lepida*).

Table 7. Special Status Mammals

Species	Status	Habitat	Probability
Nyctinomops femorosaccus pocketed free-tailed bat	F: None C: SSC State Rank: S2S3 WBWG: M CVMSHCP: No	Rocky areas with high cliffs in a variety of arid areas in southern California. Usually found near large water sources.	Roosting: Low Suitable habitat may be present in rocky outcrops on the hillside on-site but high cliffs and large body of water not present. Foraging: Low May roost on site or in vicinity and forage over site.
Nyctinomops macrotis Big free-tailed bat	F: None C: None State Rank: S3 WBWG: M CVMSHCP: No	Low-lying arid areas in Southern California. Roost in rocky outcrops, high cliffs, tree crevices, and occasionally roost in buildings. Roost in areas with water resources nearby.	Roosting: Low Rocky outcrops present within the on-site hillside may be suitable. Foraging: Low If roosting in vicinity.
Ovis canadensis nelsoni (Pop. 2) Peninsular bighorn sheep DPS	F: END C: THR State Rank: S1 MSHCP: Yes	Eastern slopes of the Peninsular Ranges below 4,600 feet. Optimal habitat includes steep-walled canyons/ridges bisected by rocky or sandy washes w/ available water	Absent Although a rocky hill exists in the work site, the site is isolated from the Santa Rosa mountains (BPS range) by the Highway 111 and existing development. If a sheep made it to the site, the small hillside does not have the resources to provide a permanent residence. The site is not within PBS reserve.
Perognathus longimembris bangsi Palm Springs pocket mouse	F: None C: SSC State Rank: S2 CVMSHCP: Yes	Inhabits flat or gently sloping areas with sparse vegetative cover and packed or sandy soils.	Absent Soil is disturbed and graded. Sandy soils not present. Site is surrounded by existing development. Site not within CVMSHCP modeled habitat for this species.
Perognathus longimembris brevinasus Los Angeles pocket mouse	F: None C: SSC State Rank: S1S2 CVMSHCP: No	Inhabits lower elevation grasslands and coastal sage communities in/around Los Angeles basin. Prefers open ground and fine sandy soils.	Absent Suitable habitat lacking. Grasslands and preferred habitat do not exist on or adjacent to the site.

Table 7. Special Status Mammals

Species	Status	Habitat	Probability
Xerospermophilus tereticaudus chlorus Coachella Valley (Palm Springs) round-tailed ground squirrel	F: None C: SSC State Rank: S1S2 CVMSHCP: Yes	Prefers open, flat, grassy areas in fine-textured, sandy soil in desert succulent scrub, desert wash, desert scrub, alkali scrub, & levees.	Absent Preferred habitat lacking. Sany soils not present. Soils on site are disturbed and compacted. Site not within CVMSHCP modeled habitat for this species.

Definitions of status designations and occurrence probabilities for Tables 1-7

Definitions for Species

Italics – Scientific name (*i.e., Genus species subspecies*)

Bold – Standard common name

[*Genus*] – Previous genus, relatively recent taxonomic revision

var. – variety (plants only)

DPS – Distinct Population Segment

Definitions of occurrence probability:

Occurs: Observed or detected on-site by WSP or recently reported by another reliable source.

High: Observed in similar habitat in region by qualified biologists, or habitat on-site is a type often utilized by the species and the site is within the known range of the species.

Moderate: Reported sightings in surrounding region, or site is within the known range of the species and habitat on-site is a type occasionally used by the species.

Low: Site is within the known range of the species but habitat on-site is rarely used by the species

Very Low: Habitat is of marginal suitability and/or site is at the edge of species known range or distribution.

*Absent:*A focused study failed to detect the species, suitable habitat not present, or site is outside the geographic distribution of the species.

Unknown: No focused surveys have been performed in the region, & the species' distribution & habitat are poorly known.

CVMSHCP designations

Yes: Conserved by the CVMSHCP

No: Not Specifically Conserved by the CVMSHCP

Federal designations: (F = federal Endangered Species Act or USFWS designations)

END: Federally listed, Endangered

THR: Federally listed, Threatened

CAN: Candidate for Federal listing

MBTA: Migratory Bird Treat

BEPA: Bald Eagle Protection Act (also protects Golden Eagles)

BCC: Birds of Conservation Concern

None: No designation

State designations: (C = California Endangered Species Act or CDFG designations)

END: State listed, Endangered

THR: State listed, Threatened

CAN: Candidate for State listing

RARE: State listed, Rare

FP: Fully Protected Species

SSC: Species of Special Concern

FGC: Fish and Game Code

WL: Watch List Species

CDFW state rankings are a reflection of the overall condition of an element throughout its California range. The number after the decimal point represents a threat designation attached to the rank:

S1 = Critically Imperiled. Less than (<) 6 Element Occurrences (EOs) OR < 1,000 individuals OR < 2,000 acres
- S1.1 = very threatened
- S1.2 = threatened
- S1.3 = no current threats known

S2 = Imperiled. 6-20 EOs OR 1,000-3,000 individuals OR 2,000-10,000 acres
- S2.1 = very threatened
- S2.2 = threatened
- S2.3 = no current threats known

S3 = Vulnerable. 21-80 EOs OR 3,000-10,000 individuals OR 10,000-50,000 acres
- S3.1 = very threatened
- S3.2 = threatened
- S3.3 = no current threats known

S4 = Apparently Secure. Uncommon but not rare in the state; some cause for long-term concern.
S5 = Secure. Common, widespread, and abundant in the state.
SH = All known California sites are historical, not extant

? = Qualifier: Inexact or Uncertain - A question mark represents a rank qualifier, denoting an inexact or uncertain numeric rank.

California Native Plant Society (CNPS) designations:

Primary Categories
LIST 1A: Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere
LIST 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
LIST 2A: Plants Presumed Extirpated in California, But Common Elsewhere
LIST 2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
LIST 3: Plants About Which More Information is Needed - A Review List
LIST 4: Plants of Limited Distribution - A Watch List

Subdivisions within Categories
0.1: Seriously threatened in California
0.2: Moderately threatened in California
0.3: Not very threatened in California

Western Bat Working Group (WBWG) designations:

The Western Bat Working Group is comprised of agencies, organizations and individuals interested in bat research, management and conservation from the 13 western states and provinces. Its goals are (1) to facilitate communication among interested parties and reduce risks of species decline or extinction; (2) to provide a mechanism by which current information on bat ecology, distribution and research techniques can be readily accessed; and (3) to develop a forum to discuss conservation strategies, provide technical assistance and encourage education programs.

- H: High: Species which are imperiled or are at high risk of imperilment based on available information on distribution, status, ecology and known threats.
- M: Medium: Species which warrant a medium level of concern and need closer evaluation, more research, and conservation actions of both the species and possible threats. A lack of meaningful information is a major obstacle in adequately assessing these species' status and should be considered a threat.
- L: Low: Species for which most of the existing data support stable populations, and for which the potential for major changes in status in the near future is considered unlikely. There may be localized concerns, but the overall status of the species is believed to be secure. Conservation actions would still apply for these bats, but limited resources are best used on High and Medium status species.
- P: Periphery: This designation indicates a species on the edge of its range, for which no other designation has been determined.

6.0 DISCUSSION

The proposed development of the 7.20 acres project site would result in the loss/conversion of approximately 3.0 acres of the total project site. The proposed disturbed areas are composed of a parking lot, and a graded vacant lot. The rock outcrop is not expected to be disturbed. The likelihood of occurrence for the special status species reported from the vicinity has either been eliminated or reduced by existing development on site and in the surrounding area, removal of most native vegetation, and the grading of existing soils. The vegetation on the rock outcrop is mostly undisturbed and most closely aligns with creosote bush scrub as described by Sawyer et. al (2009). Other existing site disturbance (i.e., compaction of soils, human disturbance, and dumping and accumulation of roadside trash) further reduces the likelihood of occurrence of many special status species. Furthermore, the presence of existing adjacent residential and commercial development to the north, south, and east of the site, and Highway 111 to the west have largely isolated the site from other undeveloped open space. The Santa Rosa Mountains are undeveloped and exist to the west and south of the site. The only barrier between the west end of the project site and the Santa Rosa mountains is Highway 111. As a result, connectivity of the site to other undeveloped open space has been eliminated, or at least diminished, for many terrestrial species.

The CVMSHCP was designed to streamline the permitting process and to mitigate potential impacts resulting from covered projects and the lawful activities of permittees through payment of the requisite development fee and participation in plan's requirements. A few species, which are not covered by the CVMSHCP and/or are not yet adequately conserved by the CVMSHCP (e.g., burrowing owl, nesting birds) require additional consideration and/or actions, which are detailed below.

6.1 Discussion of the Special Status Biological Resources Tables

A review of the CNDDB, CNPS and IPaC Resources List resulted in a total of 103 special status biological resources that have been reported from the vicinity (Tables 1-7). Of these, 92 are considered to be absent. The special status biological resources that are considered to be absent from the site include: chaparral sand-verbena (*Abronia villosa* var. *aurita*), Borrego milk-vetch (*Astragalus lentiginosus var. borreganus*), Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*), Lancaster milk-vetch (*Astragalus preussii* var. *laxiflorus*), triple-ribbed milk-vetch (*Astragalus tricarinatus*), Peninsular spineflower (*Chorizanthe leptotheca*), glandular ditaxis (*Ditaxis claryana*), Booth's evening primrose (*Eremothera boothii* var. *boothii*), Joshua Tree poppy (*Eschscholzia androuxii*), Arizona spurge (*Euphorbia arizonica*), flat-seeded spurge (*Euphorbia platysperma*), southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*), Cooper's rush (*Juncus cooperi*), Torrey's box-thorn (*Lycium torreyi*), California marina (*Marina orcuttii* var. *orcuttii*), spear-leaf matelea (*Matelea parvifolia*), slender cottonheads (*Nemacaulis denudate* var. *gracilis*), Deep

Canyon snapdragon (*Pseudorontium cyanthiferum*), Horn's milk vetch (*Astragalus hornii* var. *hornii*), singlewhorl burrobush *(Ambrosia monogyra*), alkali marsh aster (*Almutaster pauciflorus*), Payson's jewel flower (*Caulanthus simulans*), southern jewel flower (*Streptanthus campestris*), Parish's brittlescale (*Atriplex parishii*), pygmy lotus (*Acmispon haydonii*), Parry's spineflower (*Chorizanthe parryi*), white-bracted spineflower (*Chorizanthe xanti* var. *leucotheca*), little San Bernardino Mtns. Linanthus (*Linanthus maculatus*), San Jacinto linanthus (*Linanthus jaegeri*), Latimer's woodland gilia (*Saltugilia latimeri*), shaggy haired alum root (*Heuchera hirsutissima*), California ayenia (*Ayenia compacta*), lemon lily (*Lilium parryi*), California brevifolia (*Imperata brevifolia*), Sonoran maiden fern (*Pelazoneuron puberulum* var. *sonorense*), Parish's Chaenactis (*Chaenactis parishii*), Mojave tarplant (*Deinandra mohavensis*), Johnston's rockcress (*Arabis johnstonii*), rigid fringepod (*Thysanocarpus rigidus*), long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*), white-marginated oxytheca (*Oxytheca emarginata*), California beardtongue (*Penstemon californicus*), San Jacinto mariposa-lily (*Calochortus palmeri* var. *munzii*), pointed dodder (*Cuscuta californica* var. *apiculata*), Palomar monkeyflower (*Erythranthe diffusa*), slender bedstraw (*Galium pumilum*), beautiful hulsea (*Hulsea vestita* ssp. *Callicarpa*), San Jacinto beardtongue (*Penstemon clevelandii* var. *conatus*), desert spike-moss (*Selaginella eremophila*), Cove's cassia (*Senna covesii*), purple stemodia (*Stemodia durantifolia*), Mecca-aster (*Xylorhiza cognata*), desert fan palm oasis woodland, Casey's June beetle (*Dinacoma caseyi*), Crotch's bumblebee (*Bombus crotchii*), Coachella giant sand treader cricket (*Macrobaenetes valgum*), cheeseweed owlfly (*Oliarces clara*), Coachella Valley Jerusalem cricket (*Stenopelmatus cahuilaensis*), desert pupfish (*Cyprinodon macularius*), flat-tailed horned lizard (*Phrynosoma mcallii*), Coachella Valley fringe-toed lizard (*Uma inornata*), desert tortoise (*Gopherus agassizii*), nesting golden eagle (*Aquila chrysaetos*), nesting burrowing owl (*Athene cunicularia*), nesting southwestern willow flycatcher (*Empidonax traillii extimus*), nesting prairie falcon (*Falco mexicanus*), nesting bald eagle (*Haliaeetus leucocephalus*), nesting loggerhead shrike (*Lanius ludovicianus*), nesting black-tailed gnatcatcher (*Polioptila melanura*), nesting vermilion flycatcher (*Pyrocephalus rubinus*), nesting crissal thrasher (*Toxostoma crissale*), nesting Le Conte's thrasher (*Toxostoma lecontei*), nesting least Bell's vireo (*Vireo bellii pusillus*), nesting coastal California gnatcatcher (*Polioptila californica californica*), nesting black swift (*Cypseloides niger*), nesting American avocet (*Recurvirostra americana*), nesting California thrasher (*Toxostoma redivivum*), nesting Clark's grebe (*Aechmophorus clarkii*), nesting Lawrence's goldfinch (*Spinus lawrencei*), nesting Western grebe (*Aechmophorus occidentalis*), Palm Springs pocket mouse (*Perognathus longimembris bangsi*), Coachella Valley (Palm Springs) round-tailed ground squirrel (*Xerospermophilus tereticaudus chlorus*), pallid San Diego pocket mouse (*Chaetodipus fallax pallidus*), Earthquake Merriam's (Aguanga) kangaroo rat (*Dipodomys merriami collinus*), San Diego desert woodrat (*Neotoma lepida intermedia*), Peninsular bighorn sheep (*Ovis canadensis nelsoni*), and Los Angeles docket mouse (*Perognathus longimembris brevinasus*).These special status biological resources will not be discussed further, with the exception of a few.

Three of the species presumed to be absent, and one species considered to have "moderate" likelihood of being on the site are fully (or partially) covered, conserved (or partially conserved) under the CVMSHCP. Participation in the CVMSHPS and payment of the requisite CVMSHCP development fee and participation in the plan is expected to fully mitigate project related impacts (if any) to these species. Although not detected during the assessment, the western yellow bat could potentially roost in the mature California palm aprons and trees on-site. This species and mitigation efforts are discussed below. Regardless of whether these species occur on the project site or not, participation in the CVMSHCP and payment of the development fee is designed and intended to provide full coverage of potential project-related impacts. Although desert tortoise, burrowing owl, and Peninsular bighorn sheep are considered to be absent from the site, due to an overall lack of suitable habitat, they will also be discussed below for further clarification.

6.1.1 Species Covered Under the CVMSHCP

Desert tortoise is considered to be absent from the project site due to a lack of suitable habitat. However, this species is covered by the CVMSHCP and occasionally require additional efforts prior to development. The desert tortoise is federally and state listed as threatened by the CDFW and USFWS. Although desert tortoise is covered under the CVMSHCP, further actions are required (where suitable habitat is present) to ensure that take is entirely avoided and/or minimized to the greatest extent possible. No live desert tortoises or sign thereof (i.e., burrows, scat, tracks, carcass remains, courtship rings, drinking depressions) were observed on-site during the assessment. Furthermore, the site is not only surrounded by development, but also has existing development on site. The site is not located within designated critical habitat or CVMSHCP modeled habitat for desert tortoise. For these reasons, habitat suitable for desert tortoise is not present on-site. Additionally, surrounding lands (with the exception of lands to the west) have been developed or are currently in the process of being developed. The land to the east is vacant, undeveloped and disturbed but also does not appear to support habitat suitable for desert tortoise. For these reasons, although a very limited amount of remnant vegetation community (i.e., creosote bush scrub) that might otherwise technically be suitable for the desert tortoise, existing site conditions (i.e., nearly 100% conversion to former agricultural practices, existing and past site disturbance, existing adjacent development, etc.) have resulted in an area that is currently unsuitable for this conspicuous and wide-ranging species. For these reasons, it is the opinion of WSP that desert tortoise is absent from the project site and that focused surveys are not warranted or recommended. Project implementation is anticipated to have no impact on the desert tortoise.

The burrowing owl is considered absent from the project site. No burrowing owls, or sign thereof, were observed or detected on-site during the assessment. No California ground squirrel burrows of sufficient size to be suitable for burrowing were observed on-site. For these reasons, WSP considers there to be no potential for the occurrence of burrowing owl on-site. Therefore, they

are not anticipated to be an issue for the proposed development of the site. The burrowing owl is not currently listed as a federal or state listed threatened or endangered species. It is, however, managed as a BCC by the USFWS and designated as a candidate species for listing as endangered by the CDFW. This means it receives the same protections as a state-listed endangered species for a temporary period while review of the status takes place. It is also protected by the MBTA and FGC. The burrowing owl is a covered species under the CVMSHCP, however the federal permit for the CVMSHCP does not allow take of this species under the MBTA. Any impacts to burrowing owl would be considered significant under the CEQA, but are not anticipated at this time.

Peninsular bighorn sheep are considered to be absent from the project site. This species is covered by the CVMSHCP and sometimes require additional efforts. The Peninsular bighorn sheep (PBS) is federally listed as endangered and listed as threatened in California. The project site is within one mile of critical PBS habitat (Figure 6). However, the critical habitat and the project site are divided by the Highway 111. Migration to the site is unlikely, but not impossible. Although there is one relatively small rocky hillside on-site, no sign was observed, and the area is assumed to be not occupied by the species. Thus, Peninsular bighorn sheep are not anticipated to be an obstacle for the project development.

Roosting habitat for Western yellow bat is present on site. This species is covered by the CVMSHCP and is also listed as a species of special concern in California. The western yellow bat is also considered imperiled or at higher risk of imperilment by the Western Bat Working Group (WBWG). This species roosts in palm fronds which exist on site. Therefore, a bat clearance survey is recommended before removal of palm trees that exist on site, if removal is proposed. It should be noted that bats and bat sign were not observed during the biological assessment.

The remaining 10 species, which are not covered, or not fully covered, under the CVMSHCP are discussed separately below.

6.1.2 Plant Species Not Covered Under the CVMSHCP

Pink velvet mallow is considered to have a “low” possibility of occurring on-site, as they exist in rocky areas in creosote bush scrub. Potentially suitable habitat (creosote bush scrub) is located on the undeveloped rock hillside. Pink velvet mallow is not listed as threatened or endangered by either the CDFW or USWFW. This species has been designated as a List 4.3 species, generally meaning that on a watch list and is “not threatened in California” by the CNPS. Pink velvet mallow has also been assigned a state rank of S4 meaning that the species is generally considered to be “secure” in the state and is also uncommon in the state. Pink velvet mallow is not a CVMSHCP-covered species; therefore development fees offer no mitigation for impact (if any). Impacts could be considered significant under the CEQA if a significant population were to be present on-site. The likelihood of this project encountering/ disturbing this species is low due to the project not being expected to disturb the rock hillside. Therefore, impacts to pink velvet

mallow (if any) would not likely be considered significant under the CEQA. As a result, a focused survey for pink velvet mallow at this site is not anticipated to be required.

California ditaxis is considered to have a "low" possibility of occurring on-site, due to the presence of potentially suitable habitat (creosote bush scrub) located on the undeveloped rock hillside. California ditaxis is not listed as threatened or endangered by either the CDFW or USWFW. This species has been designated as a List 3.2 species, generally meaning that "more information is needed" but that it is considered a "moderately threatened in California" by the CNPS. California ditaxis has also been assigned a state rank of S2? Meaning that the species is generally considered to be "imperiled" in the state but that the assigned rank is inexact or uncertain. Like the other species above, California ditaxis is not a CVMSHCP-covered species, therefore development fees offer no mitigation for impact (if any). Impacts could be considered significant under the CEQA if a significant population were to be present on-site. The likelihood of this project encountering/ disturbing this species is low due to the project not being expected to disturb the rock hillside. Therefore, impacts to California ditaxis (if any) would not likely be considered significant under the CEQA. As a result, a focused survey for California ditaxis at this site is not anticipated to be required.

Newberry's velvet mallow is considered to have a "low" possibility of occurring on-site, as they exist in rocky areas in creosote bush scrub. Potentially suitable habitat (creosote bush scrub) is located on the undeveloped rock hillside. Newberry's velvet mallow is not listed as threatened or endangered by either the CDFW or USWFW. This species has been designated as a List 4.3 species, generally meaning that on a watch list and is "not threatened in California" by the CNPS. Newberry's velvet mallow has also been assigned a state rank of S4 meaning that the species is generally considered to be "secure" in the state, and is also uncommon in the state. Like the other species above, Newberry's velvet mallow is not a CVMSHCP-covered species, therefore development fees offer no mitigation for impact (if any). Impacts could be considered significant under the CEQA if a significant population were to be present on-site. The likelihood of this project encountering/ disturbing this species is low due to the project not being expected to disturb the rock hillside. Therefore, impacts to Newberry's velvet mallow (if any) would not likely be considered significant under the CEQA. As a result, a focused survey for Newberry's velvet mallow at this site is not anticipated to be required.

Winged cryptantha is considered to have a "low" possibility of occurring on-site, as they exist in rocky areas in creosote bush scrub. Potentially suitable habitat (creosote bush scrub) is located on the undeveloped rock hillside. Winged cryptantha is not listed as threatened or endangered by either the CDFW or USWFW. This species has been designated as a List 4.2 species, generally meaning that on a watch list and is "moderately threatened in California" by the CNPS. Winged cryptantha has also been assigned a state rank of S4 meaning that the species is generally considered to be "secure" in the state, and is also uncommon in the state. Like the other species

above, winged cryptantha is not a CVMSHCP-covered species, therefore development fees offer no mitigation for impact (if any). Impacts could be considered significant under the CEQA if a significant population were to be present on-site. The likelihood of this project encountering/ disturbing this species is low due to the project not being expected to disturb the rock hillside. Therefore, impacts to winged cryptantha (if any) would not likely be considered significant under the CEQA. As a result, a focused survey for winged cryptantha at this site is not anticipated to be required.

Narrow-leaf sandpaper-plant is considered to have a "low" possibility of occurring on-site, as they exist in rocky areas in creosote bush scrub. Potentially suitable habitat (creosote bush scrub) is located on the undeveloped rock hillside. Narrow-leaf sandpaper-plant is not listed as threatened or endangered by either the CDFW or USWFW. This species has been designated as a List 2B.3 species, generally meaning that it is rare and is "not threatened in California" by the CNPS. Narrow-leaf sandpaper-plant has also been assigned a state rank of S3? meaning that the species is generally considered to be "vulnerable" in the state, but this ranking has uncertainty, and more research is needed. Like the other species above, narrow-leaf sandpaper-plant is not a CVMSHCP-covered species, therefore development fees offer no mitigation for impact (if any). Impacts could be considered significant under the CEQA if a significant population were to be present on-site. The likelihood of this project encountering/ disturbing this species is low due to the project not being expected to disturb the rock hillside. Therefore, impacts narrow-leaf sandpaper-plant (if any) would not likely be considered significant under the CEQA. As a result, a focused survey for narrow-leaf sandpaper-plant at this site is not anticipated to be required.

6.1.3 Wildlife Species Not Covered Under the CVMSHCP

Costa's hummingbird was observed on-site during the assessment. This species is not federally or state listed by the USFWS or CDFW, however is managed as a BCC and protected by FGC and the MBTA while nesting. Limited nesting habitat for Costa's hummingbird is present on-site in the palo verde trees and a few other ornamental trees on-site. In order to avoid potentially impacting nesting Costa's hummingbird, avoidance of any project-related disturbance (i.e., grading, vegetation removal, landscaping, operation of heavy equipment, construction, etc.) during the nesting season (1 February through 31 August) is recommended. If initial project disturbance cannot be scheduled to occur outside of the nesting season, a clearance survey for nesting Costa's hummingbird conducted by a qualified ornithologist or biologist immediately prior to on-site disturbance is recommended. If nesting Costa's hummingbirds are found, 100% avoidance of impacts is required and no work buffer zones would need to be established and observed where no work would be permitted until young have fledged. While there is no established protocol for nest avoidance, when consulted the CDFW generally recommends avoidance buffers of about 100–300 feet for unlisted songbirds.

Red diamond rattlesnakes are not covered under the CVMSHCP; however they are considered a species of special concern in California. This species favors rocky habitats, and the undeveloped rock outcrop could potentially act as habitat for this species. However, this pocket of habitat is very small, and the surrounding area is developed and disturbed. At this time, the rock outcrop isn't proposed to be disturbed. Thus, this species is not expected to be an issue for the development of the site. If plans change and disturbance of the rocky area is expected to occur, a clearance survey of the rocky area would be recommended.

Monarch butterflies are not covered by the CVMSHCP and is considered to have a low potential to be on-site if milkweed, their larval host plant, is present. Monarchs are proposed threatened under the Endangered Species Act. Monarchs generally overwinter on the coast, and overwintering habitat was not abundant on site. The larval host plant (milkweed) was not observed during the biological survey. However, these plants typically remain dormant during winter and then re-emerge in the spring. The blooming periods are dependent on the species but generally occur between April-July and May-October. The biological survey took place in January and therefore was out of the blooming period. During the preconstruction survey, the on-site biologist will check the area for milkweed, during their proper blooming period immediately prior to any vegetation removal or soil disturbance.

The undeveloped rock outcrop could act as potential roost sites for both pocketed free tail and big freetail bat. Neither species have federal protections, however pocketed free tail is considered a species of special concern in California. The rock outcrop is not proposed to be impacted by the project development. If these plans change and development is expected to occur on the rock outcrop, it is suggested that a bat clearance survey be conducted prior to work activity.

6.1.4 Additional Bird Species Protected by the Migratory Bird Treaty Act

Excluded from coverage under the CVMSHCP are a variety of common bird species that are protected by the MBTA and FGC. This includes virtually all native migratory and resident bird species, including birds observed on-site and/or known to occur in the vicinity. Avoidance of impacts to these nesting migratory and resident birds is a requirement of the federal permit issued for the CVMSHCP. In order to avoid potentially impacting nesting birds, avoidance of any project-related disturbance (i.e., grading, vegetation removal, landscaping, operation of heavy equipment, construction, etc.) during the nesting season (1 February through 31 August) is recommended. If initial project disturbance cannot be scheduled to occur outside of the nesting season, a nesting bird clearance survey conducted by a qualified ornithologist or biologist immediately prior to on-site disturbance is recommended. If nesting birds are found, no work buffer zones would need to be established and observed where no work would be permitted until young have fledged. While there is no established protocol for nest avoidance, when consulted the CDFW generally

recommends avoidance buffers of about 100–300 feet for unlisted songbirds and 500 feet for listed songbirds and raptors.

6.1.5 Jurisdictional Areas

No natural streams, creeks, rivers, lakes, ponds or pools are located on the project site. For these reasons, no further actions or considerations regarding jurisdictional areas are anticipated to be required for this project.

7.0 CONCLUSION

The City of Rancho Mirage is a signatory to the CVMSHCP (CVCC 2024). Therefore, payment of the required development fees for approved projects are anticipated to mitigate the impacts and/or potential impacts (if any) to covered species potentially resulting from the development of the site, whether those covered species occur there or not. The only species covered under the CVMSHCP that may occur on site is the western yellow bat. Impacts to these species (if any) and their respective habitat, would be fully covered and mitigated under the CVMSHCP with the payment of the requisite development fee and participation in the requirements of the plan.

Bat clearance surveys are recommended if the developers plan to remove any palm trees, or if they intended to disturb the rock outcrop. Currently, the proposed project footprint does not extend to the rock outcrop.

Monarch butterflies are considered to have a low potential to be on-site. The larval host plant (milkweed) was not observed during the biological survey. However, WSP's biological survey was conducted during the dormant period for milkweeds. The blooming periods are dependent on the species but generally occur between April-July and May-October It is suggested that during the preconstruction survey, the on-site biologist looks for milkweed.

No further surveys are recommended for the five special status plant species listed above. If any project related disturbance occurs on the adjacent hillside, a pre-construction clearance survey is recommended.

No further surveys are recommended for red diamond rattlesnakes. The only suitable habitat on site for this species is the rock hillside, which is not currently proposed to be disturbed. If disturbances are proposed to take place on the rock hillside in the future, then a clearance survey is recommended.

Impacts to other bird species protected by the MBTA and FGC, including but not limited to Costa's hummingbird, Cooper's hawk, mourning dove (*Zenaida macroura*), require avoidance. If project activities (i.e., site grading, vegetation removal/trimming, earthwork in undisturbed areas, etc.) are

conducted during the nesting season (i.e., generally between 1 February and 31 August), a nesting bird clearance survey is recommended to ensure impacts to nesting birds are avoided. If project activities are conducted outside of the nesting season, a nesting bird clearance survey could likely be avoided. If active bird nests are found, at any time, proposed project activities would need to be halted and postponed until young have fledged the nest and impacts to nesting birds are entirely avoided.

With participation in and compliance with the requirements of the CVMSHC and implementation of the recommendations above, impacts to special status biological resources are anticipated to be mitigated to a less than significant level.

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USGS. 2021d. *Palm View Peak, Calif.* 7.5-Minute Topographic Quadrangle.

USGS. 2021e. *Palm Springs, Calif.* 7.5-Minute Topographic Quadrangle.

APPENDIX A

SPECIES LIST: VASCULAR PLANTS

APPENDIX A

Species List: Vascular Plants

This list reports only plants observed by WSP on the site during the field assessment. Other species may have been overlooked or undetectable due to their growing season. [*†= special status species,* * = non-native species, sp. = identified only to genus, ^=landscaped/planted, *cf*= compares favorably with]

Arecaceae	Palm family
Washingtonia filifera^	California (desert) fan palm^
*Washingtonia robusta**^	Mexican fan palm^
*Phoenix dactylifera**^	date palm^
Asparagaceae	Agave family
*Agave deserti**^	desert agave*^
Asphodelaceae	Aloe family
*Aloe sp.**^	aloe species*^
Asteraceae	Sunflower family
Encelia farinosa	brittlebush
Bebbia juncea	sweetbush
Palafoxia arida	giant Spanish needles
Perityle emoryi	rock daisy
Ambrosia dumosa	burro bush
Ambrosia salsola	cheesebush
Boraginaceae	Borage family
Johnstonella angustifolia	narrow-leaved cryptantha
Phacelia sp.	scorpion weed species
Euphorbiaceae	Spurges
Euphorbia albomarginata	whitemargin sandmat
*Euphorbia hirta**	asthma-plant*
*Euphorbia tirucalli**^	firestick plant*^
Fouquieriaceae	Ocotillo family
Fouquieria splendens^	Ocotillo^
Geraniaceae	Geranium family
*Erodium cicutarium**	common stork's bill*
Brassicaceae	Mustard family
Hirschfeldia sp.	mustard species
Cactaceae	Cactus family
Opuntia sp.^	prickly pear sp.^
Chenopodiaceae	Goosefoot family
Atriplex polycarpa	cattle saltbush
Fabaceae	Pea family
cf. Acacia sp.* ^	Unidentified non-native acacia* ^
Dalea mollissima	soft prairie clover

*Parkinsonia aculeata** ^	Mexican palo verde*^
Psorothamnus emoryi	dyebush
*Senna artemisioides**	silver senna*
Malvaceae	Mallow family
*Malva parviflora**	cheeseweed*
Myrtaceae	Myrtle family
*Eucalyptus sp.**	eucalyptus species*
Plantaginaceae	Plantain family
Plantago ovata	desert plantain
Rubiaceae	Madder family
Galium angustifolium	narrow leaved bedstraw
Zygophyllaceae	Caltrop family
*Tribulus terrestris**	puncture vine*
Larrea tridentata	creosote bush
Nyctaginaceae	F**our o'clock family**
*Bougainvillea glabra choisy**^	Bougainvillea*^
Poaceae	Grass family
*Cynodon dactylon**^	Bermuda grass*^
*Cenchrus setaceus**	fountain grass*
*Schismus cf. barbatus**	Mediterranean grass*
Stipa speciosa	desert needle grass

APPENDIX B

SPECIES LIST: VERTEBRATE ANIMALS

APPENDIX B

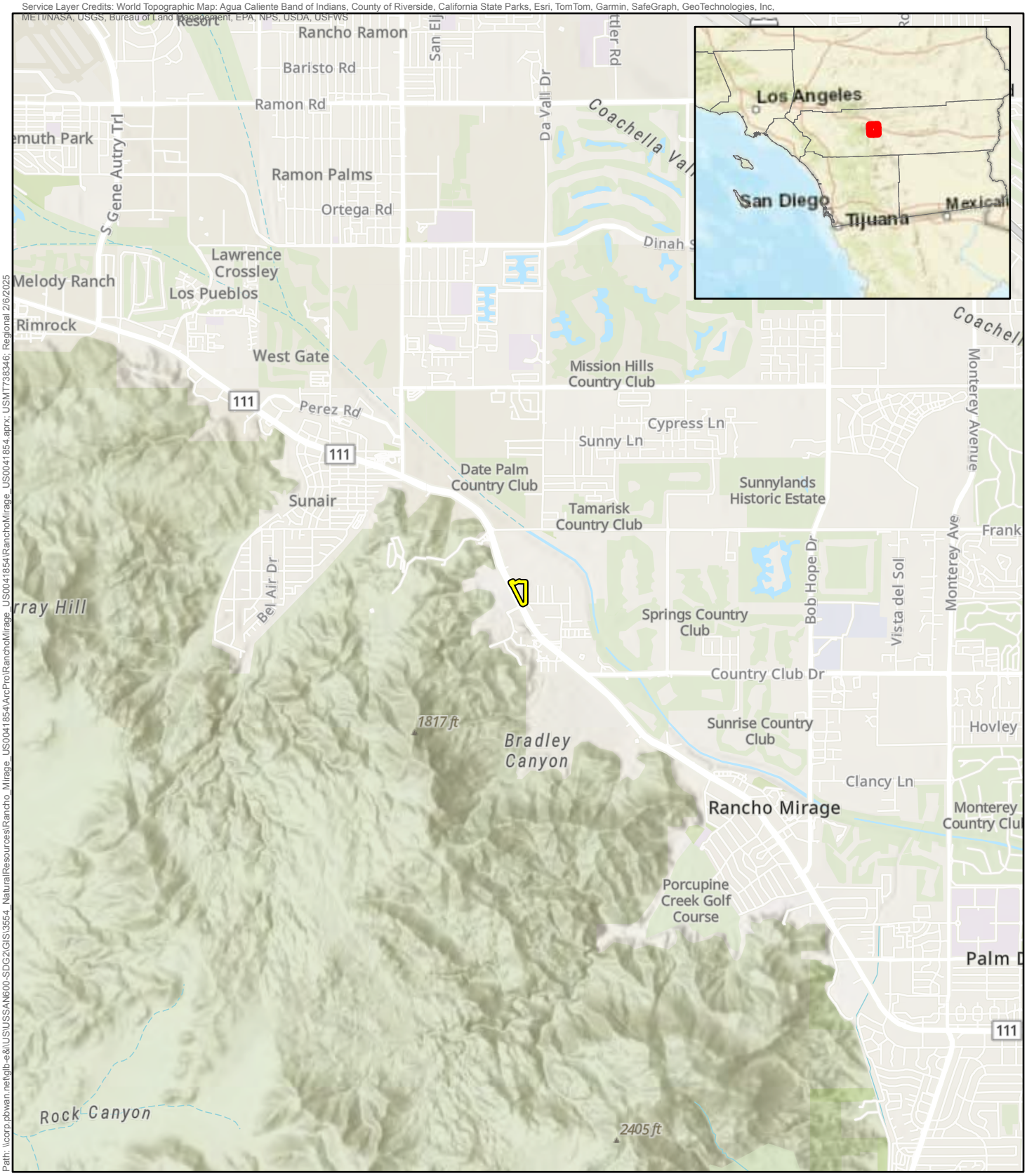
Species List: Vertebrate Animals

This list reports only the vertebrate animals observed or detected by WSP during the field assessment. Other species may have been overlooked or undetectable due to their activity patterns or weather conditions. [*†= special status species,* * = non-native species, sp. = identified only to genus, *cf* = compares favorably with]

VERTEBRATES	
REPTILIA	REPTILES
Phrynosomatidae	Spiny Lizards & Allies
Uta stansburiana	side-blotched lizard
AVES	BIRDS
Columbidae	Pigeons & Doves
Zenaida macroura	mourning dove
Trochilidae	Hummingbirds
Calypte costae†	Costa's hummingbird†
Turdidae	Thrush family
Sialia mexicana	western blue bird
Tyrannidae	Tyrant Flycatchers
Sayornis saya	Say's phoebe
Accipitridae	Hawks, Kites, Eagles & Allies
Buteo lineatus	red-shouldered hawk
Falconidae	Caracaras & Falcons
Falco sparverius	American kestrel
Mimidae	Mockingbirds & Thrashers
Mimus polyglottos	northern mockingbird
Corvidae	Crows & Ravens
Corvus corax	common raven
Corvus brachyrhynchos	American crow
Fringillidae	Fringilline & Cardueline Finches
Haemorhous mexicanus	house finch
Parulidae	New World Warblers
Setophaga coronata	yellow-rumped warbler
MAMMALIA	MAMMALS
Geomyidae	Pocket Gophers
Thomomys bottae (burrows & tailings)	Botta's pocket gopher
Cricetidae	Pack rats
Neotoma sp.	Wood rat species

APPENDIX C

FIGURES

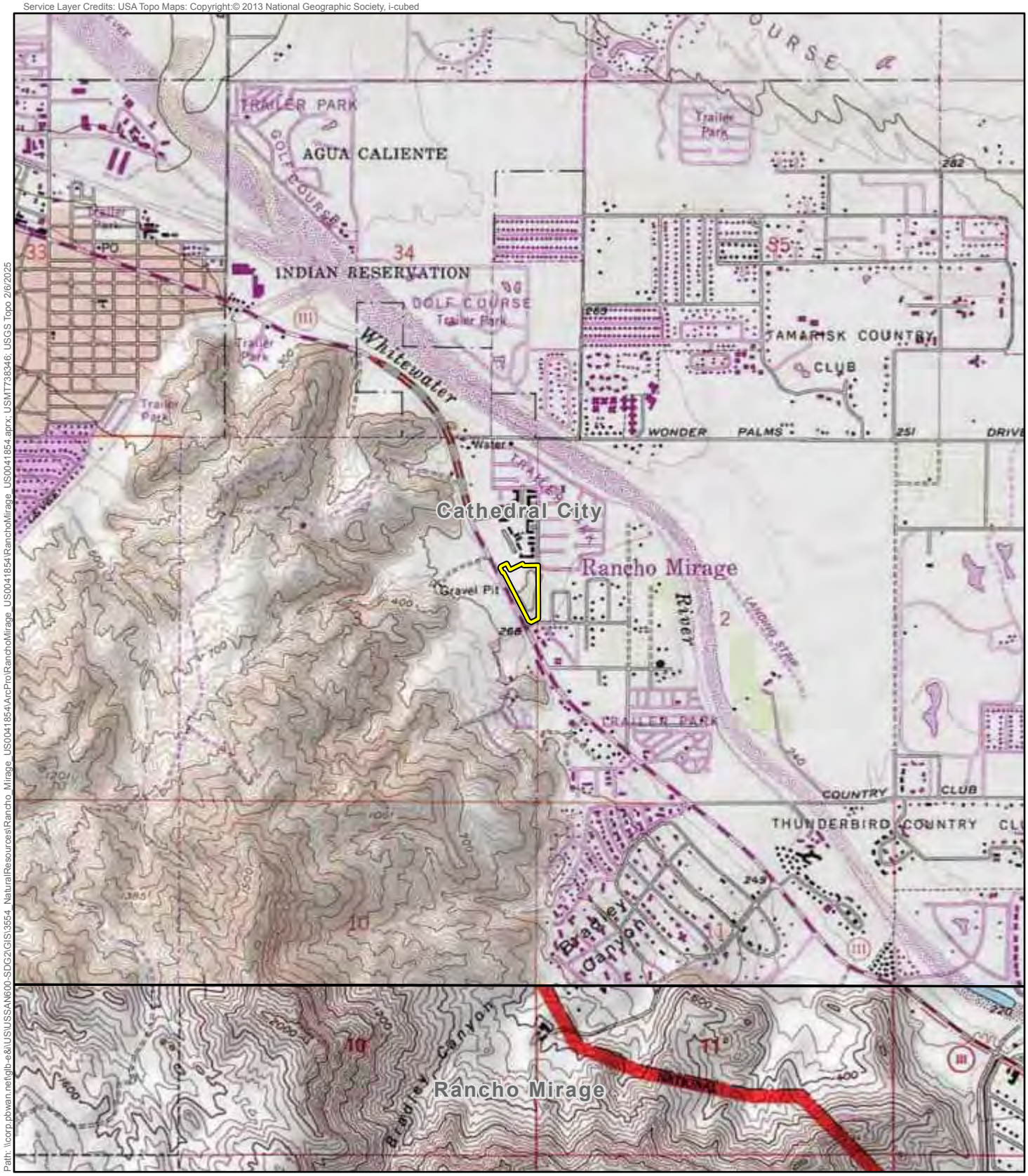


1 inch =1 miles
0 0.5 1 Miles

Project Location

FIGURE 1

Vicinity and Location
Howard World Wildlife Museum
Rancho Mirage
Riverside County, CA



1 inch =2,000 feet
0 1,000 2,000 Feet

Project Location

FIGURE 2

USGS 7.5' Topo Quad: Rancho Mirage
Howard World Wildlife Museum
Rancho Mirage
Riverside County, CA



FIGURE 3

Soils
Howard World Wildlife Museum
Rancho Mirage
Riverside County, CA

Service Layer Credits: World Imagery: Maxar



Path: \\corp.pbwan.net\gb-e&i\US\SSAN600-SDG2\GIS\3554_NaturalResources\Rancho_Mirage_US0041854\ArcPro\RanchoMirage_US0041854\RanchoMirage_US0041854.aprx; USMT738346; Fig 4 - Veg Communities 2/6/2025

1 inch =138 feet
0 100 200 Feet

Project Boundary

Vegetation Type

Urban

FIGURE 4

Vegetation Communities
Howard World Wildlife Museum
Rancho Mirage
Riverside County, CA



1 inch =1 miles
0 0.5 1 Miles

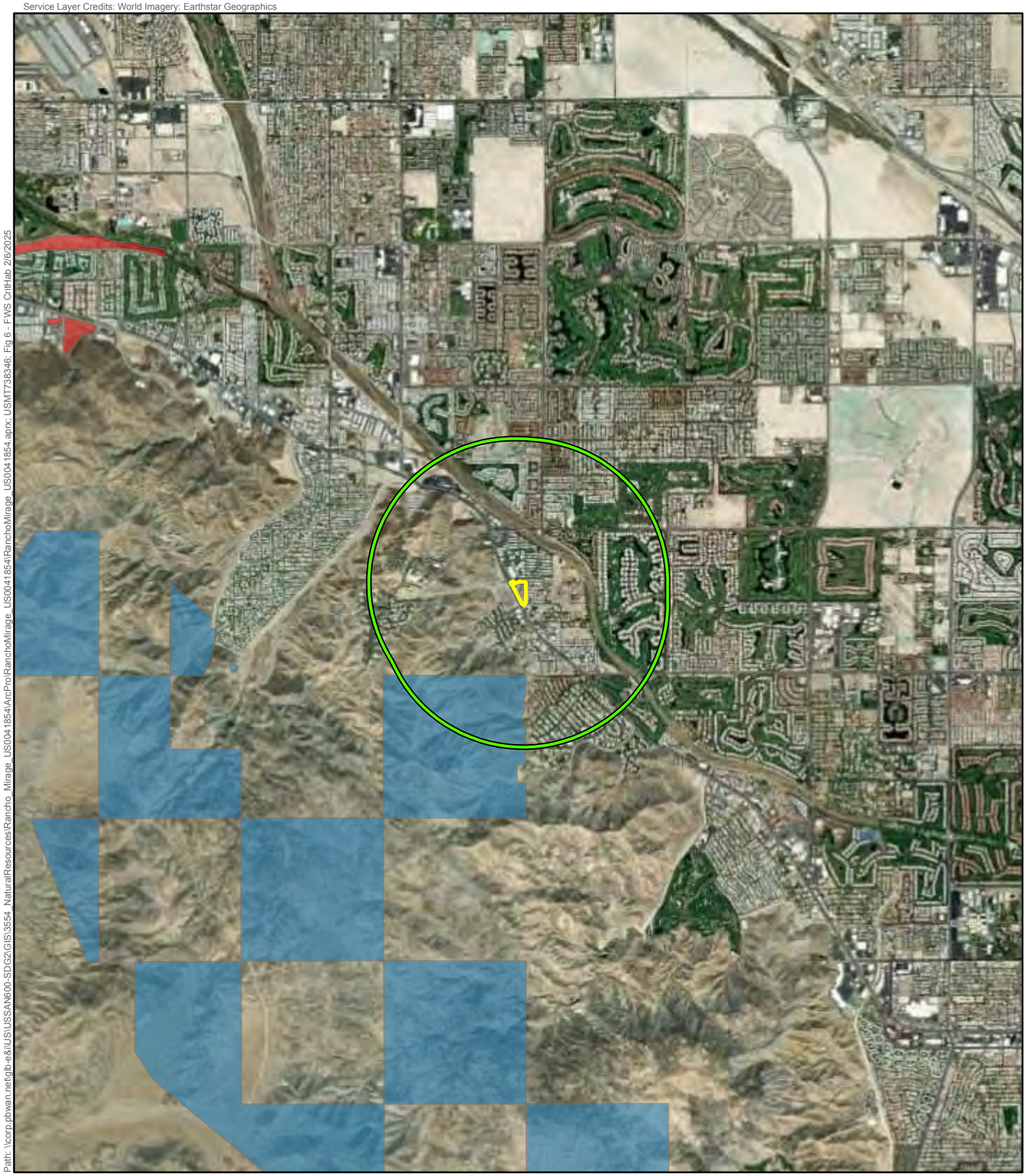
Project Boundary

Conservation Area

Santa Rosa and San Jacinto Mountains Conservation Area

FIGURE 5

CVMSHCP
Howard World Wildlife Museum
Rancho Mirage
Riverside County, CA



Project Boundary

1 Mile Buffer

Critical Habitat

Casey's June Beetle

Peninsular bighorn sheep

1 inch =1 miles

0 0.5 1 Miles

FIGURE 6

Fish and Wildlife Services - Critical Habitat
Howard World Wildlife Museum
Rancho Mirage
Riverside County, CA

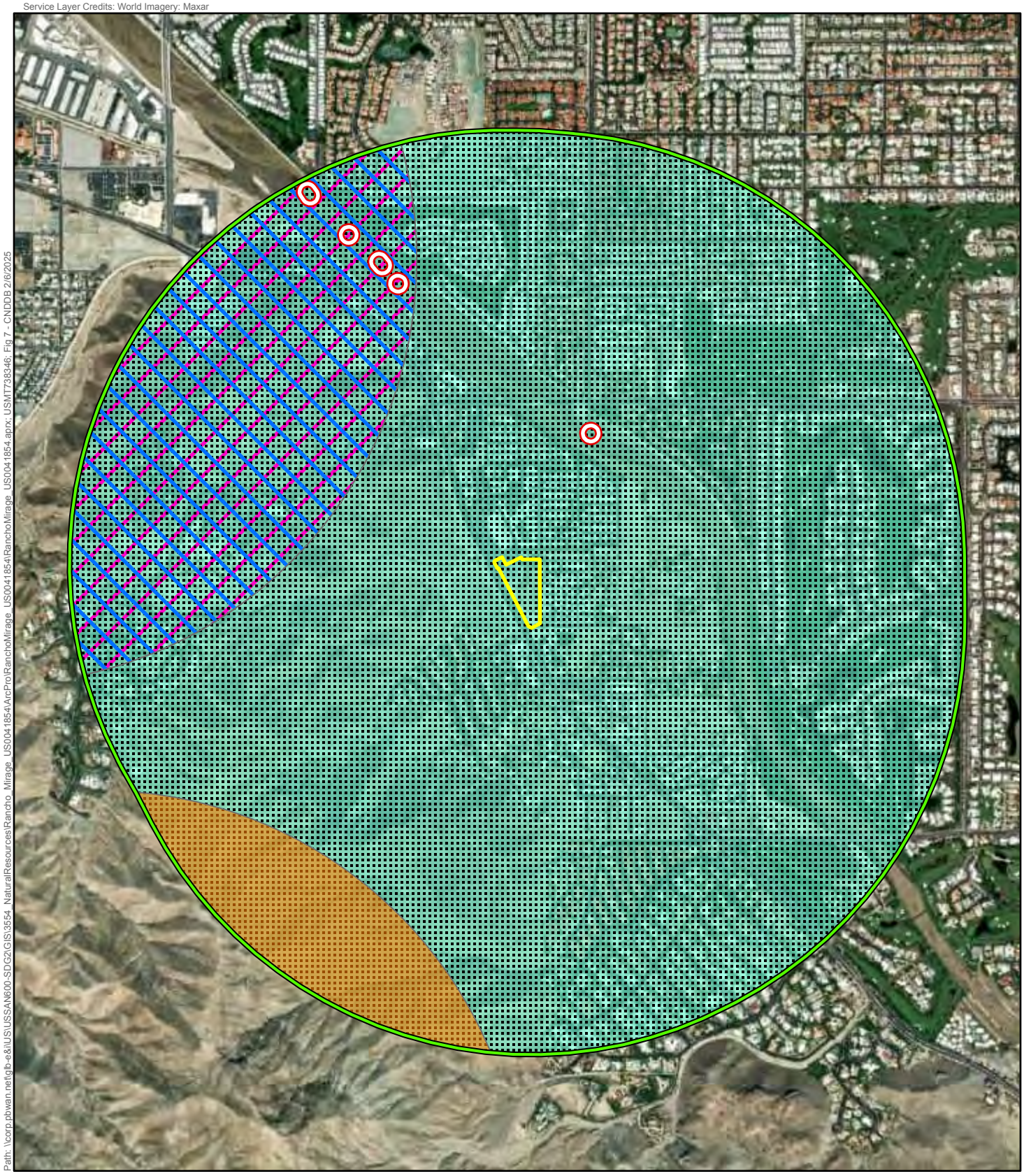


FIGURE 7

CNDDB
Howard World Wildlife Museum
Rancho Mirage
Riverside County, CA

APPENDIX D

PHOTOGRAPHIC EXHIBITS



Photo 1. Parking lot located on project site.



Photo 2. Undisturbed rocky hillside.



Photo 3. Vacant lot graded of vegetation.



Photo 4. Looking west towards the Santa Rosa mountains, Photo was taken from on top of the rocky hill.

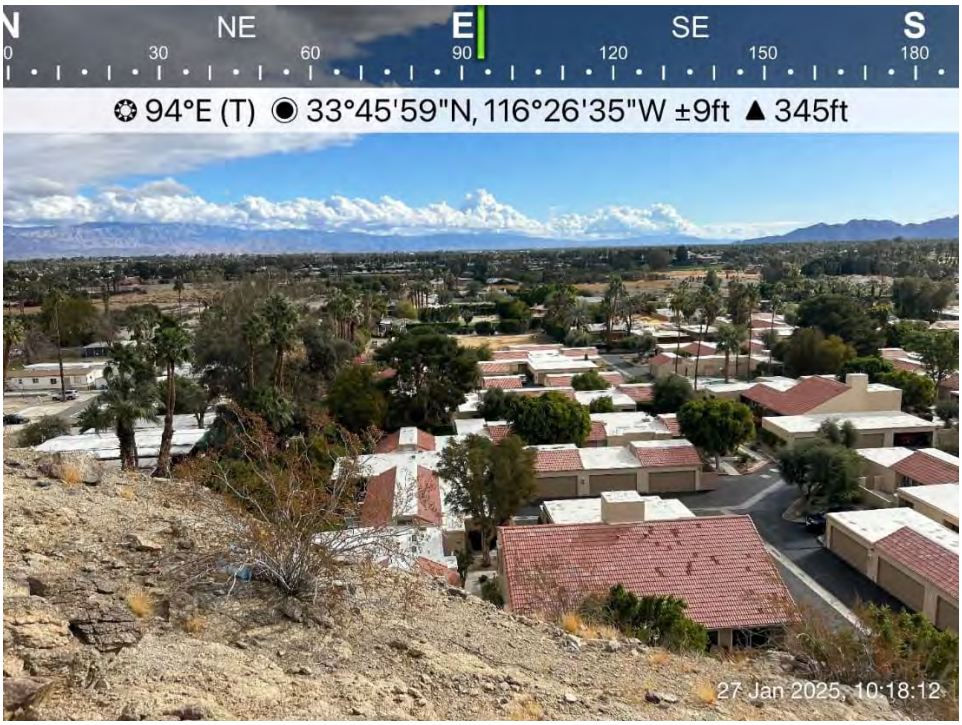


Photo 5. Looking east towards development near the project site. Photo was taken from on top of the rocky hill.



Photo 6. Looking north towards modular home community. Photo taken from the top of the rocky hill.



Photo 7. Looking south towards development and Santa Rosa mountains. Photo taken from the top of the rock hill.



Photo 8. Photo depicting the compact nature of soils on-site.

Appendix C

Phase1
Historical / Archaeological Resources Survey

PHASE I HISTORICAL/ARCHAEOLOGICAL RESOURCES SURVEY

HOWARD WORLD WILDLIFE MUSEUM PROJECT

Assessor's Parcel Nos. 689-040-023, -025, and -028
City of Rancho Mirage, Riverside County, California

For Submittal to:

Development Services Department, Planning Division
City of Rancho Mirage
69-825 Highway 111
Rancho Mirage, CA 92270

Prepared for:

Terra Nova Planning and Research, Inc.
42635 Melanie Place, Suite 101
Palm Desert, CA 92211

Prepared by:

CRM TECH
1016 East Cooley Drive, Suite A/B
Colton, CA 92324

Bai "Tom" Tang, Principal Investigator
Michael Hogan, Principal Investigator

April 10, 2025
CRM TECH Contract No. 4233

Title: Phase I Historical/Archaeological Resources Survey: Howard World Wildlife Museum Project; Assessor's Parcel Nos. 689-040-023, -025, and -028, City of Rancho Mirage, Riverside County, California

Authors: Bai "Tom" Tang, Principal Investigator/Historian
Frank Raslich, Archaeologist/Report Writer
Daniel Ballester, Archaeologist/Field Director
Michael D. Richards, Archaeologist

Consulting Firm: CRM TECH
1016 East Cooley Drive, Suite A/B
Colton, CA 92324
(909) 824-6400

Date: April 10, 2025

For Submittal to: Development Services Department, Planning Division
City of Rancho Mirage
69-825 Highway 111
Rancho Mirage, CA 92270
(760) 328-2266

Prepared for: Nicole Criste, Principal
Terra Nova Planning and Research, Inc.
42635 Melanie Place, Suite 101
Palm Desert, CA 92211
(760) 341-4800

Project Size: Approximately 6.67 acres

USGS Quadrangle: Cathedral City, Calif., 7.5' quadrangle (Section 3, T5S R5E, San Bernardino Baseline and Meridian)

Keywords: Coachella Valley, western Colorado Desert; former site of the Rancho Mirage Chart House restaurant (Kendrick Bangs Kellogg, 1978); no "historical resources" present under CEQA

EXECUTIVE SUMMARY

Between November 2024 and April 2025, at the request of Terra Nova Planning and Research, Inc., CRM TECH performed a cultural resources survey on approximately 6.67 acres of vacant land in the City of Rancho Mirage, Riverside County, California. The subject property of the study consists of Assessor's Parcel Nos. 689-040-023, -025, and -028, located north of the intersection of Highway 111 and Mirage Cove Drive, within Section 3 of Township 5 South, Range 5 East, San Bernardino Baseline and Meridian.

The study is part of the environmental review process for the proposed Howard World Wildlife Museum Project. The City of Rancho Mirage, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA). The purpose of the study is to provide the City with the necessary information and analysis to determine whether the project would cause substantial adverse changes to any "historical resources," as defined by CEQA, that may exist in or around the project area.

To identify such resources, CRM TECH conducted a historical/archaeological resources records search, initiated a Native American Sacred Lands File search, contacted pertinent Native American representatives, pursued historical background research, and carried out an intensive-level field survey. The results of these research procedures indicate that the project area once contained a building at 69-934 Highway 111 that was well-known for its "Organic Modern" architecture. Built in 1978 for the Chart House restaurant chain and designated by architect Kendrick Bangs Kellogg, the building was previously found to be eligible for listing in the National Register of Historic Places and was subsequently designated a local historic resource by the City of Rancho Mirage. After suffering extensive fire damage in 2012, however, the building was demolished in 2013.

No other potential "historical resources" were encountered within the project area throughout the course of the study. Based on these findings, CRM TECH recommends to the City of Rancho Mirage a conclusion of *No Impact* on "historical resources" for the proposed project. No further cultural resources investigation is recommended for the project unless development plans undergo such changes as to include areas not covered by this study. However, if buried cultural materials are encountered during any earth-moving operations associated with the project, all work in that area should be halted or diverted until a qualified archaeologist can evaluate the nature and significance of the finds. Additionally, in recognition of the architectural merit of the Chart House building and its celebrity in the community, the project proponent may consider establishing a commemorative display at or near its former site as a point of local historical interest.

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INTRODUCTION

Between November 2024 and April 2025, at the request of Terra Nova Planning and Research, Inc., CRM TECH performed a cultural resources survey on approximately 6.67 acres of vacant land in the City of Rancho Mirage, Riverside County, California (Figure 1). The subject property of the study consists of Assessor's Parcel Nos. 689-040-023, -025, and -028, located north of the intersection of Highway 111 and Mirage Cove Drive, within Section 3 of Township 5 South, Range 5 East, San Bernardino Baseline and Meridian (Figures 2, 3).

The study is part of the environmental review process for the proposed Howard World Wildlife Museum Project. The City of Rancho Mirage, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.). The purpose of the study is to provide the City with the necessary information and analysis to determine whether the project would cause substantial adverse changes to any "historical resources," as defined by CEQA, that may exist in or around the project area.

To identify such resources, CRM TECH conducted a historical/archaeological resources records search, initiated a Native American Sacred Lands File search, contacted pertinent Native American representatives, pursued historical background research, and carried out an intensive-level field survey. The following report is a complete account of the methods, results, and final conclusion of the study. Personnel who participated in the study are named in the appropriate sections below, and their qualifications are provided in Appendix 1.

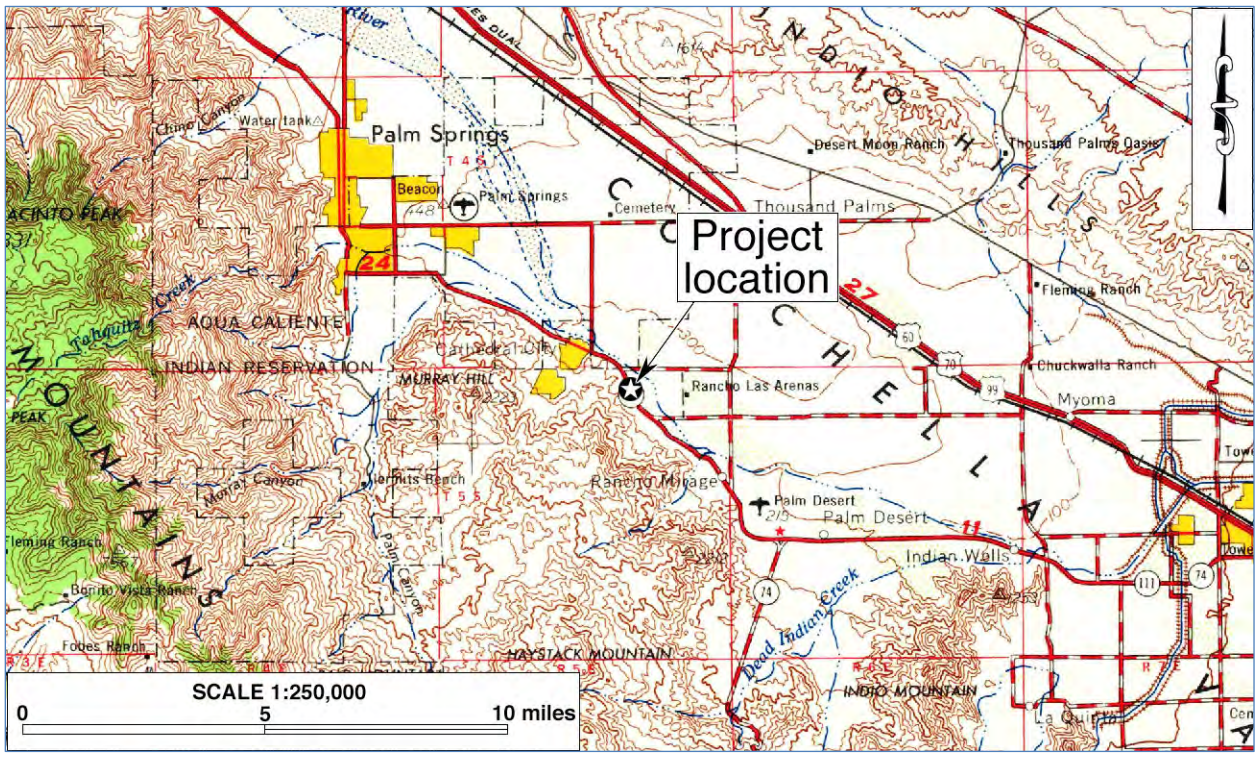


Figure 1. Project vicinity. (Based on the USGS Santa Ana, Calif., 120'x60' quadrangle [USGS 1979])

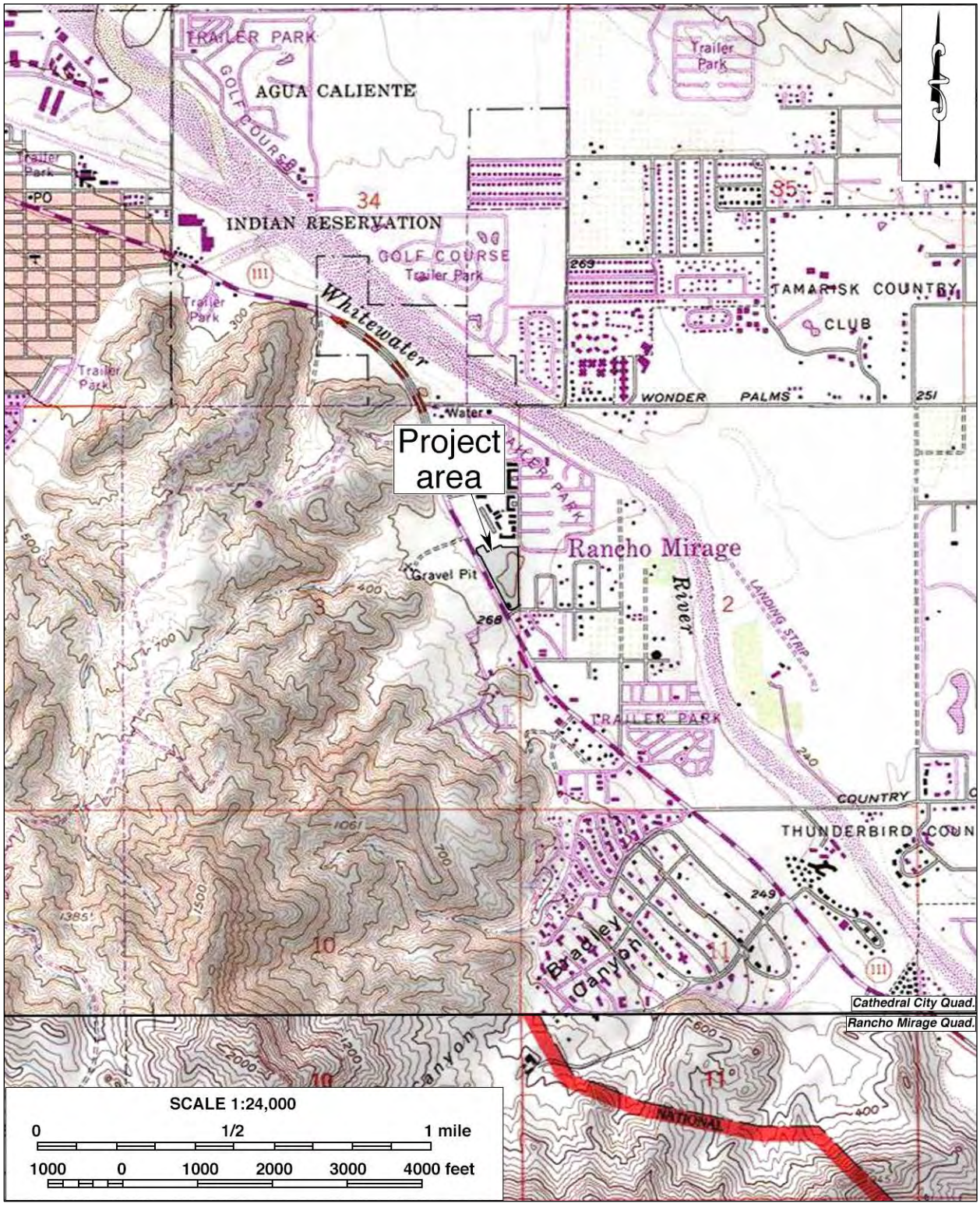


Figure 2. Project location. (Based on the USGS Cathedral City and Rancho Mirage, Calif., 7.5' quadrangles [USGS 1981; 1988])



Figure 3. Recent satellite image of the project area. (Based on Google Earth imagery)

SETTING

CURRENT NATURAL SETTING

The City of Rancho Mirage is located in the northwestern portion of the Coachella Valley, a northwest-southeast trending desert valley that constitutes the western end of the Colorado Desert. Dictated by this geographic setting, the climate and environment of the region are typical of the southern California desert country, marked by extremes in temperature and aridity. Temperatures in the region reach over 120 degrees Fahrenheit in summer and dip to freezing in winter. Average annual precipitation is less than five inches, and the average annual evaporation rate exceeds three feet.

The project area lies on the northeastern outskirts of the City of Rancho Mirage, between the San Jacinto Mountains to the west and the Whitewater River channel to the east, and within the largely urbanized Highway 111 corridor. It is bounded by Highway 111 on the west, Mirage Cove Drive on the south, a residential neighborhood on the east, and the Atrium shopping center and the Desert Braemar 55+ community on the north. The surface soil is composed of nonmarine Quaternary alluvial silty sand deposits in an ancient lake playa and terrace deposits consisting of semi-consolidated, fine- to coarse-grained sands and gravels (Jennings 1985). A granitic rocky knoll occupies the eastern portion of the project area, and the terrain on the rest of the property is generally level (Figure 4). Elevations range approximately from 285 feet to 366 feet above mean sea level.

The project location would be a part of the California Creosote Bush Scrub plant community, but the ground surface on much of the property has been cleared of native vegetation in the past. Flora and fauna observed in the project area remain mostly consistent to the Colorado Desert environment. Currently, the vegetation on the property consists of creosote (*Larrea tridentata*), native and non-native palm trees, and various native grasses (*Poaceae sp*.; Schoenherr 1992; Figure 4).

CULTURAL SETTING

Prehistoric Context

Numerous investigations on the history of cultural development in southern California have led researchers to propose a number of cultural chronologies for the desert regions. A specific cultural sequence for the Colorado Desert was offered by Schaefer (1994) on the basis of the many archaeological studies conducted in the area. The earliest time period identified is the Paleoindian (ca. 8,000 to 10,000-12,000 years ago), when "small, mobile bands" of hunters and gatherers, who relied on a variety of small and large game animals as well as wild plants for subsistence, roamed the region (Schaefer 1994:63). These small groups settled "on mesas and terraces overlooking larger washes" (Schaefer 1994:64). The artifact assemblage of that period typically consists of very simple stone tools, "cleared circles, rock rings, [and] some geoglyph types" (Schaefer 1994:64).

The Early Archaic Period follows and dates to ca. 8,000 to 4,000 years ago. It appears that a decrease in population density occurred at this time and that the indigenous groups of the area relied more on foraging than hunting. Very few archaeological remains have been identified to this time period. The ensuing Late Archaic Period (ca. 4,000 to 1,500 years ago) is characterized by continued low population densities and groups of "flexible" sizes that settled near available seasonal food



Figure 4. Overview of the current natural setting of the project area. (Photograph taken on March 20, 2025; view to the south)

resources and relied on "opportunistic" hunting of game animals. Stone grinding implements for food processing were prominent during this time period.

The most recent period in Schaefer's scheme, the Late Prehistoric, dates from ca. 1,500 years ago to the time of the Spanish missions and saw the continuation of the seasonal settlement pattern. Peoples of the Late Prehistoric Period were associated with the Patayan cultural pattern and relied more heavily on the availability of seasonal "wild plants and animal resources" (Schaefer 1994:66). It was during this period that ceramics and the bow and arrow were introduced into the region.

The shores of Holocene Lake Cahuilla, during times of its presence, attracted much settlement and resource procurement activities. In times of the lake's desiccation and absence, according to Schaefer (1994:66), the Native people moved away from its receding shores towards rivers, streams, and mountains. Numerous archaeological sites dating to the last high stand of Holocene Lake Cahuilla, roughly between 1600 and 1730 A.D., have been identified along its former shoreline. Testing and mitigative excavations at these sites have recovered brown and buff ware ceramics, a variety of stone grinding tools and projectile point types, ornaments, and cremation remains.

Ethnohistoric Context

The Coachella Valley is a historical center of Native American settlement, where U.S. surveyors noted large numbers of Indian villages and *rancherías*, occupied by the Cahuilla people, in the mid-19th century. The origin of the name "Cahuilla" is unclear but may be from their own word *káwiya*, meaning master or boss (Bean 1978). The Takic-speaking Cahuilla are generally divided by anthropologists into three groups according to their geographic setting: the Pass Cahuilla of the San Gorgonio Pass-Palm Springs area, the Mountain Cahuilla of the San Jacinto and Santa Rosa Mountains and the Cahuilla Valley, and the Desert Cahuilla of the eastern Coachella Valley. The basic written sources on Cahuilla culture and history include Kroeber (1925), Strong (1929), and Bean (1978), based on information provided by such Cahuilla informants as Juan Siva, Francisco Patencio, Katherine Siva Saubel, and Mariano Saubel. The following ethnohistoric discussion is derived primarily from these sources.

The Cahuilla did not have a single name that referred to an all-inclusive tribal affiliation. Instead, membership was in terms of lineages or clans. Each lineage or clan belonged to one of two main divisions of the people, known as moieties. Their moieties were named for the Wildcat, or *Tuktum,* and Coyote*,* or *Istam*. Members of clans in one moiety had to marry into clans from the other moiety. Individual clans had villages, or central places, and territories they called their own, for purposes of hunting game, and gathering raw materials for food, medicine, ritual, or tool use. They interacted with other clans through trade, intermarriage, and ceremonies.

Cahuilla subsistence was defined by the surrounding landscape and primarily based on the hunting and gathering of wild and cultivated foods, exploiting nearly all of the resources available in a highly developed seasonal mobility system. They were adapted to the arid conditions of the desert floor, the lacustral cycles of Holocene Lake Cahuilla, and the environments of the nearby mountains. When the lake was full, or nearly full, the Cahuilla would take advantage of the resources presented by the body of fresh water, building elaborate stone fish traps. Once the lake had desiccated, they relied on the available terrestrial resources. The cooler temperatures and resources available at higher elevations in the nearby mountains were also taken advantage of.

The Cahuilla diet included seeds, roots, wild fruits and berries, acorns, wild onions, piñon nuts, and mesquite and screw beans. Medicinal plants such as creosote, California sagebrush, yerba buena and elderberry were typically cultivated near villages (Bean and Saubel 1972). Common game animals included deer, antelope, big horn sheep, rabbits, wood rats and, when Holocene Lake Cahuilla was present, fish and waterfowl. The Cahuilla hunted with throwing sticks, clubs, nets, traps, and snares, as well as bows and arrow (Bean 1978; CSRI 2002). Common tools included manos and metates, mortars and pestles, hammerstones, fire drills, awls, arrow-straighteners, and stone knives and scrapers. These lithic tools were made from locally sourced material as well as materials procured through trade or travel. They also used wood, horn, and bone spoons and stirrers; baskets for winnowing, leaching, grinding, transporting, parching, storing, and cooking; and pottery vessels for carrying water, storage, cooking, and serving food and drink (Bean 1978; CSRI 2002).

As the landscape defined their subsistence practices, the tending and cultivation practices of the Cahuilla helped shape the landscape. Biological studies have recently found evidence that the fan palms found in the Coachella Valley and throughout the southeastern California desert

(*Washingtonia filifera*) may not be relics from a paleo-tropical environment, but instead a relatively recent addition brought to the area and cultivated by native populations (Anderson 2005). The planting of palms by the Cahuilla is well-documented, as is their enhancement of palm stands through the practice of controlled burning (Anderson 2005; Bean and Saubel 1972). Burning palm stands would increase fruit yield dramatically by eliminating pests such as the palm borer beetle, date scales, and spider mites (Bean and Saubel 1972). It also prevented out-of-control wildfires by eliminating dead undergrowth before it accumulated to dangerous levels. The Cahuilla also burned stands of chia to produce higher yields, and deergrass to yield straighter, more abundant stalks for basketry (Bean and Saubel 1972; Anderson 2005).

Population data prior to European contact is almost impossible to obtain, but estimates range from 3,600 to as high as 10,000 persons covering a territory of over 2,400 square miles. During the 19th century, the Cahuilla population was decimated as a result of European diseases, most notably smallpox, for which the Native peoples had no immunity. Today, Native Americans of Pass or Desert Cahuilla heritage are mostly affiliated with one or more of the Indian reservations in and near the Coachella Valley, including Agua Caliente, Morongo, Cabazon, Torres Martinez, and Augustine. There has been a resurgence of traditional ceremonies in recent years, and the language, songs, and stories are now being taught to the youngest generations.

Historic Context

In 1823-1825, José Romero, José Maria Estudillo, and Romualdo Pacheco became the first noted European explorers to travel through the Coachella Valley when they led a series of expeditions in search of a route to Yuma (Johnston 1987:92-95). Due to its harsh environment, few non-Indians ventured into the desert valley during the Mexican and early American periods, except those who traveled along the established trails. The most important of these trails was the Cocomaricopa Trail, an ancient Indian trading route that was "discovered" in 1862 by William David Bradshaw and known after that as the Bradshaw Trail (Gunther 1984:71; Ross 1992:25). In much of the Coachella Valley, this historic wagon road traversed a similar course to that of present-day Highway 111. During the 1860s-1870s, the Bradshaw Trail served as the main thoroughfare between coastal southern California and the Colorado River, until the completion of the Southern Pacific Railroad in 1876-1877 brought an end to its heyday (Johnston 1987:185).

Non-Indian settlement in the Coachella Valley began in the 1870s with the establishment of railroad stations along the Southern Pacific Railroad and spread further in the 1880s after public land was opened for claims under the Homestead Act, the Desert Land Act, and other federal land laws (Laflin 1998:35-36; Robinson 1948:169-171). Farming became the dominant economic activity in the valley thanks to the development of underground water sources, often in the form of artesian wells. Around the turn of the century, the date palm was introduced into the Coachella Valley, and by the late 1910s dates were the main agricultural crop and the tree an iconic image celebrating the region as the "Arabia of America" (Shields Date Gardens 1957). Then, starting in the 1920s, a new industry featuring equestrian camps, resorts, hotels, and eventually country clubs began to spread throughout the Coachella Valley, transforming it into southern California's premier winter retreat.

In the Rancho Mirage area, the first notable settlement activities occurred in the 1910s-1920s, when several date ranches were established in the present-day city boundary (Love and Tang 1996:7). In 1924, R.P. "Bert" Davie and E.E. McIntyre subdivided the Rancho Rio del Sol Estates around

today's Clancy Lane, creating a small community nicknamed "Little Santa Monica" (Love and Tang 1996:8). Ten years later, Louis Blankenhorn and Laurence Macomber began a new subdivision at the mouth of Magnesia Spring Canyon, and for the first time bestowed the name Rancho Mirage on the community (Love and Tang 1996:8). After the end of WWII, Rancho Mirage embarked on a period of rapid growth. With the development of the Thunderbird Country Club and the Tamarisk Country Club in 1951-1952, Rancho Mirage set the trend in the post-WWII boom among the five cove communities along Highway 111 (Love and Tang 1996:8-9). This trend has continued into the present and has given rise to the City of Rancho Mirage's popular reputation as the "country club city."

RESEARCH METHODS

RECORDS SEARCH

On February 27, 2025, CRM TECH archaeologist Deirdre Encarnación completed the historical/ archaeological resources records search for this study at the South Coastal Information Center (SCIC) of the California Historical Resources Information System. Located on the campus of San Diego State University, the SCIC is the State of California's official cultural resource records repository for Riverside County. The purpose of the records search was to compile a complete inventory of previously identified cultural resources and existing cultural resources reports within a one-mile radius of the project location. In addition to the SCIC records, CRM TECH also consulted archival records of the City of Rancho Mirage for pertinent information on a cultural resource that was previously located on the property (see further discussion below).

NATIVE AMERICAN PARTICIPATION

On January 24, 2025, CRM TECH submitted a written request to the State of California Native American Heritage Commission (NAHC) for a records search in the commission's Sacred Lands File. In the meantime, CRM TECH also contacted the nearby Agua Caliente Band of Cahuilla Indians (ACBCI) for additional information on potential Native American cultural resources in the project vicinity and to arrange for tribal participation in the upcoming archaeological field survey. The responses from the NAHC and the ACBCI are summarized below and attached to this report in Appendix 2.

HISTORICAL BACKGROUND RESEARCH

Historical background research for this study was conducted by CRM TECH principal investigator/ historian Bai "Tom" Tang. Sources consulted during the research included primarily published literature in local and regional history, contemporary news accounts, U.S. General Land Office (GLO) land survey plat maps dated 1856-1905, United States Geological Survey (USGS) topographic maps dated 1904-1988, and aerial/satellite photographs taken in 1954-2024. The historical maps are available at the websites of the U.S. Bureau of Land Management and the USGS, and the aerial/satellite photographs are available at the website of Nationwide Environmental Title Research (NETR) Online and through the Google Earth software.

FIELD SURVEY

On March 18, 2025, CRM TECH archaeologist Michael D. Richards carried out the field survey of the relatively level portion of the project area with the assistance of ACBCI cultural resources analysts Luz Salazar and Loriea Gregory from the Tribal Historic Preservation Office. The survey was conducted at an intensive level by walking a series of parallel north-south transects at 15-meter (approximately 50-foot) intervals. On March 20, CRM TECH archaeologist/field director Daniel Ballester conducted a similar survey on the knoll in the eastern portion of the property, with the transects placed opportunistically along the contours of the terrain. In this way, the ground surface in the entire project area was systematically and carefully examined for any evidence of human activities dating to the prehistoric or historic period (i.e., 50 years or older). Except for a paved parking lot in the northwestern portion of the project area, surface visibility was generally fair (70-80 percent) to excellent (90-100 percent) depending on the presence or absence of scattered vegetation growth (Figure 4).

RESULTS AND FINDINGS

RECORDS SEARCH

According to SCIC records, in 2012 the project area was included in the scope of a large-scale archaeological sensitivity assessment along the Whitewater River channel (Mirro 2012). However, that study did not include any archaeological fieldwork (Mirro 2012:18), and the SCIC had no records suggesting that the project area had been surveyed systematically for cultural resources prior to this study. Documentation that CRM TECH had previously obtained from the City of Rancho Mirage indicates that a building once located in the northwestern portion of the project area had been recorded in 2002 on standard record forms for the California Historical Resources Inventory (Moruzzi et al. 2002; see Appendix 3), but the records search at the SCIC yielded no evidence that this locality had been incorporated into the inventory.

Located at 69-934 Highway 111 and wrapped around the western tip of the knoll, the building recorded in 2002 was then home to a Chart House restaurant. It was designed by architect Kendrick Bangs Kellogg (1934-2024) and constructed in 1978, not yet meeting the usual 50-year age threshold for listing in the National Register of Historic Places at the time of its recordation or even today. Nonetheless, the 2002 study concluded that the building was eligible for the National Register due to its exceptional architectural merit "as a unique and outstanding example of 'Organic Modern' design, sensitively integrated into its site and responsive to the desert climate" (Moruzzi et al. 2002:2-3). In 2004, the building was designated by the City of Rancho Mirage as a local historic resource (City of Rancho Mirage 2012:1).

In January 2012, the building caught on fire and suffered extensive damage (McGinty and Indrelunas 2012; City of Rancho Mirage 2012:1-2). After the fire, further studies were commissioned by the City to explore possible means to avoid or reduce impact on the significance of this historic building, such as restoration, reconstruction, or mitigation (Tang 2012; City of Rancho Mirage 2012), and much public discussion ensued in the City's decision-making process (City of Rancho Mirage 2013a; 2013b). Ultimately, the City concluded that it was infeasible for the building

to be restored and that, under the circumstances, the issuance of a demolition permit was a ministerial act exempt from CEQA review (City of Rancho Mirage 2013b; 2013c). The former Chart House building was subsequently removed in March 2013 (Herzog 2013).

Within the one-mile scope of the records search, SCIC records identify a total of 28 previous studies completed on various tracts of land and linear features between 1978 and 2017. As a result of these and other similar studies in the vicinity, two historic-period sites and one prehistoric (i.e., Native American) site were previously recorded within the one-mile radius. One of the historic-period sites, 33-005513, represented the Peterson Ranch, featuring a circa 1930s vernacular wood-frame house in a date garden (Wagner 1982), while the other, 33-026849 (CA-RIV-12616H), was a small refuse deposit (Duryea 2015). The prehistoric site, 33-000628 (CA-RIV-628T), consisted of trail segments found on the slopes of the San Jacinto Mountains, along with several rock cairns (Banks 1979; Parr and Arkush 1988; Bissell 2000). All three of these sites were found more than a quarter-mile from the project location. Therefore, none of them requires further consideration during this study.

NATIVE AMERICAN PARTICIPATION

In response to CRM TECH's inquiry, the NAHC stated in a letter dated February 3, 2025, that the Sacred Lands File identified no Native American cultural resources in the project vicinity but recommended contacting local Native American groups for further information. For that purpose, the NAHC provided a referral list of 22 individuals affiliated with 11 Native American groups in the region. The NAHC's reply is attached to this report in Appendix 2 for reference by the City of Rancho Mirage in future government-to-government consultations, if necessary.

As mentioned above, CRM TECH contacted the ACBCI, which is the nearest Native American group to the project location, as a part of the research procedures. As a result, ACBCI cultural resources analysts Luz Salazar and Loriea Gregory participated in the archaeological field survey. In addition, Ms. Salazar responded on behalf of the ACBCI in a letter dated February 14, 2025. In the letter, Ms. Salazar identified the project location as a part of the tribe's Traditional Use Area. Therefore, the ACBCI requested copies of all cultural resources documentation generated for this project for review by the Tribal Historic Preservation Office as well as the presence of Agua Caliente Native American Cultural Resource Monitor(s) during any ground-disturbing activities associated with the project (see Appendix 2).

HISTORICAL BACKGROUND RESEARCH

Historical sources consulted for this study demonstrate that the project area has long been a part of the main travel corridor across the Coachella Valley. In the mid-1850s, when the U.S. government conducted the earliest systematic land surveys in the region, a major trail was seen traversing in a generally northwest-southeast direction less than a half-mile north of the project location, undoubtedly a part of the historic Cocomaricopa-Bradshaw Trail (Figure 5). By the turn of the century, the main branch of the trail, identified as the "Road from Colorado River to San Bernardino," had come much closer to the project area, passing roughly 200 feet from the northeastern corner of the property (Figures 6, 7). During the early 20th century, the old wagon road was replaced by an automobile highway that the County of Riverside built on the west side of the project area, which would later become a part of present-day Highway 111 (Figure 8).

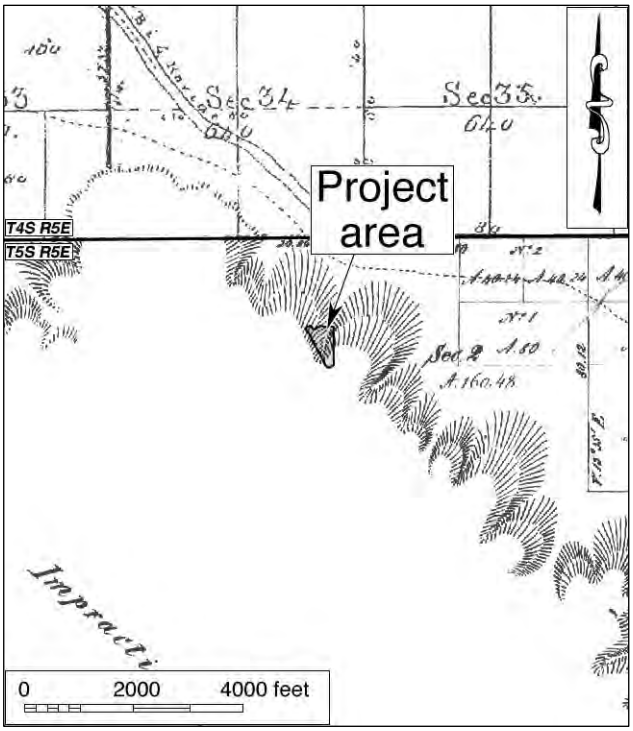


Figure 5. The project area and vicinity in 1855-1856. (Source: GLO 1856a; 1856b)

Despite its close proximity to these successive generations of transportation thoroughfares, the project area evidently remained unsettled and undeveloped until the mid-20th century (Figures 5-9). The first development on the property, in the form of a relatively large building of unknown nature on the corner of Highway 111 and Mirage Cove Drive, occurred sometime between 1941 and 1954, most likely during the post-WWII boom (Figures 8, 9; NETR Online 1954). In 1972-1975, this building and all of its associated features were removed and the Chart House restaurant was built on the northwestern portion of the property in 1978, along with most of the paved parking area that is still present today (NETR Online 1954-2022; Moruzzi et al. 2002). After Chart House was closed in 2003, a series of other restaurants operated at the same location until the fire destroyed much of the building on January 10, 2012 (McGinty 2012; Herzog and Atagi 2013). As mentioned above, the building was demolished on March 19, 2013,

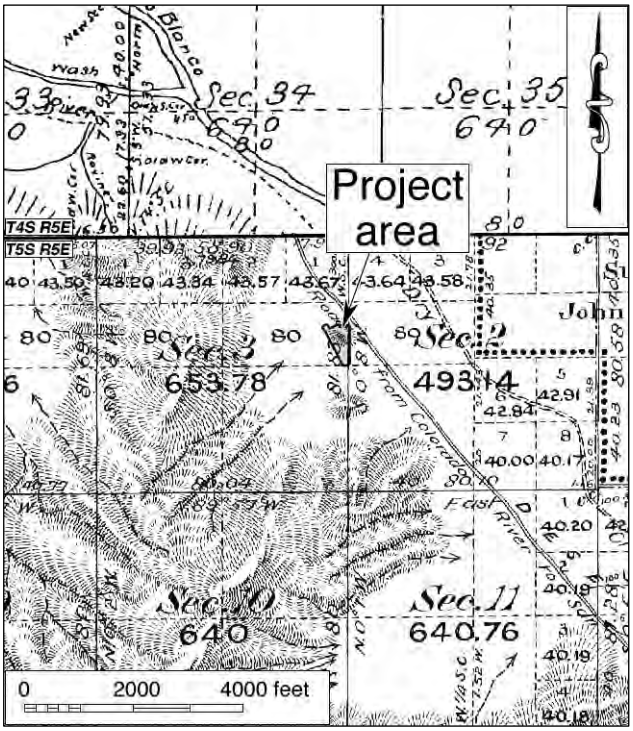


Figure 6. The project area and vicinity in 1885-1903. (Source: GLO 1886; 1905)

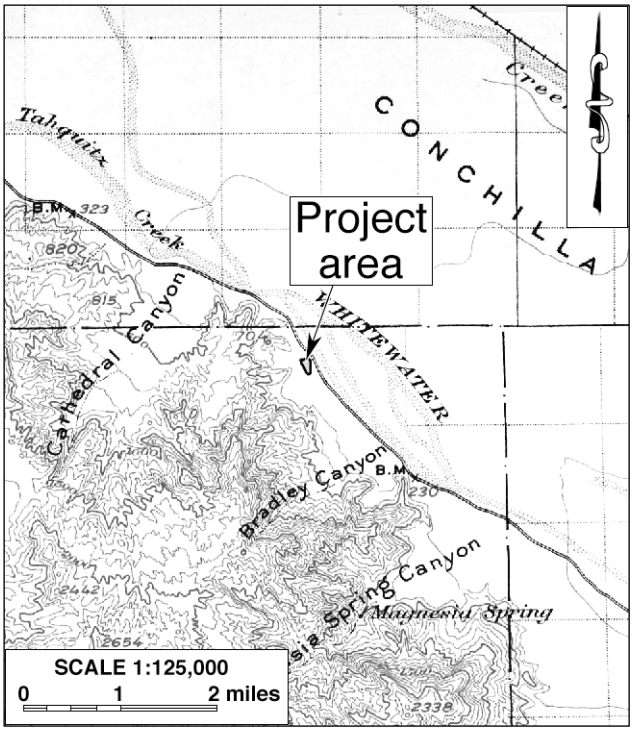


Figure 7. The project area and vicinity in 1901. (Source: USGS 1904)

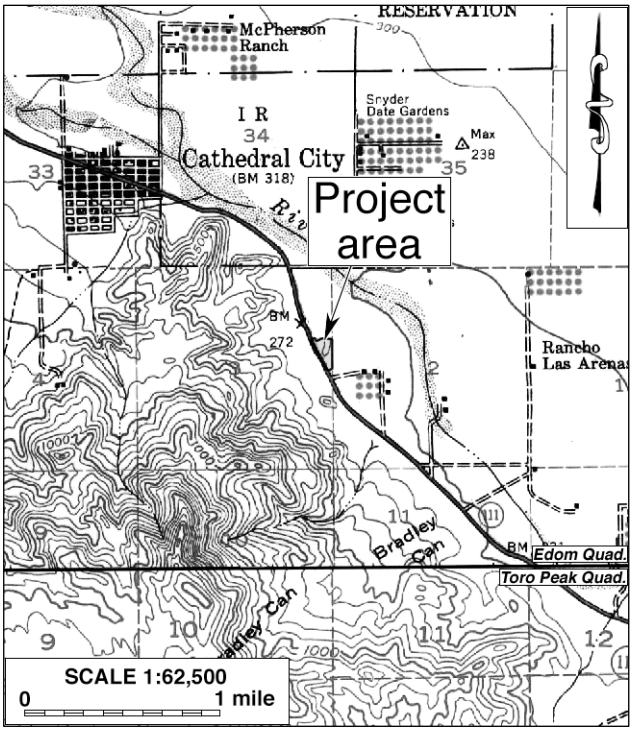


Figure 8. The project area and vicinity in 1941. (Source: USGS 1941a; 1941b)

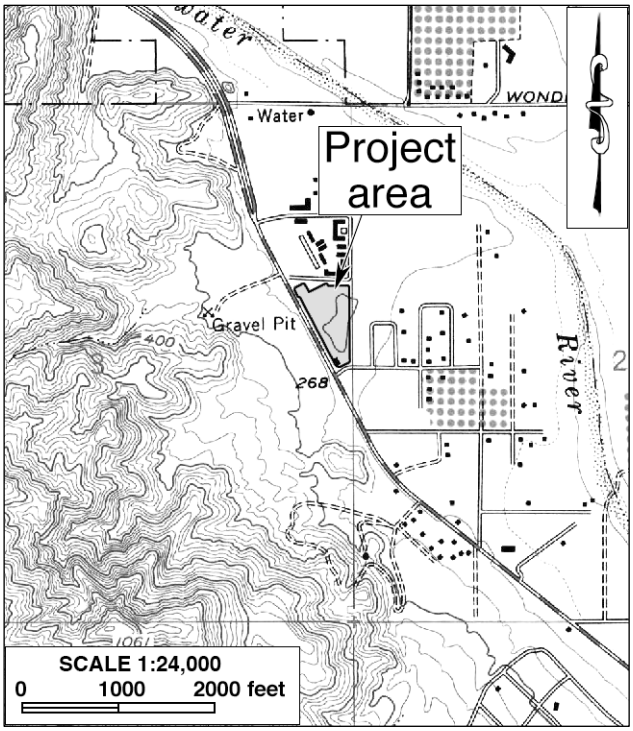


Figure 9. The project area and vicinity in 1956-1958. (Source: USGS 1958)

and the entire project area has been vacant and largely unused since then (NETR Online 2012-2022; Herzog 2013).

FIELD SURVEY

The field survey of the project area encountered no potential "historical resources." The results of the survey confirmed that the former Chart House building had been completely removed, leaving little physical trace of its 35-year presence except the paved parking lot nearby, which remains in occasional use by shoppers at the adjacent Atrium shopping center. A concrete slab foundation was noted near the southern end of the project area, where a building stood in the 1950s-1970s (see above), but no evidence of any historic-period artifact deposit was found in association. With the removal of the building in the 1970s, and exhibiting little promise for any archaeological data, the foundation is not considered a potential "historical resource" and requires no further study. Scattered modern refuse, such as bottle fragments, cans, paper, plastic scraps, and building debris, was observed over much of the property, but none of these items was found to be of any historical/ archaeological interest.

DISCUSSION

CEQA establishes that a project that may cause a substantial adverse change in the significance of a "historical resource" is a project that may have a significant effect on the environment (PRC §21084.1). "Substantial adverse change," according to PRC §5020.1(q), "means demolition,

destruction, relocation, or alteration such that the significance of a historical resource would be impaired." As defined by PRC §5020.1(j), "'historical resource' includes, but is not limited to, any object, building, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California."

More specifically, CEQA guidelines state that the term "historical resources" applies to any such resources listed in or determined to be eligible for listing in the California Register of Historical Resources, included in a local register of historical resources, or determined to be historically significant by the lead agency (Title 14 CCR §15064.5(a)(1)-(3)). Regarding the proper criteria for the evaluation of historical significance, CEQA guidelines mandate that "generally a resource shall be considered by the lead agency to be 'historically significant' if the resource meets the criteria for listing on the California Register of Historical Resources" (Title 14 CCR §15064.5(a)(3)). A resource may be listed in the California Register if it meets any of the following criteria:

(1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
(2) Is associated with the lives of persons important in our past.
(3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
(4) Has yielded, or may be likely to yield, information important in prehistory or history. (PRC §5024.1(c))

In summary of the research results presented above, the 1978 Chart House restaurant building that was once located in the project area was previously found to be eligible for listing in the National Register of Historic Places, for which the criteria are essentially identical to those for the California Register, and was subsequently designated a local historic resource by the City of Rancho Mirage. However, the building is no longer extant today, having been demolished in 2013 after suffering fire damage. No other potential "historical resources" were encountered throughout the course of the study. Therefore, the present study concludes that no "historical resources" exist within the project area.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the project area was once the site of the "Organic Modern" Chart House restaurant building, a well-recognized architectural masterpiece and a popular local landmark, but no "historical resources," as defined by CEQA, are currently present within the project area. Based on these findings, CRM TECH presents the following recommendations to the City of Rancho Mirage:

- The proposed project will not cause a substantial adverse change to any known "historical resources."
- No further cultural resources investigation is necessary for the project unless development plans undergo such changes as to include areas not covered by this study.
- If buried cultural materials are discovered during any earth-moving operations associated with the project, all work in that area should be halted or diverted until a qualified archaeologist can evaluate the nature and significance of the finds.

- In recognition of the architectural merit of the Chart House building and its celebrity in the community, the project proponent may consider establishing a commemorative display at or near its former site as a point of local historical interest.

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USGS (United States Geological Survey, U.S. Department of the Interior)
1904 Map: Indio, Calif. (30', 1:125,000); surveyed in 1901.
1941a Map: Edom, Calif. (15', 1:62,500); aerial photographs taken in 1941.
1941b Map: Toro Peak, Calif. (15', 1:62,500); aerial photographs taken in 1941.
1958 Map: Cathedral City, Calif. (7.5', 1:24,000); aerial photographs in 1956.
1979 Map: Santa Ana, Calif. (120'x60'; 1:250,000); 1959 edition revised.
1981 Map: Cathedral City, Calif. (7.5', 1:24,000); 1958 edition photorevised in 1978.
1988 Map: Rancho Mirage, Calif. (7.5', 1:24,000); 1957 edition photorevised in 1984.
Wagner, Jim
1982 California Historical Resources Inventory record forms, Site 33-005513. On file, South Coastal Information Center, San Diego State University, San Diego, California.

APPENDIX 1:
PERSONNEL QUALIFICATIONS

PRINCIPAL INVESTIGATOR/HISTORIAN
Bai "Tom" Tang, M.A.

Education

1988-1993	Graduate Program in Public History/Historic Preservation, University of California, Riverside.
1987	M.A., American History, Yale University, New Haven, Connecticut.
1982	B.A., History, Northwestern University, Xi'an, China.
2000	"Introduction to Section 106 Review," presented by the Advisory Council on Historic Preservation and the University of Nevada, Reno.
1994	"Assessing the Significance of Historic Archaeological Sites," presented by the Historic Preservation Program, University of Nevada, Reno.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside/Colton, California.
1993-2002	Project Historian/Architectural Historian, CRM TECH, Riverside, California.
1993-1997	Project Historian, Greenwood and Associates, Pacific Palisades, California.
1991-1993	Project Historian, Archaeological Research Unit, University of California, Riverside.
1990	Intern Researcher, California State Office of Historic Preservation, Sacramento.
1990-1992	Teaching Assistant, History of Modern World, University of California, Riverside.
1988-1993	Research Assistant, American Social History, University of California, Riverside.
1985-1988	Research Assistant, Modern Chinese History, Yale University.
1985-1986	Teaching Assistant, Modern Chinese History, Yale University.
1982-1985	Lecturer, History, Xi'an Foreign Languages Institute, Xi'an, China.

Cultural Resources Management Reports

Preliminary Analyses and Recommendations Regarding California's Cultural Resources Inventory System (with Special Reference to Condition 14 of NPS 1990 Program Review Report). California State Office of Historic Preservation working paper, Sacramento, September 1990.

Numerous cultural resources management reports with the Archaeological Research Unit, Greenwood and Associates, and CRM TECH, since October 1991.

PRINCIPAL INVESTIGATOR/ARCHAEOLOGIST
Michael Hogan, Ph.D., RPA (Registered Professional Archaeologist)

Education

1991	Ph.D., Anthropology, University of California, Riverside.
1981	B.S., Anthropology, University of California, Riverside; with honors.
1980-1981	Education Abroad Program, Lima, Peru.
2002	"Section 106—National Historic Preservation Act: Federal Law at the Local Level," UCLA Extension Course #888.
2002	"Recognizing Historic Artifacts," workshop presented by Richard Norwood, Historical Archaeologist.
2002	"Wending Your Way through the Regulatory Maze," symposium presented by the Association of Environmental Professionals.
1992	"Southern California Ceramics Workshop," presented by Jerry Schaefer.
1992	"Historic Artifact Workshop," presented by Anne Duffield-Stoll.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside/Colton, California.
1999-2002	Project Archaeologist/Field Director, CRM TECH, Riverside, California.
1996-1998	Project Director and Ethnographer, Statistical Research, Inc., Redlands, California.
1992-1998	Assistant Research Anthropologist, University of California, Riverside.
1992-1995	Project Director, Archaeological Research Unit, U.C. Riverside.
1993-1994	Adjunct Professor, Riverside Community College, Mt. San Jacinto College, U.C. Riverside, Chapman University, and San Bernardino Valley College.
1991-1992	Crew Chief, Archaeological Research Unit, U.C. Riverside.
1984-1998	Project Director, Field Director, Crew Chief, and Archaeological Technician for various southern California cultural resources management firms.

Research Interests

Cultural Resource Management, Southern Californian Archaeology, Settlement and Exchange Patterns, Specialization and Stratification, Culture Change, Native American Culture, Cultural Diversity.

Cultural Resources Management Reports

Principal investigator for, author or co-author of, and contributor to numerous cultural resources management study reports since 1986.

Memberships

Society for American Archaeology; Society for California Archaeology; Pacific Coast Archaeological Society; Coachella Valley Archaeological Society.

PROJECT ARCHAEOLOGIST/REPORT WRITER
Frank J. Raslich, M.A.

Education

2016-	Ph.D. candidate, Michigan State University, East Lansing.
2010	M.A., Anthropology, Michigan State University, East Lansing.
2005	B.A., Anthropology, University of Michigan, Flint.
2019	Grant and Research Proposal Writing for Archaeologists; Society for American Archaeology online seminar.
2014	Bruker Industries Tracer S1800 pXRF Training; presented by Dr. Bruce Kaiser, Bruker Scientific.

Professional Experience

2022-	Project Archaeologist/Report Writer, CRM TECH, Colton, California.
2022	Archaeological Monitor, Agua Caliente Band of Cahuilla Indians, Palm Springs, California.
2014-2022	Board of Directors, Ziibiwing Center of Anishinabe Culture and Lifeways, Saginaw Chippewa Indian Tribe of Michigan.
2008-2021	Archaeological Consultant, Saginaw Chippewa Indian Tribe of Michigan.
2019	Archaeologist, Sault Tribe of Chippewa Indians and Little Traverse Bay Band of Odawa Indians.
2016-2018	Adjunct Lecturer, Michigan State University, East Lansing.
2017-2018	Adjunct Lecturer, University of Michigan, Flint.
2009-2017	Teaching Assistant, Michigan State University, East Lansing.
2008-2014	Research Assistant, Intellectual Property Issues in Cultural Heritage, Simon Fraser University, British Columbia, Canada.
2010-2013	Research Assistant, Michigan State University, East Lansing.
2009-2011	Archaeologist/Crew Chief, Saginaw Chippewa Indian Tribe of Michigan.

Publications

2017	Preliminary Results of a Handheld X-Ray Fluorescence (pXRF) Analysis on a Marble Head Sarcophagus Sculpture from the Collection of the Kresge Art Center, Michigan State University. Submitted to Jon M. Frey, Department of Art, Art History, and Design, Michigan State University, East Lansing.
2013	Geochemical Analysis of the Dickenson Group of the Upper Peninsula, Michigan: A study of an Accreted Terrane of the Superior Province. Geological Society of America *Abstracts with Programs* 45:4(53).

PROJECT ARCHAEOLOGIST/FIELD DIRECTOR
Daniel Ballester, M.S., RPA (Registered Professional Archaeologist)

Education

2013	M.S., Geographic Information System (GIS), University of Redlands, California.
1998	B.A., Anthropology, California State University, San Bernardino.
1997	Archaeological Field School, University of Las Vegas and University of California, Riverside.
1994	University of Puerto Rico, Rio Piedras, Puerto Rico.
2021	An Introduction to Geoarchaeology: How Understanding Basic Soils, Sediments, and Landforms Can Make You a Better Archaeologist; Society for American Archaeology online seminar.
2007	Certificate in Geographic Information Systems (GIS), California State University, San Bernardino.
2002	Historic Archaeology Workshop; presented by Richard Norwood, Base Archaeologist, Edwards Air Force Base, at CRM TECH, Riverside, California.

Professional Experience

2002-	Field Director/GIS Specialist, CRM TECH, Riverside/Colton, California.
2011-2012	GIS Specialist for Caltrans District 8 Project, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew Chief, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew, ECorp, Redlands.
1999-2002	Project Archaeologist, CRM TECH, Riverside, California.
1998-1999	Field Crew, K.E.A. Environmental, San Diego, California.
1998	Field Crew, A.S.M. Affiliates, Encinitas, California.
1998	Field Crew, Archaeological Research Unit, University of California, Riverside.

Cultural Resources Management Reports

Field Director, co-author, and contributor to numerous cultural management reports since 2002.

PROJECT ARCHAEOLOGIST
Deirdre Encarnación, M.A.

Education

2003	M.A., Anthropology, San Diego State University, California.
2000	B.A., Anthropology, minor in Biology, with honors, San Diego State University, California.
2021	Certificate of Specialization, Kumeyaay Studies, Cuyamaca College, California.
2001	Archaeological Field School, San Diego State University.
2000	Archaeological Field School, San Diego State University.

Professional Experience

2016-	Archaeological Consultant, Friends of Maha'ulepu, Koloa, Hawai'i.
2004-	Project Archaeologist/Report Writer, CRM TECH, Riverside/Colton, California.
2001-2003	Part-time Lecturer, San Diego State University, California.
2001	Research Assistant for Dr. Lynn Gamble, San Diego State University.
2001	Archaeological Collection Catalog, San Diego State University Foundation.

Presentations

2023	"The Kumeyaay-Critical Awareness, Critical Activation," Salaam, San Diego College of Continuing Education.
2023	"A Look at the Three Wise Men and Their Global Celebrations," The Epiphany Project.
2022	"Voices: A Latina Advocate Shares about Life, Stereotypes, & Rising Above," Salaam online event.
2022	"The Original Beach Town: San Diego's Coastal Heritage," San Diego Archaeological Center Living Room Lecture.

Memberships

Society for California Archaeology; Society for Hawaiian Archaeology; California Native Plant Society.

PROJECT ARCHAEOLOGIST
Michael D. Richards, M.A., RPA (Registered Professional Archaeologist)

Education

2002	M.A., Anthropology, California State University, Northridge (CSUN).
1986	B.A., Anthropology: University of California, Los Angeles (UCLA).
1982	A.A., Los Angeles Valley College, Los Angeles, California.

2015	Section 106 workshop.
2000	CSUN "Olmec" field excavation and lab analysis; La Venta, Mexico.
1999	Rock art recording, UCLA Extension; Little Lake, California.
1998	Rock art symposium, UCLA Extension.

Professional Experience

2018-	Project Archaeologist/Paleontologist, CRM TECH, Colton, Calif.
2016-2018	Co-Principal Investigator/Archaeologist, LSA Associates Inc.
2012-2016	Co-Principal Investigator/Archaeologist, ICF International (Jones & Stokes).
2010-2012	Co-Principal Investigator/Archaeologist, various CRM firms (on call).
2007-2010	Principal Investigator/Field Director/Crew Chief, ASM Affiliates, Inc.
2004-2007	Project Manager/Co-Principal Investigator, ArchaeoPaleo Resource Management, Inc.
2003-2004	Staff Archaeologist/Crew Chief, SRI, Inc.
2000-2003	Project Archaeologist/Field Director, Ancient Enterprises (Clewlow, Jr.).
1999-2000	Staff Archaeologist/Lab Crew Chief, CSC/Edwards Air Force Base.

Research Interests

Pottery and rock art analysis; prehistory the American southwest; Mesoamerica; Japan.

Cultural Resources Management Reports

Author and co-author of, contributor to, and principal investigator for numerous cultural resources management study reports since 1999.

Memberships

Society for American Archaeology; Society for California Archaeology; Archaeological Institute of America; Conejo Open Space Trails Advisory Committee; Conejo Valley Historical Society.

APPENDIX 2
NATIVE AMERICAN INPUT

CHAIRPERSON
Reginald Pagaling
Chumash

VICE-CHAIRPERSON
Buffy McQuillen
Yokayo Pomo, Yuki, Nomlaki

SECRETARY
Sara Dutschke
Miwok

PARLIAMENTARIAN
Wayne Nelson
Luiseño

COMMISSIONER
Isaac Bojorquez
Ohlone-Costanoan

COMMISSIONER
Stanley Rodriguez
Kumeyaay

COMMISSIONER
Laurena Bolden
Serrano

COMMISSIONER
Reid Milanovich
Cahuilla

COMMISSIONER
Bennae Calac
Pauma-Yuima Band of Luiseño Indians

ACTING EXECUTIVE SECRETARY
Steven Quinn

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov

NATIVE AMERICAN HERITAGE COMMISSION

February 3, 2025

Nina Gallardo
CRM TECH

Via Email to: ngallardo@crmtech.us

Re: Proposed Howard World Wildlife Museum Project, Riverside County

To Whom It May Concern:

As requested, a record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed based on information submitted for the above referenced project. The results were negative. Please note that tribes do not always record their sacred sites in the SLF, nor are they required to do so. As such, a SLF search is not a substitute for consultation with all tribes that are traditionally and culturally affiliated with a project's geographic area.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. Please contact all of those listed; if they cannot supply information, they may recommend others with specific knowledge. If within two weeks of notification, a response has not been received, the Commission requests that you follow-up with a telephone call or email to ensure that the project information was received.

If you receive notification of a change of address or phone number from a tribe, please notify the NAHC so that we can assure that our lists contain current information.

In addition to engaging in tribal consultation, you should consult the appropriate regional California Historical Research Information System (CHRIS) archaeological Information Center to determine whether it has information regarding the presence of recorded archaeological sites within the project area.

If you have any questions or need additional information, please contact me at Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Cultural Resources Analyst

Attachment

2/3/2025

Tribe Name	Fed (F) Non-Fed (N)	Contact Person	Contact Address	Phone #	Fax #	Email Addre
Agua Caliente Band of Cahuilla Indians	F	Lacy Padilla, Director of Historic Preservation/THPO	5401 Dinah Shore Drive Palm Springs, CA, 92264	(760) 333-5222	(760) 699-6919	ACBCI-THPO
Augustine Band of Cahuilla Indians	F	Tribal Operations,	84-001 Avenue 54 Coachella, CA, 92236	(760) 398-4722		info@augusti
Cabazon Band of Cahuilla Indians	F	Doug Welmas, Chairperson	84-245 Indio Springs Parkway Indio, CA, 92203	(760) 342-2593	(760) 347-7880	jstapp@caba
Cahuilla Band of Indians	F	Erica Schenk, Chairperson	52701 CA Highway 371 Anza, CA, 92539	(951) 590-0942	(951) 763-2808	chair@cahuil
Cahuilla Band of Indians	F	BobbyRay Esparza, Cultural Director	52701 CA Highway 371 Anza, CA, 92539	(951) 763-5549		besparza@ca
Cahuilla Band of Indians	F	Anthony Madrigal, THPO	52701 CA Highway 371 Anza, CA, 92539	(951) 763-5549		anthonymad2
Los Coyotes Band of Cahuilla and Cupeño Indians	F	Ray Chapparosa, Chairperson	P.O. Box 189 Warner Springs, CA, 92086-0189	(760) 782-0711	(760) 782-0712	
Morongo Band of Mission Indians	F	Ann Brierty, THPO	12700 Pumarra Road Banning, CA, 92220	(951) 755-5259	(951) 572-6004	abrierty@mo
Morongo Band of Mission Indians	F	Robert Martin, Chairperson	12700 Pumarra Road Banning, CA, 92220	(951) 755-5110	(951) 755-5177	abrierty@mo
Quechan Indian Tribe of the Fort Yuma Reservation	F	Jordan Joaquin, President, Quechan Tribal Council	P.O. Box 1899 Yuma, AZ, 85366-1899	(760) 919-3600		executivesec
Quechan Indian Tribe of the Fort Yuma Reservation	F	Jill McCormick, Historic Preservation Officer	P.O. Box 1899 Yuma, AZ, 85366-1899	(928) 261-0254		historicprese
Ramona Band of Cahuilla	F	John Gomez, Environmental Coordinator	P. O. Box 391670 Anza, CA, 92539	(951) 763-4105	(951) 763-4325	jgomez@ram
Ramona Band of Cahuilla	F	Joseph Hamilton, Chairperson	P.O. Box 391670 Anza, CA, 92539	(951) 763-4105	(951) 763-4325	admin@ramo
Santa Rosa Band of Cahuilla Indians	F	Vanessa Minott, Tribal Administrator	P.O. Box 391820 Anza, CA, 92539	(951) 659-2700	(951) 659-2228	vminott@san
Santa Rosa Band of Cahuilla Indians	F	Steven Estrada, Tribal Chairman	P.O. Box 391820 Anza, CA, 92539	(951) 659-2700	(951) 659-2228	sestrada@sa
Soboba Band of Luiseno Indians	F	Jessica Valdez, Cultural Resource Specialist	P.O. Box 487 San Jacinto, CA, 92581	(951) 663-6261	(951) 654-4198	jvaldez@sob
Soboba Band of Luiseno Indians	F	Joseph Ontiveros, THPO	P.O. Box 487 San Jacinto, CA, 92581	(951) 663-5279	(951) 654-4198	jontiveros@s
Torres-Martinez Desert Cahuilla Indians	F	Alesia Reed, Cultural Committee Chairwoman	P.O. Box 1160 Thermal, CA, 92274	(760) 397-0300		lisareed990@
Torres-Martinez Desert Cahuilla Indians	F	Gary Resvaloso, TM MLD	P.O. Box 1160 Thermal, CA, 92274	(760) 777-0365		grestmtm@g
Torres-Martinez Desert Cahuilla Indians	F	Thomas Tortez, Chairperson	P.O. Box 1160 Thermal, CA, 92274	(760) 397-0300	(760) 397-8146	thomas.tortez
Torres-Martinez Desert Cahuilla Indians	F	Abraham Becerra, Cultural Coordinator	P.O. Box 1160 Thermal, CA, 92274	(760) 397-0300		abecerra@tm
Torres-Martinez Desert Cahuilla Indians	F	Mary Belardo, Cultural Committee Vice Chair	P.O. Box 1160 Thermal, CA, 92274	(760) 397-0300		belardom@g

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the
Resources Code and Section 5097.98 of the Public Resources Code.

AGUA CALIENTE BAND OF CAHUILLA INDIANS

TRIBAL HISTORIC PRESERVATION

03-008-2025-001

February 14, 2025

[VIA EMAIL TO:elopez@crmtech.us]
CRM TECH
Eulices Lopez
1016 E. Cooley Drive, Ste. A/B
Colton, CA Y92324

Re: Information Regarding the Project Area and participation in the Proposed Howard World Wildlife Museum Project, in the City of Rancho Mirage (CRM TECH No. 4233)

Dear Eulices Lopez,

The Agua Caliente Band of Cahuilla Indians (ACBCI) appreciates your efforts to include the Tribal Historic Preservation Office (THPO) in the Howard World Wildlife Museum project. The project area is not located within the boundaries of the ACBCI Reservation. However, it is within the Tribe's Traditional Use Area. For this reason, the ACBCI THPO requests the following:

*A copy of the records search with associated survey reports and site records from the information center.

*Copies of any cultural resource documentation (report and site records) generated in connection with this project.

*The presence of an approved Agua Caliente Native American Cultural Resource Monitor(s) during any ground disturbing activities (including archaeological testing and surveys). Should buried cultural deposits be encountered, the Monitor may request that destructive construction halt and the Monitor shall notify a Qualified Archaeologist (Secretary of the Interior's Standards and Guidelines) to investigate and, if necessary, prepare a mitigation plan for submission to the State Historic Preservation Officer and the Agua Caliente Tribal Historic Preservation Office.

Again, the Agua Caliente appreciates your interest in our cultural heritage. If you have questions or require additional information, please call me at (760) 883-1137. You may also email me at ACBCI-THPO@aguacaliente.net.

Cordially,

5401 Dinah Shore Drive, Palm Springs, CA 92264
(760) 883-1137 T (760) 883-1370 F www.aguacalientecr.com

AGUA CALIENTE BAND OF CAHUILLA INDIANS

TRIBAL HISTORIC PRESERVATION

Luz Salazar
Cultural Resources Analyst
Tribal Historic Preservation Office
AGUA CALIENTE BAND
OF CAHUILLA INDIANS

5401 DINAH SHORE DRIVE, PALM SPRINGS, CA 92264
T 760/699/6800 F 760/699/6924 WWW.AGUACALIENTE-NSN.GOV

APPENDIX 3

CALIFORNIA HISTORICAL RESOURCES INVENTORY SITE RECORD FORMS

(Chart House Restaurant, 69-934 Highway 111)

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary #_____
HRI #_____
Trinomial_____
NRHP Status Code_____
Other Listings_____
Review Code_____ Reviewer_____ Date_____

 Resource name(s) or number (assigned by recorder) *Chart House Restaurant*

P1. Other Identifier:
***P2. Location:** ☐Not for Publication ■Unrestricted
***a. County** *Riverside*
***b. USGS 7.5' Quad** **Date:**
*c. **Address** *69-934 Highway 111* **City** *Rancho Mirage* **Zip** *92270*
*e. **Other Locational Data:** Assessor's Parcel Number Block: Lot:

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.)

Situated at the foot of a small hill along Highway 111, the arrestingly designed Chart House restaurant follows the natural curvature of the site. The hill appears to slope down through the one-story, southwest-facing, Organic Modern building designed by architect Ken Kellogg in 1978. There is 9,296 square feet covered by the roof. Gently sloping roof, with four inches of urethane foam, the roof undulates around the perimeter of the hill, resting on recycled roof boards that are supported by laminated curved beams. Fixed windows are mostly clerestory and opaque with black anodized aluminum mullions. The center skylight is made of three layers of translucent plastic running the full length of the restaurant. The skylight culminates in a raised, ribbed dome from which a round natural rock chimney emerges. The rock in the subterranean walls and the chimney was quarried on site. The double doors of the recessed entrance are made of laminated beveled glass in curved wood frames for keeping out the summer heat. A low-profile waterfall of about 20 feet runs in and out through the glass on the east side of the entrance. Low concrete walls form planters on either side. A curved concrete walkway leads from the parking lot which, together with the restaurant, is on 5.48 acres of land. Landscaping consists of a front lawn, gravel, cacti, shrubs, and queen palms. Although the interior has been extensively remodeled, the exterior is original and in excellent condition.

***P3b. Resource Attributes:** (list attributes and codes) *HP6. 1-3 story commercial building*

***P4. Resources Present:** ■Building ☐Structure ☐Object ☐Site ☐District ☐Element of District ☐Other

P5a. Photo



P5b. Description of Photo: (view and date)
Southwest elevation
August 2002

***P6. Date Constructed/Age and Sources:** ■historic
1978/ Source: City of Rancho Mirage Buiilding Permits

***P7. Owner and Address:**
Wessman Holdings LLC
1555 South Palm Canyon Drive #G-10
Palm Springs, CA 92264

***P8. Recorded by:**
P. Moruzzi, T. Grimes, L. Heumann
Leslie Heumann and Associates
600 N. Sierra Bonita Ave.
Los Angeles, CA 90036

***P9. Date Recorded:**
September 23, 2002

***P10. Survey Type:**
Intensive Survey .

***P11. Report Citation:** (Cite survey report and other sources, or enter "none")
None.

***Attachments:** ☐None ☐Location Map ☐Sketch Map ■Continuation Sheet ■Building, Structure, and Object Record
☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record
☐Artifact Record ☐Photograph Record ☐ Other (list)

BUILDING, STRUCTURE, AND OBJECT RECORD

***NRHP Status Code** *3S*

***Resource Name or #:** *Chart House Restaurant*

B1. Historic Name: *Chart House Restaurant*
B2. Common Name: *Same*
B3. Original Use: *Restaurant* B4. Present Use: *Restaurant*
***B5. Architectural Style:** *Organic Modern*
***B6. Construction History:** (Construction date, alterations, and date of alterations):
June 6, 1978. Restaurant. Value: $317,320.
July 25, 1985. Monument sign.
March 23, 1998. Interior strip out of finishes including carpet, wood booths, fixtures, pavers, adobe tile, etc.

***B7. Moved?** ■No ☐Yes ☐Unknown **Date:**_____ **Original Location:**_____
***B8. Related Features:**

None.

B9a. Architect: *Kendrick Bangs Kellogg* b. Builder: *Wessman Construction Company*

***B10. Significance: Theme** *Cityhood* **Area** *Rancho Mirage*
Period of Significance: *1973 - Present* **Property Type:** *Single-family Residence* **Applicable Criteria:** *C*
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity)

The Chart House is architecturally significant as a unique and outstanding example of "Organic Modern" design, sensitively integrated into its site and responsive to the desert climate. Designed by architect Kendrick Bangs Kellogg, it was built in 1978 and appeared on the cover of Restaurant Design magazine in 1981. In 1994, it received the Vintage Pinot Noir Award sponsored by AIA, APA, ASLA, AEP, CSPE, IEDI of the Inland Empire of California, in large part due to its energy efficiency.

Kellogg attended university at San Diego State, University of Colorado, University of Southern California, and the University of California at Berkeley. He received an architect's license in California in 1964 and a building contractor's license in 1966, a national license in 1979, and a global (international) license in 1998. Kellogg's motto is: "the more unusual the site, the better the Architecture."

(See Continuation Sheet 3 of 3.)

B11. Additional Resource Attributes: (List attributes and codes)_____
***B12. References:**

Alan Hess and Andrew Danish, Palm Springs Weekend, Chronicle Books, 2001.
Kendrick Bangs Kellogg website. http://sandiegoart.com/KKellogg/restps.html
City of Rancho Mirage Building Permits.

B13. Remarks:

Sketch Map

***B14. Evaluator:** *Peter Moruzzi, Teresa Grimes, Leslie Heumann*

***Date of Evaluation:** *September 23, 2002*

(This space reserved for official comments.)

***B10. Significance (continued):**

Kellogg's diversified experience emphasizes composing a totally unified concept. He has a rather unorthodox philosophy regarding architecture and the profession. "Although the 'architectural school' taught basic engineering, it also inadvertently taught me what not to do. Architecture cannot be taught. Beauty comes from within. I learned early that license does not make Architecture. Competitions are, for the most part, political. The technology of any time is only a tool. The AIA is composed of those, with and without license, who primarily are in the business of promoting themselves rather than Architecture. And a committee will never be composed of anything more than another level of mediocrity." Kellogg believes "Organic Architecture is the Mother of the Arts. Beauty is the sustainable essence of life. Nature is not sentimental. Both beauty and nature are the practical aspects of our compassion for survival."

The Chart House, Kellogg's only known Coachella Valley commission, brilliantly demonstrates Kellogg's design philosophy. Here he created a building that is an integral and 'organic' part of the environment as it grows out of the hill. Hugging the land, the partially subterranean building folds, curves, and undulates with the topography. It is clearly one-of-a-kind. The property appears eligible for separate listing in the National Register of Historic Places under Criterion C for exceptional merit as an example of Organic Modern design (a "3S" National Register Status Code). In addition, the property would be eligible for designation under an existing or proposed local ordinance.

P5b. Description/Date of Photo: *View from beneath entrance overhang, August 2002.*



Recorded by Michael D. Richards **Date** March 18, 2025 ___Continuation √ Update
Form Prepared by Bai "Tom" Tang **Date** April 10, 2025
Affiliation: CRM TECH, Colton **Project No:** CRM TECH 4233

In 2004, the Chart House building was officially designated a local historic resource by the City of Rancho Mirage. Chart House itself closed prior to that, in 2003, and a series of other restaurants continued to operate at the same location until January 10, 2012, when a fire destroyed much of the building. After the fire, further studies were commissioned by the City to explore possible means to avoid or reduce impact on the significance of this historic building, such as restoration, reconstruction, or mitigation, and much public discussion ensued in the City's decision-making process.

Ultimately, the City concluded that it was infeasible for the building to be restored and that, under the circumstances, the issuance of a demolition permit was a ministerial act exempt from provisions of the California Environmental Quality Act (CEQA). The former Chart House building was subsequently demolished on March 19, 2013. A field inspection of its former site on March 18, 2025, confirmed that the building had been completely removed, leaving little physical trace of its 35-year presence except the paved parking lot nearby, which remains in occasional use by shoppers at the adjacent Atrium shopping center.

Report Citation:

Bai "Tom" Tang, Frank Raslich, Daniel Ballester, and Michael D. Richards
2025 Phase I Historical/Archaeological Resources Survey: Howard World Wildlife Museum Project; Assessor's Parcel Nos. 689-040-023, -025, and -028, City of Rancho Mirage, Riverside County, California.

Additional References:

City of Rancho Mirage
2012 Environmental Initial Study: Proposed Demolition of Fire-Damaged Structure Commonly Known as the Chart House Restaurant (Case No. EA120004); draft. Copy provided by the City of Rancho Mirage.
2013a City Council, Library Board, Housing Authority Board, the City Council Representing the Redevelopment Successor Agency and the Community Facilities District, Regular Meeting, Thursday, January 17, 2013, 1:00 P.M., Minutes. Copy provided by the City of Rancho Mirage.
2013b City Council, Library Board, Housing Authority Board, the City Council Representing the Redevelopment Successor Agency, Regular Meeting, Thursday, February 7, 2013, 1:00 P.M., Minutes. Copy provided by the City of Rancho Mirage.
2013c City Council Resolution No. 2013-07. Copy provided by the City of Rancho Mirage.
Herzog, Blake
2013 Chart House Building's Demise: "It Was a Work of Art." *The Desert Sun* (Palm Springs, California) March 20:A1, A7.
Herzog, Blake, and Colin Atagi
2013 Iconic Building to Be Leveled. *The Desert Sun* (Palm Springs, California) February 8:B1, B2.

Recorded by Michael D. Richards Date March 18, 2025 ___ Continuation √ Update
Form Prepared by Bai "Tom" Tang Date April 10, 2025
Affiliation: CRM TECH, Colton Project No: CRM TECH 4233

McGinty, Kate, and Brian Indrelunas
2012 Fire Destroys Local Landmark. *The Desert Sun* (Palm Springs, California) January 11:A1, A2.

Tang, Bai "Tom"
2012 Historic Building Study: Former Chart House, 69-934 Highway 111, City of Rancho Mirage, Riverside County, California. Report prepared for Terra Nova Planning and Research, Inc., by CRM TECH.

Appendix D

AB 52 Consultation Initiation Letter

CITY OF RANCHO MIRAGE

May 19, 2025

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear :

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear :

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Tribe Name
Contact Person
Contact Address

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Contact Person:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomiragecа.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Agua Caliente Band of Cahuilla Indians
Lacy Padilla, Director of Historic Preservation/THPO
5401 Dinah Shore Drive
Palm Springs, CA, 92264

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Ms. Padilla:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Augustine Band of Cahuilla Indians
Tribal Operations,
84-001 Avenue 54
Coachella, CA, 92236

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Tribal Operations:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Cabazon Band of Cahuilla Indians
Doug Welmas, Chairperson
84-245 Indio Springs Parkway
Indio, CA, 92203

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Welmas:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Cahuilla Band of Indians
Anthony Madrigal, Tribal Historic Preservation Officer
52701 CA Highway 371
Anza, CA, 92539

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Madrigal:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Cahuilla Band of Indians
BobbyRay Esparza, Cultural Director
52701 CA Highway 371
Anza, CA, 92539

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Esparza:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Cahuilla Band of Indians
Erica Schenk, Chairperson
52701 CA Highway 371
Anza, CA, 92539

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Ms. Schenk:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Los Coyotes Band of Cahuilla and Cupeño Indians
Ray Chapparosa, Chairperson
P.O. Box 189
Warner Springs, CA, 92086-0189

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Chapparosa:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Road
Banning, CA, 92220

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Martin:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Morongo Band of Mission Indians
Ann Brierty, THPO
12700 Pumarra Road
Banning, CA, 92220

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Ms. Brierty:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Quechan Indian Tribe of the Fort Yuma Reservation
Jordan Joaquin, President, Quechan Tribal Council
P.O.Box 1899
Yuma, AZ, 85366-1899

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Joaquin:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Quechan Indian Tribe of the Fort Yuma Reservation
Jill McCormick, Historic Preservation Officer
P.O. Box 1899
Yuma, AZ, 85366-1899

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Ms. McCormick:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Ramona Band of Cahuilla
Joseph Hamilton, Chairperson
P.O. Box 391670
Anza, CA, 92539

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Hamilton:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Santa Rosa Band of Cahuilla Indians
Steven Estrada, Tribal Chairman
P.O. Box 391820
Anza, CA, 92539

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Estrada:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Santa Rosa Band of Cahuilla Indians
Vanessa Minott, Tribal Administrator
P.O. Box 391820
Anza, CA, 92539

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Ms. Minott:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Soboba Band of Luiseno Indians
Jessica Valdez, Cultural Resource Specialist
P.O. Box 487
San Jacinto, CA, 92581

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Ms. Valdez:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Soboba Band of Luiseno Indians
Joseph Ontiveros, Tribal Historic Preservation Officer
P.O. Box 487
San Jacinto, CA, 92581

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Ontiveros:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Torres-Martinez Desert Cahuilla Indians
Mary Belardo, Cultural Committee Vice Chair
P.O. Box 1160
Thermal, CA, 92274

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Ms. Belardo:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Torres-Martinez Desert Cahuilla Indians
Thomas Tortez, Chairperson
P.O. Box 1160
Thermal, CA, 92274

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Tortez:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Torres-Martinez Desert Cahuilla Indians
Alesia Reed, Cultural Committee Chairwoman
P.O. Box 1160
Thermal, CA, 92274

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Ms. Reed:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Torres-Martinez Desert Cahuilla Indians
Gary Resvaloso, TM MLD
P.O. Box 1160
Thermal, CA, 92274

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Resvaloso:

In conformance with Assembly Bill 52 (AB 52), we are sending you this letter to offer consultation to protect cultural resources that may occur within the City per your request. The project being considered is as follows:

The World Wildlife Museum project proposes the development of a new single-story museum located adjacent to a mountain. The project consists of three separate parcels that will be merged into one parcel, totaling 6.75 acres. The building will be approximately 22,000 square feet in size. Various site improvements are proposed which include approximately 104 parking stalls, a bus drop off area/parking, perimeter landscaping, and other improvements. Enclosed is Attachment 1 – Site Plan for your reference.

If you wish to consult with the City regarding potential cultural resources within the City, or the AB 52 process, please contact me at 760-328-2266 or via email at LezleeP@ranchomirageca.gov or at the following address within 30 days from the receipt of this letter.

Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

Torres-Martinez Desert Cahuilla Indians
Abraham Becerra, Cultural Coordinator
P.O. Box 1160
Thermal, CA, 92274

RE: Environmental Assessment Case No. EA25-0003 and Preliminary Development Plan Case No. PDP25-0003 for the World Wildlife Museum at 69934 Highway 111 (APNs: 689-040-023, -025, & 028)

Dear Mr. Becerra:

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Assistant Planner

CITY OF RANCHO MIRAGE

May 19, 2025

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Sincerely,

Lezlee Perez

Lezlee Perez
Assistant Planner

CITY OF RANCHO MIRAGE

Appendix E

Geotechnical Investigation

Sladden Engineering

GEOTECHNICAL INVESTIGATION
PROPOSED HOWARD WORLD WILDLIFE MUSEUM
NEC MIRAGE COVE DRIVE AND HIGHWAY 111
CITY OF RANCHO MIRAGE, CALIFORNIA

-Prepared By-

Sladden Engineering

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Indio, California 92201
(760) 863-0713

Sladden Engineering

45090 Golf Center Parkway, Suite F, Indio, California 92201 (760) 863-0713 Fax (760) 863-0847
6782 Stanton Avenue, Suite C, Buena Park, CA 90621 (714) 523-0952 Fax (714) 523-1369
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www.sladdenengineering.com

March 31, 2025

Project No. 544-25009
25-03-126

Robert S. Howard Foundation
Attn. Cindy Finerty
74900 Highway 111, Suite #120
Indian Wells, California 92210

Subject: Geotechnical Investigation

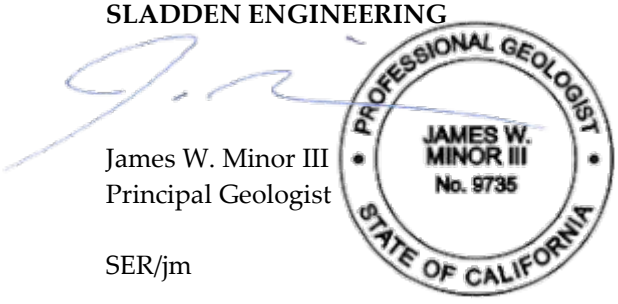
Project: Proposed Howard World Wildlife Museum
NEC Mirage Cove Drive and Highway 111
City of Rancho Mirage, California

Sladden Engineering is pleased to present the results of the geotechnical investigation performed for the Howard World Wildlife Museum proposed for the property (APN 689-040-023) located on the northeast corner of Mirage Cove Drive and Highway 111 in the City of Rancho Mirage, California. Our services were completed in accordance with our revised proposal for geotechnical engineering services dated January 21, 2025 and your authorization to proceed with the work. The purpose of our investigation was to explore the subsurface conditions at the site to provide recommendations for foundation design and the design of the various site improvements. Evaluation of environmental issues and hazardous wastes was not included within the scope of services provided.

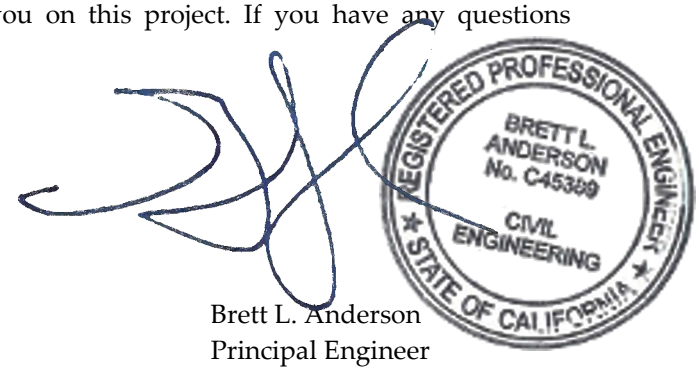
The opinions, recommendations and design criteria presented in this report are based on our field exploration program, laboratory testing and engineering analyses. Based on the results of our investigation, it is our professional opinion that the proposed project should be feasible from a geotechnical perspective provided that the recommendations presented in this report are implemented in design and carried out through construction.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING



James W. Minor III
Principal Geologist



Brett L. Anderson
Principal Engineer

SER/jm

Copies: PDF/Addressee

GEOTECHNICAL INVESTIGATION
PROPOSED HOWARD WORLD WILDLIFE MUSEUM
NEC MIRAGE COVE DRIVE AND HIGHWAY 111
CITY OF RANCHO MIRAGE, CALIFORNIA

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APPENDIX B Laboratory Testing

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INTRODUCTION

This report presents the results of the geotechnical investigation performed by Sladden Engineering (Sladden) for the Howard World Wildlife Museum proposed for the property (APN 689-040-023) located on the northeast corner of Mirage Cove Drive and Highway 111 in the City of Rancho Mirage, California. The site is located at approximately 33.7662 degrees north latitude and 116.4439 degrees west longitude. The approximate location of the site is indicated on the Site Location Map (Figure 1).



Figure 1 (USGS, 2012)

Our investigation was conducted to evaluate the engineering properties of the subsurface materials, to evaluate their *in-situ* characteristics, and to provide engineering recommendations and design criteria for site preparation, foundation design and the design of various site improvements. This study also includes a review of published and unpublished geotechnical and geological literature regarding seismicity and other geologic hazards at and near the subject site.

PROJECT DESCRIPTION

Based on the provided plans (Prest Vuksic, 2024), the project will consist of constructing a new single-story museum with a plaza/fountain area. Underground utilities, a billboard sign, paved parking areas, concrete flatwork, landscape areas, and various associated improvements are also anticipated. For our analyses, we expect that the new museum will consist of a relatively lightweight wood-frame or steel-frame structure supported on conventional shallow spread footings and concrete slabs on grade.

Sladden expects that grading will be limited to minor cuts and fills to accomplish the desired surface elevations and provide adequate gradients for site drainage. This does not include the removal and re-compaction of the loose surface soil/bedrock and primary foundation-bearing soil within the proposed building and foundation areas. Upon completion of the precise grading plans, Sladden should be retained to verify that the recommendations presented within this report are properly incorporated into the design of the proposed project

Structural foundation loads were not available at the time of this report. Based on our experience with relatively lightweight structures, we expect that isolated column loads will be less than 20 kips and continuous wall loads will be less than 2.0 kips per linear foot. If these actual loads vary significantly from the assumed loads, we should be consulted to verify the applicability of the recommendations provided.

SCOPE OF SERVICES

The purpose of our investigation was to determine specific engineering characteristics of the surface and near-surface soil to develop foundation design criteria and recommendations for site preparation. Specifically, our site characterization consisted of the following tasks:

- Site reconnaissance to assess the existing surface conditions on and adjacent to the site.
- Drilling three (3) exploratory boreholes to depths ranging from approximately 5 to 21.5 feet bgs to characterize the subsurface soil conditions. Representative samples of the soil were classified in the field and retained for laboratory testing and engineering analyses.
- Performing laboratory testing on selected samples to evaluate their engineering characteristics.
- Reviewing geologic literature and discussing geologic hazards.
- Performing site-specific ground motion procedures for the subject property.
- Performing engineering analyses to develop recommendations for foundation design and site preparation.
- The preparation of this report summarizing our work at the site.

SITE CONDITIONS

The subject property is located on the northeast corner of Mirage Cove Drive and Highway 111 in the City of Rancho Mirage, California. The new museum location is formally identified by the County of Riverside as APN 689-040-023 and occupies a total area of 0.93 acres. At the time of our investigation, the property was vacant. An existing paved parking lot was located near the northern side of the parcel. An ascending bedrock hillside was located on the eastern side of the parcel. The proposed building location is near the elevation of the adjacent properties and roadways and is bounded by residential and commercial property to the north, residential property to the east, Mirage Cove Drive to the south, and Highway 111 to the west.

Based on our review of the Cathedral City 7.5-Minute Quadrangle Map (USGS, 2021) and (Google Earth, 2025), the site is situated at an approximate elevation of 265 feet above mean sea level (MSL).

No natural ponding of water or surface seeps were observed at or near the sites during our investigation conducted on February 6, 2025. Site drainage is controlled by sheet flow, surface infiltration and through City maintained storm sewers located along nearby streets.

GEOLOGIC SETTING

The project site is located within the Colorado Desert Physiographic Province (also referred to as the Salton Trough) which is characterized as a northwest-southeast trending structural depression extending from the Gulf of California to the Banning Pass. The Salton Trough is dominated by several northwest-trending faults, most notably the San Andreas Fault system. The Salton Trough is bounded by the Santa Rosa-San Jacinto Mountains on the southwest, the San Bernardino Mountains on the north, the Little San Bernardino - Chocolate – Orocopia Mountains on the east, and extends through the Imperial Valley into the Gulf of California on the south.

A relatively thick sequence (20,000 feet) of sediment has been deposited in the Coachella Valley portion of the Salton Trough from Miocene to present times. These sediments are predominately terrestrial in nature with some lacustrine (lake) and minor marine deposits. The major contributor of these sediments has been the Colorado River. The mountains surrounding the Coachella Valley are composed primarily of Precambrian metamorphic and Mesozoic "granitic" rock.

The Salton Trough is an internally draining area with no readily available outlet to Gulf of California and with portions well below sea level (-253' msl). The region is intermittently blocked from the Gulf of California by the damming effects of the Colorado River delta (current elevation +30'msl). Between about 300AD and 1600 AD (to 1700) the Salton Trough has been inundated by the River's water, forming ancient Lake Cahuilla (max. elevation +58' msl). Since that time the floor of the Trough has been repeatedly flooded with other "fresh" water lakes (1849, 1861, and 1891), the most recent and historically long-lived being the current Salton Sea (1905). The sole outlet for these waters is evaporation, leaving behind vast amounts of terrestrial sediment materials and evaporite minerals.

The site has been mapped by Rogers (1965) to be immediately underlain by Quaternary-age alluvium (Qal) to dune sand (Qs) and Pre-Cretaceous metasedimentary rocks (ms). The regional geologic setting for the site vicinity is presented on the Regional Geologic Map (Figure 2).

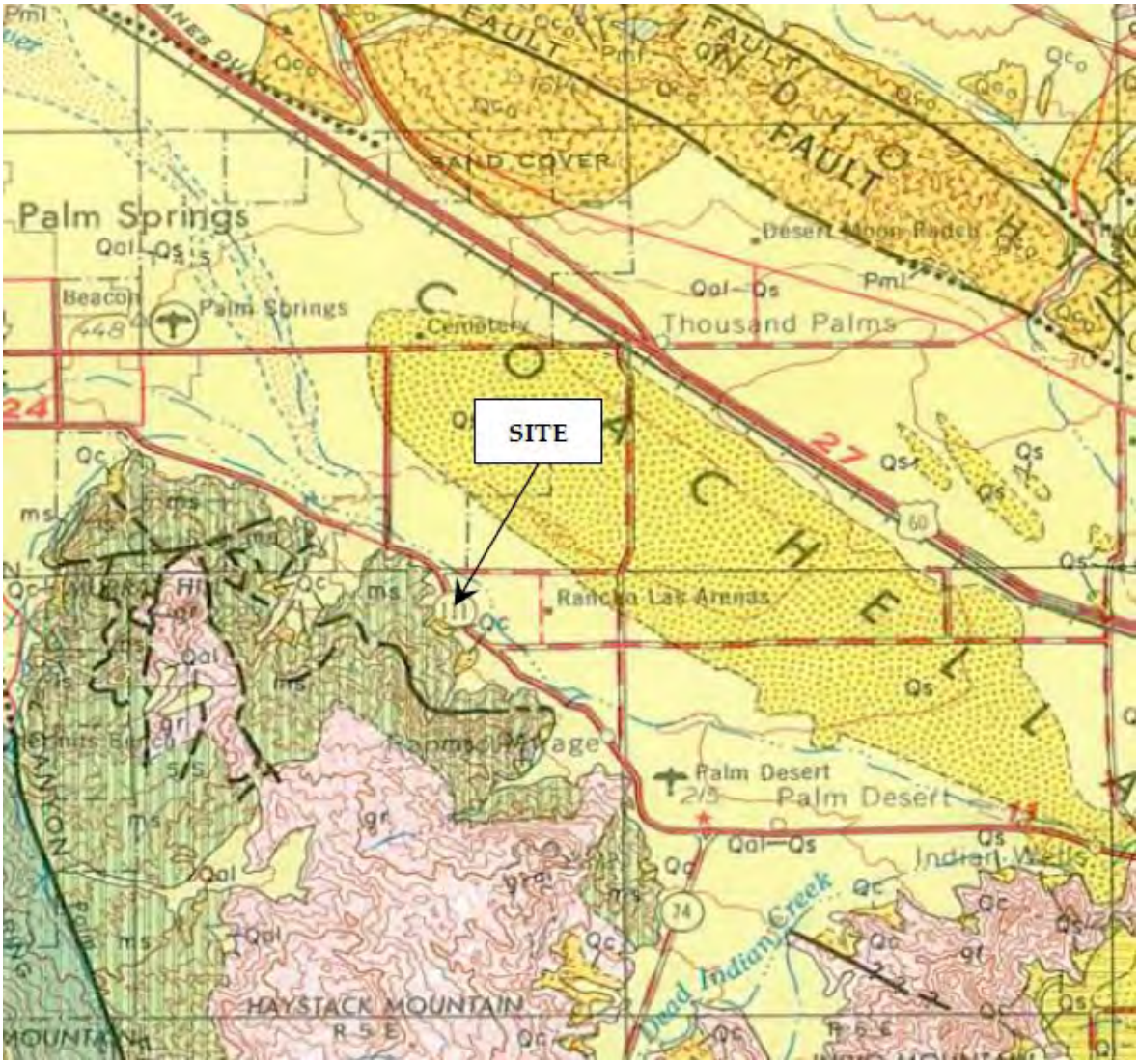


Figure 2 (Rogers, 1965)

SUBSURFACE CONDITIONS

The subsurface conditions at the site were investigated by drilling three (3) exploratory boreholes and two (2) percolation test holes on the property to depths ranging from approximately 5 to 21 feet bgs. The approximate locations of the boreholes are illustrated on the Borehole Location Plan (Figure 3). The boreholes were advanced using a truck-mounted Mobile B-61 drill-rig equipped with 8-inch outside diameter hollow stem augers. A representative of Sladden was on-site to log the materials encountered and retrieve samples for laboratory testing and engineering analysis.

During our field investigation, disturbed/fill soil was encountered to a depth of less than approximately three (3) feet below existing grade. Underlying the disturbed/fill soil, native alluvium overlying bedrock was encountered. The native alluvial soil throughout the site consists primarily of silty sand (SM), and sandy silt (ML). Generally, granular soil was found to be dry, medium dense, and grayish brown in in-situ color. Cohesive layers were found to be dry to slightly moist, medium stiff, dark grayish brown in in-situ color, and exhibited low plasticity characteristics. The encountered bedrock material consisted of a moderately hard, moderately strong, highly weathered metamorphite (ms) that breaks down into a SM/SP soil type.

The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and tests of the field samples. The final logs are included in Appendix A of this report. The stratification lines represent the approximate boundaries between soil types although the transitions may be gradual and variable across the site.

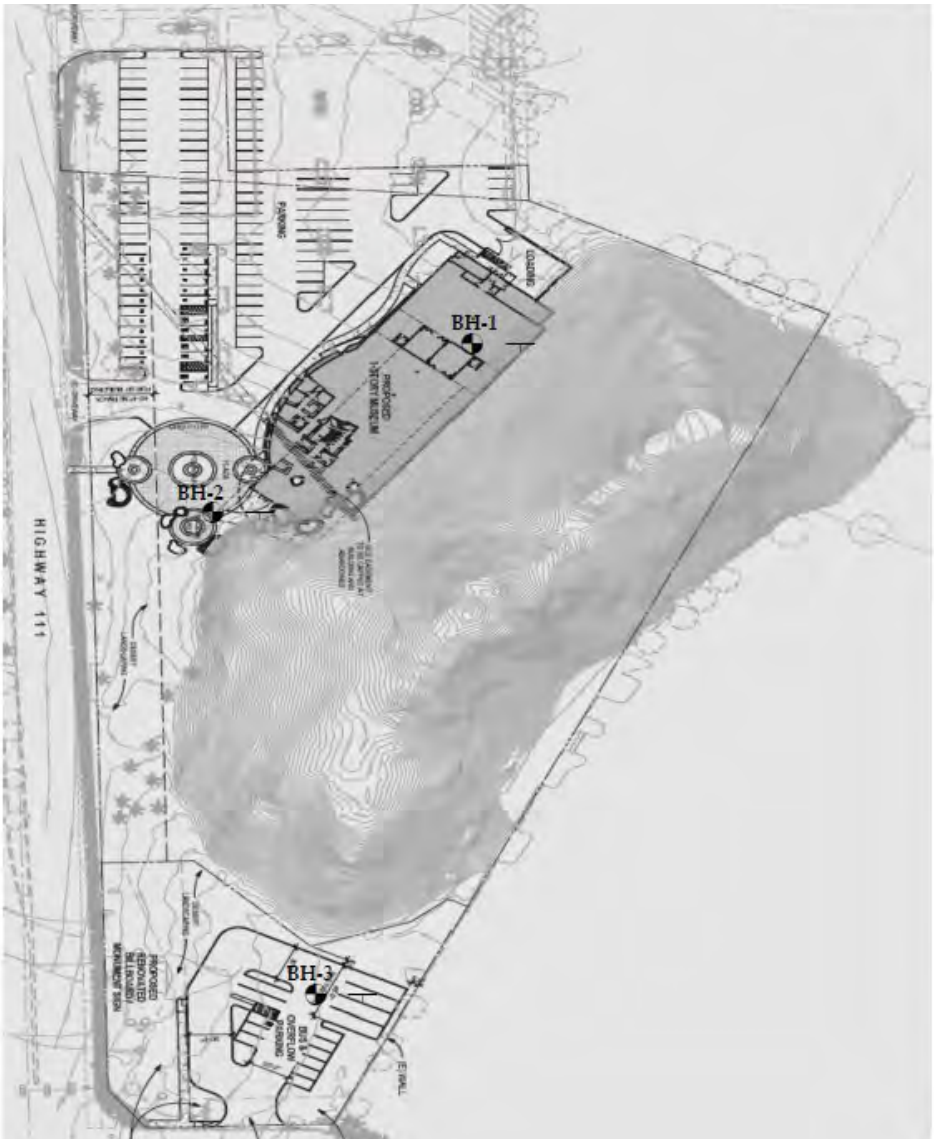


Figure 3 (Prest Vuksic, 2024)

GROUNDWATER CONDITIONS

Groundwater was not encountered at the maximum explored depth of 21 feet bgs during our field investigation. Information regarding the approximate depth to groundwater provided by the California Department of Water Resources online database indicates that the depth to groundwater is in excess of 50 feet below the existing ground surface in the vicinity of the site (CDWR, 2025). It is our opinion that groundwater should not be a factor in the design or construction of the proposed project.

SEISMICITY AND FAULTING

The southwestern United States is a tectonically active and structurally complex region, dominated by northwest-trending dextral faults. The faults of the region are often part of complex fault systems, composed of numerous subparallel faults that splay or step from main fault traces. Strong seismic shaking could be produced by any of these faults during the design life of the proposed project.

We consider the most significant geologic hazard to the project to be the potential for moderate to strong seismic shaking that is likely to occur during the design life of the project. The proposed project is located in the highly seismic Southern California region within the influence of several fault systems that are considered to be active or potentially active. An active fault is defined by the State of California as a "sufficiently active and well-defined fault" that has exhibited surface displacement within the Holocene epoch (about the last 11,000 years). A potentially active fault is defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago).

As previously stated, the site has been subjected to strong seismic shaking related to active faults that traverse through the region. Some of the more significant seismic events near the subject site within recent times include: M6.0 North Palm Springs (1986), M6.1 Joshua Tree (1992), M7.3 Landers (1992), M6.2 Big Bear (1992), M7.1 Hector Mine (1999), and M7.1 Ridgecrest (2019).

Table 2 lists the closest known potentially active faults that was generated in part using fault parameters from The Revised 2002 California Probabilistic Seismic Hazard Maps (Cao et al, 2003), 2008 National Seismic Hazard Maps – Source Parameters (USGS, 2008) and the Fault and Fold Database of the United States (USGS, 2024a). This table does not identify the probability of reactivation or the on-site effects from earthquakes occurring on any faults in the region.

TABLE 1
CLOSEST KNOWN ACTIVE FAULTS

Fault Name	Distance (Km)	Maximum Event
San Andreas - Coachella	13.3	*7.2
San Andreas - Southern	13.3	*7.2
San Andreas - San Bernardino	18.4	*7.5
Burnt Mountain	21.5	6.5
Eureka Peak	25.2	6.4
San Jacinto - Anza	29.6	7.2
San Jacinto - Coyote Creek	34.2	6.8

GROUND MOTION PARAMETERS

Sladden has reviewed the 2022 California Building Code (CBC) and ASCE7-16 and developed ground motion parameters for the subject site. The project Seismic Design Maps are summarized in the following table and included within Appendix C. The project Structural Engineer should verify that all design parameters provided are applicable for the subject project.

TABLE 2 GROUND MOTION PARAMETERS	
Latitude / Longitude	33.7662/ -116.4439
Risk Category	II
Site Class	C
Code Reference Documents	ASCE 7-16; Chapter 11 & 21

Description	Type	Map Based
MCE_R Ground Motion (0.2 second period)	S_S	1.5
MCE_R Ground Motion (1.0 second period)	S_1	0.613
Site-Modified Spectral Acceleration Value	S_{MS}	1.8
Site-Modified Spectral Acceleration Value	S_{M1}	0.858
Numeric Seismic Design Value at 0.2 second SA	S_{DS}	1.2
Numeric Seismic Design Value at 1.0 second SA	S_{D1}	0.572
Site Amplification Factor at 0.2 second	F_a	1.2
Site Amplification Factor at 1.0 second	F_v	1.4
Site Peak Ground Acceleration	PGA_M	0.788

GEOLOGIC HAZARDS

The subject site is located in an active seismic zone and will likely experience strong seismic shaking during the design life of the proposed project. In general, the intensity of ground shaking will depend on several factors including; the distance to the earthquake focus, the earthquake magnitude, the response characteristics of the underlying materials, and the quality and type of construction. Geologic hazards and their relationship to the site are discussed below.

I. Surface Rupture. Surface rupture is expected to occur along preexisting, known active fault traces. However, surface rupture could potentially splay or step from known active faults or rupture along unidentified traces. Based on our review of Rogers (1965), Jennings (1994), CGS (2025) and CDOC (2025) known active faults are not mapped on the site. In addition, no signs of active surface faulting were observed during our review of non-stereo digitized photographs of the site and site vicinity (Google Earth, 2025). Finally, no signs of active surface fault rupture or secondary seismic effects (lateral spreading, lurching etc.) were identified during our field investigation. Therefore, it is our opinion that risks associated with primary surface ground rupture should be considered “low”.

II. Ground Shaking. The site has been subjected to past ground shaking by faults that traverse through the region. Strong seismic shaking from nearby active faults is expected to produce strong seismic shaking during the design life of the proposed project. Based on site-specific ground motion parameters developed for the property (Appendix C), the site-modified peak ground acceleration (PGAm) is estimated to be 0.788g.

III. Liquefaction/Dry Sand Settlement. Liquefaction is the process in which loose, saturated granular soil loses strength as a result of cyclic loading. The strength loss is a result of a decrease in granular sand volume and a positive increase in pore pressures. Generally, liquefaction can occur if all of the following conditions apply; liquefaction-susceptible soil, groundwater within a depth of 50 feet or less, and strong seismic shaking.

The project site is situated within a County of Riverside designated "moderate" liquefaction potential zone (RCPR, 2025). Based on our review of groundwater maps of the site vicinity (>50 feet bgs), the presence of shallow seated bedrock underlying the site and our experience in the project vicinity, risks associated with liquefaction and liquefaction related hazards should be considered "negligible".

IV. Tsunamis and Seiches. Because the site is situated at an inland location and is not immediately adjacent to any impounded bodies of water, risks associated with tsunamis and seiches are considered "negligible".

V. Slope Failure, Landsliding, Rock Falls. Slope instability in the form of landslides and rock falls were not observed at or near the subject site. The site is situated partially on relatively flat ground. The site is located immediately adjacent to an ascending bedrock slope. However, bedrock appeared to be in a stable configuration during our site investigation. Risks associated with slope instability (landslides, mass wasting, and rock falls) are considered "low".

VI. Expansive Soil. Generally, the near-surface soil consists of silty sand (SM). Based on the results of our laboratory testing (EI=0), the materials underlying the site are considered to have a "very low" expansion potential. The recommended remedial grading will result in substantial mixing and blending of the surface soil. The expansion potential of the subsurface soil should be reevaluated after grading.

VII. Static Settlement. Static settlement resulting from the anticipated foundation loads should be tolerable provided that the recommendations included in this report are considered in foundation design and construction. The ultimate static settlement is expected to be less than 1 inch when using the recommended allowable bearing pressures. As a practical matter, differential static settlement between footings can be assumed as one-half of the total static settlement.

VIII. Subsidence. Land subsidence can occur in valleys where aquifer systems have been subjected to extensive groundwater pumping, such that groundwater pumping exceeds groundwater recharge. Generally, pore water reduction can result in a rearrangement of skeletal grains and could result in elastic (recoverable) or inelastic (unrecoverable) deformation of an aquifer system. Locally, no fissures or other surficial evidence of subsidence were observed at or near the subject site.

Although recent investigations have documented significant subsidence within the Coachella Valley area (USGS, 2007), no fissures or other surficial evidence of subsidence were observed at the subject site. With the exception of isolated tension zones typically manifested on the ground surface as fissures and/or ground cracks, subsidence related to groundwater depletion is generally areal in nature with minimal differential settlement over short distances such as across individual buildings.

The Coachella Valley Water District has publicly acknowledged regional subsidence throughout the southern portion of the Coachella Valley and has indicated a commitment to groundwater replenishment programs that are intended to limit future subsidence. At this time, subsidence is considered a regional problem requiring regional mitigation not specific to the project vicinity.

IX. Debris Flows. Debris flows are viscous flows consisting of poorly sorted mixtures of sediment and water and are generally initiated on slopes steeper than approximately six horizontal to one vertical (6H:1V) (Boggs, 2001). Based on the flat nature of the site and the composition of the surface soil, we judge that risks associated with debris flows should be considered "negligible".

X. Flooding and Erosion. No signs of flooding or erosion were observed during our field investigation. Risks associated with flooding and erosion should be evaluated and mitigated by the project design Civil Engineer.

CONCLUSIONS

Based on the results of our investigation, it is our professional opinion that the project should be feasible from a geotechnical perspective provided that the recommendations included in this report are incorporated into design and carried out through construction. The main geotechnical concerns in the construction of the proposed project are the current building location along an existing hillside and the presence of shallow seated bedrock underlying the subject site.

We recommend that remedial work within the proposed new building and foundation areas include over-excavation and re-compaction of the primary foundation-bearing soil. Specific recommendations for foundation area preparation are presented in the Earthwork and Grading section of this report.

Caving did occur to varying degrees within each of our exploratory bores and the surface soil may be susceptible to caving within deeper excavations. All excavations should be constructed in accordance with the normal CalOSHA excavation criteria. Based on our observations of the materials encountered, we anticipate that the subsoil will conform to that described by CalOSHA as Type C and the underlying bedrock will be classified as Type A. Soil conditions should be verified in the field by a "Competent person" employed by the Contractor.

The following recommendations present more detailed design criteria that have been developed based on our field and laboratory investigation.

EARTHWORK AND GRADING

All earthwork including excavation, backfill, and preparation of the primary foundation and/or slab bearing soil should be performed in accordance with the geotechnical recommendations presented in this report and portions of the local regulatory requirements, as applicable. All earthwork should be performed under the observation and testing of a qualified soil engineer. The following geotechnical engineering recommendations for the proposed project are based on observations from the field investigation program, laboratory testing, and geotechnical engineering analyses.

a. Site Clearing: Areas to be graded should be cleared of vegetation, associated root systems, underground utilities, and debris. All areas scheduled to receive fill should be cleared of old fills and any irreducible matter. The strippings should be removed off-site, or stockpiled for later use in landscape areas. Voids left by obstructions should be properly backfilled in accordance with the compaction recommendations of this report.

b. Preparation of the Building Areas. To provide firm and uniform foundation bearing conditions and to mitigate potential transition related differential settlements, we recommend over-excavation and re-compaction of the surface soil and bedrock throughout the building areas. The primary foundation-bearing soil and bedrock should be removed to a depth of at least 4 feet below the existing grade or 3 feet below the bottom of the footings, whichever is deeper. Remedial grading should extend laterally, a minimum of 5 feet beyond the building perimeter. The exposed surface should then be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction. The previously removed soil may then be replaced with compacted fill in accordance with the compaction recommendations provided below. Specialized grading equipment may be necessary to accomplish bedrock removals.

c. Cut/Fill Slopes. Where fill is required on slopes steeper than five horizontal to one vertical (5H:1V), all weak soil should be removed and these areas should be positively benched horizontally into bedrock in conjunction with fill placement. Keyways will be required at the toe of all fill embankments. The keyways should be excavated at least two (2) feet into competent bedrock as measured on the downhill side. The height of the benches and keyway dimensions should be determined by the geologist in the field during grading.

d. Compaction: Soil to be used as engineered fill should be free of organic material, debris, and other deleterious substances. All fill material should be placed in thin lifts, not exceeding six inches in a loose condition. If import fill is required, the material should be of a low to non-expansive nature and should meet the following criteria:

Plastic Index	Less than 12
Liquid Limit	Less than 35
Percent Soil Passing #200 Sieve	Between 15% and 35%
Maximum Aggregate Size	3 inches

The subgrade and all fill should be compacted with acceptable compaction equipment, to at least 90 percent relative compaction. The bottom of the exposed subgrade should be observed by a representative of Sladden Engineering prior to fill placement. Compaction testing should be performed on all lifts to ensure proper placement of the fill materials. Table 4 provides a summary of the excavation and compaction recommendations.

TABLE 3
SUMMARY OF RECOMMENDATIONS

*Remedial Grading	Over-excavation and re-compaction within the building envelope and extending laterally for 5 feet beyond the building limits where possible and to a minimum of 4 feet below existing grade or 3 feet below the bottom of the footings, whichever is deeper.
Native / Import Engineered Fill	Place in thin lifts not exceeding 6 inches in a loose condition, at near optimum moisture content and compact to a minimum of 90 percent relative compaction.
Asphalt Concrete Sections	Compact the top 12 inches to at least 95 percent compaction at near optimum moisture content.

*Actual depth may vary and should be determined by a representative of Sladden Engineering in the field during construction.

e. Shrinkage and Subsidence**:** Volumetric shrinkage of the material that is excavated and replaced as controlled compacted fill should be anticipated. We estimate that this shrinkage should be between 10 and 20 percent. Subsidence of the surfaces that are scarified and compacted should be between 1 tenth and 3 tenths of a foot. This will vary depending upon the type of equipment used, the moisture content of the soil at the time of grading and the actual degree of compaction attained.

CONVENTIONAL SHALLOW SPREAD FOOTINGS

All footings should be founded entirely upon properly compacted engineered fill soil and should have a minimum embedment depth of 12 inches measured from the lowest adjacent finished grade. Continuous footings and isolated pad footings should have minimum widths of 12 inches and 24 inches, respectively. Continuous footings and isolated pad footings supported upon properly compacted engineered fill soil may be designed using allowable bearing pressures of 1800 and 2000 pounds per square foot (psf), respectively. Allowable increases of 200 psf for each additional 1 foot of width and 250 psf for each additional 6 inches of depth may be used if desired. The maximum allowable bearing pressure should be 3000 psf. The allowable bearing pressures apply to combined dead and sustained live loads. The allowable bearing pressures may be increased by one-third when considering transient live loads, including seismic and wind forces.

Based on the recommended allowable bearing pressures, the total static settlement of the shallow footings is anticipated to be less than ½ inch, provided foundation preparations conform to the recommendations described in this report. Static differential settlement is anticipated to be approximately one-half of the total settlement for similarly loaded footings spaced up to approximately 50 feet apart.

Lateral load resistance for the conventional shallow spread footings will be developed by passive pressure against the sides of the footings below grade and by friction acting at the base of the footings. An allowable passive pressure of 275 psf per foot of depth may be used for design purposes. An allowable coefficient of friction 0.45 may be used for dead and sustained live loads to compute the frictional resistance of the footing placed directly on compacted fill. Under seismic and wind loading conditions, the passive pressure and frictional resistance may be increased by one-third.

All footing excavations should be observed by a representative of the project geotechnical consultant to verify adequate embedment depths prior to placement of forms, steel reinforcement or concrete. The excavations should be trimmed neat, level and square. All loose, disturbed, sloughed or moisture-softened soils and/or any construction debris should be removed prior to concrete placement. Excavated soil generated from footing and/or utility trenches should not be stockpiled within the building envelope or in areas of exterior concrete flatwork. All footings should be reinforced in accordance with the project Structural Engineer's recommendations.

SLABS-ON-GRADE

To provide uniform and adequate support, concrete slabs-on-grade must be placed on properly compacted engineered fill soil as outlined in the previous sections of this report. The slab subgrade should remain near optimum moisture content and should not be permitted to dry prior to concrete placement. Slab subgrade should be firm and unyielding. Disturbed soil should be removed and replaced with engineered fill soil compacted to a minimum of 90 percent relative compaction.

Slab thickness and reinforcement should be determined by the Structural Engineer. We recommend a minimum slab thickness of 4.0 inches and minimum reinforcement of #3 bars at 18 inches on center in both directions. All slab reinforcement should be supported on concrete chairs to ensure that reinforcement is placed at slab mid-height. Final floor slab design and reinforcement should be determined by the Structural Engineer.

Slabs with moisture-sensitive surfaces should be underlain with a moisture vapor retarder consisting of a polyvinyl chloride membrane such as 10-mil visqueen, or equivalent. All laps within the membrane should be sealed and at least 2 inches of clean sand should be placed over the membrane to promote uniform curing of the concrete. To reduce the potential for punctures, the membrane should be placed on a pad surface that has been graded smooth without any sharp protrusions. If a smooth surface can not be achieved by grading, consideration should be given to placing a thin leveling course of sand across the pad surface prior to placement of the membrane.

RETAINING WALLS

Minor retaining walls may be necessary to accomplish the proposed construction. Cantilever retaining walls may be designed using "active" pressures. Active pressures may be estimated using an equivalent fluid weight of 35 pcf for level native backfill soil acting in a triangular pressure distribution with drained backfill conditions. "At Rest" pressures should be utilized for restrained walls. At rest pressures may be estimated using an equivalent fluid weight of 55 pcf for native backfill soil with level drained backfill conditions.

We recommend that a back drain system be provided behind all retaining walls or that the walls be designed for full hydrostatic pressures. The back drains should consist of a heavy walled, four-inch diameter, perforated pipe sloped to drain to outlets by gravity, and of clean, free-draining, three-quarter to one-and-a-half-inch crushed rock or gravel. The crushed rock or gravel should extend to within one foot of the surface. The upper one foot should be backfilled with compacted, fine-grained soil to exclude surface water. A Mirafi 140N (or equivalent) filter cloth should be placed between the on-site native material and the drain rock.

We recommend that the ground surface behind retaining walls be sloped to drain. Under no circumstances should the surface water be diverted into back drains. Where migration of moisture through walls would be detrimental, the walls should be waterproofed.

CORROSION SERIES

The soluble sulfate concentrations of the surface soil were determined to be 20 parts per million (ppm). The soil falls within the "negligible-S0" sulfate exposure category. The use of Type V cement and special sulfate-resistant concrete mixes may not be necessary. The soluble sulfate content of the surface soil should be reevaluated after grading and appropriate concrete mix designs should be established based upon post-grading test results.

The pH level of the surface soil was determined to be 7.7. Based on soluble chloride concentration testing (90 ppm) the falls within the "C1" chloride exposure category. The minimum resistivity of the surface soil was found to be 2,700 that suggests the site soil is considered to have "moderate" corrosion potential with respect to ferrous metal installations. A corrosion expert should be consulted regarding appropriate corrosion protection measures for corrosion sensitive installations.

UTILITY TRENCH BACKFILL

All utility trench backfill should be compacted to a minimum of 90 percent relative compaction. Trench backfill materials should be placed in lifts no greater than six inches in a loose condition, moisture conditioned (or air-dried) as necessary to achieve near optimum moisture content, and mechanically compacted to a minimum of 90 percent relative compaction. A representative of the project soil engineer should test the backfill to verify adequate compaction.

EXTERIOR CONCRETE FLATWORK

To provide uniform support and minimize settlement related cracking of concrete flatwork, the subgrade soil within concrete flatwork areas should be compacted to a minimum of 90 percent relative compaction. A representative of the project geotechnical consultant should observe and verify the density and moisture content of the soil prior to concrete placement.

ON-SITE PAVEMENT DESIGN

Asphalt concrete pavements should be designed in accordance with the Caltrans Highway Design Manual based on the R-Value and Traffic Index. The R-value of the near-surface soil was estimated to be 50. Because site grading will result in the significant blending of the near surface soil, the R-value should be determined based on post grading test results. For preliminary pavement design, Traffic Indices (TI) of 5.0 and 6.5 were used for the light-duty and heavy-duty pavements, respectively. We assumed Asphalt Concrete (AC) over Class II Aggregate Base (AB). The preliminary flexible pavement layer thickness is as follows:

TABLE 4
RECOMMENDED ASPHALT PAVEMENT SECTION LAYER THICKNESS

Pavement Material	Recommended Thickness
	TI = 5.0
Asphalt Concrete Surface Course	3.0 inches
Class II Aggregate Base Course	4.0 inches
Compacted Subgrade Soil	12.0 inches

Asphalt concrete and Class II aggregate base should conform to the latest edition of the Standard Specifications for Public Works Construction ("Greenbook") or CalTrans Standard Specifications. The aggregate base course should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Method D 1557.

DRAINAGE

All final grades should be provided with positive gradients away from foundations to provide rapid removal of surface water runoff to an adequate discharge point. No water should be allowed to be pond on or immediately adjacent to foundation elements. To reduce water infiltration into the subgrade soil, surface water should be directed away from building foundations to an adequate discharge point. Subgrade drainage should be evaluated upon completion of the precise grading plans and in the field during grading.

LIMITATIONS

The findings and recommendations presented in this report are based upon an interpolation of the soil conditions between the exploratory locations and extrapolation of these conditions throughout the proposed building areas. Should conditions encountered during grading appear different than those indicated in this report, this office should be notified.

The use of this report by other parties or for other projects is not authorized. The recommendations of this report are contingent upon monitoring of the grading operation by a representative of Sladden Engineering. All recommendations are considered to be tentative pending our review of the grading operation and additional testing, if indicated. If others are employed to perform any soil testing, this office should be notified prior to such testing in order to coordinate any required site visits by our representative and to assure indemnification of Sladden Engineering.

We recommend that a pre-job conference be held on the site prior to the initiation of site grading. The purpose of this meeting will be to assure a complete understanding of the recommendations presented in this report as they apply to the actual grading performed.

ADDITIONAL SERVICES

Once completed, final project plans and specifications should be reviewed by use prior to construction to confirm that the full intent of the recommendations presented herein have been applied to design and construction. Following review of plans and specifications, observation should be performed by the Soil Engineer during construction to document that foundation elements are founded on/or extend into the properly compacted soil, and that suitable backfill soil is placed upon competent materials and properly compacted at the recommended moisture content.

Tests and observations should be performed during grading by the Soil Engineer or his representative in order to verify that the grading is being performed in accordance with the project specifications. Field density testing shall be performed in accordance with acceptable ASTM test methods. The minimum acceptable degree of compaction should be 90 percent for engineered fill soil and 95 percent for Class II aggregate base as obtained by ASTM Test Method D1557. Where testing indicates insufficient density, additional compactive effort shall be applied until retesting indicates satisfactory compaction.

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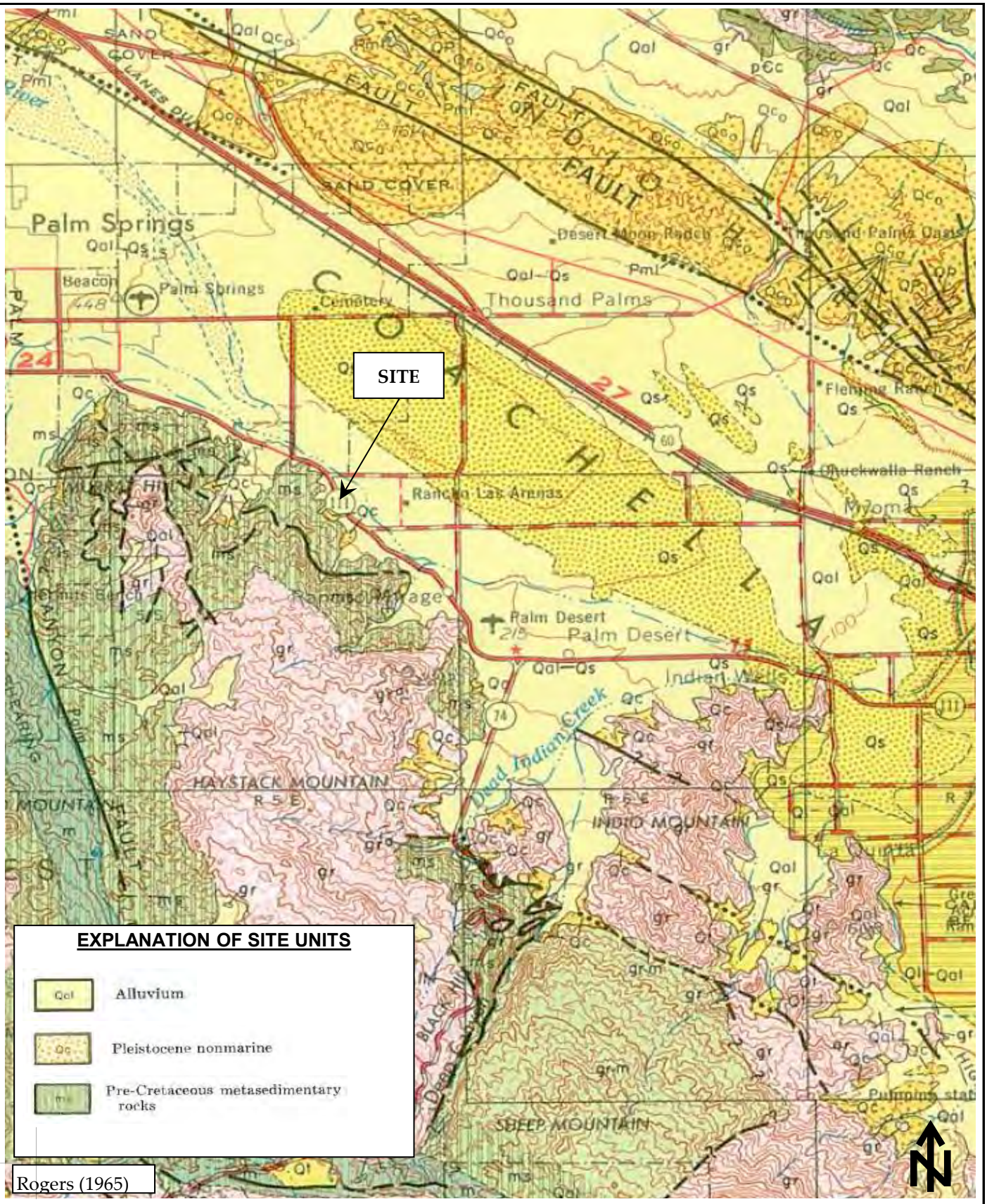
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FIGURES

SITE LOCATION MAP
REGIONAL GEOLOGIC MAP
BOREHOLE LOCATION PLAN

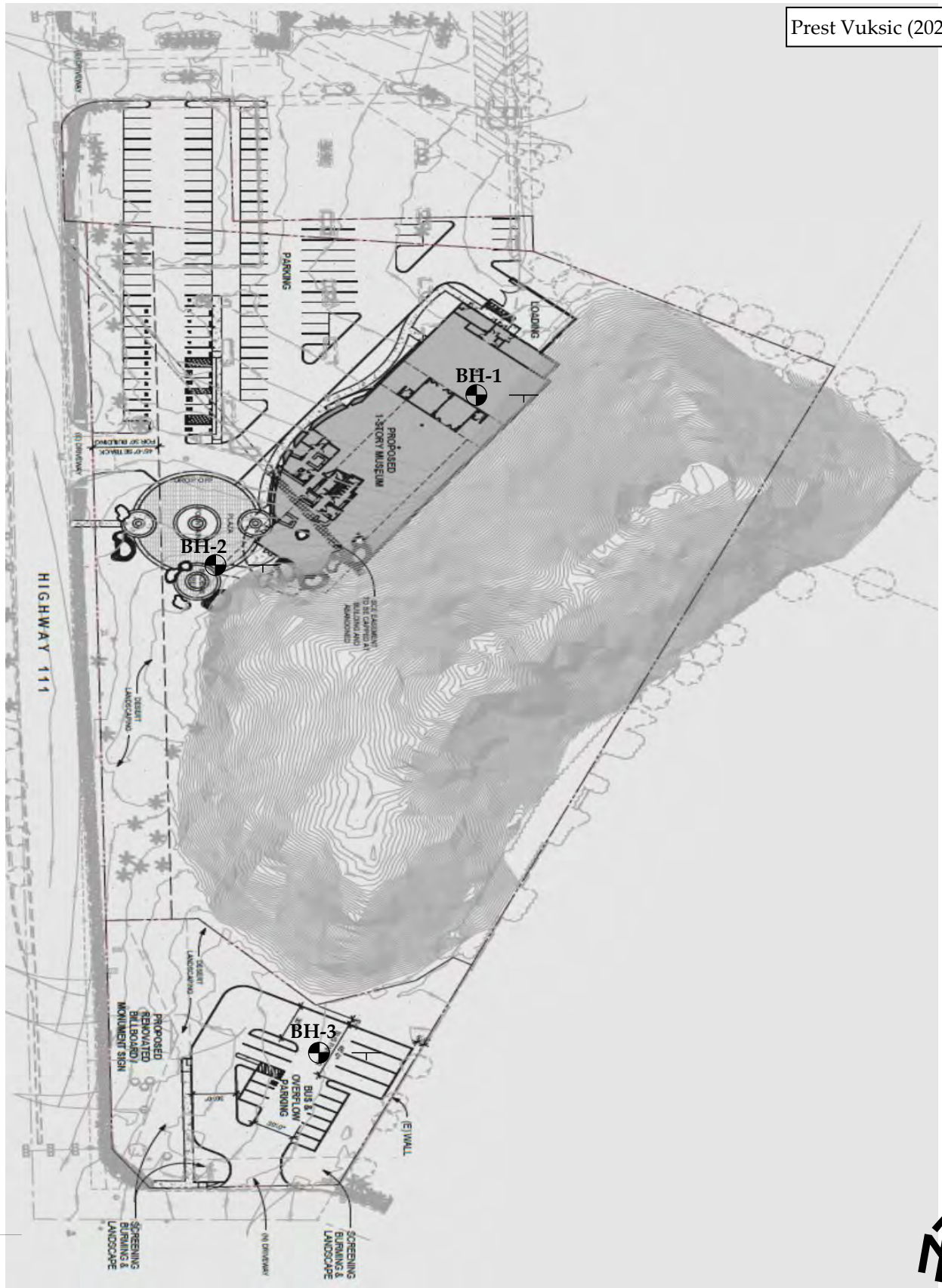


Sladden Engineering	SITE LOCATION MAP	FIGURE 1
	Project Number: 544-25009	
	Report Number: 25-03-126	
	Date: March 31, 2025	



Sladden Engineering	REGIONAL GEOLOGIC MAP	FIGURE 2
	Project Number: 544-25009	
	Report Number: 25-03-126	
	Date: March 31, 2025	

Prest Vuksic (2024)



Sladden Engineering

BOREHOLE LOCATION PLAN

Project Number:	544-25009
Report Number:	25-03-126
Date:	March 31, 2025

FIGURE

3

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

For our field investigation, three (3) exploratory boreholes were excavated on the subject site. Continuous logs of the materials encountered were made by a representative of Sladden Engineering. Materials encountered in the bores were classified in accordance with the Unified Soil Classification System.

Representative undisturbed samples were obtained within our borings by driving a thin-walled steel penetration sampler (California split spoon sampler) or a Standard Penetration Test (SPT) sampler with a 140 pound automatic-trip hammer dropping approximately 30 inches (ASTM D1586). The number of blows required to drive the samplers 18 inches was recorded in 6-inch increments and blowcounts are indicated on the boring logs.

The California samplers are 3.0 inches in diameter, carrying brass sample rings having inner diameters of 2.5 inches. The standard penetration samplers are 2.0 inches in diameter with an inner diameter of 1.5 inches. Undisturbed samples were removed from the sampler and placed in moisture sealed containers in order to preserve the natural soil moisture content. Bulk samples were obtained from the excavation spoils and samples were then transported to our laboratory for further observations and testing.

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BORE LOG

Equipment:	Mobil-B-61	Date Drilled:	2/6/2025
Elevation:	270 Ft. MSL	Boring No:	BH-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
		1	0				0		4.0 Inches Asphalt
	3 3 4				1.3	89.3	2–6		Sandy Silt (ML); dark grayish brown, dry, medium stiff, non plastic (Qal/Qs).
	17 50				6.5		10–12		Bedrock (Metamorphite); moderately hard, moderately strong, highly weathered (ms); breaks down to SM/SP soil type.
	50-9"				2.6		16		Practical Bedrock Refusal at ~16.5 Feet bgs. Bedrock Encountered at 10.0 Feet bgs. No Groundwater or Seepage Encountered.
							18–50		

Completion Notes:

PROPOSED HOWARD WORLD WILDLIFE MUSEUM
NEC MIRAGE DRIVE & HIGHWAY 111, RANCHO MIRAGE

Project No: 544-25009
Report No: 25-03-126

Sladden Engineering

BORE LOG

Equipment:	Mobil-B-61	Date Drilled:	2/6/2025
Elevation:	270 Ft. MSL	Boring No:	BH-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							0		Silty Sand/Sandy Silt (SM/ML); grayish brown, dry, fine-to coarse-grained (Disturbed).
■	15 21 39				3.4	115.9	2		Bedrock (Metamorphite); moderately hard, moderately strong, highly weathered (ms); breaks down to SM/SP soil type.
■	50-3"						4		
							6		
							8		
							10		
							12		
							14		
							16		
							18		Practical Bedrock Refusal at ~5.0 Feet bgs. Bedrock Encountered at 2.0 Feet bgs. No Groundwater or Seepage Encountered.
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED HOWARD WORLD WILDLIFE MUSEUM
NEC MIRAGE DRIVE & HIGHWAY 111, RANCHO MIRAGE

Project No: 544-25009
Report No: 25-03-126

Sladden Engineering

BORE LOG

Equipment:	Mobil-B-61	Date Drilled:	2/6/2025
Elevation:	270 Ft. MSL	Boring No:	BH-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Density, pcf	Depth (Feet)	Graphic Lithology	Description
							0		Silty Sand/Sandy Silt (SM/ML); grayish brown, dry, fine-to coarse-grained (Disturbed).
							2		
							4		
■	5 8 11				1.5	95.1	6		Silty Sand (SM); grayish brown, dry, medium dense, fine-to coarse-grained (Qal/Qa).
							8		
■	7 5 6				1.5		10		Silty Sand (SM); grayish brown, dry, medium dense, fine-to coarse-grained (Qal/Qa).
							12		
■	12 14 17				0.8	114.9	14		
							16		Silty Sand (SM); grayish brown, dry, medium dense, fine-to coarse-grained (Qal/Qa).
							18		
■	8 10 11				1.4		20		Silty Sand (SM); grayish brown, dry, medium dense, fine-to coarse-grained (Qal/Qa).
							22		
							24		Terminated at ~21.5 Feet bgs. No Bedrock Encountered. No Groundwater or Seepage Encountered.
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED HOWARD WORLD WILDLIFE MUSEUM
NEC MIRAGE DRIVE & HIGHWAY 111, RANCHO MIRAGE

Project No: 544-25009
Report No: 25-03-126

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Representative bulk soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soils underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557, Test Method A. Graphic representations of the results of this testing are presented in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses. This provides information for developing classifications for the soil in accordance with the Unified Soil Classification System which is presented in the preceding appendix. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing is very useful in detecting variations in the soil and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Expansion Testing: One (1) bulk sample was selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete.

Direct Shear Testing: One (1) bulk sample was selected for Direct Shear testing. This test measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation design and lateral design. Tests were performed using a recompacted test specimen that was saturated prior to tests. Tests were performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Corrosion Series Testing: The soluble sulfate concentrations of the surface soil were determined in accordance with California Test Method Number (CA) 417. The pH and Minimum Resistivity were determined in accordance with CA 643. The soluble chloride concentrations were determined in accordance with CA 422.

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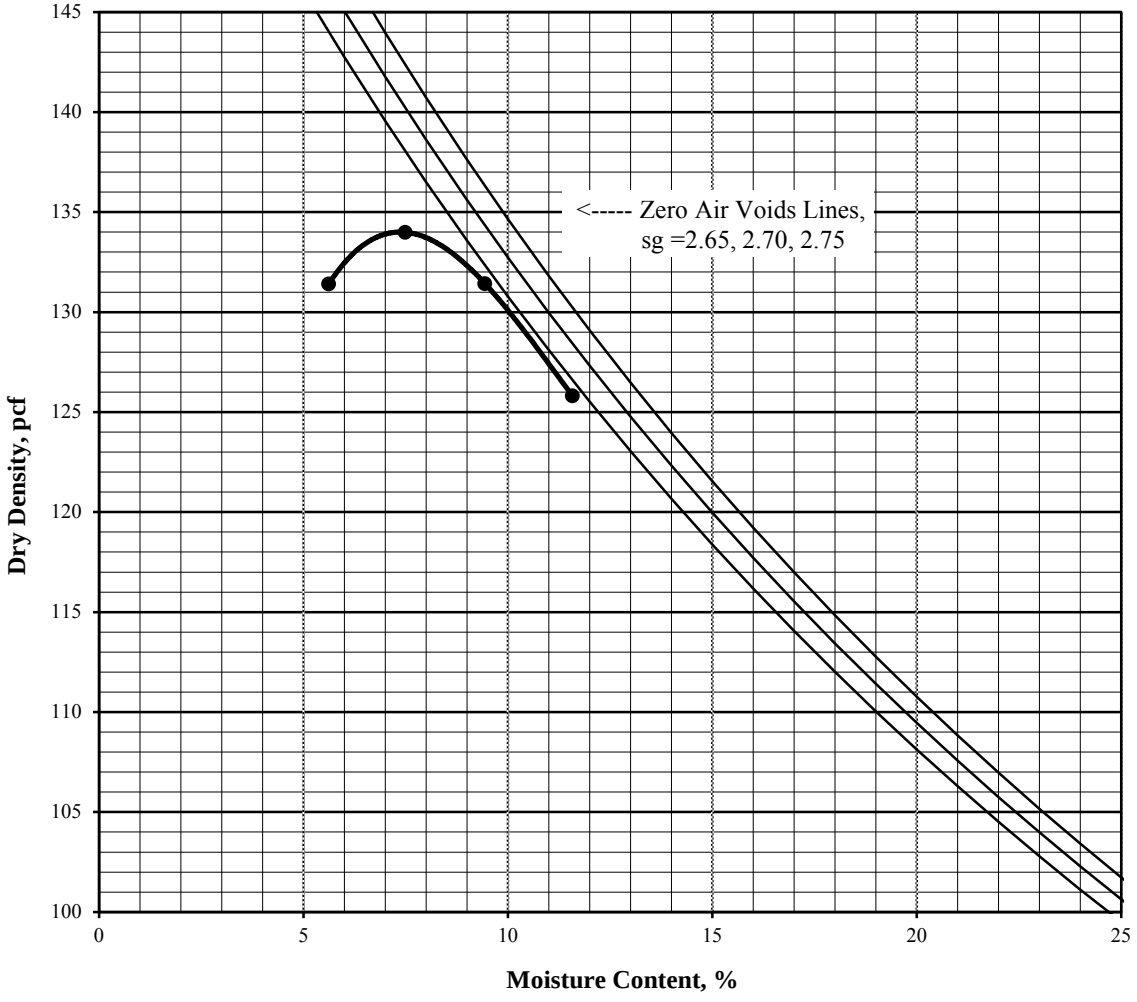
Maximum Density/Optimum Moisture

ASTM D698/D1557

Project Number:	544-25009	March 28, 2025
Project Name:	NEC Mirage Drive & HWY 111	
Lab ID Number:	LN6-25046	ASTM D-1557 A
Sample Location:	BH-1 Bulk 1 @ 0-5'	Rammer Type: Machine
Description:	Dark Brown Silty Sand (SM)	

Maximum Density: 137.5 pcf
Optimum Moisture: 8%
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	
3/8"	
#4	10.5



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Expansion Index

ASTM D 4829

Job Number: 544-25009 March 28, 2025

Job Name: NEC Mirage Drive & HWY 111

Lab ID Number: LN6-25046

Sample ID: BH-1 Bulk 1 @ 0-5'

Soil Description: Dark Brown Silty Sand (SM)

Wt of Soil + Ring:	606.3
Weight of Ring:	188.5
Wt of Wet Soil:	417.8
Percent Moisture:	6.3%
Sample Height, in	0.95
Wet Density, pcf:	133.7
Dry Denstiy, pcf:	125.8

% Saturation:	50.1

Expansion **Rack # 3**

Date/Time	3/27/2025	2:00 PM
Initial Reading	0.0000	
Final Reading	0.0000	

Expansion Index **0**

(Final - Initial) x 1000

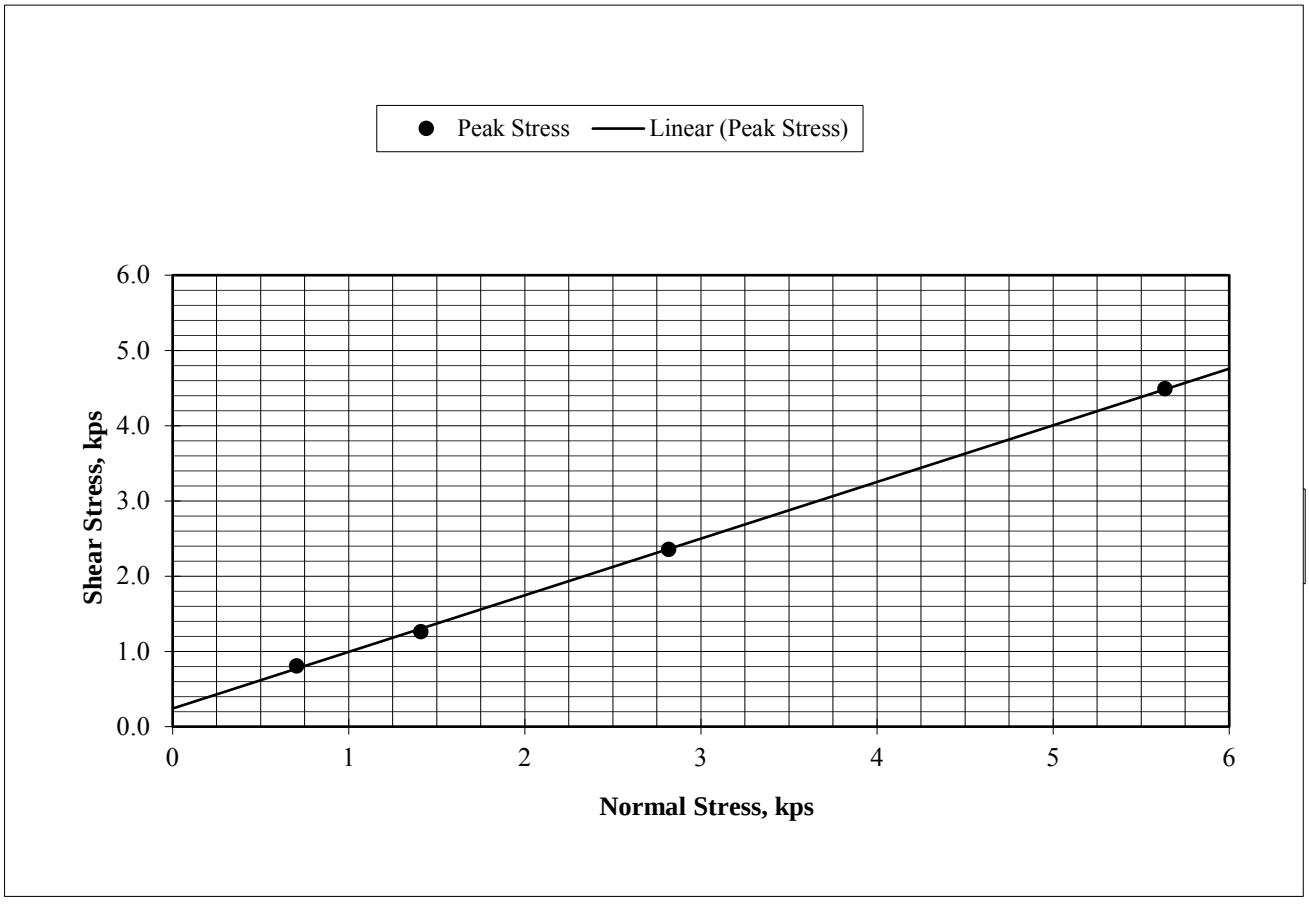
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Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number:	544-25009		March 28, 2025
Job Name	NEC Mirage Drive & HWY 111	Initial Dry Density:	127.0 pcf
Lab ID No.	LN6-25046	Initial Mosture Content:	3.9 %
Sample ID	BH-1 Bulk 1 @ 0-5'	Peak Friction Angle (Ø):	37°
Classification	Dark Brown Silty Sand (SM)	Cohesion (c):	240 psf
Sample Type	Remolded @ 90% of Maximum Density		

Test Results	1	2	3	4	Average
Moisture Content, %	6.7	6.7	6.7	6.7	6.7
Saturation, %	55.6	55.6	55.6	55.6	55.6
Normal Stress, kps	0.704	1.409	2.817	5.635	
Peak Stress, kps	0.807	1.264	2.354	4.491	



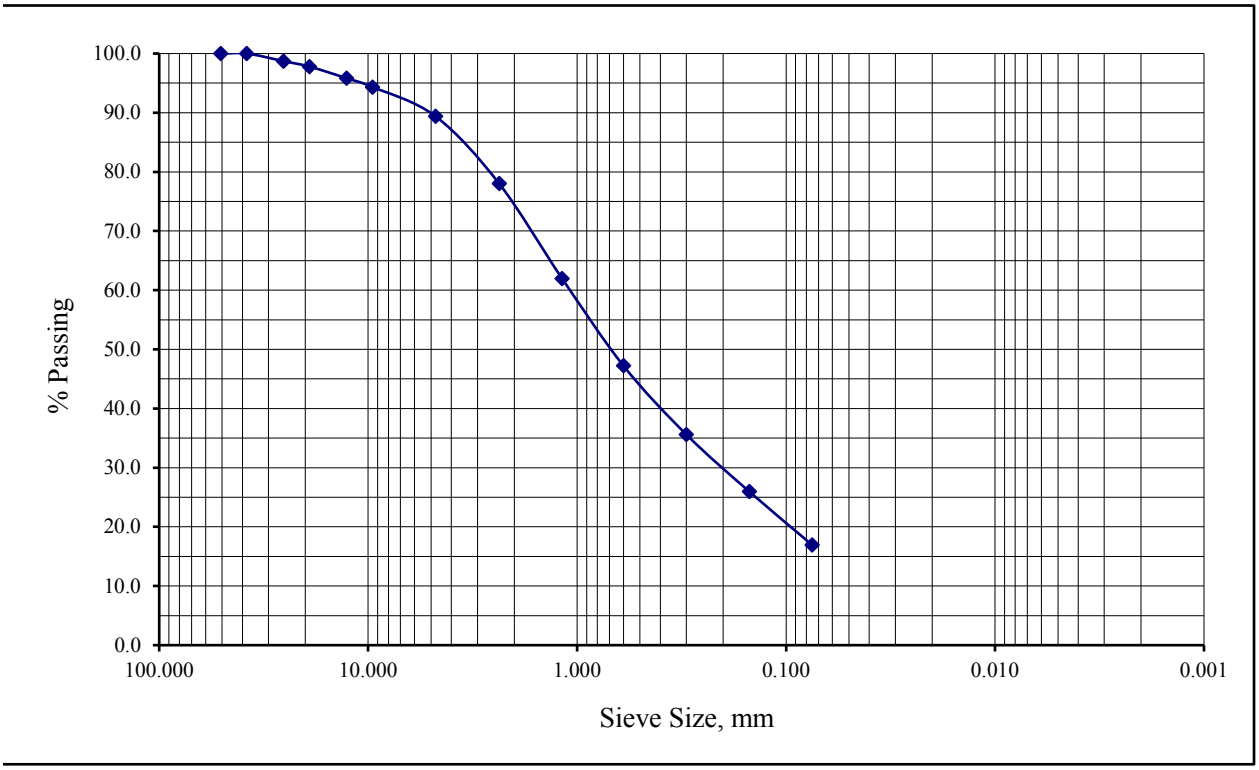
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Gradation

ASTM C117 & C136

Project Number: 544-25009 March 28, 2025
Project Name: NEC Mirage Drive & HWY 111
Lab ID Number: LN6-25046
Sample ID: BH-1 Bulk 1 0-5' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	98.7
3/4"	19.1	97.8
1/2"	12.7	95.8
3/8"	9.53	94.3
#4	4.75	89.4
#8	2.36	78.0
#16	1.18	62.0
#30	0.60	47.2
#50	0.30	35.6
#100	0.15	26.0
#200	0.075	16.9



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45090 Golf Center Pkwy, Suite F, Indio, CA 92201 (760) 863-0713 Fax (760) 863-0847
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863

Date: March 28, 2025

Account No.: 544-25009

Customer: Robert S. Howard Foundation

Location: Proposed Howard World Wildlife Museum NEC Mirage Drive & HWY 111 Rancho Mirage

Analytical Report

Corrosion Series

	pH per CA 643	Soluble Sulfates per CA 417 ppm	Soluble Chloride per CA 422 ppm	Min. Resistivity per CA 643 ohm-cm
BH-1 @ 0-5’	7.7	20	90	2,700

APPENDIX C

SEISMIC DESIGN MAP AND REPORT

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout* error.
USGS web services are now operational so this tool should work as expected.

OSHPD

Latitude, Longitude: 33.7662, -116.4439



Date	2/24/2025, 9:10:46 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.613	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.8	Site-modified spectral acceleration value
S_{M1}	0.858	Site-modified spectral acceleration value
S_{DS}	1.2	Numeric seismic design value at 0.2 second SA
S_{D1}	0.572	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.4	Site amplification factor at 1.0 second
PGA	0.656	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.788	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.827	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.997	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.702	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.784	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.613	Factored deterministic acceleration value. (1.0 second)
PGAd	0.656	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.788	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.915	Mapped value of the risk coefficient at short periods

Type	Value	Description
C_{R1}	0.895	Mapped value of the risk coefficient at a period of 1 s
C_V	1.2	Vertical coefficient

DISCLAIMER

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Appendix F

Preliminary Water Quality Management Plan

Project Specific
Preliminary Water Quality Management Plan

Howard World Wildlife Museum
69934 CA-111, Rancho Mirage, CA

Prepared for:

Robert S. Howard Foundation
74-900 Hwy 111, Suite #120
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3/27/25

James Bazua
RCE 58394

Date
Exp. 12/31/26



Original Date Prepared: March 27, 2025

Revision Date(s):

OWNER'S CERTIFICATION

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

Prest Vuksic Greenwood Architects by **The Altum Group** for the project known as **The World Wildlife Museum** at **69934 CA-111, Rancho Mirage, CA 92270.**

.

This Preliminary WQMP is intended to comply with the requirements of The City of Rancho Mirage for **ASSESSOR'S PARCEL NUMBERS: 689-040-023, 689-040-025, and 689-040-028** which includes the requirement for the preparation and implementation of a project-specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of the WQMP and will ensure that the WQMP is amended as appropriate to reflect up-to-date conditions on the site. This Preliminary 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 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 WQMP is enforceable under The City of Rancho Mirage Water Quality Ordinance (City of Rancho Mirage Ordinance 13.05.010).

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 WQMP.

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

_____
Owner's Signature

_____
Owner's Printed Name

_____
Owner

_____
Owner's Title/Position

_____
Date

ATTEST

_____
Notary Signature

_____
Printed Name

_____
Title/Position

_____
Date

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

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APPENDICES

A. Conditions of Approval
B. Vicinity Map, WQMP Site Plan, and Receiving Waters Map
C. Supporting Detail Related to Hydrologic Conditions of Concern (If Applicable)
D. Educational Materials
E. Soils Report (if applicable)
F. Structural BMP and/or Retention Facility Sizing Calculations and Design Details
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
H. Phase 1 Environmental Site Assessment – Summary of Site Remediation Conducted and Use Restrictions
I. Project-Specific WQMP Summary Data Form

I. Project Description

Applicant: **Prest Vuksic Greenwood Architects**
44-530 San Pablo Avenue, Ste 200
Palm Desert, CA 92260

WQMP Preparer:

James R. Bazua, PE

44-600 Village Court Suite 100

Palm Desert, CA 92260

Telephone: (760) 346 – 4750
james.bazua@thealtumgroup.com

_____

James Bazua	Date
RCE 58394	Exp. 12/31/2
Project Site Address:	**69934 CA-111**
	Rancho Mirage, CA 92270
Planning Area/ Community Name/ Development Name:	C-G General Commercial
APN Number(s):	**689-040-023, 689-040-025, 689-040-028**
Latitude & Longitude:	**33.766514, -116.443635**
Receiving Water:	Whitewater River
Project Site Size:	6.78 acres

Standard Industrial Classification (SIC) Code: **8412** – Museums and Art Galleries

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

Additional Permits/Approvals required for the Project:

AGENCY	Permit required
State Department of Fish and Wildlife, Fish and Game Code §1602 Streambed Alteration Agreement	Y ☐ N☒
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Certification	Y ☐ N☒
US Army Corps of Engineers, CWA Section 404 permit	Y ☐ N☒
US Fish and Wildlife, Endangered Species Act Section 7 biological opinion	Y ☐ N☒
Statewide Construction General Permit Coverage	Y ☒ N☐
Statewide Industrial General Permit Coverage	Y ☐ N☒
South Coast Air Quality Management District – PM10 Approval to comply with Rule 403	Y ☒ N☐
Other: City of Rancho Mirage Grading Permit and Building Permit	Y ☒ N☐

Project Description

The proposed project, 'World Wildlife Museum', is located at 69934 CA State Highway 111, Rancho Mirage, CA 92270 on a 6.78 acre site. Project activities consist of the construction of The World Wildlife Museum, a commercial museum development that will occupy a portion of Parcel 1 of Parcel Map No. 8674 (689-040-025), Parcel 2 of Parcel Map No. 8674 (689-040-023) and Lot 88, R.M. Annex No 2 (689-040-028). Construction activities will disturb approximately 3.2 acres of the 6.78 acre site.

Under existing conditions, the site is partially developed with a parking lot. The existing parking lot served a previous commercial building located on Parcel 2 which has been completely demolished. Existing drainage is designed to surface flow to a low point located in the northeasterly portion of the parking lot toward an existing combination curb inlet/grate catch basin that collects runoff in a sump condition and directs flow into an existing storm drain pipe designed to convey runoff off-site toward the existing Whitewater Evacuation Channel (receiving water) located nearby, to the northeast. Lot 88, R.M. Annex No. 2 (689-040-028) is located at the southerly end of the project boundary, is currently vacant and surface flows over pervious ground cover in a southeasterly direction toward Mirage Cove Drive, and off-site within public right of way and ultimately into Whitewater Evacuation Channel to the east.

Under post development conditions, the existing parking lot (Parcels 1 &2) will be improved and re-purposed, and a new museum building will be constructed and new separate overflow parking facilities will be constructed on Lot 88. Storm runoff generated on improved portions of Parcel 1 and Parcel 2 will continue to flow to the low point of the existing parking lot and into a new combination collection basin and underground storage system designed to replace the existing curb inlet. Storm runoff generated on the overflow parking improvements within Lot 88 will surface flow toward the east into a new surface detention basin.

Developments south and southwest of the Whitewater Evacuation Channel within City of Rancho are required to comply with MS4 permit WQMP treatment requirements but are not required to retain the runoff generated during the 100 year design storm event. The World Wildlife Museum project will collect and store runoff underground (Parcels 1 & 2) and in a surface retention basin (Lot 88) in a manner that captures and treats the Design Capture Volume (DCV) and ensures that flowrates, velocities and volumes leaving the site under the proposed condition do not exceed those under the existing condition. Flows exceeding the storage capacity of the new on-site storage facilities will leave the project site, and continue to flow toward the Whitewater Evacuation Channel as they do under the existing condition.

Appendix A of this project-specific WQMP will include a complete copy of the Conditions of Approval. Appendix B of this project-specific Preliminary 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 the project-specific WQMP.

II. Site Characterization

Land Use Designation or Zoning: **C-G General Commercial**

Current Property Use: **Paved Parking/ Vacant Land**

Proposed Property Use: **Commercial Development**

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 (0.5 miles)
Coachella Valley Storm Water Channel	Pathogens, Toxephene	FRSH, REC 1, REC 2, WARM, WILD, RARE	Designated as RARE (17.0 miles)

III. Pollutants of Concern

Table 1. Pollutant of Concern Summary

Pollutant Category	Potential for Project and/or Existing Site	Causing Receiving Water Impairment
Bacteria/Virus (pathogens(1))	YES	YES
Heavy Metals	YES	NO
Nutrients	YES	YES
Toxic Organic Compounds (3)	YES	YES
Sediment/Turbidity	YES	NO
Trash & Debris	YES	NO
Oil & Grease (4)	YES	NO
Oxygen Demanding Substances	YES	NO
Toxaphene(2), DDT and Dieldren	YES	YES

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) Toxaphene is an insecticide which was banned from use in the United States in 1990. Therefore, it is not a potential for the project but is currently a receiving water impairment.

3) Petroleum hydrocarbons are one of the most common organic compounds associated with street and parking lots and is a potential pollutant for the site. See Section V.2 for a description of appropriate Source Control BMPs.

4) Oil and Grease associated with landscaping and onsite operations are potential pollutants for the development. See Section V.2 for a description of appropriate Source Control BMP's.

Discussion of Receiving Water Impairment

Most of the pollutants which have caused impairment to the project's receiving waters are no longer being used. Many of these pollutants can be traced back to agricultural operations prevalent in the Coachella Valley. In addition, water quality management practices (i.e., the MS4 Permit requirements) have been implemented throughout the region to govern storm and non-storm water discharges to the designated receiving waters. These discharges have the ability to impact the "Beneficial Uses" of the receiving waters and can cause or threaten to cause a condition of "pollution" or "nuisance". The purpose of the project WQMP is to provide Best Management Practices (BMPs) which the property owner or their designee will implement and maintain to meet the requirements of the MS4 permit, thus minimizing the pollutant load associated with urban runoff.

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)	3.88 (n), 0.23(s)	0 (n), 0 (s)	10.73 (n), 0.63 (s)	10.13 (n), 0 (s)
Velocity (fps)	5.4 (n), 0.55 (s)	0 (n), 0 (s)	7.12 (n), 0.70 (s)	7.01 (n), 0 (s)
Volume (cubic ft)	1,537 (n), 602 (s)	0 (n), 0 (s)	3,560 (n), 1,178 (s)	3,360 (n) 0 (s)
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)

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

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

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

Table 3. Implementation of Site Design BMP Concepts

Design Concept	Technique	Specific BMP	Included			Brief Reason for BMPs Indicated as No or N/A
			Yes	No	N/A	
Site Design BMP Concept 1	**Minimize Urban Runoff, Minimize Impervious Footprint, and Conserve Natural Areas** **(See WQMP Section 3.5.1.3)**	Conserve natural areas by concentrating or clustering development on the least environmentally sensitive portions of a site while leaving the remaining land in a natural, undisturbed condition.	☒	☐	☐	
		Conserve natural areas by incorporating the goals of the Multi-Species Habitat Conservation Plan or other natural resource plans.	☒	☐	☐	
		Preserve natural drainage features and natural depressional storage areas on the site.	☒	☐	☐	
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	☒	☐	☐	
		Use natural drainage systems.	☐	☒	☐	Existing drainage infrastructure is being used.
		Where applicable, incorporate Self-Treating Areas	☒	☐	☐	
		Where applicable, incorporate Self-Retaining Areas	☒	☐	☐	
		Increase the building floor to area ratio (i.e., number of stories above or below ground).	☐	☒	☐	Proposed structure will use an existing pad.
		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 do not exist for this site
		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).	☒	☐	☐	

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.	☐	☒	☐	Roof runoff will be directed to infiltration type BMPs
		Drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	☐	☒	☐	Impervious areas will be directed to infiltration type BMPs
		Incorporate landscaped buffer areas between sidewalks and streets.	☒	☐	☐	
		Use natural or landscaped drainage swales in lieu of underground piping or imperviously lined swales.	☐	☐	☒	Opportunities do not exist on this site
		Where soil conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.	☐	☒	☐	Infiltration type BMPs will be used on this site.
		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 pavements are not effective in this area that experiences severe blowsand.
		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.	☐	☒	☐	Runoff surface flows to infiltration type BMPs
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to landscaped swale or biofilter.	☐	☒	☐	Runoff surface flows to infiltration type BMPs
		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.	☐	☒	☐	Runoff surface flows to infiltration type BMPs
		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).	☒	☐	☐	
		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).	☐	☐	☒	Opportunities do not exist on this site
		Uncovered temporary or guest parking on residential lots paved with a permeable surface, or designed to drain into landscaping.	☐	☐	☒	Not a residential project.

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).	☒	☐	☐	
		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.	☐	☒	☐	An existing parking lot is being resued.
		Overflow parking (parking stalls provided in excess of the Permittee's minimum parking requirements) may be constructed with permeable pavement.	☐	☒	☐	Permeable pavements are not effective in this area that experiences severe blowsand.
		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).	☒	☐	☐	

Project Site Design BMP Concepts:

The storm water runoff will surface flow towards infiltration type retention basin BMPs. The retention basin will be designed to capture and store the calculated Design Capture Volume (DCV)

Alternative Project Site Design BMP Concepts:

No alternatives to the infiltration facility have been proposed. The infiltration basin system for the disturbed area will serve as the main Site Design BMP.

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)
NORTH	INFILTRATION BASIN	BACTERIA, HEAVY METALS, NUTRIENTS, TOXIC ORGANICS, SEDIMENT, TRASH, OIL & GREASE	BACTERIA, NUTRIENTS, TOXIC ORGANICS	H	V(BMP)	3.80
SOUTH	INFILTRATION BASIN	BACTERIA, HEAVY METALS, NUTRIENTS, TOXIC ORGANICS, SEDIMENT, TRASH, OIL & GREASE	BACTERIA, NUTRIENTS, TOXIC ORGANICS	H	V(BMP)	1.23
TOTAL PROJECT AREA TREATED WITH LID/SITE DESIGN BMPs (NEAREST 0.1 ACRE)						**5.03 AC**

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

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

N/A

V.1.B TREATMENT CONTROL BMPS

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

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

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

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

Table 5: Treatment Control BMP Summary

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

V.1.C MEASURABLE GOAL SUMMARY

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

Table 6: Measurable Goal Summary

(1) **Total Area Treated with LID/Site Design BMPs** **(Last row of Table 4)**	(2) **Total Area Treated with Treatment Control BMPs** **(Last row of Table 5)**	(3) **% of Treatment Control BMP Requirement addressed with LID/Site Design BMPs**
5.03 ac	0.0 ac	100%

V.2 SOURCE CONTROL BMPS

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

Table 7. Source Control BMPs

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	☒	☐	
Activity Restrictions	☒	☐	
Irrigation System and Landscape Maintenance	☒	☐	
Common Area Litter Control	☒	☐	
Street Sweeping Private Streets and Parking Lots	☒	☐	
Drainage Facility Inspection and Maintenance	☒	☐	
Structural Source Control BMPs			
Storm Drain Inlet Stenciling and Signage	☒	☐	
Landscape and Irrigation System Design	☒	☐	
Protect Slopes and Channels	☒	☐	
Provide Community Car Wash Racks	☐	☒	Not part of the project design
Properly Design*:			
Fueling Areas	☐	☒	No facilities
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	☐	☒	

*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 Final WQMP, will ensure that owner's employees, operators, and managers are properly trained and attend continuing education classes.

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, maintenance of vehicles (which contributes to storm water contamination by oil and grease) is not authorized in this area.
Similarly, washing of vehicles and equipment shall be restricted to offsite locations 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 parking lot is 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).

5.2.2 Structural Source Control BMPs

5.2.2.1 MS4 Stenciling and Signage

Yes

Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language and/or graphical icons to discourage illegal dumping.

5.2.2.2 Landscape and Irrigation System Design

Yes

The project will be designed to include native, drought-tolerant plants. These 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's water quality requirements and the Coachella Valley Water District's irrigation requirements.

5.2.2.3 Protect Slopes and Channels

Yes

Project plans shall include Source Control BMPs to decrease the potential for erosion of slopes. The following design principles shall be considered, and incorporated and implemented where determined applicable and feasible by the local land use authority:

- Convey runoff safely from the tops of slopes.
- Plant slopes with native or drought tolerant vegetation.
- Install energy dissipaters at the outlets of new MS4s, culverts, conduits, or channels that enter unlined channels. in accordance with applicable specifications to minimize erosion.

5.2.2.4 Provide Community Car Wash Racks

No

The project site will not include community car wash racks as part of the project design. Washing of private vehicles and equipment is also a restricted activity.

5.2.2.5 Fueling Areas

No

Project development does not include the construction of 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 enclosures) will be located on-site. Also, 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 shall be kept in a clean and orderly condition through a regular program of sweeping and litter control and immediate cleanup of spills and broken containers. Cleanup procedures should minimize or eliminate the use of water. If washdown water is used, it must be properly disposed (containment, collection, and disposal to sanitary sewer) and not discharged to the MS4.

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 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 outdoor work areas or processing areas.

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 the project-specific WQMP.

V.3 EQUIVALENT TREATMENT CONTROL BMP ALTERNATIVES

The project site will not include any other treatment control alternatives.

V.4 REGIONALLY-BASED BMPS

100% of the Design Capture Volume generated on-site during storm events will be retained on-site in infiltration type retention basins.

VI. Operation and Maintenance Responsibility for BMPs

Appendix G of the project-specific 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 the Owner, their agents, and/or their assignees. The BMPs for the project are a infiltration type retention basins designed with a capacity to store 100% of the Design Capture Volume generate during the 100-year storm event.

Maintenance of the on-site storm drain and retention basin systems consists primarily of the removal of trash and debris, repair and removal/reinstallation of facilities if damaged or saturated by native material (due to wind and water erosion) or sediment and organic material from human activity. Any removed material must be hauled away to an approved disposal facility. See Appendix D for a recommended “Infiltration System Maintenance Plan”.

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 the owner. The Owner shall be responsible for all O&M and inspections, until such time as another staff member is designated.

(1) **ALL BMPS REQUIRING MAINTENANCE**	(2) **DESCRIPTION OF O&M ACTIVITIES**	(3) **START DATE**	(4) **O&M FREQUENCY**	(5) **PARTY RESPONSIBLE FOR O&M**	(6) **SELF INSPECTION AND RECORD KEEPING REQUIREMENTS**
EDUCATION FOR PROPERTY OWNERS OPERATORS, OR EMPLOYEES	MATERIALS WILL BE AVAILABLE TO EMPLOYEES, MAINTENANCE CREWS AND CONTRACTORS. PROVIDE EDUCATIONAL MATERIALS ON AN ANNUAL BASIS AND UPON HIRING OF EMPLOYEES.	AT PROJECT COMPLETION	ANNUALLY	OWNER	SEE ATTCHED EXAMPLE OF TRAINING / EDUCATION LOG. RECORD TRAINING OF EMPLOYEES
ACTIVITY RESTRICTIONS	PROVIDE ACCESS TO WQMP FOR ALL EMPLOYEES AND CONTRACTORS THAT PERFORM MAINTENANCE WORK.	AT PROJECT COMPLETION	ANNUALLY	OWNER	SEE ATTACHED EXAMPLE OF BMP OPERATION AND MAINTENANCE LOG
IRRIGATION SYSTEM AND LANDSCAPE MANAGEMENT	INSPECT ALL COMMON LANDSCAPE AREAS AND REPLACE DEAD VEGETATION. INSPECT, ADJUST AND REPAIR IRRIGATION SYSTEM.	UPON COMPLETION OF LANDSCAPED AREAS	WEEKLY DURING REGULAR MAINTENANCE	OWNER	SEE ATTACHED EXAMPLE OF BMP OPERATION AND MAINTENANCE LOG
COMMON AREA LITTER CONTROL	INSPECT AND REMOVE ALL LITTER AND DEBRIS LOCATED IN ALL COMMON AREAS, INCLUDING STREETS, PARKWAYS AND SIDEWALKS	AT PROJECT COMPLETION	AS NEEDED	OWNER	SEE ATTACHED EXAMPLE OF BMP OPERATION AND MAINTENANCE LOG
STREET SWEEPING	INSPECT FOR SEDIMENT DURING ROUTINE MAINTENANCE ADJUST FREQUENCY OF SWEEPING OPERATIONS	PROJECT COMPLETION	BI-MONTHLY AND AS NEEDED	OWNER	SEE ATTACHED EXAMPLE OF BMP OPERATION AND MAINTENANCE LOG

DRAINAGE FACILITY PROTECTION	INSPECT ALL CATCH BASINS AND STORM DRAIN PIPES, REMOVE LITTER DEBRIS AND ANY LIQUIDS	UPON INSTALLATION OF STORM DRAIN SYSTEM ADDITIONS	QUARTERLY AND AFTER A QUALIFYING RAIN EVENT OF 0.5" /24HRS	OWNER	SEE ATTACHED EXAMPLE OF BMP OPERATION AND MAINTENANCE LOG
LANDSCAPE AND IRRIGATION SYSTEM DESIGN	INSPECT AND REPAIR LANDSCAPE IRRIGATION TIMERS. INSPECT AND REPAIR ALL SPRINKLER HEADS AS NEEDED,	UPON COMPLETION OF LANDSCAPED AREAS	WEEKLY	OWNER	SEE ATTACHED EXAMPLE OF BMP OPERATION AND MAINTENANCE LOG
TRASH STORAGE AREA	INSPECT INTEGRITY OF STRUCTURAL ELEMENTS REPLACE CONTAINERS WHEN NEEDED	AT PROJECT COMPLETION	MONTHLY AND AS NEEDED	OWNER	SEE ATTACHED EXAMPLE OF BMP OPERATION AND MAINTENANCE LOG
RETENTION BASIN	INSPECT AND REMOVE LITTER AND DEBRIS, MAINTAIN LANDSCAPE, REMOVE DEAD VEGETATION	AT PROJECT COMPLETION	QUARTERLY DURING DRY SEASON, MONTHLY DURING RAINY SEASON	OWNER	SEE ATTACHED EXAMPLE OF BMP OPERATION AND MAINTENANCE LOG

VII. Funding

Source funding and long term funding of operations and maintenance of the project BMP will be provided by the Owner, their agents, and/or assignees. Funding will be addressed in a covenant agreement entered into between City of Rancho Mirage and the Owner before approval of the Final WQMP.

Appendix A

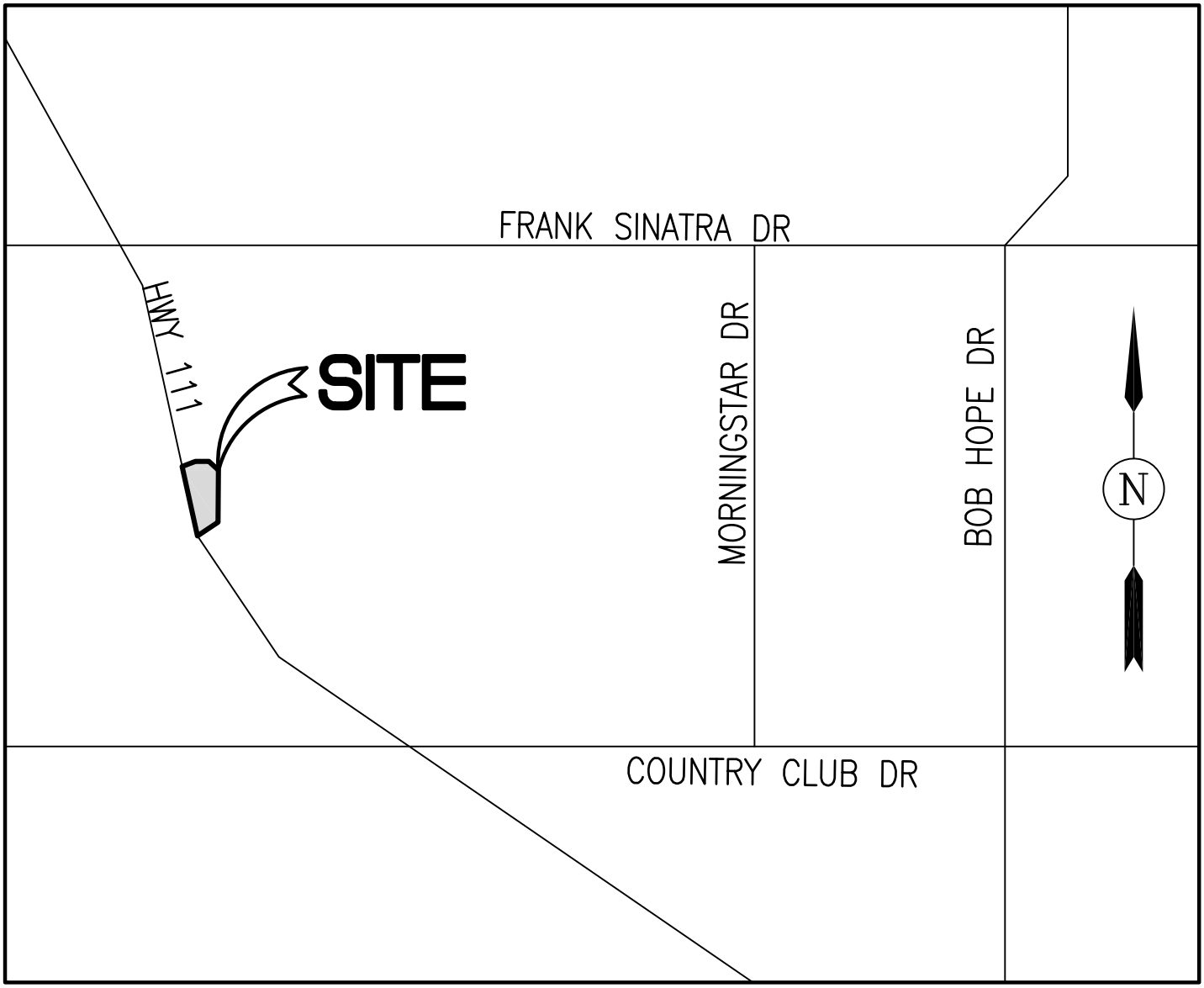
Conditions of Approval

Planning Commission Resolution _____

Dated _____

Appendix B

Vicinity Map, WQMP Site Plan, and Receiving Waters Map



VICINITY MAP

NOT TO SCALE

WORLD WILDLIFE MUSEUM

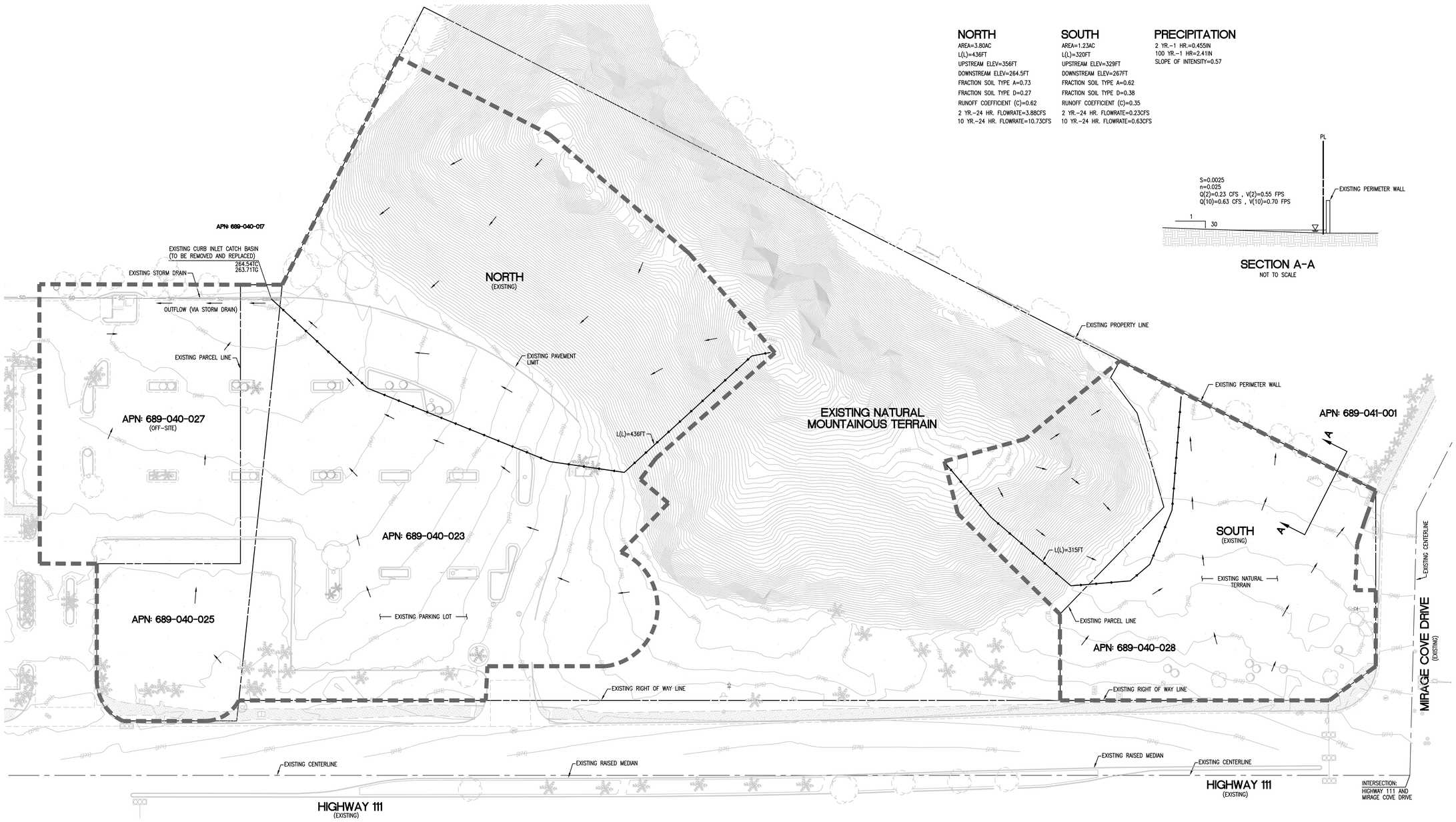
PRELIMINARY WQMP PLAN - EXISTING CONDITION

NORTH
AREA=3.80AC
L(L)=436FT
UPSTREAM ELEV=356FT
DOWNSTREAM ELEV=264.5FT
FRACTION SOIL TYPE A=0.73
FRACTION SOIL TYPE D=0.27
RUNOFF COEFFICIENT (C)=0.62
2 YR.-24 HR. FLOWRATE=3.88CFS
10 YR.-24 HR. FLOWRATE=10.73CFS

SOUTH
AREA=1.23AC
L(L)=320FT
UPSTREAM ELEV=329FT
DOWNSTREAM ELEV=267FT
FRACTION SOIL TYPE A=0.62
FRACTION SOIL TYPE D=0.38
RUNOFF COEFFICIENT (C)=0.35
2 YR.-24 HR. FLOWRATE=0.23CFS
10 YR.-24 HR. FLOWRATE=0.63CFS

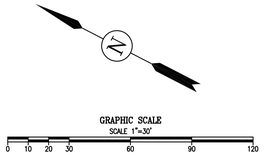
PRECIPITATION
2 YR.-1 HR.=0.455IN
100 YR.-1 HR=2.41IN
SLOPE OF INTENSITY=0.57

SECTION A-A
NOT TO SCALE



LEGEND

- SUBAREA BOUNDARY
- LONGEST LENGTH OF TRAVEL
- PROPOSED EARTHEN SWALE
- DIRECTIONAL FLOW ARROW



(NOT FOR CONSTRUCTION)

The Altum Group
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Palm Desert, CA 92260
t.760.346.4750 f. 760.340.0089
TheAltumGroup.com

CITY OF PALM DESERT, CALIFORNIA

PRELIMINARY WQMP PLAN - EXISTING
WORLD WILDLIFE MUSEUM

FOR:

SHEET 1
OF 1

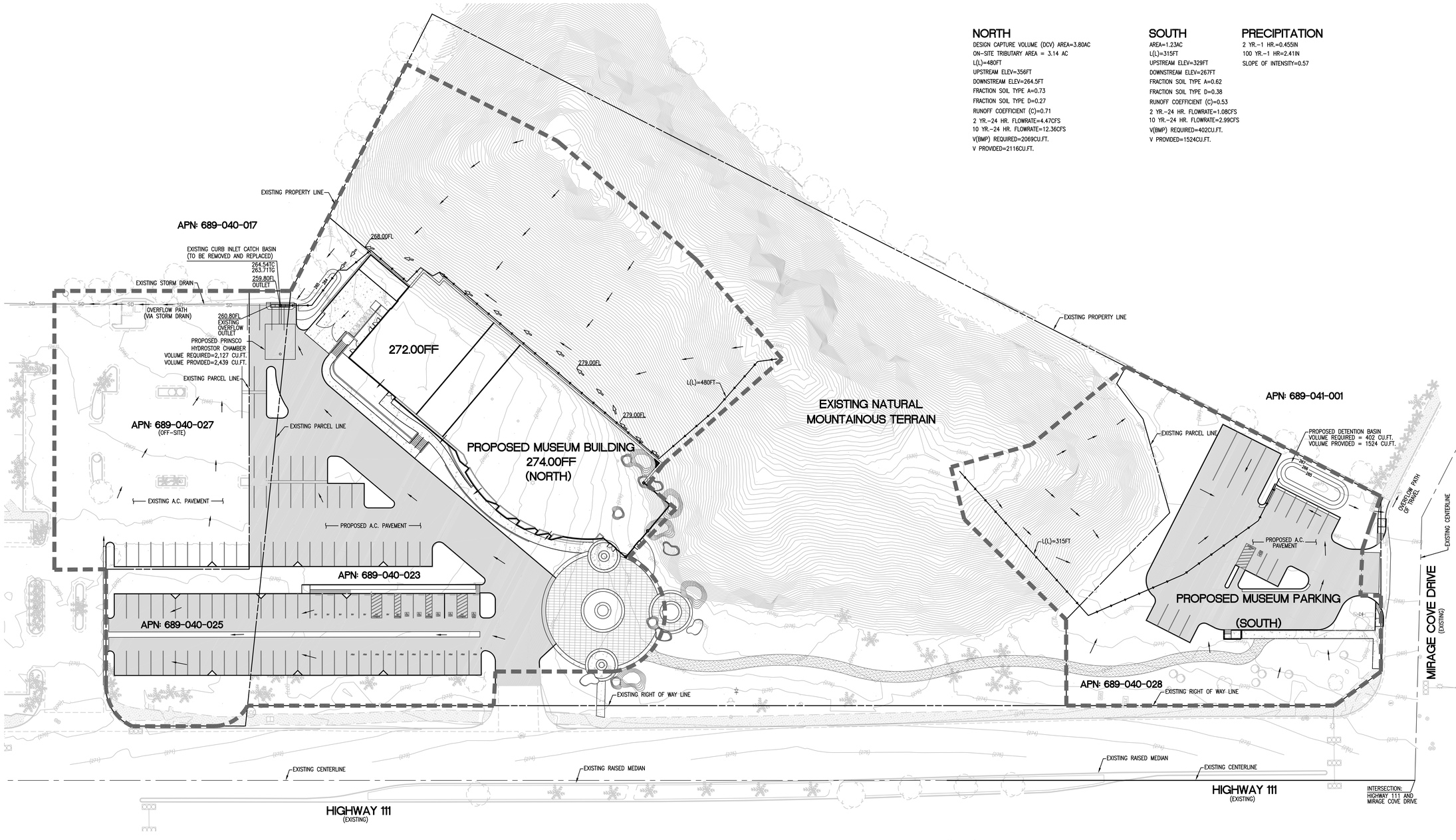
WORLD WILDLIFE MUSEUM

PRELIMINARY WQMP PLAN - DEVELOPED CONDITION

NORTH
DESIGN CAPTURE VOLUME (DCV) AREA=3.80AC
ON-SITE TRIBUTARY AREA = 3.14 AC
L(L)=480FT
UPSTREAM ELEV=356FT
DOWNSTREAM ELEV=264.5FT
FRACTION SOIL TYPE A=0.73
FRACTION SOIL TYPE D=0.27
RUNOFF COEFFICIENT (C)=0.71
2 YR.-24 HR. FLOWRATE=4.47CFS
10 YR.-24 HR. FLOWRATE=12.36CFS
V(BMP) REQUIRED=2069CU.FT.
V PROVIDED=2116CU.FT.

SOUTH
AREA=1.23AC
L(L)=315FT
UPSTREAM ELEV=329FT
DOWNSTREAM ELEV=267FT
FRACTION SOIL TYPE A=0.62
FRACTION SOIL TYPE D=0.38
RUNOFF COEFFICIENT (C)=0.53
2 YR.-24 HR. FLOWRATE=1.08CFS
10 YR.-24 HR. FLOWRATE=2.99CFS
V(BMP) REQUIRED=402CU.FT.
V PROVIDED=1524CU.FT.

PRECIPITATION
2 YR.-1 HR.=0.455IN
100 YR.-1 HR=2.41IN
SLOPE OF INTENSITY=0.57



LEGEND

- SUBAREA BOUNDARY
- LONGEST LENGTH OF TRAVEL
- PROPOSED EARTHEN SWALE
- PROPOSED A.C. PAVEMENT
- DIRECTIONAL FLOW ARROW

GRAPHIC SCALE
SCALE 1"=30'
0 10 20 30 60 90 120

(NOT FOR CONSTRUCTION)

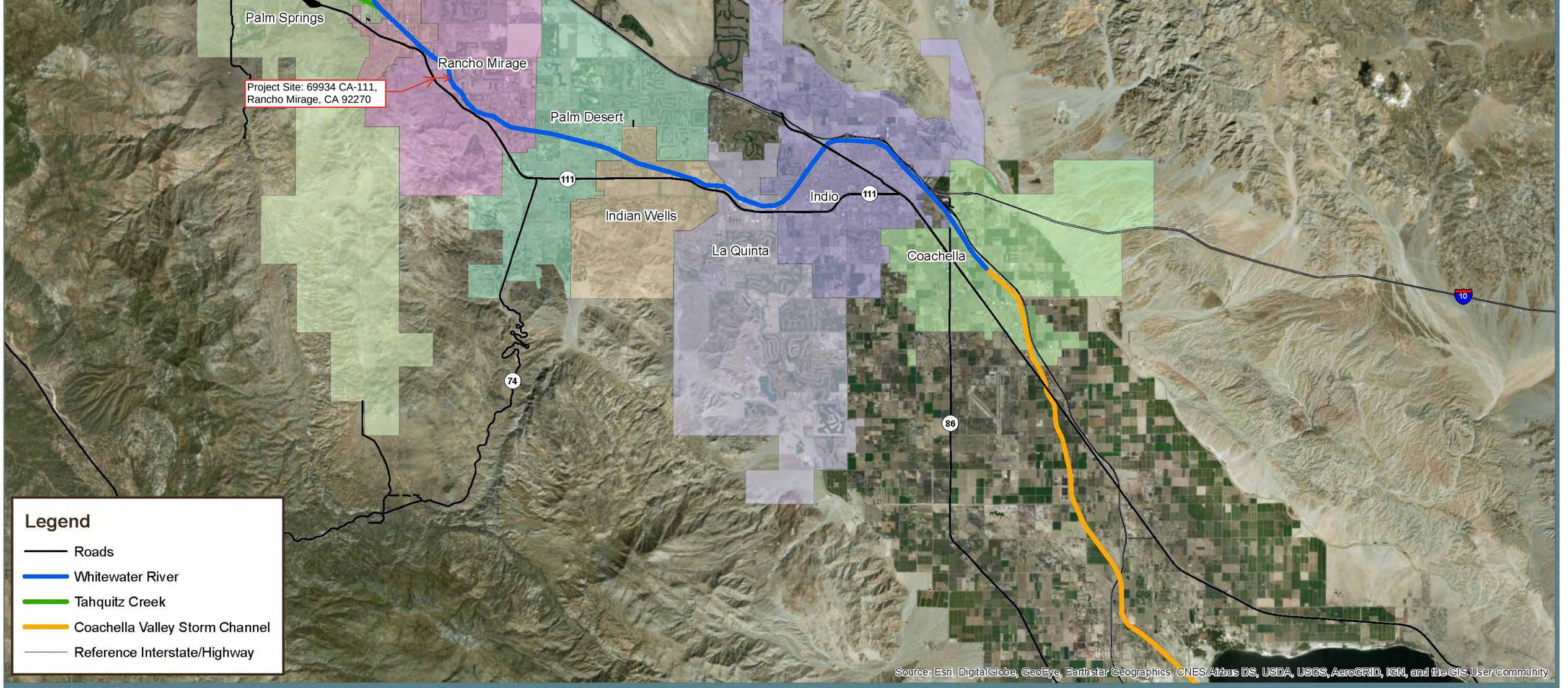
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CITY OF PALM DESERT, CALIFORNIA

PRELIMINARY WQMP PLAN - DEVELOPED
WORLD WILDLIFE MUSEUM

FOR:

SHEET 1
OF 1



Geographic Information Systems

Cartographic Design By: Randee Martin

TheAltumGroup
Strive Higher
44-600 Village Ct Suite 100, Palm Desert, CA 92260
Phone: (760) 346 - 4750 TheAltumGroup.com

1 inch = 2.755735 miles

Receiving Water Exhibit

N

Appendix C

Supporting Detail Related to Hydrologic Conditions of Concern

(see supporting Preliminary Hydrology Report – Appendix F)

Appendix D

Educational Materials

After the Storm

A Citizen's Guide to Understanding Stormwater



United States Environmental Protection Agency

EPA 833-B-03-002

January 2003

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For more information contact:

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

What is stormwater runoff?



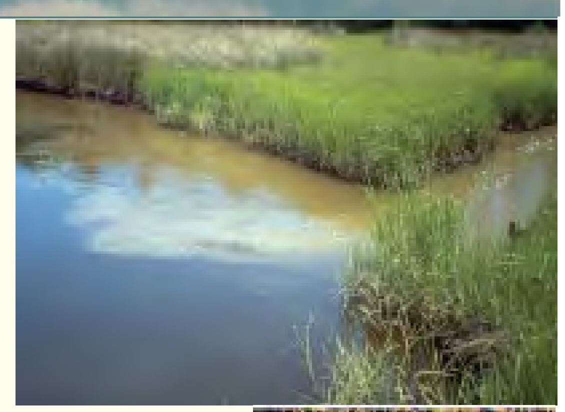
Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?



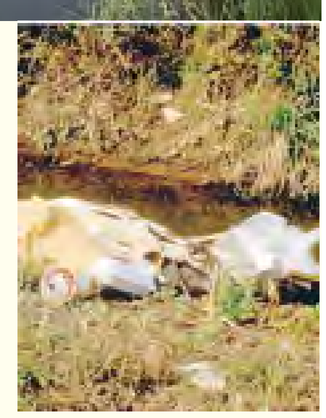
Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking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

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.

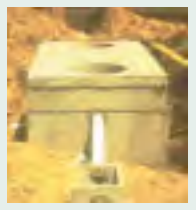
Lawn care



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.

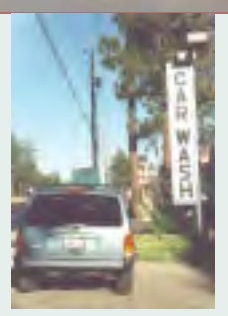
Septic systems



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.



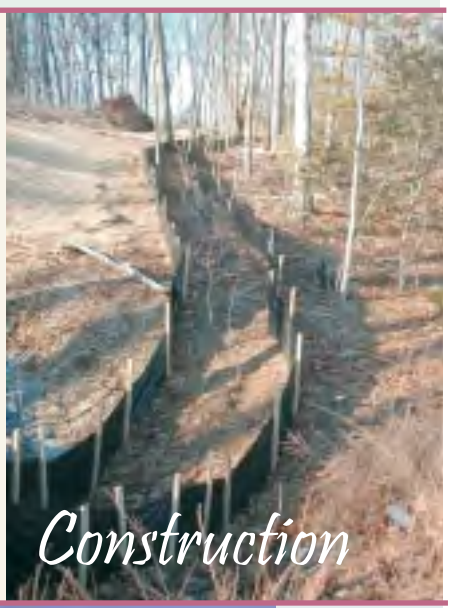
Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.



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.

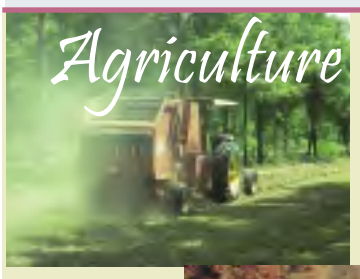
- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming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

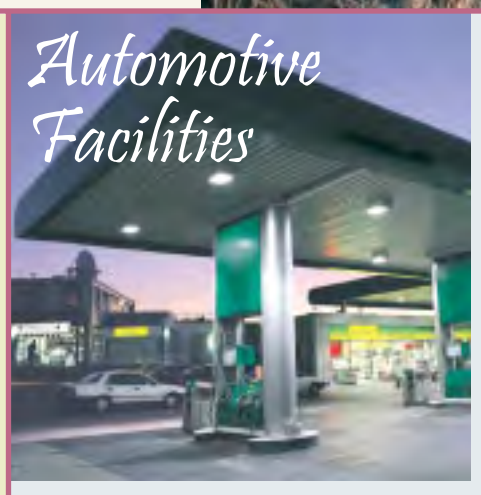


Agriculture

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.



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.



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.



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

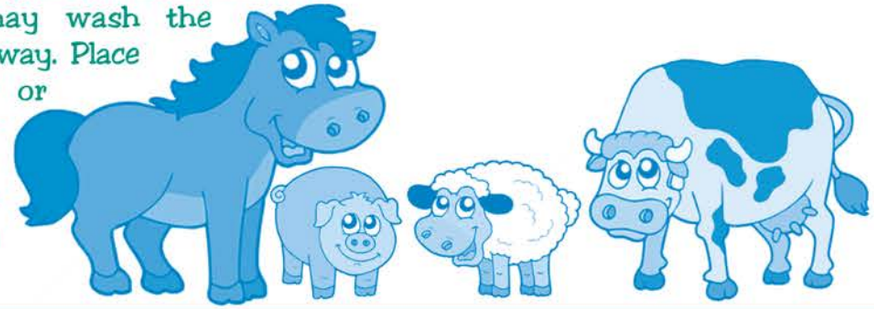
Pets are only one of many sources that contribute to water pollution. However, these other sources of water pollution cannot only harm the environment but also harm your pet. Improperly used or stored lawn fertilizers, pesticides, soaps, grease and vehicle fluids cannot only be washed into local streams 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.

Saltwater Pools

- Salt water pools, although different from regular pools, are in fact, sanitized using chlorine. A salt-chlorine generator separates the chlorine and sodium molecules in salt and reintroduces them into the pool water. The same harmful effects of chlorine still apply.
- A salt water pool is still maintained with chemicals such as Muriatic acid, soda ash and sodium carbonate to help keep a proper pH, total Alkalinity, Calcium Hardness and Stabilizer levels.



- It may be illegal to discharge salt water to land. The salt may kill plants and the build-up of salt in soil puts animals, plants, and groundwater at risk. Consult your city representatives to determine local requirements regarding salt water drainage.

NEVER put unused chemicals into the trash, onto the ground or down a storm drain.

IMPORTANT: The discharge of pollutants into the street, gutter, storm drain system or waterways - without a permit or waiver - is strictly prohibited by local ordinances, state and federal law. Violations may result in monetary fines and enforcement actions.

Helpful telephone numbers and links

Riverside County Water Agencies:

City of Banning	(951) 922-3130
City of Beaumont/Cherry Valley	(951) 845-9581
City of Blythe	(760) 922-6161
City of Coachella	(760) 398-3502
City of Corona	(951) 736-2263
City of Hemet	(951) 765-3710
City of Norco	(951) 270 5607
City of Riverside Public Works	(951) 351-6140
City of San Jacinto	(951) 654-4041
Coachella Valley Water District	(760) 398-2651
Desert Water Agency (Palm Springs)	(760) 323-4971
Eastern Municipal Water District	(951) 928-3777
Elsinore Valley Municipal Water District	(951) 674 3146
Elsinore Water District	(951) 674-2168
Farm Mutual Water Company	(951) 244-4198
Idyllwild Water District	(951) 659-2143
Indio Water Authority	(760) 391-4129
Jurupa Community Services District	(951) 685-7434
Lee Lake Water	(951) 658-3241
Mission Springs Water	(760) 329-6448
Rancho California Water District	(951) 296-6900
Ripley, CSA #62	(760) 922-4951
Riverside Co. Service Area #51	(760) 227-3203
Rubidoux Community Services District	(951) 684-7580
Valley Sanitary District	(760) 347-2356
Western Municipal Water District	(951) 789-5000
Yucaipa Valley Water District	(909) 797-5117

CALL 1-800-506-2555 to:

- Report clogged storm drains or illegal storm drain disposal from residential, industrial, construction and commercial sites into public streets, storm drains and/or water bodies.
- Find out about our various storm drain pollution prevention materials.
- Locate the dates and times of Household Hazardous Waste (HHW) Collection Events.
- Request adult, neighborhood, or classroom presentations.
- Locate other County environmental services.
- Receive grasscycling information and composting workshop information.

Or visit our
Riverside County Flood Control and Water Conservation District
website at: www.rcflood.org

Other links to additional storm drain pollution information:

- County of Riverside Environmental Health: www.rivcoeh.org
- State Water Resources Control Board: www.waterboards.ca.gov
- California Stormwater Quality Association: www.casqa.org
- United States Environmental Protection Agency (EPA): www.epa.gov/compliance/assistance (compliance assistance information)

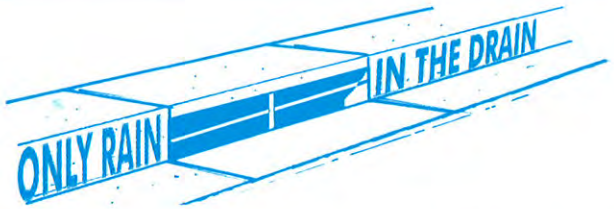
Riverside County's, "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges the Bay Area Stormwater Management Agencies Association and the Cleaning Equipment Trade Association for information provided in this brochure.

Guidelines for Maintaining your...



Swimming Pool, Jacuzzi and Garden Fountain

Where does the water go?



Pool, Jacuzzi and Fountain wastewater and rain water runoff (also called stormwater) that reach streets can enter the storm drain and be conveyed directly into local streams, rivers and lakes.



A storm drain's purpose is to prevent flooding by carrying rain water away from developed areas. Storm drains are not connected to sanitary sewers systems and treatment plants!

Wastewater, from residential swimming pools, Jacuzzis, fishponds and fountains, often contains chemicals used for sanitizing or cleansing purposes. Toxic chemicals (such as chlorine or copper-based algaecides) may pollute the environment when discharged into a storm drain system.

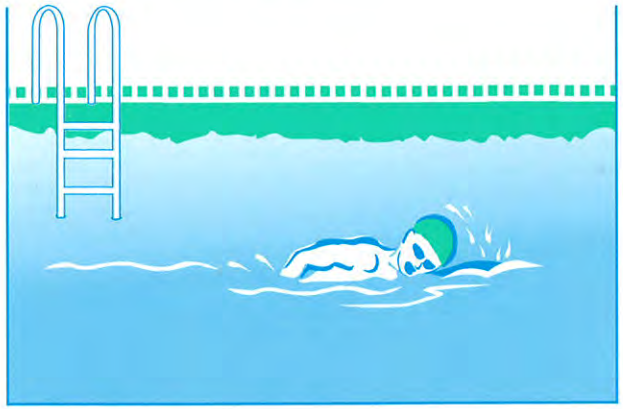
The Cities and County of Riverside have adopted ordinances that prohibit the discharge of wastewater to the street and storm drain system.



Discharge Regulations

Regulatory requirements for discharging wastewater from your pool may differ from city to city. Chlorinated water should not be discharged into the street, storm drain or surface waters. Check with your water agency to see if disposal to the sanitary sewer line is allowed for pool discharges (see reverse for Riverside County sewer agencies).

If allowed, a hose can be run from the pool Jacuzzi, or fountain to the private sewer cleanout, washing machine drain or a sink or bathtub.



If you cannot discharge to the sewer, you may drain your fountain, pool, or jacuzzi to your landscaping by following these guidelines:

First, reduce or eliminate solids (e.g. debris, leaves or dirt) in the pool water and allow the chemicals in the pool water to dissipate before draining the pool (this could take up to 7 days, verify using a home pool test kit).

Second, slowly drain to a landscaped area away from buildings or structures. Control the flow to prevent soil erosion; it may take more than one day to empty. Do not allow sediment to enter the street, gutter or storm drain.

Maintenance & Chemicals



Cleaning Filters

Filter rinse water and backwash must be discharged to the sanitary sewer, on-site septic tank and drain field system (if properly designed and adequately sized), or a seepage pit. Alternatively, rinse water or backwash may be diverted to landscaped or dirt areas. Filter media and other non-hazardous solids should be picked up and disposed of in the trash.

Algaecides

Avoid using copper-based algaecides unless absolutely necessary. Control algae with chlorine, organic polymers or other alternatives to copper-based pool chemicals. Copper is a heavy metal that can be toxic to aquatic life when you drain your pool.

Chemical Storage and Handling

- Use only the amount indicated on product labels
- Store chlorine and other chemicals in a covered area to prevent runoff. Keep out of reach of children and pets.
- Chlorine kits, available at retail swimming pool equipment and supply stores, should be used to monitor the chlorine and pH levels before draining your pool.
- Chlorine and other pool chemicals should never be allowed to flow into the gutter or storm drain system.

Take unwanted chemicals to a Household Hazardous Waste (HHW) Collection Event. There's no cost for taking HHW items to collection events – it's FREE! Call **1-800-506-2555** for a schedule of HHW events in your community.



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.

SAMPLE

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) in accordance with City of Rancho Mirage Standard Detail No. 306 (see attached).	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 (see BMP SC-43) 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.

10. PUBLIC EDUCATION AND OUTREACH

WATERSHED SPECIFIC EDUCATIONAL ACTIVITIES CONDUCTED DURING THE REPORTING PERIOD

This section provides an overview of watershed specific education activities conducted by the Permittees. During the reporting period **Appendix E** contains images of most public education materials that are described in this section.

Program Overview

The Riverside County NPDES Permittees have established an ongoing watershed based public education and outreach program known as the "**Only Rain Down the Storm Drain"** pollution prevention program. The specific objectives of the public education program include:

- Fostering a broad public awareness of water pollution concerns;
- Increasing public acceptance of pollution prevention activities to curtail everyday human behaviors that contribute to water quality problems;
- Educating/informing the general public, regulators and key local government and state decision makers on Urban Runoff conditions in Riverside County; and
- Promoting stewardship of local water resources.

The "Only Rain Down the Storm Drain" program implements the public awareness objectives by focusing on three areas of pollutant reduction/prevention:

- Public Behavior;
- Proper Management of Pollutants; and
- Business Specific Education Outreach.

In addition, when attempting to make use of the finite resources available to the Public Education Program, the Permittees use these management goals to ensure that resources are used effectively:

- Focusing on pollutants of concern specific to each watershed region;
- Coordinating public education efforts with adjacent storm water management programs and other related education programs to share resources, coordinate outreach efforts, and avoid costly duplication of effort; and
- Adapt public education programs and objectives, based on effectiveness analysis, to address changing MS4 programs and objectives.

Program Highlights

The public education program continues to develop changes for the better. Highlights include:

- The public education program has developed surveys in both English and Spanish. The purpose of these surveys is to evaluate the effectiveness of the public education program and are distributed to the public at community events. The results of these surveys are contained in **Appendix E**. Two surveys were also developed for the K-3 and 4 through 6 grades education outreach programs.

- The public education web page continues to be revamped and improved.
- The program continues to update brochures and develop outreach programs specific to the needs of the MS4.
- As part of the on-going effectiveness evaluation for the municipal training programs, testing has been incorporated into the training for evaluation of its efficiency. In addition, the overall training program was evaluated and is included in the Assessment and Enhancement Analysis of the NPDES Traning Program, August 2006 in **Appendix E.**
- Each month, the County hosts a New Employee Orientation to an average of forty new employees. All the attendees receive "Only Rain Down the Storm Drain" materials and promotionals. The Toll Free 800 Number the message to call to report illegal storm drain disposal is incorporated into all materials.

Santa Ana Pollutants of Concern

Based on monitoring data collected to date, the current 303(d) list and discussions among the Co-Permittees, and stakeholders, the following preventative pollutants of concern were established for this watershed. More discussion on the selection of preventative pollutants of concern can be found in the monitoring section of this report. After each identified pollutant, specific BMP outreach activities are identified to address the pollutant:

- Sedimentation associated with Urban Development and Land Uses
    - Specific section on construction, municipal, industrial/commercial and new development training focusing on the need to address sedimentation within the watershed;
    - Distribution of dust pans at public education outreach events to promote dry cleaning of drive ways and impervious surfaces;
    - Construction BMP Poster;
    - School/Student program incorporates education on controlling soil erosion;
    - The "After the Storm" and Storm Water Pollution, what you should know brochures
    - General Construction Activities & Outdoor Activities brochure

- Nutrients and pathogens associated with Urban Development and Land Uses
    - Specific section on construction, municipal, industrial/commercial and new development training focusing on the need to address increased nutrients within the watershed;
    - Pet Waste "What's the Scoop" brochure;
    - Partnership with SGA Advertising to place pet waste information in pet stores, veterinarian clinics, kennels and pet grooming facilities;
    - Coordination with Riverside County Animal Control Department to distribute "What's the Scoop" and "After the Storm" brochures to families adopting pets;
    - The Agricultural Commissioner assist in educating on water conservation, fertilizer management and integrated pest management practices. In conjunction with County Waste Management's Composting Workshop, the "After the Storm" brochure and

Household Hazardous Waste flyer is included in the adult informational packet.
- o "Keep Our Water Clean" video to cover proper use of fertilizers as well as excess runoff from sprinklers;
- o Earth Day mailing inserts were developed to inform residents about the problem of storm water pollution and provide simple pollution prevention activities in gardening;
- o Adult presentations conducted by RCRCD discussing the effects of fertilizers and pesticides on local waterways;
- o The "After the Storm" brochure; and
- o Construction BMP Activities brochure and poster.

In addition, the District has developed other outreach materials to focus on other pollutants and pollutant causing activities/businesses commonly associated with urban runoff. Outreach methods can be combined to focus on specific pollutants that may exist within the watershed.

24-hour Watershed-Wide Outreach Portals

The Permittees maintain three 24-hour/7 days per week watershed wide portals to receive and distribute information regarding the "Only Rain Down the Storm Drain" program. These portals include a website, 1-800 number, and an e-mail address.

Storm Water Protection Program Website

The District operates a website that provides information on how to report illegal dumping, clogged storm drains, facility signage and worn or missing curb markers, as well as provide information on upcoming activities, opportunities for public participation in program development and general information about Urban Runoff pollution prevention techniques. The website is located at:

http://www.floodcontrol.co.riverside.ca.us/stormwater/

Almost all of the District's outreach materials have been scanned into an electronic .pdf format and are available for download. Online Order forms and phone numbers are also available to assist in obtaining information that might not be available online.

The website contains pages specific to the following target audiences:
- General Public/Residents
- Businesses
- Developers
- Contractors
- Schools and Teachers
- Kids Page

In addition the website contains links to:

- Assist viewers in locating their watershed
- An online media library
- Materials order form
- 1-800 information to report storm drain pollution

The District tracks the number of hits to its public education website. The website was completely revamped during the previous reporting period and the web-page counter replaced this reporting period. Results of the webpage counter report are included in **Appendix E.**

Storm Water toll free 1-800 Hotline

On October 1994, a Toll Free "800" telephone number for reporting suspected Urban Runoff pollution and obtaining pollution prevention information was established.

1. This call line offers easy to understand instructions for connecting to County Environmental Health or Waste Management to obtain grasscycling, composting, or household hazardous waste collection dates and locations.
2. The 24-hour Hotline also allows callers to report clogged catch basin inlets, illegal dumping and other illicit discharge violations.
3. Finally, the hotline allows people to order public education materials and/or request storm water presentations for schools or community groups. The Permittees advertise the hotline in all appropriate County telephone directories, public education outreach materials, and in other appropriate venues and locations. Callers to the hotline are given options to seek emergency services if the spill is of a suspicious origin or a safety issue.

The 1-800 line diverts callers to appropriate Permittee departments based on caller selections. Callers requesting information on pollution collection activities are diverted to either County Environmental Health or Waste Management depending on their specific selection. Callers reporting illicit discharges are directed to County Code Enforcement, who accepts the calls and then re-directs them to appropriate Permittee Code Enforcement Departments. Calls for public education materials or presentations are directed to the district's front desk and then to the District's Public Education Staff. School presentation inquiries are directed to the Riverside County Conservation District office, who have been contracted to provide education to elementary schools in the Santa Ana Region. The specific text to the hotline is included as **Exhibit A**.

The provider of the 1-800 line, Riverside County Communication, tracks the number of incoming calls to the line. This tracking mechanism was discontinued during past reporting period but restored this reporting period.

Exhibit A
"ONLY RAIN DOWN THE STORM DRAIN" POLLUTION PREVENTION PROGRAM

TOLL FREE 1-800 LINE DIALOGUE

Thank you for calling the "Only Rain Down the Storm Drain" Pollution Prevention Program. To better serve the needs of our County communities, please listen carefully to the following options:

If this is an emergency, or you wish to report a significant release or threatened releases of hazardous material into the storm drain or elsewhere in the environment, please hang up and immediately Dial 911.

(Si esta llamada es una emergencia o decea reportar desechos de contaminantes peligrosos en las alcantarillas o en el medio ambiente, por favor cuelge y llame 911.)

For water service connection, disconnection, or any other water utility information, call your local water service provider.

To report illegal dumping at residential, commercial, industrial or construction sites, please call Environmental Health at 951.955.8982, or press #1 to be directly connected.

For information regarding Household Hazardous Waste Collection Events, please Press #2.

To report clogged storm drains, please call your local municipal public works department. To report faded or missing "Only Rain Down the Storm Drain" storm drain markers, please press #3.

For General or specific business pollution prevention information or to receive other pollution prevention information please press #3.

(Drop Off Dialogue)

Thank you for your interest in obtaining information on storm drain pollution protection. Basic, construction, industrial, commercial and children's storm water protection outreach packets are available. For a quick response to your request, please slowly and clearly leave your name, address, city and zip code. Also state the type and quantity of the materials you are interested in receiving. Should you need additional assistance, provide your area code and phone number and someone will contact you as soon as possible.

To inquire about our free storm water classroom presentations, workshops, youth group activities and other outreach programs, please press #4.

(Drop Off Dialogue)

The "Only Rain Down the Storm Drain" public education program offers classroom presentations, workshops, youth group activities, special event opportunities and other programs. For inquiries for the Temecula or Murrieta area, please press #1 (Drops to Mission Resource Conservation District)

For inquiries in all other Riverside County areas, press 2 (drops to Riverside/Corona Resource Conservation District).

For Grasscycling and composting information or workshops, please PRESS #5. (to 951.486.3200)

For additional assistance regarding our storm drain pollution prevention program during regular business office hours, Monday through Thursday from 7:30 am to 5:30 pm and on Friday from 7:30 am to 4:30 pm

E-mail

The Permittees also maintain an e-mail address that can be used to report illicit discharges or request storm water related public information. The e-mail address is:

Flood.fcnpdes@co.riverside.ca.us

E-mails are received by the District's Public Information Specialist and are responded to, in most cases, within 2 business days.

Program Coordination with other Stakeholders

The "Only Rain Down the Storm Drain" program has used partnerships to leverage and increase available resources. The Permittees utilize every opportunity to work with Co-permittees, local environmental groups, and other public, private and business organizations to maximize use of existing distribution outlets, events, programs and materials. Impressions, attendance, and other measures of effectiveness relative to these programs are included in **Appendix E** (Public Education) of this Watershed Annual Report.

To facilitate statewide awareness of storm water public education, educate local and state decision makers, and assist in the development of more effective public education outreach programs, the District participates in the following public education committees:

- Public Information Public Participation Committee (PIPP) – A subcommittee of the California Storm Water Quality Association, and
- Western Regional Pollution Prevention Network (WRPPN)

To leverage education outreach resources and coordinate public education activities with other environmental programs, the Permittees closely coordinate and/or have existing partnerships with the following entities/organizations:

- Household Hazardous Waste Information Exchange (HHWIE); This is an eGroup that provides household hazardous waste affiliates the ability to better communicate, share ideas and the latest in legislative rulings.
- Riverside-Corona Resource Conservation District (RCRCD);
- Partnership to provide student education outreach in the Santa Ana and Whitewater Watersheds
- Partnership to provide adult education outreach activities in the Santa Ana and Whitewater Watersheds
- Partnership to provide support services for public education outreach activities at community events
- Mission Resource Conservation District (RCRCD);
- Partnership to provide student education outreach in the Santa Ana and Santa Margarita Watersheds
- Partnership to provide adult education outreach activities in the Santa Ana and Santa Margarita Watersheds

  - Partnership to provide support services for public education outreach activities at community events

- California Regional Environmental Education Community Network (CREEC)
  - A network whose mission is to develop a communication network which provides educators with access to high quality environmental education resources to enhance the environmental literacy of California students.

- Santa Ana River Watershed Clean Up Stakeholders Group in coordination with Riverside Corona Conservation District, Keep Riverside Clean and Beautiful and the California Coastal Commission's Coast. This collaboration of environmental partners support and encourage volunteers, allies and groups to gather for a day to remove trash and debris from the Santa Ana River that might otherwise flow downstream, through the river to the ocean.

- In addition the "Only Rain Down the Storm Drain" program also coordinates with the following City/County departments to distribute appropriate storm water education outreach materials:

  - City/County/District Front Counters
  - County Waste Management
  - County Public Health Department
  - Agriculture Department
  - County Executive Offices
  - Code Enforcement
  - County Parks
  - Animal Control;
  - Economic Development Agency
  - County Assessor/Recorders Office
  - Bio-terrorism
  - Fleet Services
  - Human Resources
  - Library System
  - Central Mail
    - Stamp on every piece of mail sent by the County that identifies the 1-800 Number and requests that citizens call it to report storm drain pollution.
  - County Safety
  - County DPSS
  - Transportation and Land Management

In general, brochures and promotional items are provided to these departments for distribution in public lobbies, training sessions, through customer interactions and new employee orientations.

Finally, the "Only Drain Down the Storm Drain" Program also coordinates with the following state and/or local government or business entities to distribute public education information:

- Western Riverside Council of Governments
- Santa Ana Regional Water Quality Control Board
- Orange County Watershed & Coastal Resources Division
- Santa Ana Watershed Association
- South Coast Air Quality Management District
- Santa Rosa Plateau
- Bureau of Reclamation
- Elsinore Valley Municipal Water District
- Metropolitan Water District
- Lake Elsinore/San Jacinto Watershed Authority
- Eastern Municipal Water District
- The Water Education Center
- Rancho California Water District
- Valley Greeters
- Department of Water Resources Southern District
- Western Municipal Water District
- Business Industrial Association (BIA)
- Caltrans

Outreach Tools to Change Public Behavior

The "Only Rain Down the Storm Drain" program conducts a wide range of outreach activities to residents, students, community groups, new home owners, homeowner associations; informing them of how their "everyday activities" may contribute to the pollution of Receiving Waters, and encouraging them to adopt alternatives that will lessen or eliminate pollution-causing behaviors. Program efforts include providing information on pollution prevention techniques and informing residents about the proper disposal of household hazardous wastes, construction materials, used motor oil, pet waste and litter. Public education materials and media emphasize the theme that all citizens have a role to play in reducing and preventing the polluting of Receiving Waters. The goal is to present a clear and consistent message that explains the simple connections between people's everyday activities and their impacts upon Receiving Water quality.

As the public education and outreach program continues to be implemented and enhanced, the Permittees hope to broaden public awareness of Urban Runoff quality problems, promote proper disposal of household hazardous waste and motor oil, encourage illegal discharge reporting, foster good stewardship of Receiving Waters, and take personal responsibility for their actions in preventing pollution.

While public education outreach at events indicates that most people are willing to act in an environmentally responsible manner if given simple ways to change their behavior to avoid polluting our water bodies; most are unaware of the sources of pollution from everyday urban land use. The "Only Rain Down the Storm Drain" pollution prevention program using various media forms educates the County's population about modified behaviors to prevent storm water pollution by focusing on residents, general public, students, home gardeners, do-it-yourselfers, mobile businesses, etc.

Direct Outreach Methods

The "Only Rain Down the Storm Drain" program interfaces directly via program staff, or through contracts and partnerships, to the public through attendance at community events, school education programs, adult education programs and/or by providing classroom based training. Specific outreach activities, segregated by target audiences, are described below.

General Community Outreach

The "Only Rain Down the Storm Drain" program participates in various community events to ensure that our message is delivered to the largest possible municipal audience. At these community events, surveys, to assess overall program effectiveness, have been used.

In addition, the "Only Rain Down the Storm Drain" program has partnered with County Environmental Health to ensure that a storm drain pollution prevention material is available and distributed at all Household Hazardous Waste and Antifreeze, Batteries, Oil and Paint Collection Centers and/or Events throughout each of the Watershed Region's within Riverside County. These events provide free disposal sites for receiving common pollutants that can impair Receiving Waters.

Elementary School Outreach

Elementary (K-6)

The Riverside County Resource Conservation District (RCRCD) continues to provide a variety of K-6 education programs for the "Only Rain Down the Storm Drain" Program. The K-6 education program includes materials such as the Storm Water Pollution Prevention Patrol workbook, the Fancy Fin hands-on classroom presentation and accompanying coloring book, various word match and crossword activity sheets and videos. A second story line featuring Fancy Fin and her friend Phinnious J. Green (a Pacific Tree Frog) educate students about point and non-point pollution and their effects on the environment and other creatures in the watershed. School materials are offered to all public and provide schools in the Santa Ana Watershed Region, as well as to youth groups such as the boy and girl scouts.

Secondary Schools

A video entitled "How to Conduct an Environmentally Friendly Car Wash and Make Money Too" was developed for the "Car Wash Challenge" program. An accompanying flyer is also used which informs students/groups of the potential storm water problems generated from car wash runoff, and provides practical BMPs to minimize or eliminate contaminated runoff. The original focus of the program was high school clubs. However, after contacting several high schools, it was discovered that car washing fundraisers are relatively rare and revenue deficient in comparison with other high

school fund raising activities. Nevertheless, church groups, scout troops and other organizations do conduct car wash fundraisers. Thus, the scope of the Car Wash Challenge program has been expanded to include these additional fundraising organizations.

Adult Outreach

Valley Greeters is a "Welcoming Wagon" business taking discount coupons, product samples and general vicinity information door to door to new residents and homeowners to the Temecula, Murrieta and Lake Elsinore area. For the past four years, Valley Greeters has included our MS4 materials, (After the Storm; What's the Scoop; Pool, Spa and Fountain Maintenance and HHW Collection Schedule). This information is accompanied with a handy full size dustpan, shop cloth and vehicle air freshener. Every material and promotional is clearly imprinted with the 1-800 Toll Free number for reporting illegal discharges into the storm drain. Young family members receive a copy of Fancy Finn and box of crayons. This business is solely dependent on the status of the construction economy and by January, 07 experienced a considerable slowdown.

The "Only Rain Down the Storm Drain" program contracts with the Riverside/Corona Resource Conservation District for public outreach. Storm Water Pollution Prevention presentations are given to community groups who call and request such services.

Steve Groner & Associates has been retained to prepare and present workshops at major home improvement stores throughout Riverside County. The workshops include passing out reading material regarding targeted BMPs to the public through established corporate partnerships (paint, hardware, home show coordinators, home improvement, garden centers, nurseries and pet stores). All commercial employees are informed about storm water impacts that could occur from the improper application of all types of home and garden hazardous chemicals. In turn, the employees are then able to share with customers on the proper use and disposal of products that are potential storm drain pollutants. Attendees at the workshop receive "Only Rain Down the Storm Drain" promotionals to help emphasize the storm water pollution prevention message. Fixed advertising tools such as counter displays, tear sheets have been placed throughout to attract attention.

Brochures

Residential: After the Storm; Storm Water Pollution and the Solutions, Household Hazardous Waste Collection Schedule, Outdoor Activities; Swimming Pool, Jacuzzi and Fountain Maintenance; and What's the Scoop (Pet waste).

Outreach Materials

In addition to the brochures mentioned above, the program utilizes other effective outreach materials such as, magnets, a billboard ad, videos, newspaper supplements, flyers, door knob hangers, calendars, promotionals items, workbooks, curriculum, shop rags, shelf talkers, tear sheets, posters and print ads to cultivate interest in the program.

A door hanger is also being utilized to help address problem discharges that are commonly observed in residential settings. The door hanger notifies the recipient that a problem discharge was observed flowing in to the street and offering help by following recommended pollution prevention activities. The door hanger is provided to all cities and is used by various County departments and the NPDES staff when conducting field or site activities/inspections.

Mailing Inserts/Slugs

The "Only Rain Down the Storm Drain" Pollution Prevention Program encourages advertising the County's Household Hazardous Waste Collection events via the use of mail inserts. The inserts are included in various utility bills and special notice mass mailings.

In addition, the "Only Rain Down the Storm Drain" program has coordinated with the County Mail Department to have the postage meter carry the "Only Rain Down the Storm Drain" message and the 1-800 Toll Free number to report an illegal storm drain disposal or spill. In 05/06, over 5,000,000 pieces of outgoing County mail were stamped with the message. In November of 06, the postage system was replaced with more sophisticated postage meter units but the cost of the ink in the new system far exceeded the costs and benefits from other media options and therefore this media venue was dissolved.

Media Outreach

The "Only Rain Down the Storm Drain" Program continues to utilize various mass media to reach the public and promote the storm water pollution prevention. Special newspaper inserts, fliers, and advertisements help increase public awareness of storm water pollution and environmental protection.

- Our Sixth Edition of a four-page insert called the National Pollution Prevention or P-2, (National Pollution Prevention Week recognization), was distributed Countywide through the PennySaver. The insert included topics on proper disposal of pet waste, pesticide alternatives, motor oil recycling, grass-cycling, pool and spa best management practices, storm drain marking program, storm water school presentations, general storm drain pollution protection, business storm water pollution information, household hazardous waste (HHW) collection events, syringe disposal program, composting workshops and motor oil specific recycling locations. The insert is released to over 650,500 Riverside County homes generating an increase of calls to the 800 Toll Free Hotline and District IC/ID investigations.

Cooperative Used Oil Program

The Western Riverside Council of Governments (WRCOG) is responsible for administering the Used Oil Block Cycle Grant on behalf of ten cities within WRCOG's boundaries. These cities include: Banning, Beaumont, Canyon Lake, Lake Elsinore, Murrieta, Norco, Perris, Riverside, San Jacinto and Temecula.

The objective of the Used Oil Block Grant is to make it convenient for Do-It-Yourselfers (DIYers) to recycle their used oil and to make it easy for them to find a Certified Center accepting used oil. In order for these centers to be certified, they need to apply for certification with the California Integrated Waste Management Board (CIWMB). As a grant recipient, WRCOG contacts non-certified centers in the jurisdiction to interest them in becoming certified used motor oil collection center. The goal is to see a significant decrease in the amount of illegally dumped motor oil by adding more oil collection centers within close proximity to users.

Through the same grant funding source, WRCOG also provides used oil containers for distribution to DIYers who need proper containers for automotive fluids. Through WRCOG efforts, all certified centers in the County are in compliance to state and local mandates.

The Storm Drain Pollution Prevention Program assists WRCOG's efforts by making available our MS4 information and supporting promotionals for distributions to their targeted groups.

At various venues, WRCOG staff obtain participant responses to a ten question survey. The survey examines the public's understanding on:

- used oil recycling,
- used oil drop-off locations,
- curbside programs, and other local recycling programs.

The program also maintains an English and Spanish 800 hotline that can be used to get answers to any recycling question a resident may have regarding, "where the nearest Certified Center is located?" and "where can I find a used oil container?". The phone number is printed on all distributed materials including the oil containers.

Cleanest County in the West Program

Through another grant funding source, WRCOG created the "Cleanest County in the West" program to address issues relating to litter and illegal dumping. The program was designed to assist jurisdictions in meeting the 50% diversion goals mandated by Assembly Bill 939. AB 939 was a state mandate signed in 1989 that required cities to reduce their waste by 50% by the Year 2000.

The core of the program is the elementary school assembly. WRCOG partners with Radio Disney AM 1290 to present an interactive and informational presentation for children in grades K-6th. This program continually reinforces the responsibility of everyone to recycle and pick up litter.

WRCOG at the end of the assembly gives the school two recycling containers for the collection of cans and bottles. During the 06/07 school year, over 18,000 students and 600 teachers have experienced the assembly. Each student receives an environmental activity book and an application to join the Riverside County Kids Recycle Club where they will receive a quarterly newspaper. This club has over 200 members.

Like the "Only Rain Down the Storm Drain" Program which promotes litter reduction and recycling throughout the Santa Ana Region, WRCOG also participates in events to promote litter reduction and beverage container recycling. These events gives staff an opportunity to assess how informed the local community is regarding recycling and also allows us to distribute brochures and informational flyers that will assist people in finding the nearest recycling center. During these events promotional items made from recycled content are also given out to show examples on how used items such as money can be recycled into new things such as a pencil, a promotional product first used by the "Only Rain Down the Storm Drain" Program. This particular promotional item especially increases the interest of the people visiting out booth and demonstrates how almost anything can be recycled and reused.

Outreach tools specific to Business Specific

The "Only Rain Down the Storm Drain" Program conducts a wide range of outreach activities to businesses; informing them of how their "everyday activities" may contribute to the pollution of Receiving Waters, and encouraging them to adopt alternatives that will lessen or eliminate polluting-causing activities. Program efforts include providing information on pollution prevention techniques and informing businesses about the proper disposal of wastes. Public education materials and media emphasize the theme that all businesses have a role to play in reducing and preventing the polluting of Receiving waters. The goal is to present a clear and consistent message that explains the simple connections between a business' everyday activities and their impacts upon Receiving Water quality.

Originally, the business education program mainly consisted of the development and distribution of formal BMP guidance and outreach to business associations. The program has now expanded to include direct outreach to businesses through classroom formats, advertising in business trade papers and providing exhibits at various business specific symposiums.

Discussion of the current Business Specific Outreach tools implemented by the Permittees are discussed below.

Direct Business Outreach Activities

The "Only Rain Down the Storm Drain" Program partners with various entities to provide training and education. Currently, the District has allowed AEI-CASC Engineering, a consultant who provides the Permittees internal education programs to train developers and consultants regarding the new WQMP/SUSMP requirements for Riverside County. The District has partnered with Riverside/Corona Resource Conservation District, to develop a Water Quality Design class that focuses on sub-regional solutions and low impact development. This class was offered for the first time through UCR extension in October 2005. Additionally, the District presented at Construction Storm Water Compliance Workshop hosted by the Building Industry Association of Southern California (BIA/SC) on March 22, 2006. The workshop focused on state and municipal construction requirements for contractors, developers, and consultants.

Through the Compliance Assistance Program (CAP), a partnership with County Environmental Health restaurants and businesses that handle hazardous wastes are reviewed for potential storm water impacts from their activities. Each business is provided with storm drain pollution prevention public education outreach information specific to their activities.

Steve Groner Associates has been retained to prepare and present workshops at major home improvement stores throughout Riverside County. The workshops include a handout educating the store's employees about storm water impacts that could occur from improper application of paint, pesticides or fertilizers. Attendees at the workshop also receive "Only Rain Down the Storm Drain" information and promotionals to help highlight the storm water protection message. Employees are then able to share with customers the proper use and disposal of products that are potential storm drain pollutants. Point of purchase displays, tearsheets, and counter displays have been installed at strategic locations to educate the public directly.

Each new business trade in Riverside County that is listed in the Inland Business Press newspaper is provided with an "Only Rain Down the Storm Drain" Pollution Prevention packet.

Brochures

Commercial*:* After the Storm; Food Facilities; Outdoor Cleaning Activities and Non-Point Source Discharges; Automotive Maintenance & Car Care. Note: (Staff is revising the Outdoor Activity brochure to include broader examples of urban pollution causing activities such as, power washers and mobile vehicle maintenance operators).

Industrial*:* After the Storm; Outdoor Cleaning Activities and Non-Point Source Discharges; and Your Facility May Need a Storm Water Permit.

Construction*:* After the Storm; Outdoor Cleaning Activities and Non-Point Source Discharges; General Construction & Site Supervision The revision to the construction brochure is pending the finalization of the construction permit.

Posters

BMP posters for automotive, food service establishments (available in Spanish) and construction employees are available. The posters address activities associated with the automotive repair industry, and the food/restaurant industry that may pose a threat to water quality. There are also two new posters for the Fueling Stations and Service Bay Service centers. All the posters recommend storm water BMPs and are designed to serve as informative and attractive visual reminders for employees.

Media Outreach

In March, 07, a full-page ad was placed in the Inland Business Press newspaper to draw the attention of Inland Empire businesses whose urban runoff activities might be threatening local

water quality. The ad also provided links to the District's and CASQA's website for more detailed BMP information.

Supplemental Environmental Projects (SEP)

In an effort to change the behaviors of large storm drain pollution prevention offenders in the County, Environmental Health established a Supplemental Environmental Project (S.E.P.). The S.E.P. requires from the violator a monetary fine and/or the violator's cooperation for the development of a public education tool on the effects of polluted urban run off. S.E.P.'s to date include:

- A Downs Energy SEP project resulted in the development of a billboard ad that has been greeting commuters traveling Westbound on the 60 Freeway lanes.

Outreach tools specific to Pollutants

"Only Rain Down the Storm Drain" Pollution Prevention Program conducts a wide range of outreach activities focusing on reduction of certain pollutants in the receiving waters. These outreach activities focus on sources of those pollutants whether it is residential, business, municipal or some other state or federal source. Education materials explain how "everyday activities" of potential sources may contribute to the pollution of receiving waters, and encourage the sources to adopt alternative approaches to pollutant management that will lessen or eliminate polluting-causing activities. Program efforts include providing information on pollution prevention techniques and informing sources about the proper disposal of pollutants. Public education materials and media emphasize the theme that all citizens/businesses have a role to play in reducing and preventing the polluting of receiving waters. The goal is to present a clear and consistent message that explains the simple connections between a business' everyday activities and their impacts upon receiving water quality.

Each subsection that follows identifies how existing outreach materials previously described address specific potential pollutant sources in the watershed.

Use of pesticides, fertilizers, and herbicides

A. The Riverside County Agricultural Commissioner's Pesticide Applicator's License renewal information package includes materials on the proper use of pesticides and offers information on training workshops. The license renewal process requires continuing education of applicants and detailed record keeping of pesticide applications. Municipal employees that are responsible for the application of pesticides are encouraged to obtain and maintain credentials as Certified Applicators and/or licensed Pest Control Advisors.

B. The "Home Garden Care" materials are being revised to draw and attract the interest of the general public and amateur gardener. The new materials will include Integrated Pest Management and plant selection and materials from the State Water Resource Control Board, Central Contra Costa IPM Outreach Program, University of California and The

Orange County Storm Water Program are being used. All the materials selected offer alternatives to using chemically based pesticides, herbicides and fertilizers.

C. The "Keep Our Water Clean" video covers proper use of pesticides, fertilizers and herbicides as well as excess runoff from sprinklers.

D. The September annual “Only Rain Down The Storm Drain’s” participation in the National Pollution Prevention Week insert informs residents about the problem of storm water pollution and provides simple pollution prevention activities in gardening.

E. The “Only Rain Down The Storm Drain” adult presentations conducted by RCRCD discusses the effects of pesticides and fertilizers on local waterways. The materials distributed following the presentation promote alternatives to pesticide use in the yard and garden.

F. The 2006 Environmental Calendar included a wide array of storm water protection information. It is designed to attract the adult audience by listing best management practices, scheduled special events, household hazardous waste collection sites, used oil collection sites, composting workshops, citywide clean ups, and each of the watersheds along with geographical information. Throughout the calendar the main message is “Only Rain Down The Storm Drain” and the hotline number to call for additional home garden care information.

G. Steve Groner Associates has been retained to prepare and present employee workshops at major home improvement stores throughout Riverside County. This information is then passed on to the public via the shelf talkers accessible to the public or when an employee is addressed with a question. The workshops include information on BMPs the public should be aware of for pesticide and fertilizer application, use, and storage.

Appendix E

Soils Report

PRELIMINARY PARAMETERS

GROUND MOTION PARAMETERS

Sladden has reviewed the 2022 California Building Code (CBC) and ASCE7-16 and developed ground motion parameters for the subject site. The project Seismic Design Maps are summarized in the following table and included within Appendix C. The project Structural Engineer should verify that all design parameters provided are applicable for the subject project.

TABLE
GROUND MOTION PARAMETERS

Latitude / Longitude	33.7662/ -116.4439
Risk Category	II
Site Class	C
Code Reference Documents	ASCE 7-16; Chapter 11 & 21

Description	Type	Map Based
MCE_R Ground Motion (0.2 second period)	S_S	1.5
MCE_R Ground Motion (1.0 second period)	S_1	0.613
Site-Modified Spectral Acceleration Value	S_{MS}	1.8
Site-Modified Spectral Acceleration Value	S_{M1}	0.858
Numeric Seismic Design Value at 0.2 second SA	S_{DS}	1.2
Numeric Seismic Design Value at 1.0 second SA	S_{D1}	0.572
Site Amplification Factor at 0.2 second	F_a	1.2
Site Amplification Factor at 1.0 second	F_v	1.4
Site Peak Ground Acceleration	PGA_M	0.788

Cut/Fill Slopes. Where fill is required on slopes steeper than five horizontal to one vertical (5H:1V), all weak soil should be removed and these areas should be positively benched horizontally into bedrock in conjunction with fill placement. Keyways will be required at the toe of all fill embankments. The keyways should be excavated at least two (2) feet into competent bedrock as measured on the downhill side. The height of the benches and keyway dimensions should be determined by the geologist in the field during grading.

CONVENTIONAL SHALLOW SPREAD FOOTINGS

All footings should be founded entirely upon properly compacted engineered fill soil and should have a minimum embedment depth of 12 inches measured from the lowest adjacent finished grade. Continuous and isolated pad footings should have minimum widths of 12 inches and 24 inches, respectively. Continuous and isolated pad footings supported upon properly compacted engineered fill soil may be designed using allowable bearing pressures of 1800 and 2000 pounds per square foot (psf), respectively. Allowable increases of 200 psf for each additional 1 foot of width and 250 psf for each additional 6 inches of depth may be used if desired. The maximum allowable bearing pressure should be 3000 psf. The allowable bearing pressures apply to combined dead and sustained live loads. The allowable bearing pressures may be increased by one-third when considering transient live loads, including seismic and wind forces.

Based on the recommended allowable bearing pressures, the total static settlement of the shallow footings is anticipated to be less than ½ inch, provided foundation preparations conform to the recommendations described in this report. Static differential settlement is anticipated to be approximately one-half of the total settlement for similarly loaded footings spaced up to approximately 50 feet apart.

Lateral load resistance for the conventional shallow spread footings will be developed by passive pressure against the sides of the footings below grade and by friction acting at the base of the footings. An allowable passive pressure of 275 psf per foot of depth may be used for design purposes. An allowable coefficient of friction 0.45 may be used for dead and sustained live loads to compute the frictional resistance of the footing placed directly on compacted fill. Under seismic and wind loading conditions, the passive pressure and frictional resistance may be increased by one-third.

All footing excavations should be observed by a representative of the project geotechnical consultant to verify adequate embedment depths prior to placement of forms, steel reinforcement or concrete. The excavations should be trimmed neat, level and square. All loose, disturbed, sloughed or moisture-softened soils and/or any construction debris should be removed prior to concrete placement. Excavated soil generated from footing and/or utility trenches should not be stockpiled within the building envelope or in areas of exterior concrete flatwork. All footings should be reinforced in accordance with the project Structural Engineer's recommendations.

SLABS-ON-GRADE

To provide uniform and adequate support, concrete slabs-on-grade must be placed on properly compacted engineered fill soil as outlined in the previous sections of this report. The slab subgrade should remain near optimum moisture content and should not be permitted to dry prior to concrete placement. Slab subgrade should be firm and unyielding. Disturbed soil should be removed and replaced with engineered fill soil compacted to a minimum of 90 percent relative compaction.

Slab thickness and reinforcement should be determined by the Structural Engineer. We recommend a minimum slab thickness of 4.0 inches and minimum reinforcement of #3 bars at 18 inches on center in both directions. All slab reinforcement should be supported on concrete chairs to ensure that reinforcement is placed at slab mid-height. Final floor slab design and reinforcement should be determined by the Structural Engineer.

Slabs with moisture-sensitive surfaces should be underlain with a moisture vapor retarder consisting of a polyvinyl chloride membrane such as 10-mil visqueen, or equivalent. All laps within the membrane should be sealed and at least 2 inches of clean sand should be placed over the membrane to promote uniform curing of the concrete. To reduce the potential for punctures, the membrane should be placed on a pad surface that has been graded smooth without any sharp protrusions. If a smooth surface can not be achieved by grading, consideration should be given to placing a thin leveling course of sand across the pad surface prior to placement of the membrane.

Appendix F

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

WORLD WILDLIFE MUSEUM
RANCHO MIRAGE, CA

PRELIMINARY HYDROLOGY REPORT

PREPARED FOR:
PREST VUKSIC GREENWOOD ARCHITECTS
44-530 SAN PABLO AVENUE, STE 200
PALM DESERT, CA 92260

PREPARED BY:

TheAltumGroup

44-600 VILLAGE COURT, SUITE 100
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MARCH 27, 2025

Prepared Under the Supervision of:

3/27/25

James Bazua, PE
R.C.E. 58394
Expiration Date: December 31, 2026



World Wildlife Museum

PRELIMINARY HYDROLOGY REPORT

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V RUNOFF DISCHARGE CALCULATIONS

VI RUNOFF VELOCITY CALCULATIONS

VII APPENDIX

I. PROJECT DESCRIPTION

This report was prepared in support of the World Wildlife Museum submittal. The purpose of this preliminary hydrology report is to analyze and compare the drainage patterns for existing and proposed development conditions, to show that the project meets MS4 permit requirements.

The proposed project, 'World Wildlife Museum', is located at 69934 CA State Highway 111, Rancho Mirage, CA 92270 on a 6.78 acre site. Project activities consist of the construction of the World Wildlife Museum, a commercial museum development that will occupy a portion of Parcel 1 of Parcel Map No. 8674 (689-040-025), Parcel 2 of Parcel Map No. 8674 (689-040-023) and Lot 88, R.M. Annex No 2 (689-040-028). Construction activities will disturb approximately 3.2 acres of the 6.78 acre site.

Under existing conditions, the site is partially developed with a parking lot. The existing parking lot served a previous commercial building located on Parcel 2 which has been completely demolished. Existing drainage is designed to surface flow to a low point located in the northeasterly portion of the parking lot toward an existing combination curb inlet/grate catch basin that collects runoff in a sump condition and directs flow into an existing storm drain pipe designed to convey runoff off-site toward the existing Whitewater Evacuation Channel (receiving water) located nearby, to the northeast. Lot 88, R.M. Annex No. 2 (689-040-028) is located at the southerly end of the project boundary, is currently vacant and surface flows over pervious ground cover in a southeasterly direction toward Mirage Cove Drive, and off-site within public right of way and ultimately into Whitewater Evacuation Channel to the east.

Under post development conditions, the existing parking lot (Parcels 1 &2) will be improved and re-purposed, and a new museum building will be constructed and new separate overflow parking facilities will be constructed on Lot 88. Storm runoff generated on improved portions of Parcel 1 and Parcel 2 will continue to flow to the low point of the existing parking lot and into a new combination collection basin and underground storage system designed to replace the existing curb inlet. Storm runoff generated on the overflow parking improvements within Lot 88 will surface flow toward the east into a new surface detention basin.

II. DESIGN METHODOLOGY AND CALCULATIONS

Developments south and southwest of the Whitewater Evacuation Channel within City of Rancho are required to comply with MS4 permit WQMP treatment requirements, but are not required to retain the runoff generated during the 100 year design storm event. The World Wildlife Museum project will collect and store runoff underground (Parcels 1 & 2) and in a surface retention basin (Lot 88) in a manner that captures and treats the Design Capture Volume (DCV) and ensures that flowrates, velocities and volumes leaving the site under the proposed condition do not exceed those under the existing condition. Flows exceeding the storage capacity of the new on-site storage facilities will leave the project site, and continue to flow toward the Whitewater Evacuation Channel as they do under the existing condition.

1.) The Water Quality Management Plan (WQMP) Design Capture Volume (DCV) is calculated using worksheets provided by Riverside County Flood Control and Water Conservation District for Stormwater Quality Best Management Practices for the Riverside County Whitewater River Region.
2.) Riverside County Flood Control District Synthetic Unit Hydrograph methods are used to quantify the runoff volumes generated for the pre and post development site conditions during the 2 year-24 hour and 10 year-24 hour storm events.
3.) Flowrates (Q) generated for the pre and post development site conditions during the 2 year-24 hour and 10 year-24 hour storm events are calculated using CivilD rational method software.
4.) Flow velocities for the pre and post development site conditions during the 2 year-24 hour and 10 year-24 hour storm events are calculated using manning's equation for open channel flow and flowrate results listed in this report

DESIGN CRITERIA

The following Riverside County Flood Control District (RCFCD) parameters were used in the preparation of the analyses:

- 2 year – 1 hour Precipitation 0.455" (NOAA)
- 2 year – 3 hour Precipitation 0.721" (NOAA)
- 2 year – 6 hour Precipitation 0.953" (NOAA)
- 2 year – 24 hour Precipitation 1.36" (NOAA)
- 10 year – 3 hour Precipitation 1.50" (NOAA)
- 10 year – 6 hour Precipitation 1.93" (NOAA)
- 10 year – 24 hour Precipitation 2.66" (NOAA)
- 100 year – 1 hour Precipitation 2.41" (NOAA)
- Hydrologic Soil Type "A" (RCFC&WCD Plate C-1.36)
- Slope Intensity Duration Curve (RCFC&WCD Plate D-4.6)
- Runoff Index Number 32 (RCFC&WCD Plate D-5.5)

III DESIGN CAPTURE VOLUME CALCULATIONS

NORTH

DESIGN CAPTURE VOLUME AREA = 3.80 AC (INCLUDES OFF-SITE FLOW)

IMPERVIOUS FRACTION = 0.55

DESIGN CAPTURE VOLUME = 2,069 CU.FT.

INFILTRATION BMP VOLUME PROVIDED = 2,439 CU.FT.

SOUTH

DESIGN CAPTURE VOLUME AREA = 1.23 AC

IMPERVIOUS FRACTION = 0.30

DESIGN CAPTURE VOLUME = 402 CU.FT.

INFILTRATION BMP VOLUME PROVIDED = 1,524 CU.FT.

Whitewater Watershed

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

Legend: Required Entries / Calculated Cells

Company Name	The Altum Group	Date	3/20/2025
Designed by	James Bazua	County/City Case No	C2026
Company Project Number/Name			
Drainage Area Number/Name	WORLD WILDLIFE MUSEUM - NORTH		

Enter the Area Tributary to this Feature A_T = 3.8 acres

Determine the Effective Impervious Fraction

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

Effective Impervious Fraction I_f = 0.55

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

Use the following equation based on the WEF/ASCE Method

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

C = 0.37

Determine Design Storage Volume, V_{BMP}

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

V_u = 0.15 (in*ac)/ac

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

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

V_{BMP} = 2,069 ft^3

Notes:

Whitewater Watershed

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

Legend: Required Entries / Calculated Cells

Company Name	The Altum Group	Date	3/20/2025
Designed by	James Bazua	County/City Case No	C2026
Company Project Number/Name			
Drainage Area Number/Name	WORLD WILDLIFE MUSEUM - SOUTH		

Enter the Area Tributary to this Feature A_T = 1.23 acres

Determine the Effective Impervious Fraction

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

Effective Impervious Fraction I_f = 0.30

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

Use the following equation based on the WEF/ASCE Method

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

C = 0.23

Determine Design Storage Volume, V_{BMP}

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

V_u = 0.09 (in*ac)/ac

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

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

V_{BMP} = 402 ft^3

Notes:

IV RUNOFF VOLUME CALCULATIONS

SUBAREA	NORTH EXISTING	NORTH PROPOSED
2 YR. – 24 HR VOLUME (CU.FT.)	1537	1537
2 YR. – 24 HR VOLUME STORED ON-SITE (CU.FT.)	0	1537
2 YR. – 24 HR VOLUME LEAVING SITE (CU.FT.)	1537	0
10 YR. – 24 HR VOLUME (CU.FT.)	3560	5799
10 YR. – 24 HR VOLUME STORED ON-SITE (CU.FT.)	-	2439
10 YR. – 24 HR VOLUME LEAVING SITE (CU.FT.)	3560	3360

SUBAREA	SOUTH EXISTING	SOUTH PROPOSED
2 YR. – 24 HR VOLUME (CU.FT.)	602	602
2 YR. – 24 HR VOLUME STORED ON-SITE (CU.FT.)	0	602
2 YR. – 24 HR VOLUME LEAVING SITE (CU.FT.)	602	0
10 YR. – 24 HR VOLUME (CU.FT.)	1178	1168
10 YR. – 24 HR VOLUME STORED ON-SITE (CU.FT.)	0	1168
10 YR. – 24 HR VOLUME LEAVING SITE (CU.FT.)	1178	0

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM EXIST 2 YR EVENT - NORTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	1.24		
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			
24	GOLF COURSE			
25	MOUNTAINOUS	1.03		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	436		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	46		
30				
31	ELEVATION OF HEADWATER	356		
32	ELEVATION OF CONCENTRATION POINT	264.5		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.721		
40	6-HOUR	0.953		
41	24-HOUR	1.36		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NORTH
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	3.140
[4] L-FEET	436
[5] L-MILES	0.083
[6] La-FEET	46.00
[7] La-MILES	0.009
[8] ELEVATION OF HEADWATER	356
[9] ELEVATION OF CONCENTRATION POINT	264.5
[10] H-FEET	91.5
[11] S-FEET/MILE	1108.1
[12] S^0.5	33.29
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.5
[17] 100% OF LAG-MINUTES	0.5
[18] 200% OF LAG-MINUTES	1.0
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
0.72	3.140	1.00	0.72	0.95	3.140	1.00	0.95	1.36	3.140	1.00	1.36
		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]	3.14	SUM [7]	0.72	SUM [9]	3.14	SUM [11]	0.95	SUM [13]	3.14	SUM [15]	1.36
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.72				0.95				1.36

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.17	0.16	0.14
FLOOD VOLUME	(cu-ft)	1,896	1,843	1,550
	(acre-ft)	0.04	0.04	0.04
REQUIRED STORAGE	(cu-ft)	1,880	1,828	1,537
	(acre-ft)	0.04	0.04	0.04
PEAK FLOW	(cfs)	1.31	1.09	0.06
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM EXIST 2 YR EVENT - NORTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	1.24	0.395	0.0292
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.87	0.277	0.2050
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	1.03	0.328	0.0592
					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 3.14	SUM	0.2935

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.146731688

C= 0.00272

Ft=C(24-(T/60))^1.55 = 0.00272 (24-(T/60))^1.55 + 0.15 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: WORLD MUSEUM EXIST 2 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.49
UNIT TIME-PERCENT OF LAG	1029.0
TOTAL ADJUSTED STORM RAIN-INCHES	0.72
CONSTANT LOSS RATE-in/hr	0.29
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.112	0.29	0.10	0.01	0.04	10.60
2	10	0.17	1.3	0.112	0.29	0.10	0.01	0.04	10.60
3	15	0.25	1.1	0.095	0.29	0.09	0.01	0.03	8.97
4	20	0.33	1.5	0.130	0.29	0.12	0.01	0.04	12.23
5	25	0.42	1.5	0.130	0.29	0.12	0.01	0.04	12.23
6	30	0.50	1.8	0.156	0.29	0.14	0.02	0.05	14.67
7	35	0.58	1.5	0.130	0.29	0.12	0.01	0.04	12.23
8	40	0.67	1.8	0.156	0.29	0.14	0.02	0.05	14.67
9	45	0.75	1.8	0.156	0.29	0.14	0.02	0.05	14.67
10	50	0.83	1.5	0.130	0.29	0.12	0.01	0.04	12.23
11	55	0.92	1.6	0.138	0.29	0.12	0.01	0.04	13.04
12	60	1.00	1.8	0.156	0.29	0.14	0.02	0.05	14.67
13	65	1.08	2.2	0.190	0.29	0.17	0.02	0.06	17.93
14	70	1.17	2.2	0.190	0.29	0.17	0.02	0.06	17.93
15	75	1.25	2.2	0.190	0.29	0.17	0.02	0.06	17.93
16	80	1.33	2.0	0.173	0.29	0.16	0.02	0.05	16.30
17	85	1.42	2.6	0.225	0.29	0.20	0.02	0.07	21.19
18	90	1.50	2.7	0.234	0.29	0.21	0.02	0.07	22.01
19	95	1.58	2.4	0.208	0.29	0.19	0.02	0.07	19.56
20	100	1.67	2.7	0.234	0.29	0.21	0.02	0.07	22.01
21	105	1.75	3.3	0.286	0.29	0.26	0.03	0.09	26.90
22	110	1.83	3.1	0.268	0.29	0.24	0.03	0.08	25.27
23	115	1.92	2.9	0.251	0.29	0.23	0.03	0.08	23.64
24	120	2.00	3.0	0.260	0.29	0.23	0.03	0.08	24.45
25	125	2.08	3.1	0.268	0.29	0.24	0.03	0.08	25.27
26	130	2.17	4.2	0.363	0.29	0.33	0.07	0.22	65.87
27	135	2.25	5.0	0.433	0.29	0.39	0.14	0.44	131.07
28	140	2.33	3.5	0.303	0.29	0.27	0.01	0.03	8.81
29	145	2.42	6.8	0.588	0.29	0.53	0.29	0.93	277.77
30	150	2.50	7.3	0.632	0.29	0.57	0.34	1.06	318.52
31	155	2.58	8.2	0.709	0.29	0.64	0.42	1.31	391.87
32	160	2.67	5.9	0.510	0.29	0.46	0.22	0.68	204.42
33	165	2.75	2.0	0.173	0.29	0.16	0.02	0.05	16.30
34	170	2.83	1.8	0.156	0.29	0.14	0.02	0.05	14.67
35	175	2.92	1.8	0.156	0.29	0.14	0.02	0.05	14.67
36	180	3.00	0.6	0.052	0.29	0.05	0.01	0.02	4.89

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.17
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1895.68
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1880.00
PEAK FLOW RATE (cfs)	1.31

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

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NOR
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.49
UNIT TIME-PERCENT OF LAG	1029.0
TOTAL ADJUSTED STORM RAIN-INCHES	0.95
CONSTANT LOSS RATE-in/hr	0.293
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.057	0.29	0.05	0.01	0.02	5.39
2	10	0.17	0.6	0.069	0.29	0.06	0.01	0.02	6.46
3	15	0.25	0.6	0.069	0.29	0.06	0.01	0.02	6.46
4	20	0.33	0.6	0.069	0.29	0.06	0.01	0.02	6.46
5	25	0.42	0.6	0.069	0.29	0.06	0.01	0.02	6.46
6	30	0.50	0.7	0.080	0.29	0.07	0.01	0.03	7.54
7	35	0.58	0.7	0.080	0.29	0.07	0.01	0.03	7.54
8	40	0.67	0.7	0.080	0.29	0.07	0.01	0.03	7.54
9	45	0.75	0.7	0.080	0.29	0.07	0.01	0.03	7.54
10	50	0.83	0.7	0.080	0.29	0.07	0.01	0.03	7.54
11	55	0.92	0.7	0.080	0.29	0.07	0.01	0.03	7.54
12	60	1.00	0.8	0.091	0.29	0.08	0.01	0.03	8.62
13	65	1.08	0.8	0.091	0.29	0.08	0.01	0.03	8.62
14	70	1.17	0.8	0.091	0.29	0.08	0.01	0.03	8.62
15	75	1.25	0.8	0.091	0.29	0.08	0.01	0.03	8.62
16	80	1.33	0.8	0.091	0.29	0.08	0.01	0.03	8.62
17	85	1.42	0.8	0.091	0.29	0.08	0.01	0.03	8.62
18	90	1.50	0.8	0.091	0.29	0.08	0.01	0.03	8.62
19	95	1.58	0.8	0.091	0.29	0.08	0.01	0.03	8.62
20	100	1.67	0.8	0.091	0.29	0.08	0.01	0.03	8.62
21	105	1.75	0.8	0.091	0.29	0.08	0.01	0.03	8.62
22	110	1.83	0.8	0.091	0.29	0.08	0.01	0.03	8.62
23	115	1.92	0.8	0.091	0.29	0.08	0.01	0.03	8.62
24	120	2.00	0.9	0.103	0.29	0.09	0.01	0.03	9.70
25	125	2.08	0.8	0.091	0.29	0.08	0.01	0.03	8.62
26	130	2.17	0.9	0.103	0.29	0.09	0.01	0.03	9.70
27	135	2.25	0.9	0.103	0.29	0.09	0.01	0.03	9.70
28	140	2.33	0.9	0.103	0.29	0.09	0.01	0.03	9.70
29	145	2.42	0.9	0.103	0.29	0.09	0.01	0.03	9.70
30	150	2.50	0.9	0.103	0.29	0.09	0.01	0.03	9.70
31	155	2.58	0.9	0.103	0.29	0.09	0.01	0.03	9.70
32	160	2.67	0.9	0.103	0.29	0.09	0.01	0.03	9.70
33	165	2.75	1.0	0.114	0.29	0.10	0.01	0.04	10.77
34	170	2.83	1.0	0.114	0.29	0.10	0.01	0.04	10.77
35	175	2.92	1.0	0.114	0.29	0.10	0.01	0.04	10.77
36	180	3.00	1.0	0.114	0.29	0.10	0.01	0.04	10.77
37	185	3.08	1.0	0.114	0.29	0.10	0.01	0.04	10.77
38	190	3.17	1.1	0.126	0.29	0.11	0.01	0.04	11.85
39	195	3.25	1.1	0.126	0.29	0.11	0.01	0.04	11.85
40	200	3.33	1.1	0.126	0.29	0.11	0.01	0.04	11.85
41	205	3.42	1.2	0.137	0.29	0.12	0.01	0.04	12.93
42	210	3.50	1.3	0.149	0.29	0.13	0.01	0.05	14.00
43	215	3.58	1.4	0.160	0.29	0.14	0.02	0.05	15.08
44	220	3.67	1.4	0.160	0.29	0.14	0.02	0.05	15.08
45	225	3.75	1.5	0.172	0.29	0.15	0.02	0.05	16.16
46	230	3.83	1.5	0.172	0.29	0.15	0.02	0.05	16.16
47	235	3.92	1.6	0.183	0.29	0.16	0.02	0.06	17.24
48	240	4.00	1.6	0.183	0.29	0.16	0.02	0.06	17.24
49	245	4.08	1.7	0.194	0.29	0.17	0.02	0.06	18.31
50	250	4.17	1.8	0.206	0.29	0.19	0.02	0.06	19.39
51	255	4.25	1.9	0.217	0.29	0.20	0.02	0.07	20.47
52	260	4.33	2.0	0.229	0.29	0.21	0.02	0.07	21.55
53	265	4.42	2.1	0.240	0.29	0.22	0.02	0.08	22.62
54	270	4.50	2.1	0.240	0.29	0.22	0.02	0.08	22.62
55	275	4.58	2.2	0.252	0.29	0.23	0.03	0.08	23.70
56	280	4.67	2.3	0.263	0.29	0.24	0.03	0.08	24.78

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NOR CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.49		
UNIT TIME-PERCENT OF LAG	1029.0		
TOTAL ADJUSTED STORM RAIN-INCHES	0.95		
CONSTANT LOSS RATE-in/hr	0.293		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.274	0.29	0.25	0.03	0.09	25.85
58	290	4.83	2.4	0.274	0.29	0.25	0.03	0.09	25.85
59	295	4.92	2.5	0.286	0.29	0.26	0.03	0.09	26.93
60	300	5.00	2.6	0.297	0.29	0.27	0.00	0.01	3.65
61	305	5.08	3.1	0.355	0.29	0.32	0.06	0.19	57.51
62	310	5.17	3.6	0.412	0.29	0.37	0.12	0.37	111.38
63	315	5.25	3.9	0.446	0.29	0.40	0.15	0.48	143.69
64	320	5.33	4.2	0.480	0.29	0.43	0.19	0.59	176.01
65	325	5.42	4.7	0.537	0.29	0.48	0.24	0.77	229.87
66	330	5.50	5.6	0.640	0.29	0.58	0.35	1.09	326.83
67	335	5.58	1.9	0.217	0.29	0.20	0.02	0.07	20.47
68	340	5.67	0.9	0.103	0.29	0.09	0.01	0.03	9.70
69	345	5.75	0.6	0.069	0.29	0.06	0.01	0.02	6.46
70	350	5.83	0.5	0.057	0.29	0.05	0.01	0.02	5.39
71	355	5.92	0.3	0.034	0.29	0.03	0.00	0.01	3.23
72	360	6.00	0.2	0.023	0.29	0.02	0.00	0.01	2.15

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.16
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1843.05
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1827.81
PEAK FLOW RATE (cfs)	1.09

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

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2935
LAG TIME - MINUTES	0.49	MINIMUM LOSS RATE (for var. loss) - in/hr	0.147
UNIT TIME-PERCENT OF LAG	3086.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00272
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.011	0.518	0.010	0.001	0.00	3.07
2	30	0.50	0.3	0.016	0.512	0.015	0.002	0.01	4.61
3	45	0.75	0.3	0.016	0.506	0.015	0.002	0.01	4.61
4	60	1.00	0.4	0.022	0.500	0.020	0.002	0.01	6.15
5	75	1.25	0.3	0.016	0.494	0.015	0.002	0.01	4.61
6	90	1.50	0.3	0.016	0.489	0.015	0.002	0.01	4.61
7	105	1.75	0.3	0.016	0.483	0.015	0.002	0.01	4.61
8	120	2.00	0.4	0.022	0.477	0.020	0.002	0.01	6.15
9	135	2.25	0.4	0.022	0.471	0.020	0.002	0.01	6.15
10	150	2.50	0.4	0.022	0.465	0.020	0.002	0.01	6.15
11	165	2.75	0.5	0.027	0.460	0.024	0.003	0.01	7.69
12	180	3.00	0.5	0.027	0.454	0.024	0.003	0.01	7.69
13	195	3.25	0.5	0.027	0.448	0.024	0.003	0.01	7.69
14	210	3.50	0.5	0.027	0.443	0.024	0.003	0.01	7.69
15	225	3.75	0.5	0.027	0.437	0.024	0.003	0.01	7.69
16	240	4.00	0.6	0.033	0.432	0.029	0.003	0.01	9.22
17	255	4.25	0.6	0.033	0.426	0.029	0.003	0.01	9.22
18	270	4.50	0.7	0.038	0.421	0.034	0.004	0.01	10.76
19	285	4.75	0.7	0.038	0.415	0.034	0.004	0.01	10.76
20	300	5.00	0.8	0.044	0.410	0.039	0.004	0.01	12.30
21	315	5.25	0.6	0.033	0.405	0.029	0.003	0.01	9.22
22	330	5.50	0.7	0.038	0.400	0.034	0.004	0.01	10.76
23	345	5.75	0.8	0.044	0.394	0.039	0.004	0.01	12.30
24	360	6.00	0.8	0.044	0.389	0.039	0.004	0.01	12.30
25	375	6.25	0.9	0.049	0.384	0.044	0.005	0.02	13.84
26	390	6.50	0.9	0.049	0.379	0.044	0.005	0.02	13.84
27	405	6.75	1.0	0.054	0.374	0.049	0.005	0.02	15.37
28	420	7.00	1.0	0.054	0.369	0.049	0.005	0.02	15.37
29	435	7.25	1.0	0.054	0.364	0.049	0.005	0.02	15.37
30	450	7.50	1.1	0.060	0.359	0.054	0.006	0.02	16.91
31	465	7.75	1.2	0.065	0.354	0.059	0.007	0.02	18.45
32	480	8.00	1.3	0.071	0.349	0.064	0.007	0.02	19.99
33	495	8.25	1.5	0.082	0.344	0.073	0.008	0.03	23.06
34	510	8.50	1.5	0.082	0.339	0.073	0.008	0.03	23.06
35	525	8.75	1.6	0.087	0.335	0.078	0.009	0.03	24.60
36	540	9.00	1.7	0.092	0.330	0.083	0.009	0.03	26.13
37	555	9.25	1.9	0.103	0.325	0.093	0.010	0.03	29.21
38	570	9.50	2.0	0.109	0.321	0.098	0.011	0.03	30.75
39	585	9.75	2.1	0.114	0.316	0.103	0.011	0.04	32.28
40	600	10.00	2.2	0.120	0.311	0.108	0.012	0.04	33.82
41	615	10.25	1.5	0.082	0.307	0.073	0.008	0.03	23.06
42	630	10.50	1.5	0.082	0.302	0.073	0.008	0.03	23.06
43	645	10.75	2.0	0.109	0.298	0.098	0.011	0.03	30.75
44	660	11.00	2.0	0.109	0.294	0.098	0.011	0.03	30.75
45	675	11.25	1.9	0.103	0.289	0.093	0.010	0.03	29.21
46	690	11.50	1.9	0.103	0.285	0.093	0.010	0.03	29.21
47	705	11.75	1.7	0.092	0.281	0.083	0.009	0.03	26.13
48	720	12.00	1.8	0.098	0.277	0.088	0.010	0.03	27.67
49	735	12.25	2.5	0.136	0.273	0.122	0.014	0.04	38.43
50	750	12.50	2.6	0.141	0.268	0.127	0.014	0.04	39.97
51	765	12.75	2.8	0.152	0.264	0.137	0.015	0.05	43.05
52	780	13.00	2.9	0.158	0.260	0.142	0.016	0.05	44.58
53	795	13.25	3.4	0.185	0.257	0.166	0.018	0.06	52.27
54	810	13.50	3.4	0.185	0.253	0.166	0.018	0.06	52.27
55	825	13.75	2.3	0.125	0.249	0.113	0.013	0.04	35.36
56	840	14.00	2.3	0.125	0.245	0.113	0.013	0.04	35.36
57	855	14.25	2.7	0.147	0.241	0.132	0.015	0.05	41.51
58	870	14.50	2.6	0.141	0.238	0.127	0.014	0.04	39.97
59	885	14.75	2.6	0.141	0.234	0.127	0.014	0.04	39.97
60	900	15.00	2.5	0.136	0.230	0.122	0.014	0.04	38.43
61	915	15.25	2.4	0.131	0.227	0.118	0.013	0.04	36.90
62	930	15.50	2.3	0.125	0.223	0.113	0.013	0.04	35.36
63	945	15.75	1.9	0.103	0.220	0.093	0.010	0.03	29.21
64	960	16.00	1.9	0.103	0.217	0.093	0.010	0.03	29.21
65	975	16.25	0.4	0.022	0.213	0.020	0.002	0.01	6.15
66	990	16.50	0.4	0.022	0.210	0.020	0.002	0.01	6.15
67	1005	16.75	0.3	0.016	0.207	0.015	0.002	0.01	4.61

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UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2935
LAG TIME - MINUTES	0.49	MINIMUM LOSS RATE (for var. loss) - in/hr	0.147
UNIT TIME-PERCENT OF LAG	3086.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00272
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.016	0.204	0.015	0.002	0.01	4.61
69	1035	17.25	0.5	0.027	0.201	0.024	0.003	0.01	7.69
70	1050	17.50	0.5	0.027	0.198	0.024	0.003	0.01	7.69
71	1065	17.75	0.5	0.027	0.195	0.024	0.003	0.01	7.69
72	1080	18.00	0.4	0.022	0.192	0.020	0.002	0.01	6.15
73	1095	18.25	0.4	0.022	0.189	0.020	0.002	0.01	6.15
74	1110	18.50	0.4	0.022	0.186	0.020	0.002	0.01	6.15
75	1125	18.75	0.3	0.016	0.184	0.015	0.002	0.01	4.61
76	1140	19.00	0.2	0.011	0.181	0.010	0.001	0.00	3.07
77	1155	19.25	0.3	0.016	0.178	0.015	0.002	0.01	4.61
78	1170	19.50	0.4	0.022	0.176	0.020	0.002	0.01	6.15
79	1185	19.75	0.3	0.016	0.174	0.015	0.002	0.01	4.61
80	1200	20.00	0.2	0.011	0.171	0.010	0.001	0.00	3.07
81	1215	20.25	0.3	0.016	0.169	0.015	0.002	0.01	4.61
82	1230	20.50	0.3	0.016	0.167	0.015	0.002	0.01	4.61
83	1245	20.75	0.3	0.016	0.165	0.015	0.002	0.01	4.61
84	1260	21.00	0.2	0.011	0.163	0.010	0.001	0.00	3.07
85	1275	21.25	0.3	0.016	0.161	0.015	0.002	0.01	4.61
86	1290	21.50	0.2	0.011	0.159	0.010	0.001	0.00	3.07
87	1305	21.75	0.3	0.016	0.157	0.015	0.002	0.01	4.61
88	1320	22.00	0.2	0.011	0.155	0.010	0.001	0.00	3.07
89	1335	22.25	0.3	0.016	0.154	0.015	0.002	0.01	4.61
90	1350	22.50	0.2	0.011	0.152	0.010	0.001	0.00	3.07
91	1365	22.75	0.2	0.011	0.151	0.010	0.001	0.00	3.07
92	1380	23.00	0.2	0.011	0.150	0.010	0.001	0.00	3.07
93	1395	23.25	0.2	0.011	0.149	0.010	0.001	0.00	3.07
94	1410	23.50	0.2	0.011	0.148	0.010	0.001	0.00	3.07
95	1425	23.75	0.2	0.011	0.147	0.010	0.001	0.00	3.07
96	1440	24.00	0.2	0.011	0.147	0.010	0.001	0.00	3.07

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.14
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1550.16
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1537.34
PEAK FLOW (cfs)	0.06

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NORTH
JOB # C2026
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

1

JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	11	21	0	21	-	21	0.00
3	15	0.03	9	30	0	30	-	30	0.00
4	20	0.04	12	42	0	42	-	42	0.00
5	25	0.04	12	55	0	55	-	55	0.00
6	30	0.05	15	69	0	69	-	69	0.00
7	35	0.04	12	82	0	82	-	82	0.00
8	40	0.05	15	96	0	96	-	96	0.00
9	45	0.05	15	111	0	111	-	111	0.00
10	50	0.04	12	123	0	123	-	123	0.00
11	55	0.04	13	136	0	136	-	136	0.00
12	60	0.05	15	151	0	151	-	151	0.00
13	65	0.06	18	169	0	169	-	169	0.00
14	70	0.06	18	187	0	187	-	187	0.00
15	75	0.06	18	205	0	205	-	205	0.00
16	80	0.05	16	221	0	221	-	221	0.01
17	85	0.07	21	242	0	242	-	242	0.01
18	90	0.07	22	264	0	264	-	264	0.01
19	95	0.07	20	284	0	284	-	284	0.01
20	100	0.07	22	306	0	306	-	306	0.01
21	105	0.09	27	333	0	333	-	333	0.01
22	110	0.08	25	358	0	358	-	358	0.01
23	115	0.08	24	381	0	381	-	381	0.01
24	120	0.08	24	406	0	406	-	406	0.01
25	125	0.08	25	431	0	431	-	431	0.01
26	130	0.22	66	497	0	497	-	497	0.01
27	135	0.44	131	628	0	628	-	628	0.01
28	140	0.03	9	637	0	637	-	637	0.01
29	145	0.93	278	915	0	915	-	915	0.02
30	150	1.06	319	1,233	0	1,233	-	1,233	0.03
31	155	1.31	392	1,625	0	1,625	-	1,625	0.04
32	160	0.68	204	1,829	0	1,829	-	1,829	0.04
33	165	0.05	16	1,846	0	1,846	-	1,846	0.04
34	170	0.05	15	1,860	0	1,860	-	1,860	0.04
35	175	0.05	15	1,875	0	1,875	-	1,875	0.04
36	180	0.02	5	1,880	0	1,880	-	1,880	0.04

1

JOB # C2026

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	5	5	0	5	-	5	0.00
2	10	0.02	6	12	0	12	-	12	0.00
3	15	0.02	6	18	0	18	-	18	0.00
4	20	0.02	6	25	0	25	-	25	0.00
5	25	0.02	6	31	0	31	-	31	0.00
6	30	0.03	8	39	0	39	-	39	0.00
7	35	0.03	8	46	0	46	-	46	0.00
8	40	0.03	8	54	0	54	-	54	0.00
9	45	0.03	8	61	0	61	-	61	0.00
10	50	0.03	8	69	0	69	-	69	0.00
11	55	0.03	8	76	0	76	-	76	0.00
12	60	0.03	9	85	0	85	-	85	0.00
13	65	0.03	9	94	0	94	-	94	0.00
14	70	0.03	9	102	0	102	-	102	0.00
15	75	0.03	9	111	0	111	-	111	0.00
16	80	0.03	9	120	0	120	-	120	0.00
17	85	0.03	9	128	0	128	-	128	0.00
18	90	0.03	9	137	0	137	-	137	0.00
19	95	0.03	9	145	0	145	-	145	0.00
20	100	0.03	9	154	0	154	-	154	0.00
21	105	0.03	9	163	0	163	-	163	0.00
22	110	0.03	9	171	0	171	-	171	0.00
23	115	0.03	9	180	0	180	-	180	0.00
24	120	0.03	10	190	0	190	-	190	0.00
25	125	0.03	9	198	0	198	-	198	0.00
26	130	0.03	10	208	0	208	-	208	0.00
27	135	0.03	10	218	0	218	-	218	0.00
28	140	0.03	10	227	0	227	-	227	0.01
29	145	0.03	10	237	0	237	-	237	0.01
30	150	0.03	10	247	0	247	-	247	0.01
31	155	0.03	10	256	0	256	-	256	0.01
32	160	0.03	10	266	0	266	-	266	0.01
33	165	0.04	11	277	0	277	-	277	0.01
34	170	0.04	11	288	0	288	-	288	0.01
35	175	0.04	11	298	0	298	-	298	0.01
36	180	0.04	11	309	0	309	-	309	0.01
37	185	0.04	11	320	0	320	-	320	0.01
38	190	0.04	12	332	0	332	-	332	0.01
39	195	0.04	12	344	0	344	-	344	0.01
40	200	0.04	12	355	0	355	-	355	0.01
41	205	0.04	13	368	0	368	-	368	0.01
42	210	0.05	14	382	0	382	-	382	0.01
43	215	0.05	15	398	0	398	-	398	0.01
44	220	0.05	15	413	0	413	-	413	0.01
45	225	0.05	16	429	0	429	-	429	0.01
46	230	0.05	16	445	0	445	-	445	0.01
47	235	0.06	17	462	0	462	-	462	0.01
48	240	0.06	17	479	0	479	-	479	0.01
49	245	0.06	18	498	0	498	-	498	0.01
50	250	0.06	19	517	0	517	-	517	0.01
51	255	0.07	20	538	0	538	-	538	0.01
52	260	0.07	22	559	0	559	-	559	0.01
53	265	0.08	23	582	0	582	-	582	0.01
54	270	0.08	23	604	0	604	-	604	0.01
55	275	0.08	24	628	0	628	-	628	0.01

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JOB # C2026

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	0.08	25	653	0	653	-	653	0.01
57	285	0.09	26	679	0	679	-	679	0.02
58	290	0.09	26	705	0	705	-	705	0.02
59	295	0.09	27	731	0	731	-	731	0.02
60	300	0.01	4	735	0	735	-	735	0.02
61	305	0.19	58	793	0	793	-	793	0.02
62	310	0.37	111	904	0	904	-	904	0.02
63	315	0.48	144	1,048	0	1,048	-	1,048	0.02
64	320	0.59	176	1,224	0	1,224	-	1,224	0.03
65	325	0.77	230	1,454	0	1,454	-	1,454	0.03
66	330	1.09	327	1,780	0	1,780	-	1,780	0.04
67	335	0.07	20	1,801	0	1,801	-	1,801	0.04
68	340	0.03	10	1,811	0	1,811	-	1,811	0.04
69	345	0.02	6	1,817	0	1,817	-	1,817	0.04
70	350	0.02	5	1,822	0	1,822	-	1,822	0.04
71	355	0.01	3	1,826	0	1,826	-	1,826	0.04
72	360	0.01	2	1,828	0	1,828	-	1,828	0.04

1

JOB # C2026

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	3	3	0	3	-	3	0.00
2	30	0.01	5	8	0	8	-	8	0.00
3	45	0.01	5	12	0	12	-	12	0.00
4	60	0.01	6	18	0	18	-	18	0.00
5	75	0.01	5	23	0	23	-	23	0.00
6	90	0.01	5	28	0	28	-	28	0.00
7	105	0.01	5	32	0	32	-	32	0.00
8	120	0.01	6	38	0	38	-	38	0.00
9	135	0.01	6	45	0	45	-	45	0.00
10	150	0.01	6	51	0	51	-	51	0.00
11	165	0.01	8	58	0	58	-	58	0.00
12	180	0.01	8	66	0	66	-	66	0.00
13	195	0.01	8	74	0	74	-	74	0.00
14	210	0.01	8	81	0	81	-	81	0.00
15	225	0.01	8	89	0	89	-	89	0.00
16	240	0.01	9	98	0	98	-	98	0.00
17	255	0.01	9	108	0	108	-	108	0.00
18	270	0.01	11	118	0	118	-	118	0.00
19	285	0.01	11	129	0	129	-	129	0.00
20	300	0.01	12	141	0	141	-	141	0.00
21	315	0.01	9	151	0	151	-	151	0.00
22	330	0.01	11	161	0	161	-	161	0.00
23	345	0.01	12	174	0	174	-	174	0.00
24	360	0.01	12	186	0	186	-	186	0.00
25	375	0.02	14	200	0	200	-	200	0.00
26	390	0.02	14	214	0	214	-	214	0.00
27	405	0.02	15	229	0	229	-	229	0.01
28	420	0.02	15	244	0	244	-	244	0.01
29	435	0.02	15	260	0	260	-	260	0.01
30	450	0.02	17	277	0	277	-	277	0.01
31	465	0.02	18	295	0	295	-	295	0.01
32	480	0.02	20	315	0	315	-	315	0.01
33	495	0.03	23	338	0	338	-	338	0.01
34	510	0.03	23	361	0	361	-	361	0.01
35	525	0.03	25	386	0	386	-	386	0.01
36	540	0.03	26	412	0	412	-	412	0.01
37	555	0.03	29	441	0	441	-	441	0.01
38	570	0.03	31	472	0	472	-	472	0.01
39	585	0.04	32	504	0	504	-	504	0.01
40	600	0.04	34	538	0	538	-	538	0.01
41	615	0.03	23	561	0	561	-	561	0.01
42	630	0.03	23	584	0	584	-	584	0.01
43	645	0.03	31	615	0	615	-	615	0.01
44	660	0.03	31	646	0	646	-	646	0.01
45	675	0.03	29	675	0	675	-	675	0.02
46	690	0.03	29	704	0	704	-	704	0.02
47	705	0.03	26	730	0	730	-	730	0.02
48	720	0.03	28	758	0	758	-	758	0.02
49	735	0.04	38	796	0	796	-	796	0.02
50	750	0.04	40	836	0	836	-	836	0.02
51	765	0.05	43	879	0	879	-	879	0.02
52	780	0.05	45	924	0	924	-	924	0.02
53	795	0.06	52	976	0	976	-	976	0.02
54	810	0.06	52	1,028	0	1,028	-	1,028	0.02
55	825	0.04	35	1,064	0	1,064	-	1,064	0.02
56	840	0.04	35	1,099	0	1,099	-	1,099	0.03
57	855	0.05	42	1,141	0	1,141	-	1,141	0.03
58	870	0.04	40	1,181	0	1,181	-	1,181	0.03

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JOB # C2026

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	0.04	40	1,221	0	1,221	-	1,221	0.03
60	900	0.04	38	1,259	0	1,259	-	1,259	0.03
61	915	0.04	37	1,296	0	1,296	-	1,296	0.03
62	930	0.04	35	1,331	0	1,331	-	1,331	0.03
63	945	0.03	29	1,361	0	1,361	-	1,361	0.03
64	960	0.03	29	1,390	0	1,390	-	1,390	0.03
65	975	0.01	6	1,396	0	1,396	-	1,396	0.03
66	990	0.01	6	1,402	0	1,402	-	1,402	0.03
67	1005	0.01	5	1,407	0	1,407	-	1,407	0.03
68	1020	0.01	5	1,411	0	1,411	-	1,411	0.03
69	1035	0.01	8	1,419	0	1,419	-	1,419	0.03
70	1050	0.01	8	1,427	0	1,427	-	1,427	0.03
71	1065	0.01	8	1,434	0	1,434	-	1,434	0.03
72	1080	0.01	6	1,440	0	1,440	-	1,440	0.03
73	1095	0.01	6	1,447	0	1,447	-	1,447	0.03
74	1110	0.01	6	1,453	0	1,453	-	1,453	0.03
75	1125	0.01	5	1,457	0	1,457	-	1,457	0.03
76	1140	0.00	3	1,460	0	1,460	-	1,460	0.03
77	1155	0.01	5	1,465	0	1,465	-	1,465	0.03
78	1170	0.01	6	1,471	0	1,471	-	1,471	0.03
79	1185	0.01	5	1,476	0	1,476	-	1,476	0.03
80	1200	0.00	3	1,479	0	1,479	-	1,479	0.03
81	1215	0.01	5	1,484	0	1,484	-	1,484	0.03
82	1230	0.01	5	1,488	0	1,488	-	1,488	0.03
83	1245	0.01	5	1,493	0	1,493	-	1,493	0.03
84	1260	0.00	3	1,496	0	1,496	-	1,496	0.03
85	1275	0.01	5	1,500	0	1,500	-	1,500	0.03
86	1290	0.00	3	1,504	0	1,504	-	1,504	0.03
87	1305	0.01	5	1,508	0	1,508	-	1,508	0.03
88	1320	0.00	3	1,511	0	1,511	-	1,511	0.03
89	1335	0.01	5	1,516	0	1,516	-	1,516	0.03
90	1350	0.00	3	1,519	0	1,519	-	1,519	0.03
91	1365	0.00	3	1,522	0	1,522	-	1,522	0.03
92	1380	0.00	3	1,525	0	1,525	-	1,525	0.04
93	1395	0.00	3	1,528	0	1,528	-	1,528	0.04
94	1410	0.00	3	1,531	0	1,531	-	1,531	0.04
95	1425	0.00	3	1,534	0	1,534	-	1,534	0.04
96	1440	0.00	3	1,537	0	1,537	-	1,537	0.04

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM NORTH EXIST 10 YR EVENT		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	1.24		
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			
24	GOLF COURSE			
25	MOUNTAINOUS	1.03		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	436		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	46		
30				
31	ELEVATION OF HEADWATER	356		
32	ELEVATION OF CONCENTRATION POINT	264.5		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	1.5		
40	6-HOUR	1.93		
41	24-HOUR	2.66		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVENT
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	3.140
[4] L-FEET	436
[5] L-MILES	0.083
[6] La-FEET	46.00
[7] La-MILES	0.009
[8] ELEVATION OF HEADWATER	356
[9] ELEVATION OF CONCENTRATION POINT	264.5
[10] H-FEET	91.5
[11] S-FEET/MILE	1108.1
[12] S^0.5	33.29
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.5
[17] 100% OF LAG-MINUTES	0.5
[18] 200% OF LAG-MINUTES	1.0
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
1.50	3.140	1.00	1.50	1.93	3.140	1.00	1.93	2.66	3.140	1.00	2.66
		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]	3.14	SUM [7]	1.50	SUM [9]	3.14	SUM [11]	1.93	SUM [13]	3.14	SUM [15]	2.66
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.50				1.93				2.66

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.68	0.66	0.31
FLOOD VOLUME	(cu-ft)	7,740	7,485	3,590
	(acre-ft)	0.18	0.17	0.08
REQUIRED STORAGE	(cu-ft)	7,676	7,423	3,560
	(acre-ft)	0.18	0.17	0.08
PEAK FLOW	(cfs)	3.71	3.15	0.34
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM NORTH EXIST 10 YR EVENT
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	1.24	0.395	0.0292
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.87	0.277	0.2050
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	1.03	0.328	0.0592
					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 3.14	SUM	0.2935

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.146731688

C= 0.00272

Ft=C(24-(T/60))^1.55 = 0.00272 (24-(T/60))^1.55 + 0.15 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: WORLD MUSEUM NORTH EXIST 10 YR EVENT
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.49
UNIT TIME-PERCENT OF LAG	1029.0
TOTAL ADJUSTED STORM RAIN-INCHES	1.50
CONSTANT LOSS RATE-in/hr	0.29
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.234	0.29	0.21	0.02	0.07	22.04
2	10	0.17	1.3	0.234	0.29	0.21	0.02	0.07	22.04
3	15	0.25	1.1	0.198	0.29	0.18	0.02	0.06	18.65
4	20	0.33	1.5	0.270	0.29	0.24	0.03	0.08	25.43
5	25	0.42	1.5	0.270	0.29	0.24	0.03	0.08	25.43
6	30	0.50	1.8	0.324	0.29	0.29	0.03	0.10	28.77
7	35	0.58	1.5	0.270	0.29	0.24	0.03	0.08	25.43
8	40	0.67	1.8	0.324	0.29	0.29	0.03	0.10	28.77
9	45	0.75	1.8	0.324	0.29	0.29	0.03	0.10	28.77
10	50	0.83	1.5	0.270	0.29	0.24	0.03	0.08	25.43
11	55	0.92	1.6	0.288	0.29	0.26	0.03	0.09	27.13
12	60	1.00	1.8	0.324	0.29	0.29	0.03	0.10	28.77
13	65	1.08	2.2	0.396	0.29	0.36	0.10	0.32	96.59
14	70	1.17	2.2	0.396	0.29	0.36	0.10	0.32	96.59
15	75	1.25	2.2	0.396	0.29	0.36	0.10	0.32	96.59
16	80	1.33	2.0	0.360	0.29	0.32	0.07	0.21	62.68
17	85	1.42	2.6	0.468	0.29	0.42	0.17	0.55	164.41
18	90	1.50	2.7	0.486	0.29	0.44	0.19	0.60	181.37
19	95	1.58	2.4	0.432	0.29	0.39	0.14	0.44	130.50
20	100	1.67	2.7	0.486	0.29	0.44	0.19	0.60	181.37
21	105	1.75	3.3	0.594	0.29	0.53	0.30	0.94	283.11
22	110	1.83	3.1	0.558	0.29	0.50	0.26	0.83	249.19
23	115	1.92	2.9	0.522	0.29	0.47	0.23	0.72	215.28
24	120	2.00	3.0	0.540	0.29	0.49	0.25	0.77	232.24
25	125	2.08	3.1	0.558	0.29	0.50	0.26	0.83	249.19
26	130	2.17	4.2	0.756	0.29	0.68	0.46	1.45	435.71
27	135	2.25	5.0	0.900	0.29	0.81	0.61	1.90	571.36
28	140	2.33	3.5	0.630	0.29	0.57	0.34	1.06	317.02
29	145	2.42	6.8	1.224	0.29	1.10	0.93	2.92	876.57
30	150	2.50	7.3	1.314	0.29	1.18	1.02	3.20	961.35
31	155	2.58	8.2	1.476	0.29	1.33	1.18	3.71	1113.95
32	160	2.67	5.9	1.062	0.29	0.96	0.77	2.41	723.96
33	165	2.75	2.0	0.360	0.29	0.32	0.07	0.21	62.68
34	170	2.83	1.8	0.324	0.29	0.29	0.03	0.10	28.77
35	175	2.92	1.8	0.324	0.29	0.29	0.03	0.10	28.77
36	180	3.00	0.6	0.108	0.29	0.10	0.01	0.03	10.17

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.68
FLOOD VOLUME (acft)	0.18
FLOOD VOLUME (cuft)	7740.06
REQUIRED STORAGE (acft)	0.18
REQUIRED STORAGE (cuft)	7676.06
PEAK FLOW RATE (cfs)	3.71

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

PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVE
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.49
UNIT TIME-PERCENT OF LAG	1029.0
TOTAL ADJUSTED STORM RAIN-INCHES	1.93
CONSTANT LOSS RATE-in/hr	0.293
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.116	0.29	0.10	0.01	0.04	10.91
2	10	0.17	0.6	0.139	0.29	0.13	0.01	0.04	13.09
3	15	0.25	0.6	0.139	0.29	0.13	0.01	0.04	13.09
4	20	0.33	0.6	0.139	0.29	0.13	0.01	0.04	13.09
5	25	0.42	0.6	0.139	0.29	0.13	0.01	0.04	13.09
6	30	0.50	0.7	0.162	0.29	0.15	0.02	0.05	15.27
7	35	0.58	0.7	0.162	0.29	0.15	0.02	0.05	15.27
8	40	0.67	0.7	0.162	0.29	0.15	0.02	0.05	15.27
9	45	0.75	0.7	0.162	0.29	0.15	0.02	0.05	15.27
10	50	0.83	0.7	0.162	0.29	0.15	0.02	0.05	15.27
11	55	0.92	0.7	0.162	0.29	0.15	0.02	0.05	15.27
12	60	1.00	0.8	0.185	0.29	0.17	0.02	0.06	17.45
13	65	1.08	0.8	0.185	0.29	0.17	0.02	0.06	17.45
14	70	1.17	0.8	0.185	0.29	0.17	0.02	0.06	17.45
15	75	1.25	0.8	0.185	0.29	0.17	0.02	0.06	17.45
16	80	1.33	0.8	0.185	0.29	0.17	0.02	0.06	17.45
17	85	1.42	0.8	0.185	0.29	0.17	0.02	0.06	17.45
18	90	1.50	0.8	0.185	0.29	0.17	0.02	0.06	17.45
19	95	1.58	0.8	0.185	0.29	0.17	0.02	0.06	17.45
20	100	1.67	0.8	0.185	0.29	0.17	0.02	0.06	17.45
21	105	1.75	0.8	0.185	0.29	0.17	0.02	0.06	17.45
22	110	1.83	0.8	0.185	0.29	0.17	0.02	0.06	17.45
23	115	1.92	0.8	0.185	0.29	0.17	0.02	0.06	17.45
24	120	2.00	0.9	0.208	0.29	0.19	0.02	0.07	19.64
25	125	2.08	0.8	0.185	0.29	0.17	0.02	0.06	17.45
26	130	2.17	0.9	0.208	0.29	0.19	0.02	0.07	19.64
27	135	2.25	0.9	0.208	0.29	0.19	0.02	0.07	19.64
28	140	2.33	0.9	0.208	0.29	0.19	0.02	0.07	19.64
29	145	2.42	0.9	0.208	0.29	0.19	0.02	0.07	19.64
30	150	2.50	0.9	0.208	0.29	0.19	0.02	0.07	19.64
31	155	2.58	0.9	0.208	0.29	0.19	0.02	0.07	19.64
32	160	2.67	0.9	0.208	0.29	0.19	0.02	0.07	19.64
33	165	2.75	1.0	0.232	0.29	0.21	0.02	0.07	21.82
34	170	2.83	1.0	0.232	0.29	0.21	0.02	0.07	21.82
35	175	2.92	1.0	0.232	0.29	0.21	0.02	0.07	21.82
36	180	3.00	1.0	0.232	0.29	0.21	0.02	0.07	21.82
37	185	3.08	1.0	0.232	0.29	0.21	0.02	0.07	21.82
38	190	3.17	1.1	0.255	0.29	0.23	0.03	0.08	24.00
39	195	3.25	1.1	0.255	0.29	0.23	0.03	0.08	24.00
40	200	3.33	1.1	0.255	0.29	0.23	0.03	0.08	24.00
41	205	3.42	1.2	0.278	0.29	0.25	0.03	0.09	26.18
42	210	3.50	1.3	0.301	0.29	0.27	0.01	0.02	7.17
43	215	3.58	1.4	0.324	0.29	0.29	0.03	0.10	28.99
44	220	3.67	1.4	0.324	0.29	0.29	0.03	0.10	28.99
45	225	3.75	1.5	0.347	0.29	0.31	0.05	0.17	50.81
46	230	3.83	1.5	0.347	0.29	0.31	0.05	0.17	50.81
47	235	3.92	1.6	0.371	0.29	0.33	0.08	0.24	72.63
48	240	4.00	1.6	0.371	0.29	0.33	0.08	0.24	72.63
49	245	4.08	1.7	0.394	0.29	0.35	0.10	0.31	94.44
50	250	4.17	1.8	0.417	0.29	0.38	0.12	0.39	116.26
51	255	4.25	1.9	0.440	0.29	0.40	0.15	0.46	138.08
52	260	4.33	2.0	0.463	0.29	0.42	0.17	0.53	159.89
53	265	4.42	2.1	0.486	0.29	0.44	0.19	0.61	181.71
54	270	4.50	2.1	0.486	0.29	0.44	0.19	0.61	181.71
55	275	4.58	2.2	0.510	0.29	0.46	0.22	0.68	203.53
56	280	4.67	2.3	0.533	0.29	0.48	0.24	0.75	225.34

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVE CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.49		
UNIT TIME-PERCENT OF LAG	1029.0		
TOTAL ADJUSTED STORM RAIN-INCHES	1.93		
CONSTANT LOSS RATE-in/hr	0.293		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time		Pattern	Storm	Loss Rate		Effective	Flood	Required
	Minutes	Hours	Percent	Rain in/hr	in/hr		Rain	Hydrograph Flow	Storage
			(Plate E-5.9)		Max	Low	in/hr	cfs	cf
57	285	4.75	2.4	0.556	0.29	0.50	0.26	0.82	247.16
58	290	4.83	2.4	0.556	0.29	0.50	0.26	0.82	247.16
59	295	4.92	2.5	0.579	0.29	0.52	0.29	0.90	268.98
60	300	5.00	2.6	0.602	0.29	0.54	0.31	0.97	290.79
61	305	5.08	3.1	0.718	0.29	0.65	0.42	1.33	399.88
62	310	5.17	3.6	0.834	0.29	0.75	0.54	1.70	508.96
63	315	5.25	3.9	0.903	0.29	0.81	0.61	1.91	574.41
64	320	5.33	4.2	0.973	0.29	0.88	0.68	2.13	639.86
65	325	5.42	4.7	1.089	0.29	0.98	0.80	2.50	748.94
66	330	5.50	5.6	1.297	0.29	1.17	1.00	3.15	945.29
67	335	5.58	1.9	0.440	0.29	0.40	0.15	0.46	138.08
68	340	5.67	0.9	0.208	0.29	0.19	0.02	0.07	19.64
69	345	5.75	0.6	0.139	0.29	0.13	0.01	0.04	13.09
70	350	5.83	0.5	0.116	0.29	0.10	0.01	0.04	10.91
71	355	5.92	0.3	0.069	0.29	0.06	0.01	0.02	6.55
72	360	6.00	0.2	0.046	0.29	0.04	0.00	0.01	4.36

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.66
FLOOD VOLUME (acft)	0.17
FLOOD VOLUME (cuft)	7485.04
REQUIRED STORAGE (acft)	0.17
REQUIRED STORAGE (cuft)	7423.15
PEAK FLOW RATE (cfs)	3.15

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

PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVENT
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2935
LAG TIME - MINUTES	0.49	MINIMUM LOSS RATE (for var. loss) - in/hr	0.147
UNIT TIME-PERCENT OF LAG	3086.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00272
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.021	0.518	0.019	0.002	0.01	6.01
2	30	0.50	0.3	0.032	0.512	0.029	0.003	0.01	9.02
3	45	0.75	0.3	0.032	0.506	0.029	0.003	0.01	9.02
4	60	1.00	0.4	0.043	0.500	0.038	0.004	0.01	12.03
5	75	1.25	0.3	0.032	0.494	0.029	0.003	0.01	9.02
6	90	1.50	0.3	0.032	0.489	0.029	0.003	0.01	9.02
7	105	1.75	0.3	0.032	0.483	0.029	0.003	0.01	9.02
8	120	2.00	0.4	0.043	0.477	0.038	0.004	0.01	12.03
9	135	2.25	0.4	0.043	0.471	0.038	0.004	0.01	12.03
10	150	2.50	0.4	0.043	0.465	0.038	0.004	0.01	12.03
11	165	2.75	0.5	0.053	0.460	0.048	0.005	0.02	15.03
12	180	3.00	0.5	0.053	0.454	0.048	0.005	0.02	15.03
13	195	3.25	0.5	0.053	0.448	0.048	0.005	0.02	15.03
14	210	3.50	0.5	0.053	0.443	0.048	0.005	0.02	15.03
15	225	3.75	0.5	0.053	0.437	0.048	0.005	0.02	15.03
16	240	4.00	0.6	0.064	0.432	0.057	0.006	0.02	18.04
17	255	4.25	0.6	0.064	0.426	0.057	0.006	0.02	18.04
18	270	4.50	0.7	0.074	0.421	0.067	0.007	0.02	21.05
19	285	4.75	0.7	0.074	0.415	0.067	0.007	0.02	21.05
20	300	5.00	0.8	0.085	0.410	0.077	0.009	0.03	24.05
21	315	5.25	0.6	0.064	0.405	0.057	0.006	0.02	18.04
22	330	5.50	0.7	0.074	0.400	0.067	0.007	0.02	21.05
23	345	5.75	0.8	0.085	0.394	0.077	0.009	0.03	24.05
24	360	6.00	0.8	0.085	0.389	0.077	0.009	0.03	24.05
25	375	6.25	0.9	0.096	0.384	0.086	0.010	0.03	27.06
26	390	6.50	0.9	0.096	0.379	0.086	0.010	0.03	27.06
27	405	6.75	1.0	0.106	0.374	0.096	0.011	0.03	30.07
28	420	7.00	1.0	0.106	0.369	0.096	0.011	0.03	30.07
29	435	7.25	1.0	0.106	0.364	0.096	0.011	0.03	30.07
30	450	7.50	1.1	0.117	0.359	0.105	0.012	0.04	33.08
31	465	7.75	1.2	0.128	0.354	0.115	0.013	0.04	36.08
32	480	8.00	1.3	0.138	0.349	0.124	0.014	0.04	39.09
33	495	8.25	1.5	0.160	0.344	0.144	0.016	0.05	45.10
34	510	8.50	1.5	0.160	0.339	0.144	0.016	0.05	45.10
35	525	8.75	1.6	0.170	0.335	0.153	0.017	0.05	48.11
36	540	9.00	1.7	0.181	0.330	0.163	0.018	0.06	51.12
37	555	9.25	1.9	0.202	0.325	0.182	0.020	0.06	57.13
38	570	9.50	2.0	0.213	0.321	0.192	0.021	0.07	60.14
39	585	9.75	2.1	0.223	0.316	0.201	0.022	0.07	63.14
40	600	10.00	2.2	0.234	0.311	0.211	0.023	0.07	66.15
41	615	10.25	1.5	0.160	0.307	0.144	0.016	0.05	45.10
42	630	10.50	1.5	0.160	0.302	0.144	0.016	0.05	45.10
43	645	10.75	2.0	0.213	0.298	0.192	0.021	0.07	60.14
44	660	11.00	2.0	0.213	0.294	0.192	0.021	0.07	60.14
45	675	11.25	1.9	0.202	0.289	0.182	0.020	0.06	57.13
46	690	11.50	1.9	0.202	0.285	0.182	0.020	0.06	57.13
47	705	11.75	1.7	0.181	0.281	0.163	0.018	0.06	51.12
48	720	12.00	1.8	0.192	0.277	0.172	0.019	0.06	54.12
49	735	12.25	2.5	0.266	0.273	0.239	0.027	0.08	75.17
50	750	12.50	2.6	0.277	0.268	0.249	0.008	0.03	23.04
51	765	12.75	2.8	0.298	0.264	0.268	0.033	0.11	94.58
52	780	13.00	2.9	0.309	0.260	0.278	0.048	0.15	135.91
53	795	13.25	3.4	0.362	0.257	0.326	0.105	0.33	297.38
54	810	13.50	3.4	0.362	0.253	0.326	0.109	0.34	308.37
55	825	13.75	2.3	0.245	0.249	0.220	0.024	0.08	69.16
56	840	14.00	2.3	0.245	0.245	0.220	0.024	0.08	69.16
57	855	14.25	2.7	0.287	0.241	0.259	0.046	0.14	129.99
58	870	14.50	2.6	0.277	0.238	0.249	0.039	0.12	110.33
59	885	14.75	2.6	0.277	0.234	0.249	0.043	0.13	120.60
60	900	15.00	2.5	0.266	0.230	0.239	0.036	0.11	100.64
61	915	15.25	2.4	0.255	0.227	0.230	0.028	0.09	80.54
62	930	15.50	2.3	0.245	0.223	0.220	0.021	0.07	60.28
63	945	15.75	1.9	0.202	0.220	0.182	0.020	0.06	57.13
64	960	16.00	1.9	0.202	0.217	0.182	0.020	0.06	57.13
65	975	16.25	0.4	0.043	0.213	0.038	0.004	0.01	12.03
66	990	16.50	0.4	0.043	0.210	0.038	0.004	0.01	12.03
67	1005	16.75	0.3	0.032	0.207	0.029	0.003	0.01	9.02

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVENT CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2935
LAG TIME - MINUTES	0.49	MINIMUM LOSS RATE (for var. loss) - in/hr	0.147
UNIT TIME-PERCENT OF LAG	3086.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00272
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.032	0.204	0.029	0.003	0.01	9.02
69	1035	17.25	0.5	0.053	0.201	0.048	0.005	0.02	15.03
70	1050	17.50	0.5	0.053	0.198	0.048	0.005	0.02	15.03
71	1065	17.75	0.5	0.053	0.195	0.048	0.005	0.02	15.03
72	1080	18.00	0.4	0.043	0.192	0.038	0.004	0.01	12.03
73	1095	18.25	0.4	0.043	0.189	0.038	0.004	0.01	12.03
74	1110	18.50	0.4	0.043	0.186	0.038	0.004	0.01	12.03
75	1125	18.75	0.3	0.032	0.184	0.029	0.003	0.01	9.02
76	1140	19.00	0.2	0.021	0.181	0.019	0.002	0.01	6.01
77	1155	19.25	0.3	0.032	0.178	0.029	0.003	0.01	9.02
78	1170	19.50	0.4	0.043	0.176	0.038	0.004	0.01	12.03
79	1185	19.75	0.3	0.032	0.174	0.029	0.003	0.01	9.02
80	1200	20.00	0.2	0.021	0.171	0.019	0.002	0.01	6.01
81	1215	20.25	0.3	0.032	0.169	0.029	0.003	0.01	9.02
82	1230	20.50	0.3	0.032	0.167	0.029	0.003	0.01	9.02
83	1245	20.75	0.3	0.032	0.165	0.029	0.003	0.01	9.02
84	1260	21.00	0.2	0.021	0.163	0.019	0.002	0.01	6.01
85	1275	21.25	0.3	0.032	0.161	0.029	0.003	0.01	9.02
86	1290	21.50	0.2	0.021	0.159	0.019	0.002	0.01	6.01
87	1305	21.75	0.3	0.032	0.157	0.029	0.003	0.01	9.02
88	1320	22.00	0.2	0.021	0.155	0.019	0.002	0.01	6.01
89	1335	22.25	0.3	0.032	0.154	0.029	0.003	0.01	9.02
90	1350	22.50	0.2	0.021	0.152	0.019	0.002	0.01	6.01
91	1365	22.75	0.2	0.021	0.151	0.019	0.002	0.01	6.01
92	1380	23.00	0.2	0.021	0.150	0.019	0.002	0.01	6.01
93	1395	23.25	0.2	0.021	0.149	0.019	0.002	0.01	6.01
94	1410	23.50	0.2	0.021	0.148	0.019	0.002	0.01	6.01
95	1425	23.75	0.2	0.021	0.147	0.019	0.002	0.01	6.01
96	1440	24.00	0.2	0.021	0.147	0.019	0.002	0.01	6.01

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.31
FLOOD VOLUME (acft)	0.08
FLOOD VOLUME (cuft)	3590.13
REQUIRED STORAGE (acft)	0.08
REQUIRED STORAGE (cuft)	3560.45
PEAK FLOW (cfs)	0.34

PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVENT
JOB # C2026
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

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JOB # C2026

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	0.07	22	22	0	22	-	22	0.00
2	10	0.07	22	44	0	44	-	44	0.00
3	15	0.06	19	63	0	63	-	63	0.00
4	20	0.08	25	88	0	88	-	88	0.00
5	25	0.08	25	114	0	114	-	114	0.00
6	30	0.10	29	142	0	142	-	142	0.00
7	35	0.08	25	168	0	168	-	168	0.00
8	40	0.10	29	197	0	197	-	197	0.00
9	45	0.10	29	225	0	225	-	225	0.01
10	50	0.08	25	251	0	251	-	251	0.01
11	55	0.09	27	278	0	278	-	278	0.01
12	60	0.10	29	307	0	307	-	307	0.01
13	65	0.32	97	403	0	403	-	403	0.01
14	70	0.32	97	500	0	500	-	500	0.01
15	75	0.32	97	596	0	596	-	596	0.01
16	80	0.21	63	659	0	659	-	659	0.02
17	85	0.55	164	824	0	824	-	824	0.02
18	90	0.60	181	1,005	0	1,005	-	1,005	0.02
19	95	0.44	131	1,135	0	1,135	-	1,135	0.03
20	100	0.60	181	1,317	0	1,317	-	1,317	0.03
21	105	0.94	283	1,600	0	1,600	-	1,600	0.04
22	110	0.83	249	1,849	0	1,849	-	1,849	0.04
23	115	0.72	215	2,064	0	2,064	-	2,064	0.05
24	120	0.77	232	2,297	0	2,297	-	2,297	0.05
25	125	0.83	249	2,546	0	2,546	-	2,546	0.06
26	130	1.45	436	2,981	0	2,981	-	2,981	0.07
27	135	1.90	571	3,553	0	3,553	-	3,553	0.08
28	140	1.06	317	3,870	0	3,870	-	3,870	0.09
29	145	2.92	877	4,746	0	4,746	-	4,746	0.11
30	150	3.20	961	5,708	0	5,708	-	5,708	0.13
31	155	3.71	1,114	6,822	0	6,822	-	6,822	0.16
32	160	2.41	724	7,546	0	7,546	-	7,546	0.17
33	165	0.21	63	7,608	0	7,608	-	7,608	0.17
34	170	0.10	29	7,637	0	7,637	-	7,637	0.18
35	175	0.10	29	7,666	0	7,666	-	7,666	0.18
36	180	0.03	10	7,676	0	7,676	-	7,676	0.18

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JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	13	24	0	24	-	24	0.00
3	15	0.04	13	37	0	37	-	37	0.00
4	20	0.04	13	50	0	50	-	50	0.00
5	25	0.04	13	63	0	63	-	63	0.00
6	30	0.05	15	79	0	79	-	79	0.00
7	35	0.05	15	94	0	94	-	94	0.00
8	40	0.05	15	109	0	109	-	109	0.00
9	45	0.05	15	124	0	124	-	124	0.00
10	50	0.05	15	140	0	140	-	140	0.00
11	55	0.05	15	155	0	155	-	155	0.00
12	60	0.06	17	172	0	172	-	172	0.00
13	65	0.06	17	190	0	190	-	190	0.00
14	70	0.06	17	207	0	207	-	207	0.00
15	75	0.06	17	225	0	225	-	225	0.01
16	80	0.06	17	242	0	242	-	242	0.01
17	85	0.06	17	260	0	260	-	260	0.01
18	90	0.06	17	277	0	277	-	277	0.01
19	95	0.06	17	295	0	295	-	295	0.01
20	100	0.06	17	312	0	312	-	312	0.01
21	105	0.06	17	329	0	329	-	329	0.01
22	110	0.06	17	347	0	347	-	347	0.01
23	115	0.06	17	364	0	364	-	364	0.01
24	120	0.07	20	384	0	384	-	384	0.01
25	125	0.06	17	401	0	401	-	401	0.01
26	130	0.07	20	421	0	421	-	421	0.01
27	135	0.07	20	441	0	441	-	441	0.01
28	140	0.07	20	460	0	460	-	460	0.01
29	145	0.07	20	480	0	480	-	480	0.01
30	150	0.07	20	500	0	500	-	500	0.01
31	155	0.07	20	519	0	519	-	519	0.01
32	160	0.07	20	539	0	539	-	539	0.01
33	165	0.07	22	561	0	561	-	561	0.01
34	170	0.07	22	583	0	583	-	583	0.01
35	175	0.07	22	604	0	604	-	604	0.01
36	180	0.07	22	626	0	626	-	626	0.01
37	185	0.07	22	648	0	648	-	648	0.01
38	190	0.08	24	672	0	672	-	672	0.02
39	195	0.08	24	696	0	696	-	696	0.02
40	200	0.08	24	720	0	720	-	720	0.02
41	205	0.09	26	746	0	746	-	746	0.02
42	210	0.02	7	753	0	753	-	753	0.02
43	215	0.10	29	782	0	782	-	782	0.02
44	220	0.10	29	811	0	811	-	811	0.02
45	225	0.17	51	862	0	862	-	862	0.02
46	230	0.17	51	913	0	913	-	913	0.02
47	235	0.24	73	986	0	986	-	986	0.02
48	240	0.24	73	1,058	0	1,058	-	1,058	0.02
49	245	0.31	94	1,153	0	1,153	-	1,153	0.03
50	250	0.39	116	1,269	0	1,269	-	1,269	0.03
51	255	0.46	138	1,407	0	1,407	-	1,407	0.03
52	260	0.53	160	1,567	0	1,567	-	1,567	0.04
53	265	0.61	182	1,749	0	1,749	-	1,749	0.04
54	270	0.61	182	1,930	0	1,930	-	1,930	0.04
55	275	0.68	204	2,134	0	2,134	-	2,134	0.05

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JOB # C2026

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	0.75	225	2,359	0	2,359	-	2,359	0.05
57	285	0.82	247	2,606	0	2,606	-	2,606	0.06
58	290	0.82	247	2,853	0	2,853	-	2,853	0.07
59	295	0.90	269	3,122	0	3,122	-	3,122	0.07
60	300	0.97	291	3,413	0	3,413	-	3,413	0.08
61	305	1.33	400	3,813	0	3,813	-	3,813	0.09
62	310	1.70	509	4,322	0	4,322	-	4,322	0.10
63	315	1.91	574	4,896	0	4,896	-	4,896	0.11
64	320	2.13	640	5,536	0	5,536	-	5,536	0.13
65	325	2.50	749	6,285	0	6,285	-	6,285	0.14
66	330	3.15	945	7,231	0	7,231	-	7,231	0.17
67	335	0.46	138	7,369	0	7,369	-	7,369	0.17
68	340	0.07	20	7,388	0	7,388	-	7,388	0.17
69	345	0.04	13	7,401	0	7,401	-	7,401	0.17
70	350	0.04	11	7,412	0	7,412	-	7,412	0.17
71	355	0.02	7	7,419	0	7,419	-	7,419	0.17
72	360	0.01	4	7,423	0	7,423	-	7,423	0.17

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JOB # C2026

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	6	6	0	6	-	6	0.00
2	30	0.01	9	15	0	15	-	15	0.00
3	45	0.01	9	24	0	24	-	24	0.00
4	60	0.01	12	36	0	36	-	36	0.00
5	75	0.01	9	45	0	45	-	45	0.00
6	90	0.01	9	54	0	54	-	54	0.00
7	105	0.01	9	63	0	63	-	63	0.00
8	120	0.01	12	75	0	75	-	75	0.00
9	135	0.01	12	87	0	87	-	87	0.00
10	150	0.01	12	99	0	99	-	99	0.00
11	165	0.02	15	114	0	114	-	114	0.00
12	180	0.02	15	129	0	129	-	129	0.00
13	195	0.02	15	144	0	144	-	144	0.00
14	210	0.02	15	159	0	159	-	159	0.00
15	225	0.02	15	174	0	174	-	174	0.00
16	240	0.02	18	192	0	192	-	192	0.00
17	255	0.02	18	210	0	210	-	210	0.00
18	270	0.02	21	232	0	232	-	232	0.01
19	285	0.02	21	253	0	253	-	253	0.01
20	300	0.03	24	277	0	277	-	277	0.01
21	315	0.02	18	295	0	295	-	295	0.01
22	330	0.02	21	316	0	316	-	316	0.01
23	345	0.03	24	340	0	340	-	340	0.01
24	360	0.03	24	364	0	364	-	364	0.01
25	375	0.03	27	391	0	391	-	391	0.01
26	390	0.03	27	418	0	418	-	418	0.01
27	405	0.03	30	448	0	448	-	448	0.01
28	420	0.03	30	478	0	478	-	478	0.01
29	435	0.03	30	508	0	508	-	508	0.01
30	450	0.04	33	541	0	541	-	541	0.01
31	465	0.04	36	577	0	577	-	577	0.01
32	480	0.04	39	616	0	616	-	616	0.01
33	495	0.05	45	662	0	662	-	662	0.02
34	510	0.05	45	707	0	707	-	707	0.02
35	525	0.05	48	755	0	755	-	755	0.02
36	540	0.06	51	806	0	806	-	806	0.02
37	555	0.06	57	863	0	863	-	863	0.02
38	570	0.07	60	923	0	923	-	923	0.02
39	585	0.07	63	986	0	986	-	986	0.02
40	600	0.07	66	1,052	0	1,052	-	1,052	0.02
41	615	0.05	45	1,098	0	1,098	-	1,098	0.03
42	630	0.05	45	1,143	0	1,143	-	1,143	0.03
43	645	0.07	60	1,203	0	1,203	-	1,203	0.03
44	660	0.07	60	1,263	0	1,263	-	1,263	0.03
45	675	0.06	57	1,320	0	1,320	-	1,320	0.03
46	690	0.06	57	1,377	0	1,377	-	1,377	0.03
47	705	0.06	51	1,428	0	1,428	-	1,428	0.03
48	720	0.06	54	1,482	0	1,482	-	1,482	0.03
49	735	0.08	75	1,558	0	1,558	-	1,558	0.04
50	750	0.03	23	1,581	0	1,581	-	1,581	0.04
51	765	0.11	95	1,675	0	1,675	-	1,675	0.04
52	780	0.15	136	1,811	0	1,811	-	1,811	0.04
53	795	0.33	297	2,108	0	2,108	-	2,108	0.05
54	810	0.34	308	2,417	0	2,417	-	2,417	0.06
55	825	0.08	69	2,486	0	2,486	-	2,486	0.06
56	840	0.08	69	2,555	0	2,555	-	2,555	0.06
57	855	0.14	130	2,685	0	2,685	-	2,685	0.06
58	870	0.12	110	2,795	0	2,795	-	2,795	0.06

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JOB # C2026

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	0.13	121	2,916	0	2,916	-	2,916	0.07
60	900	0.11	101	3,017	0	3,017	-	3,017	0.07
61	915	0.09	81	3,097	0	3,097	-	3,097	0.07
62	930	0.07	60	3,158	0	3,158	-	3,158	0.07
63	945	0.06	57	3,215	0	3,215	-	3,215	0.07
64	960	0.06	57	3,272	0	3,272	-	3,272	0.08
65	975	0.01	12	3,284	0	3,284	-	3,284	0.08
66	990	0.01	12	3,296	0	3,296	-	3,296	0.08
67	1005	0.01	9	3,305	0	3,305	-	3,305	0.08
68	1020	0.01	9	3,314	0	3,314	-	3,314	0.08
69	1035	0.02	15	3,329	0	3,329	-	3,329	0.08
70	1050	0.02	15	3,344	0	3,344	-	3,344	0.08
71	1065	0.02	15	3,359	0	3,359	-	3,359	0.08
72	1080	0.01	12	3,371	0	3,371	-	3,371	0.08
73	1095	0.01	12	3,383	0	3,383	-	3,383	0.08
74	1110	0.01	12	3,395	0	3,395	-	3,395	0.08
75	1125	0.01	9	3,404	0	3,404	-	3,404	0.08
76	1140	0.01	6	3,410	0	3,410	-	3,410	0.08
77	1155	0.01	9	3,419	0	3,419	-	3,419	0.08
78	1170	0.01	12	3,431	0	3,431	-	3,431	0.08
79	1185	0.01	9	3,440	0	3,440	-	3,440	0.08
80	1200	0.01	6	3,446	0	3,446	-	3,446	0.08
81	1215	0.01	9	3,455	0	3,455	-	3,455	0.08
82	1230	0.01	9	3,464	0	3,464	-	3,464	0.08
83	1245	0.01	9	3,473	0	3,473	-	3,473	0.08
84	1260	0.01	6	3,479	0	3,479	-	3,479	0.08
85	1275	0.01	9	3,488	0	3,488	-	3,488	0.08
86	1290	0.01	6	3,494	0	3,494	-	3,494	0.08
87	1305	0.01	9	3,503	0	3,503	-	3,503	0.08
88	1320	0.01	6	3,509	0	3,509	-	3,509	0.08
89	1335	0.01	9	3,518	0	3,518	-	3,518	0.08
90	1350	0.01	6	3,524	0	3,524	-	3,524	0.08
91	1365	0.01	6	3,530	0	3,530	-	3,530	0.08
92	1380	0.01	6	3,536	0	3,536	-	3,536	0.08
93	1395	0.01	6	3,542	0	3,542	-	3,542	0.08
94	1410	0.01	6	3,548	0	3,548	-	3,548	0.08
95	1425	0.01	6	3,554	0	3,554	-	3,554	0.08
96	1440	0.01	6	3,560	0	3,560	-	3,560	0.08

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM PROP 2 YR EVENT - NORTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	1.67		
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	0.55		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.92		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	480		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	75		
30				
31	ELEVATION OF HEADWATER	356		
32	ELEVATION OF CONCENTRATION POINT	264.5		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.721		
40	6-HOUR	0.953		
41	24-HOUR	1.36		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD — PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH
BASIC DATA CALCULATION FORM — JOB # C2026
SHORTCUT METHOD — BY ES R. BAZUA, P.E. — DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	3.140
[4] L-FEET	480
[5] L-MILES	0.091
[6] La-FEET	75.00
[7] La-MILES	0.014
[8] ELEVATION OF HEADWATER	356
[9] ELEVATION OF CONCENTRATION POINT	264.5
[10] H-FEET	91.5
[11] S-FEET/MILE	1006.5
[12] S^0.5	31.73
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.6
[17] 100% OF LAG-MINUTES	0.6
[18] 200% OF LAG-MINUTES	1.2
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
0.72	3.140	1.00	0.72	0.95	3.140	1.00	0.95	1.36	3.140	1.00	1.36
		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]	3.14	SUM [7]	0.72	SUM [9]	3.14	SUM [11]	0.95	SUM [13]	3.14	SUM [15]	1.36
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.72				0.95				1.36

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.21	0.21	0.14
FLOOD VOLUME	(cu-ft)	2,417	2,393	1,550
	(acre-ft)	0.06	0.05	0.04
REQUIRED STORAGE	(cu-ft)	2,397	2,373	1,537
	(acre-ft)	0.06	0.05	0.04
PEAK FLOW	(cfs)	1.53	1.31	0.06
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM PROP 2 YR EVENT - NORTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	1.67	0.532	0.0394
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.55	0.175	0.1296
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.92	0.293	0.0529
					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 3.14	SUM	0.2219

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.110929936

C= 0.00205

Ft=C(24-(T/60))^1.55 = 0.00205 (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
100 YEAR - 3 HOUR STORM EVENT

PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.62
UNIT TIME-PERCENT OF LAG	808.9
TOTAL ADJUSTED STORM RAIN-INCHES	0.72
CONSTANT LOSS RATE-in/hr	0.22
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.112	0.22	0.10	0.01	0.04	10.60
2	10	0.17	1.3	0.112	0.22	0.10	0.01	0.04	10.60
3	15	0.25	1.1	0.095	0.22	0.09	0.01	0.03	8.97
4	20	0.33	1.5	0.130	0.22	0.12	0.01	0.04	12.23
5	25	0.42	1.5	0.130	0.22	0.12	0.01	0.04	12.23
6	30	0.50	1.8	0.156	0.22	0.14	0.02	0.05	14.67
7	35	0.58	1.5	0.130	0.22	0.12	0.01	0.04	12.23
8	40	0.67	1.8	0.156	0.22	0.14	0.02	0.05	14.67
9	45	0.75	1.8	0.156	0.22	0.14	0.02	0.05	14.67
10	50	0.83	1.5	0.130	0.22	0.12	0.01	0.04	12.23
11	55	0.92	1.6	0.138	0.22	0.12	0.01	0.04	13.04
12	60	1.00	1.8	0.156	0.22	0.14	0.02	0.05	14.67
13	65	1.08	2.2	0.190	0.22	0.17	0.02	0.06	17.93
14	70	1.17	2.2	0.190	0.22	0.17	0.02	0.06	17.93
15	75	1.25	2.2	0.190	0.22	0.17	0.02	0.06	17.93
16	80	1.33	2.0	0.173	0.22	0.16	0.02	0.05	16.30
17	85	1.42	2.6	0.225	0.22	0.20	0.00	0.01	2.91
18	90	1.50	2.7	0.234	0.22	0.21	0.01	0.04	11.06
19	95	1.58	2.4	0.208	0.22	0.19	0.02	0.07	19.56
20	100	1.67	2.7	0.234	0.22	0.21	0.01	0.04	11.06
21	105	1.75	3.3	0.286	0.22	0.26	0.06	0.20	59.96
22	110	1.83	3.1	0.268	0.22	0.24	0.05	0.15	43.66
23	115	1.92	2.9	0.251	0.22	0.23	0.03	0.09	27.36
24	120	2.00	3.0	0.260	0.22	0.23	0.04	0.12	35.51
25	125	2.08	3.1	0.268	0.22	0.24	0.05	0.15	43.66
26	130	2.17	4.2	0.363	0.22	0.33	0.14	0.44	133.32
27	135	2.25	5.0	0.433	0.22	0.39	0.21	0.66	198.52
28	140	2.33	3.5	0.303	0.22	0.27	0.08	0.25	76.26
29	145	2.42	6.8	0.588	0.22	0.53	0.37	1.15	345.22
30	150	2.50	7.3	0.632	0.22	0.57	0.41	1.29	385.97
31	155	2.58	8.2	0.709	0.22	0.64	0.49	1.53	459.32
32	160	2.67	5.9	0.510	0.22	0.46	0.29	0.91	271.87
33	165	2.75	2.0	0.173	0.22	0.16	0.02	0.05	16.30
34	170	2.83	1.8	0.156	0.22	0.14	0.02	0.05	14.67
35	175	2.92	1.8	0.156	0.22	0.14	0.02	0.05	14.67
36	180	3.00	0.6	0.052	0.22	0.05	0.01	0.02	4.89

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.21
FLOOD VOLUME (acft)	0.06
FLOOD VOLUME (cuft)	2416.63
REQUIRED STORAGE (acft)	0.06
REQUIRED STORAGE (cuft)	2396.65
PEAK FLOW RATE (cfs)	1.53

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

PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NOR
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.62
UNIT TIME-PERCENT OF LAG	808.9
TOTAL ADJUSTED STORM RAIN-INCHES	0.95
CONSTANT LOSS RATE-in/hr	0.222
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.057	0.22	0.05	0.01	0.02	5.39
2	10	0.17	0.6	0.069	0.22	0.06	0.01	0.02	6.46
3	15	0.25	0.6	0.069	0.22	0.06	0.01	0.02	6.46
4	20	0.33	0.6	0.069	0.22	0.06	0.01	0.02	6.46
5	25	0.42	0.6	0.069	0.22	0.06	0.01	0.02	6.46
6	30	0.50	0.7	0.080	0.22	0.07	0.01	0.03	7.54
7	35	0.58	0.7	0.080	0.22	0.07	0.01	0.03	7.54
8	40	0.67	0.7	0.080	0.22	0.07	0.01	0.03	7.54
9	45	0.75	0.7	0.080	0.22	0.07	0.01	0.03	7.54
10	50	0.83	0.7	0.080	0.22	0.07	0.01	0.03	7.54
11	55	0.92	0.7	0.080	0.22	0.07	0.01	0.03	7.54
12	60	1.00	0.8	0.091	0.22	0.08	0.01	0.03	8.62
13	65	1.08	0.8	0.091	0.22	0.08	0.01	0.03	8.62
14	70	1.17	0.8	0.091	0.22	0.08	0.01	0.03	8.62
15	75	1.25	0.8	0.091	0.22	0.08	0.01	0.03	8.62
16	80	1.33	0.8	0.091	0.22	0.08	0.01	0.03	8.62
17	85	1.42	0.8	0.091	0.22	0.08	0.01	0.03	8.62
18	90	1.50	0.8	0.091	0.22	0.08	0.01	0.03	8.62
19	95	1.58	0.8	0.091	0.22	0.08	0.01	0.03	8.62
20	100	1.67	0.8	0.091	0.22	0.08	0.01	0.03	8.62
21	105	1.75	0.8	0.091	0.22	0.08	0.01	0.03	8.62
22	110	1.83	0.8	0.091	0.22	0.08	0.01	0.03	8.62
23	115	1.92	0.8	0.091	0.22	0.08	0.01	0.03	8.62
24	120	2.00	0.9	0.103	0.22	0.09	0.01	0.03	9.70
25	125	2.08	0.8	0.091	0.22	0.08	0.01	0.03	8.62
26	130	2.17	0.9	0.103	0.22	0.09	0.01	0.03	9.70
27	135	2.25	0.9	0.103	0.22	0.09	0.01	0.03	9.70
28	140	2.33	0.9	0.103	0.22	0.09	0.01	0.03	9.70
29	145	2.42	0.9	0.103	0.22	0.09	0.01	0.03	9.70
30	150	2.50	0.9	0.103	0.22	0.09	0.01	0.03	9.70
31	155	2.58	0.9	0.103	0.22	0.09	0.01	0.03	9.70
32	160	2.67	0.9	0.103	0.22	0.09	0.01	0.03	9.70
33	165	2.75	1.0	0.114	0.22	0.10	0.01	0.04	10.77
34	170	2.83	1.0	0.114	0.22	0.10	0.01	0.04	10.77
35	175	2.92	1.0	0.114	0.22	0.10	0.01	0.04	10.77
36	180	3.00	1.0	0.114	0.22	0.10	0.01	0.04	10.77
37	185	3.08	1.0	0.114	0.22	0.10	0.01	0.04	10.77
38	190	3.17	1.1	0.126	0.22	0.11	0.01	0.04	11.85
39	195	3.25	1.1	0.126	0.22	0.11	0.01	0.04	11.85
40	200	3.33	1.1	0.126	0.22	0.11	0.01	0.04	11.85
41	205	3.42	1.2	0.137	0.22	0.12	0.01	0.04	12.93
42	210	3.50	1.3	0.149	0.22	0.13	0.01	0.05	14.00
43	215	3.58	1.4	0.160	0.22	0.14	0.02	0.05	15.08
44	220	3.67	1.4	0.160	0.22	0.14	0.02	0.05	15.08
45	225	3.75	1.5	0.172	0.22	0.15	0.02	0.05	16.16
46	230	3.83	1.5	0.172	0.22	0.15	0.02	0.05	16.16
47	235	3.92	1.6	0.183	0.22	0.16	0.02	0.06	17.24
48	240	4.00	1.6	0.183	0.22	0.16	0.02	0.06	17.24
49	245	4.08	1.7	0.194	0.22	0.17	0.02	0.06	18.31
50	250	4.17	1.8	0.206	0.22	0.19	0.02	0.06	19.39
51	255	4.25	1.9	0.217	0.22	0.20	0.02	0.07	20.47
52	260	4.33	2.0	0.229	0.22	0.21	0.01	0.02	6.46
53	265	4.42	2.1	0.240	0.22	0.22	0.02	0.06	17.23
54	270	4.50	2.1	0.240	0.22	0.22	0.02	0.06	17.23
55	275	4.58	2.2	0.252	0.22	0.23	0.03	0.09	28.01
56	280	4.67	2.3	0.263	0.22	0.24	0.04	0.13	38.78

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NOR CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.62		
UNIT TIME-PERCENT OF LAG	808.9		
TOTAL ADJUSTED STORM RAIN-INCHES	0.95		
CONSTANT LOSS RATE-in/hr	0.222		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time		Pattern	Storm	Loss Rate		Effective	Flood	Required
	Minutes	Hours	Percent	Rain in/hr	in/hr		Rain	Hydrograph Flow	Storage
			(Plate E-5.9)		Max	Low	in/hr	cfs	cf
57	285	4.75	2.4	0.274	0.22	0.25	0.05	0.17	49.55
58	290	4.83	2.4	0.274	0.22	0.25	0.05	0.17	49.55
59	295	4.92	2.5	0.286	0.22	0.26	0.06	0.20	60.33
60	300	5.00	2.6	0.297	0.22	0.27	0.08	0.24	71.10
61	305	5.08	3.1	0.355	0.22	0.32	0.13	0.42	124.96
62	310	5.17	3.6	0.412	0.22	0.37	0.19	0.60	178.83
63	315	5.25	3.9	0.446	0.22	0.40	0.22	0.70	211.14
64	320	5.33	4.2	0.480	0.22	0.43	0.26	0.81	243.46
65	325	5.42	4.7	0.537	0.22	0.48	0.32	0.99	297.33
66	330	5.50	5.6	0.640	0.22	0.58	0.42	1.31	394.28
67	335	5.58	1.9	0.217	0.22	0.20	0.02	0.07	20.47
68	340	5.67	0.9	0.103	0.22	0.09	0.01	0.03	9.70
69	345	5.75	0.6	0.069	0.22	0.06	0.01	0.02	6.46
70	350	5.83	0.5	0.057	0.22	0.05	0.01	0.02	5.39
71	355	5.92	0.3	0.034	0.22	0.03	0.00	0.01	3.23
72	360	6.00	0.2	0.023	0.22	0.02	0.00	0.01	2.15

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.21
FLOOD VOLUME (acft)	0.05
FLOOD VOLUME (cuft)	2392.99
REQUIRED STORAGE (acft)	0.05
REQUIRED STORAGE (cuft)	2373.21
PEAK FLOW RATE (cfs)	1.31

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

PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2219
LAG TIME - MINUTES	0.62	MINIMUM LOSS RATE (for var. loss) - in/hr	0.111
UNIT TIME-PERCENT OF LAG	2426.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00205
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.011	0.392	0.010	0.001	0.00	3.07
2	30	0.50	0.3	0.016	0.387	0.015	0.002	0.01	4.61
3	45	0.75	0.3	0.016	0.383	0.015	0.002	0.01	4.61
4	60	1.00	0.4	0.022	0.378	0.020	0.002	0.01	6.15
5	75	1.25	0.3	0.016	0.374	0.015	0.002	0.01	4.61
6	90	1.50	0.3	0.016	0.369	0.015	0.002	0.01	4.61
7	105	1.75	0.3	0.016	0.365	0.015	0.002	0.01	4.61
8	120	2.00	0.4	0.022	0.361	0.020	0.002	0.01	6.15
9	135	2.25	0.4	0.022	0.356	0.020	0.002	0.01	6.15
10	150	2.50	0.4	0.022	0.352	0.020	0.002	0.01	6.15
11	165	2.75	0.5	0.027	0.348	0.024	0.003	0.01	7.69
12	180	3.00	0.5	0.027	0.343	0.024	0.003	0.01	7.69
13	195	3.25	0.5	0.027	0.339	0.024	0.003	0.01	7.69
14	210	3.50	0.5	0.027	0.335	0.024	0.003	0.01	7.69
15	225	3.75	0.5	0.027	0.331	0.024	0.003	0.01	7.69
16	240	4.00	0.6	0.033	0.326	0.029	0.003	0.01	9.22
17	255	4.25	0.6	0.033	0.322	0.029	0.003	0.01	9.22
18	270	4.50	0.7	0.038	0.318	0.034	0.004	0.01	10.76
19	285	4.75	0.7	0.038	0.314	0.034	0.004	0.01	10.76
20	300	5.00	0.8	0.044	0.310	0.039	0.004	0.01	12.30
21	315	5.25	0.6	0.033	0.306	0.029	0.003	0.01	9.22
22	330	5.50	0.7	0.038	0.302	0.034	0.004	0.01	10.76
23	345	5.75	0.8	0.044	0.298	0.039	0.004	0.01	12.30
24	360	6.00	0.8	0.044	0.294	0.039	0.004	0.01	12.30
25	375	6.25	0.9	0.049	0.290	0.044	0.005	0.02	13.84
26	390	6.50	0.9	0.049	0.286	0.044	0.005	0.02	13.84
27	405	6.75	1.0	0.054	0.283	0.049	0.005	0.02	15.37
28	420	7.00	1.0	0.054	0.279	0.049	0.005	0.02	15.37
29	435	7.25	1.0	0.054	0.275	0.049	0.005	0.02	15.37
30	450	7.50	1.1	0.060	0.271	0.054	0.006	0.02	16.91
31	465	7.75	1.2	0.065	0.267	0.059	0.007	0.02	18.45
32	480	8.00	1.3	0.071	0.264	0.064	0.007	0.02	19.99
33	495	8.25	1.5	0.082	0.260	0.073	0.008	0.03	23.06
34	510	8.50	1.5	0.082	0.257	0.073	0.008	0.03	23.06
35	525	8.75	1.6	0.087	0.253	0.078	0.009	0.03	24.60
36	540	9.00	1.7	0.092	0.249	0.083	0.009	0.03	26.13
37	555	9.25	1.9	0.103	0.246	0.093	0.010	0.03	29.21
38	570	9.50	2.0	0.109	0.242	0.098	0.011	0.03	30.75
39	585	9.75	2.1	0.114	0.239	0.103	0.011	0.04	32.28
40	600	10.00	2.2	0.120	0.235	0.108	0.012	0.04	33.82
41	615	10.25	1.5	0.082	0.232	0.073	0.008	0.03	23.06
42	630	10.50	1.5	0.082	0.229	0.073	0.008	0.03	23.06
43	645	10.75	2.0	0.109	0.225	0.098	0.011	0.03	30.75
44	660	11.00	2.0	0.109	0.222	0.098	0.011	0.03	30.75
45	675	11.25	1.9	0.103	0.219	0.093	0.010	0.03	29.21
46	690	11.50	1.9	0.103	0.216	0.093	0.010	0.03	29.21
47	705	11.75	1.7	0.092	0.212	0.083	0.009	0.03	26.13
48	720	12.00	1.8	0.098	0.209	0.088	0.010	0.03	27.67
49	735	12.25	2.5	0.136	0.206	0.122	0.014	0.04	38.43
50	750	12.50	2.6	0.141	0.203	0.127	0.014	0.04	39.97
51	765	12.75	2.8	0.152	0.200	0.137	0.015	0.05	43.05
52	780	13.00	2.9	0.158	0.197	0.142	0.016	0.05	44.58
53	795	13.25	3.4	0.185	0.194	0.166	0.018	0.06	52.27
54	810	13.50	3.4	0.185	0.191	0.166	0.018	0.06	52.27
55	825	13.75	2.3	0.125	0.188	0.113	0.013	0.04	35.36
56	840	14.00	2.3	0.125	0.185	0.113	0.013	0.04	35.36
57	855	14.25	2.7	0.147	0.182	0.132	0.015	0.05	41.51
58	870	14.50	2.6	0.141	0.180	0.127	0.014	0.04	39.97
59	885	14.75	2.6	0.141	0.177	0.127	0.014	0.04	39.97
60	900	15.00	2.5	0.136	0.174	0.122	0.014	0.04	38.43
61	915	15.25	2.4	0.131	0.172	0.118	0.013	0.04	36.90
62	930	15.50	2.3	0.125	0.169	0.113	0.013	0.04	35.36
63	945	15.75	1.9	0.103	0.166	0.093	0.010	0.03	29.21
64	960	16.00	1.9	0.103	0.164	0.093	0.010	0.03	29.21
65	975	16.25	0.4	0.022	0.161	0.020	0.002	0.01	6.15
66	990	16.50	0.4	0.022	0.159	0.020	0.002	0.01	6.15
67	1005	16.75	0.3	0.016	0.156	0.015	0.002	0.01	4.61

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2219
LAG TIME - MINUTES	0.62	MINIMUM LOSS RATE (for var. loss) - in/hr	0.111
UNIT TIME-PERCENT OF LAG	2426.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00205
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.016	0.154	0.015	0.002	0.01	4.61
69	1035	17.25	0.5	0.027	0.152	0.024	0.003	0.01	7.69
70	1050	17.50	0.5	0.027	0.149	0.024	0.003	0.01	7.69
71	1065	17.75	0.5	0.027	0.147	0.024	0.003	0.01	7.69
72	1080	18.00	0.4	0.022	0.145	0.020	0.002	0.01	6.15
73	1095	18.25	0.4	0.022	0.143	0.020	0.002	0.01	6.15
74	1110	18.50	0.4	0.022	0.141	0.020	0.002	0.01	6.15
75	1125	18.75	0.3	0.016	0.139	0.015	0.002	0.01	4.61
76	1140	19.00	0.2	0.011	0.137	0.010	0.001	0.00	3.07
77	1155	19.25	0.3	0.016	0.135	0.015	0.002	0.01	4.61
78	1170	19.50	0.4	0.022	0.133	0.020	0.002	0.01	6.15
79	1185	19.75	0.3	0.016	0.131	0.015	0.002	0.01	4.61
80	1200	20.00	0.2	0.011	0.129	0.010	0.001	0.00	3.07
81	1215	20.25	0.3	0.016	0.128	0.015	0.002	0.01	4.61
82	1230	20.50	0.3	0.016	0.126	0.015	0.002	0.01	4.61
83	1245	20.75	0.3	0.016	0.124	0.015	0.002	0.01	4.61
84	1260	21.00	0.2	0.011	0.123	0.010	0.001	0.00	3.07
85	1275	21.25	0.3	0.016	0.121	0.015	0.002	0.01	4.61
86	1290	21.50	0.2	0.011	0.120	0.010	0.001	0.00	3.07
87	1305	21.75	0.3	0.016	0.119	0.015	0.002	0.01	4.61
88	1320	22.00	0.2	0.011	0.118	0.010	0.001	0.00	3.07
89	1335	22.25	0.3	0.016	0.116	0.015	0.002	0.01	4.61
90	1350	22.50	0.2	0.011	0.115	0.010	0.001	0.00	3.07
91	1365	22.75	0.2	0.011	0.114	0.010	0.001	0.00	3.07
92	1380	23.00	0.2	0.011	0.113	0.010	0.001	0.00	3.07
93	1395	23.25	0.2	0.011	0.113	0.010	0.001	0.00	3.07
94	1410	23.50	0.2	0.011	0.112	0.010	0.001	0.00	3.07
95	1425	23.75	0.2	0.011	0.111	0.010	0.001	0.00	3.07
96	1440	24.00	0.2	0.011	0.111	0.010	0.001	0.00	3.07

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.14
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1550.16
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1537.34
PEAK FLOW (cfs)	0.06

PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH
JOB # C2026
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

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JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	11	21	0	21	-	21	0.00
3	15	0.03	9	30	0	30	-	30	0.00
4	20	0.04	12	42	0	42	-	42	0.00
5	25	0.04	12	55	0	55	-	55	0.00
6	30	0.05	15	69	0	69	-	69	0.00
7	35	0.04	12	82	0	82	-	82	0.00
8	40	0.05	15	96	0	96	-	96	0.00
9	45	0.05	15	111	0	111	-	111	0.00
10	50	0.04	12	123	0	123	-	123	0.00
11	55	0.04	13	136	0	136	-	136	0.00
12	60	0.05	15	151	0	151	-	151	0.00
13	65	0.06	18	169	0	169	-	169	0.00
14	70	0.06	18	187	0	187	-	187	0.00
15	75	0.06	18	205	0	205	-	205	0.00
16	80	0.05	16	221	0	221	-	221	0.01
17	85	0.01	3	224	0	224	-	224	0.01
18	90	0.04	11	235	0	235	-	235	0.01
19	95	0.07	20	254	0	254	-	254	0.01
20	100	0.04	11	265	0	265	-	265	0.01
21	105	0.20	60	325	0	325	-	325	0.01
22	110	0.15	44	369	0	369	-	369	0.01
23	115	0.09	27	396	0	396	-	396	0.01
24	120	0.12	36	432	0	432	-	432	0.01
25	125	0.15	44	476	0	476	-	476	0.01
26	130	0.44	133	609	0	609	-	609	0.01
27	135	0.66	199	807	0	807	-	807	0.02
28	140	0.25	76	884	0	884	-	884	0.02
29	145	1.15	345	1,229	0	1,229	-	1,229	0.03
30	150	1.29	386	1,615	0	1,615	-	1,615	0.04
31	155	1.53	459	2,074	0	2,074	-	2,074	0.05
32	160	0.91	272	2,346	0	2,346	-	2,346	0.05
33	165	0.05	16	2,362	0	2,362	-	2,362	0.05
34	170	0.05	15	2,377	0	2,377	-	2,377	0.05
35	175	0.05	15	2,392	0	2,392	-	2,392	0.05
36	180	0.02	5	2,397	0	2,397	-	2,397	0.06

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JOB # C2026

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	5	5	0	5	-	5	0.00
2	10	0.02	6	12	0	12	-	12	0.00
3	15	0.02	6	18	0	18	-	18	0.00
4	20	0.02	6	25	0	25	-	25	0.00
5	25	0.02	6	31	0	31	-	31	0.00
6	30	0.03	8	39	0	39	-	39	0.00
7	35	0.03	8	46	0	46	-	46	0.00
8	40	0.03	8	54	0	54	-	54	0.00
9	45	0.03	8	61	0	61	-	61	0.00
10	50	0.03	8	69	0	69	-	69	0.00
11	55	0.03	8	76	0	76	-	76	0.00
12	60	0.03	9	85	0	85	-	85	0.00
13	65	0.03	9	94	0	94	-	94	0.00
14	70	0.03	9	102	0	102	-	102	0.00
15	75	0.03	9	111	0	111	-	111	0.00
16	80	0.03	9	120	0	120	-	120	0.00
17	85	0.03	9	128	0	128	-	128	0.00
18	90	0.03	9	137	0	137	-	137	0.00
19	95	0.03	9	145	0	145	-	145	0.00
20	100	0.03	9	154	0	154	-	154	0.00
21	105	0.03	9	163	0	163	-	163	0.00
22	110	0.03	9	171	0	171	-	171	0.00
23	115	0.03	9	180	0	180	-	180	0.00
24	120	0.03	10	190	0	190	-	190	0.00
25	125	0.03	9	198	0	198	-	198	0.00
26	130	0.03	10	208	0	208	-	208	0.00
27	135	0.03	10	218	0	218	-	218	0.00
28	140	0.03	10	227	0	227	-	227	0.01
29	145	0.03	10	237	0	237	-	237	0.01
30	150	0.03	10	247	0	247	-	247	0.01
31	155	0.03	10	256	0	256	-	256	0.01
32	160	0.03	10	266	0	266	-	266	0.01
33	165	0.04	11	277	0	277	-	277	0.01
34	170	0.04	11	288	0	288	-	288	0.01
35	175	0.04	11	298	0	298	-	298	0.01
36	180	0.04	11	309	0	309	-	309	0.01
37	185	0.04	11	320	0	320	-	320	0.01
38	190	0.04	12	332	0	332	-	332	0.01
39	195	0.04	12	344	0	344	-	344	0.01
40	200	0.04	12	355	0	355	-	355	0.01
41	205	0.04	13	368	0	368	-	368	0.01
42	210	0.05	14	382	0	382	-	382	0.01
43	215	0.05	15	398	0	398	-	398	0.01
44	220	0.05	15	413	0	413	-	413	0.01
45	225	0.05	16	429	0	429	-	429	0.01
46	230	0.05	16	445	0	445	-	445	0.01
47	235	0.06	17	462	0	462	-	462	0.01
48	240	0.06	17	479	0	479	-	479	0.01
49	245	0.06	18	498	0	498	-	498	0.01
50	250	0.06	19	517	0	517	-	517	0.01
51	255	0.07	20	538	0	538	-	538	0.01
52	260	0.02	6	544	0	544	-	544	0.01
53	265	0.06	17	561	0	561	-	561	0.01
54	270	0.06	17	578	0	578	-	578	0.01
55	275	0.09	28	606	0	606	-	606	0.01

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JOB # C2026

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	0.13	39	645	0	645	-	645	0.01
57	285	0.17	50	695	0	695	-	695	0.02
58	290	0.17	50	744	0	744	-	744	0.02
59	295	0.20	60	805	0	805	-	805	0.02
60	300	0.24	71	876	0	876	-	876	0.02
61	305	0.42	125	1,001	0	1,001	-	1,001	0.02
62	310	0.60	179	1,180	0	1,180	-	1,180	0.03
63	315	0.70	211	1,391	0	1,391	-	1,391	0.03
64	320	0.81	243	1,634	0	1,634	-	1,634	0.04
65	325	0.99	297	1,932	0	1,932	-	1,932	0.04
66	330	1.31	394	2,326	0	2,326	-	2,326	0.05
67	335	0.07	20	2,346	0	2,346	-	2,346	0.05
68	340	0.03	10	2,356	0	2,356	-	2,356	0.05
69	345	0.02	6	2,362	0	2,362	-	2,362	0.05
70	350	0.02	5	2,368	0	2,368	-	2,368	0.05
71	355	0.01	3	2,371	0	2,371	-	2,371	0.05
72	360	0.01	2	2,373	0	2,373	-	2,373	0.05

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JOB # C2026

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	3	3	0	3	-	3	0.00
2	30	0.01	5	8	0	8	-	8	0.00
3	45	0.01	5	12	0	12	-	12	0.00
4	60	0.01	6	18	0	18	-	18	0.00
5	75	0.01	5	23	0	23	-	23	0.00
6	90	0.01	5	28	0	28	-	28	0.00
7	105	0.01	5	32	0	32	-	32	0.00
8	120	0.01	6	38	0	38	-	38	0.00
9	135	0.01	6	45	0	45	-	45	0.00
10	150	0.01	6	51	0	51	-	51	0.00
11	165	0.01	8	58	0	58	-	58	0.00
12	180	0.01	8	66	0	66	-	66	0.00
13	195	0.01	8	74	0	74	-	74	0.00
14	210	0.01	8	81	0	81	-	81	0.00
15	225	0.01	8	89	0	89	-	89	0.00
16	240	0.01	9	98	0	98	-	98	0.00
17	255	0.01	9	108	0	108	-	108	0.00
18	270	0.01	11	118	0	118	-	118	0.00
19	285	0.01	11	129	0	129	-	129	0.00
20	300	0.01	12	141	0	141	-	141	0.00
21	315	0.01	9	151	0	151	-	151	0.00
22	330	0.01	11	161	0	161	-	161	0.00
23	345	0.01	12	174	0	174	-	174	0.00
24	360	0.01	12	186	0	186	-	186	0.00
25	375	0.02	14	200	0	200	-	200	0.00
26	390	0.02	14	214	0	214	-	214	0.00
27	405	0.02	15	229	0	229	-	229	0.01
28	420	0.02	15	244	0	244	-	244	0.01
29	435	0.02	15	260	0	260	-	260	0.01
30	450	0.02	17	277	0	277	-	277	0.01
31	465	0.02	18	295	0	295	-	295	0.01
32	480	0.02	20	315	0	315	-	315	0.01
33	495	0.03	23	338	0	338	-	338	0.01
34	510	0.03	23	361	0	361	-	361	0.01
35	525	0.03	25	386	0	386	-	386	0.01
36	540	0.03	26	412	0	412	-	412	0.01
37	555	0.03	29	441	0	441	-	441	0.01
38	570	0.03	31	472	0	472	-	472	0.01
39	585	0.04	32	504	0	504	-	504	0.01
40	600	0.04	34	538	0	538	-	538	0.01
41	615	0.03	23	561	0	561	-	561	0.01
42	630	0.03	23	584	0	584	-	584	0.01
43	645	0.03	31	615	0	615	-	615	0.01
44	660	0.03	31	646	0	646	-	646	0.01
45	675	0.03	29	675	0	675	-	675	0.02
46	690	0.03	29	704	0	704	-	704	0.02
47	705	0.03	26	730	0	730	-	730	0.02
48	720	0.03	28	758	0	758	-	758	0.02
49	735	0.04	38	796	0	796	-	796	0.02
50	750	0.04	40	836	0	836	-	836	0.02
51	765	0.05	43	879	0	879	-	879	0.02
52	780	0.05	45	924	0	924	-	924	0.02
53	795	0.06	52	976	0	976	-	976	0.02
54	810	0.06	52	1,028	0	1,028	-	1,028	0.02
55	825	0.04	35	1,064	0	1,064	-	1,064	0.02
56	840	0.04	35	1,099	0	1,099	-	1,099	0.03
57	855	0.05	42	1,141	0	1,141	-	1,141	0.03
58	870	0.04	40	1,181	0	1,181	-	1,181	0.03

1

JOB # C2026

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	0.04	40	1,221	0	1,221	-	1,221	0.03
60	900	0.04	38	1,259	0	1,259	-	1,259	0.03
61	915	0.04	37	1,296	0	1,296	-	1,296	0.03
62	930	0.04	35	1,331	0	1,331	-	1,331	0.03
63	945	0.03	29	1,361	0	1,361	-	1,361	0.03
64	960	0.03	29	1,390	0	1,390	-	1,390	0.03
65	975	0.01	6	1,396	0	1,396	-	1,396	0.03
66	990	0.01	6	1,402	0	1,402	-	1,402	0.03
67	1005	0.01	5	1,407	0	1,407	-	1,407	0.03
68	1020	0.01	5	1,411	0	1,411	-	1,411	0.03
69	1035	0.01	8	1,419	0	1,419	-	1,419	0.03
70	1050	0.01	8	1,427	0	1,427	-	1,427	0.03
71	1065	0.01	8	1,434	0	1,434	-	1,434	0.03
72	1080	0.01	6	1,440	0	1,440	-	1,440	0.03
73	1095	0.01	6	1,447	0	1,447	-	1,447	0.03
74	1110	0.01	6	1,453	0	1,453	-	1,453	0.03
75	1125	0.01	5	1,457	0	1,457	-	1,457	0.03
76	1140	0.00	3	1,460	0	1,460	-	1,460	0.03
77	1155	0.01	5	1,465	0	1,465	-	1,465	0.03
78	1170	0.01	6	1,471	0	1,471	-	1,471	0.03
79	1185	0.01	5	1,476	0	1,476	-	1,476	0.03
80	1200	0.00	3	1,479	0	1,479	-	1,479	0.03
81	1215	0.01	5	1,484	0	1,484	-	1,484	0.03
82	1230	0.01	5	1,488	0	1,488	-	1,488	0.03
83	1245	0.01	5	1,493	0	1,493	-	1,493	0.03
84	1260	0.00	3	1,496	0	1,496	-	1,496	0.03
85	1275	0.01	5	1,500	0	1,500	-	1,500	0.03
86	1290	0.00	3	1,504	0	1,504	-	1,504	0.03
87	1305	0.01	5	1,508	0	1,508	-	1,508	0.03
88	1320	0.00	3	1,511	0	1,511	-	1,511	0.03
89	1335	0.01	5	1,516	0	1,516	-	1,516	0.03
90	1350	0.00	3	1,519	0	1,519	-	1,519	0.03
91	1365	0.00	3	1,522	0	1,522	-	1,522	0.03
92	1380	0.00	3	1,525	0	1,525	-	1,525	0.04
93	1395	0.00	3	1,528	0	1,528	-	1,528	0.04
94	1410	0.00	3	1,531	0	1,531	-	1,531	0.04
95	1425	0.00	3	1,534	0	1,534	-	1,534	0.04
96	1440	0.00	3	1,537	0	1,537	-	1,537	0.04

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM PROP 10 YR EVENT - NORTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	1.67		
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	0.55		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.92		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	480		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	75		
30				
31	ELEVATION OF HEADWATER	356		
32	ELEVATION OF CONCENTRATION POINT	264.5		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	1.5		
40	6-HOUR	1.93		
41	24-HOUR	2.66		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	3.140
[4] L-FEET	480
[5] L-MILES	0.091
[6] La-FEET	75.00
[7] La-MILES	0.014
[8] ELEVATION OF HEADWATER	356
[9] ELEVATION OF CONCENTRATION POINT	264.5
[10] H-FEET	91.5
[11] S-FEET/MILE	1006.5
[12] S^0.5	31.73
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.6
[17] 100% OF LAG-MINUTES	0.6
[18] 200% OF LAG-MINUTES	1.2
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
1.50	3.140	1.00	1.50	1.93	3.140	1.00	1.93	2.66	3.140	1.00	2.66
		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]	3.14	SUM [7]	1.50	SUM [9]	3.14	SUM [11]	1.93	SUM [13]	3.14	SUM [15]	2.66
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.50				1.93				2.66

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.85	0.81	0.51
FLOOD VOLUME	(cu-ft)	9,671	9,238	5,847
	(acre-ft)	0.22	0.21	0.13
REQUIRED STORAGE	(cu-ft)	9,591	9,161	5,799
	(acre-ft)	0.22	0.21	0.13
PEAK FLOW	(cfs)	3.94	3.38	0.54
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM PROP 10 YR EVENT - NORTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	1.67	0.532	0.0394
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.55	0.175	0.1296
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.92	0.293	0.0529
					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	3.14	SUM	0.2219

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.110929936

C= 0.00205

Ft=C(24-(T/60))^1.55 = 0.00205 (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
100 YEAR - 3 HOUR STORM EVENT

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.62
UNIT TIME-PERCENT OF LAG	808.9
TOTAL ADJUSTED STORM RAIN-INCHES	1.50
CONSTANT LOSS RATE-in/hr	0.22
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.234	0.22	0.21	0.01	0.04	11.44
2	10	0.17	1.3	0.234	0.22	0.21	0.01	0.04	11.44
3	15	0.25	1.1	0.198	0.22	0.18	0.02	0.06	18.65
4	20	0.33	1.5	0.270	0.22	0.24	0.05	0.15	45.35
5	25	0.42	1.5	0.270	0.22	0.24	0.05	0.15	45.35
6	30	0.50	1.8	0.324	0.22	0.29	0.10	0.32	96.22
7	35	0.58	1.5	0.270	0.22	0.24	0.05	0.15	45.35
8	40	0.67	1.8	0.324	0.22	0.29	0.10	0.32	96.22
9	45	0.75	1.8	0.324	0.22	0.29	0.10	0.32	96.22
10	50	0.83	1.5	0.270	0.22	0.24	0.05	0.15	45.35
11	55	0.92	1.6	0.288	0.22	0.26	0.07	0.21	62.30
12	60	1.00	1.8	0.324	0.22	0.29	0.10	0.32	96.22
13	65	1.08	2.2	0.396	0.22	0.36	0.17	0.55	164.04
14	70	1.17	2.2	0.396	0.22	0.36	0.17	0.55	164.04
15	75	1.25	2.2	0.396	0.22	0.36	0.17	0.55	164.04
16	80	1.33	2.0	0.360	0.22	0.32	0.14	0.43	130.13
17	85	1.42	2.6	0.468	0.22	0.42	0.25	0.77	231.86
18	90	1.50	2.7	0.486	0.22	0.44	0.26	0.83	248.82
19	95	1.58	2.4	0.432	0.22	0.39	0.21	0.66	197.95
20	100	1.67	2.7	0.486	0.22	0.44	0.26	0.83	248.82
21	105	1.75	3.3	0.594	0.22	0.53	0.37	1.17	350.56
22	110	1.83	3.1	0.558	0.22	0.50	0.34	1.06	316.64
23	115	1.92	2.9	0.522	0.22	0.47	0.30	0.94	282.73
24	120	2.00	3.0	0.540	0.22	0.49	0.32	1.00	299.69
25	125	2.08	3.1	0.558	0.22	0.50	0.34	1.06	316.64
26	130	2.17	4.2	0.756	0.22	0.68	0.53	1.68	503.16
27	135	2.25	5.0	0.900	0.22	0.81	0.68	2.13	638.81
28	140	2.33	3.5	0.630	0.22	0.57	0.41	1.28	384.47
29	145	2.42	6.8	1.224	0.22	1.10	1.00	3.15	944.02
30	150	2.50	7.3	1.314	0.22	1.18	1.09	3.43	1028.80
31	155	2.58	8.2	1.476	0.22	1.33	1.25	3.94	1181.40
32	160	2.67	5.9	1.062	0.22	0.96	0.84	2.64	791.41
33	165	2.75	2.0	0.360	0.22	0.32	0.14	0.43	130.13
34	170	2.83	1.8	0.324	0.22	0.29	0.10	0.32	96.22
35	175	2.92	1.8	0.324	0.22	0.29	0.10	0.32	96.22
36	180	3.00	0.6	0.108	0.22	0.10	0.01	0.03	10.17

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.85
FLOOD VOLUME (acft)	0.22
FLOOD VOLUME (cuft)	9670.81
REQUIRED STORAGE (acft)	0.22
REQUIRED STORAGE (cuft)	9590.85
PEAK FLOW RATE (cfs)	3.94

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

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NOF
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.62
UNIT TIME-PERCENT OF LAG	808.9
TOTAL ADJUSTED STORM RAIN-INCHES	1.93
CONSTANT LOSS RATE-in/hr	0.222
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.116	0.22	0.10	0.01	0.04	10.91
2	10	0.17	0.6	0.139	0.22	0.13	0.01	0.04	13.09
3	15	0.25	0.6	0.139	0.22	0.13	0.01	0.04	13.09
4	20	0.33	0.6	0.139	0.22	0.13	0.01	0.04	13.09
5	25	0.42	0.6	0.139	0.22	0.13	0.01	0.04	13.09
6	30	0.50	0.7	0.162	0.22	0.15	0.02	0.05	15.27
7	35	0.58	0.7	0.162	0.22	0.15	0.02	0.05	15.27
8	40	0.67	0.7	0.162	0.22	0.15	0.02	0.05	15.27
9	45	0.75	0.7	0.162	0.22	0.15	0.02	0.05	15.27
10	50	0.83	0.7	0.162	0.22	0.15	0.02	0.05	15.27
11	55	0.92	0.7	0.162	0.22	0.15	0.02	0.05	15.27
12	60	1.00	0.8	0.185	0.22	0.17	0.02	0.06	17.45
13	65	1.08	0.8	0.185	0.22	0.17	0.02	0.06	17.45
14	70	1.17	0.8	0.185	0.22	0.17	0.02	0.06	17.45
15	75	1.25	0.8	0.185	0.22	0.17	0.02	0.06	17.45
16	80	1.33	0.8	0.185	0.22	0.17	0.02	0.06	17.45
17	85	1.42	0.8	0.185	0.22	0.17	0.02	0.06	17.45
18	90	1.50	0.8	0.185	0.22	0.17	0.02	0.06	17.45
19	95	1.58	0.8	0.185	0.22	0.17	0.02	0.06	17.45
20	100	1.67	0.8	0.185	0.22	0.17	0.02	0.06	17.45
21	105	1.75	0.8	0.185	0.22	0.17	0.02	0.06	17.45
22	110	1.83	0.8	0.185	0.22	0.17	0.02	0.06	17.45
23	115	1.92	0.8	0.185	0.22	0.17	0.02	0.06	17.45
24	120	2.00	0.9	0.208	0.22	0.19	0.02	0.07	19.64
25	125	2.08	0.8	0.185	0.22	0.17	0.02	0.06	17.45
26	130	2.17	0.9	0.208	0.22	0.19	0.02	0.07	19.64
27	135	2.25	0.9	0.208	0.22	0.19	0.02	0.07	19.64
28	140	2.33	0.9	0.208	0.22	0.19	0.02	0.07	19.64
29	145	2.42	0.9	0.208	0.22	0.19	0.02	0.07	19.64
30	150	2.50	0.9	0.208	0.22	0.19	0.02	0.07	19.64
31	155	2.58	0.9	0.208	0.22	0.19	0.02	0.07	19.64
32	160	2.67	0.9	0.208	0.22	0.19	0.02	0.07	19.64
33	165	2.75	1.0	0.232	0.22	0.21	0.01	0.03	9.18
34	170	2.83	1.0	0.232	0.22	0.21	0.01	0.03	9.18
35	175	2.92	1.0	0.232	0.22	0.21	0.01	0.03	9.18
36	180	3.00	1.0	0.232	0.22	0.21	0.01	0.03	9.18
37	185	3.08	1.0	0.232	0.22	0.21	0.01	0.03	9.18
38	190	3.17	1.1	0.255	0.22	0.23	0.03	0.10	30.99
39	195	3.25	1.1	0.255	0.22	0.23	0.03	0.10	30.99
40	200	3.33	1.1	0.255	0.22	0.23	0.03	0.10	30.99
41	205	3.42	1.2	0.278	0.22	0.25	0.06	0.18	52.81
42	210	3.50	1.3	0.301	0.22	0.27	0.08	0.25	74.63
43	215	3.58	1.4	0.324	0.22	0.29	0.10	0.32	96.44
44	220	3.67	1.4	0.324	0.22	0.29	0.10	0.32	96.44
45	225	3.75	1.5	0.347	0.22	0.31	0.13	0.39	118.26
46	230	3.83	1.5	0.347	0.22	0.31	0.13	0.39	118.26
47	235	3.92	1.6	0.371	0.22	0.33	0.15	0.47	140.08
48	240	4.00	1.6	0.371	0.22	0.33	0.15	0.47	140.08
49	245	4.08	1.7	0.394	0.22	0.35	0.17	0.54	161.89
50	250	4.17	1.8	0.417	0.22	0.38	0.20	0.61	183.71
51	255	4.25	1.9	0.440	0.22	0.40	0.22	0.69	205.53
52	260	4.33	2.0	0.463	0.22	0.42	0.24	0.76	227.34
53	265	4.42	2.1	0.486	0.22	0.44	0.26	0.83	249.16
54	270	4.50	2.1	0.486	0.22	0.44	0.26	0.83	249.16
55	275	4.58	2.2	0.510	0.22	0.46	0.29	0.90	270.98
56	280	4.67	2.3	0.533	0.22	0.48	0.31	0.98	292.79

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NOF CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.62		
UNIT TIME-PERCENT OF LAG	808.9		
TOTAL ADJUSTED STORM RAIN-INCHES	1.93		
CONSTANT LOSS RATE-in/hr	0.222		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.556	0.22	0.50	0.33	1.05	314.61
58	290	4.83	2.4	0.556	0.22	0.50	0.33	1.05	314.61
59	295	4.92	2.5	0.579	0.22	0.52	0.36	1.12	336.43
60	300	5.00	2.6	0.602	0.22	0.54	0.38	1.19	358.24
61	305	5.08	3.1	0.718	0.22	0.65	0.50	1.56	467.33
62	310	5.17	3.6	0.834	0.22	0.75	0.61	1.92	576.41
63	315	5.25	3.9	0.903	0.22	0.81	0.68	2.14	641.86
64	320	5.33	4.2	0.973	0.22	0.88	0.75	2.36	707.31
65	325	5.42	4.7	1.089	0.22	0.98	0.87	2.72	816.39
66	330	5.50	5.6	1.297	0.22	1.17	1.08	3.38	1012.74
67	335	5.58	1.9	0.440	0.22	0.40	0.22	0.69	205.53
68	340	5.67	0.9	0.208	0.22	0.19	0.02	0.07	19.64
69	345	5.75	0.6	0.139	0.22	0.13	0.01	0.04	13.09
70	350	5.83	0.5	0.116	0.22	0.10	0.01	0.04	10.91
71	355	5.92	0.3	0.069	0.22	0.06	0.01	0.02	6.55
72	360	6.00	0.2	0.046	0.22	0.04	0.00	0.01	4.36

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.81
FLOOD VOLUME (acft)	0.21
FLOOD VOLUME (cuft)	9237.65
REQUIRED STORAGE (acft)	0.21
REQUIRED STORAGE (cuft)	9161.27
PEAK FLOW RATE (cfs)	3.38

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

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2219
LAG TIME - MINUTES	0.62	MINIMUM LOSS RATE (for var. loss) - in/hr	0.111
UNIT TIME-PERCENT OF LAG	2426.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00205
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.021	0.392	0.019	0.002	0.01	6.01
2	30	0.50	0.3	0.032	0.387	0.029	0.003	0.01	9.02
3	45	0.75	0.3	0.032	0.383	0.029	0.003	0.01	9.02
4	60	1.00	0.4	0.043	0.378	0.038	0.004	0.01	12.03
5	75	1.25	0.3	0.032	0.374	0.029	0.003	0.01	9.02
6	90	1.50	0.3	0.032	0.369	0.029	0.003	0.01	9.02
7	105	1.75	0.3	0.032	0.365	0.029	0.003	0.01	9.02
8	120	2.00	0.4	0.043	0.361	0.038	0.004	0.01	12.03
9	135	2.25	0.4	0.043	0.356	0.038	0.004	0.01	12.03
10	150	2.50	0.4	0.043	0.352	0.038	0.004	0.01	12.03
11	165	2.75	0.5	0.053	0.348	0.048	0.005	0.02	15.03
12	180	3.00	0.5	0.053	0.343	0.048	0.005	0.02	15.03
13	195	3.25	0.5	0.053	0.339	0.048	0.005	0.02	15.03
14	210	3.50	0.5	0.053	0.335	0.048	0.005	0.02	15.03
15	225	3.75	0.5	0.053	0.331	0.048	0.005	0.02	15.03
16	240	4.00	0.6	0.064	0.326	0.057	0.006	0.02	18.04
17	255	4.25	0.6	0.064	0.322	0.057	0.006	0.02	18.04
18	270	4.50	0.7	0.074	0.318	0.067	0.007	0.02	21.05
19	285	4.75	0.7	0.074	0.314	0.067	0.007	0.02	21.05
20	300	5.00	0.8	0.085	0.310	0.077	0.009	0.03	24.05
21	315	5.25	0.6	0.064	0.306	0.057	0.006	0.02	18.04
22	330	5.50	0.7	0.074	0.302	0.067	0.007	0.02	21.05
23	345	5.75	0.8	0.085	0.298	0.077	0.009	0.03	24.05
24	360	6.00	0.8	0.085	0.294	0.077	0.009	0.03	24.05
25	375	6.25	0.9	0.096	0.290	0.086	0.010	0.03	27.06
26	390	6.50	0.9	0.096	0.286	0.086	0.010	0.03	27.06
27	405	6.75	1.0	0.106	0.283	0.096	0.011	0.03	30.07
28	420	7.00	1.0	0.106	0.279	0.096	0.011	0.03	30.07
29	435	7.25	1.0	0.106	0.275	0.096	0.011	0.03	30.07
30	450	7.50	1.1	0.117	0.271	0.105	0.012	0.04	33.08
31	465	7.75	1.2	0.128	0.267	0.115	0.013	0.04	36.08
32	480	8.00	1.3	0.138	0.264	0.124	0.014	0.04	39.09
33	495	8.25	1.5	0.160	0.260	0.144	0.016	0.05	45.10
34	510	8.50	1.5	0.160	0.257	0.144	0.016	0.05	45.10
35	525	8.75	1.6	0.170	0.253	0.153	0.017	0.05	48.11
36	540	9.00	1.7	0.181	0.249	0.163	0.018	0.06	51.12
37	555	9.25	1.9	0.202	0.246	0.182	0.020	0.06	57.13
38	570	9.50	2.0	0.213	0.242	0.192	0.021	0.07	60.14
39	585	9.75	2.1	0.223	0.239	0.201	0.022	0.07	63.14
40	600	10.00	2.2	0.234	0.235	0.211	0.023	0.07	66.15
41	615	10.25	1.5	0.160	0.232	0.144	0.016	0.05	45.10
42	630	10.50	1.5	0.160	0.229	0.144	0.016	0.05	45.10
43	645	10.75	2.0	0.213	0.225	0.192	0.021	0.07	60.14
44	660	11.00	2.0	0.213	0.222	0.192	0.021	0.07	60.14
45	675	11.25	1.9	0.202	0.219	0.182	0.020	0.06	57.13
46	690	11.50	1.9	0.202	0.216	0.182	0.020	0.06	57.13
47	705	11.75	1.7	0.181	0.212	0.163	0.018	0.06	51.12
48	720	12.00	1.8	0.192	0.209	0.172	0.019	0.06	54.12
49	735	12.25	2.5	0.266	0.206	0.239	0.060	0.19	169.38
50	750	12.50	2.6	0.277	0.203	0.249	0.074	0.23	208.17
51	765	12.75	2.8	0.298	0.200	0.268	0.098	0.31	276.93
52	780	13.00	2.9	0.309	0.197	0.278	0.112	0.35	315.51
53	795	13.25	3.4	0.362	0.194	0.326	0.168	0.53	474.26
54	810	13.50	3.4	0.362	0.191	0.326	0.171	0.54	482.57
55	825	13.75	2.3	0.245	0.188	0.220	0.057	0.18	160.01
56	840	14.00	2.3	0.245	0.185	0.220	0.059	0.19	168.11
57	855	14.25	2.7	0.287	0.182	0.259	0.105	0.33	296.36
58	870	14.50	2.6	0.277	0.180	0.249	0.097	0.30	274.16
59	885	14.75	2.6	0.277	0.177	0.249	0.100	0.31	281.92
60	900	15.00	2.5	0.266	0.174	0.239	0.092	0.29	259.50
61	915	15.25	2.4	0.255	0.172	0.230	0.084	0.26	236.97
62	930	15.50	2.3	0.245	0.169	0.220	0.076	0.24	214.31
63	945	15.75	1.9	0.202	0.166	0.182	0.036	0.11	101.34
64	960	16.00	1.9	0.202	0.164	0.182	0.038	0.12	108.52
65	975	16.25	0.4	0.043	0.161	0.038	0.004	0.01	12.03
66	990	16.50	0.4	0.043	0.159	0.038	0.004	0.01	12.03
67	1005	16.75	0.3	0.032	0.156	0.029	0.003	0.01	9.02

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2219
LAG TIME - MINUTES	0.62	MINIMUM LOSS RATE (for var. loss) - in/hr	0.111
UNIT TIME-PERCENT OF LAG	2426.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00205
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.032	0.154	0.029	0.003	0.01	9.02
69	1035	17.25	0.5	0.053	0.152	0.048	0.005	0.02	15.03
70	1050	17.50	0.5	0.053	0.149	0.048	0.005	0.02	15.03
71	1065	17.75	0.5	0.053	0.147	0.048	0.005	0.02	15.03
72	1080	18.00	0.4	0.043	0.145	0.038	0.004	0.01	12.03
73	1095	18.25	0.4	0.043	0.143	0.038	0.004	0.01	12.03
74	1110	18.50	0.4	0.043	0.141	0.038	0.004	0.01	12.03
75	1125	18.75	0.3	0.032	0.139	0.029	0.003	0.01	9.02
76	1140	19.00	0.2	0.021	0.137	0.019	0.002	0.01	6.01
77	1155	19.25	0.3	0.032	0.135	0.029	0.003	0.01	9.02
78	1170	19.50	0.4	0.043	0.133	0.038	0.004	0.01	12.03
79	1185	19.75	0.3	0.032	0.131	0.029	0.003	0.01	9.02
80	1200	20.00	0.2	0.021	0.129	0.019	0.002	0.01	6.01
81	1215	20.25	0.3	0.032	0.128	0.029	0.003	0.01	9.02
82	1230	20.50	0.3	0.032	0.126	0.029	0.003	0.01	9.02
83	1245	20.75	0.3	0.032	0.124	0.029	0.003	0.01	9.02
84	1260	21.00	0.2	0.021	0.123	0.019	0.002	0.01	6.01
85	1275	21.25	0.3	0.032	0.121	0.029	0.003	0.01	9.02
86	1290	21.50	0.2	0.021	0.120	0.019	0.002	0.01	6.01
87	1305	21.75	0.3	0.032	0.119	0.029	0.003	0.01	9.02
88	1320	22.00	0.2	0.021	0.118	0.019	0.002	0.01	6.01
89	1335	22.25	0.3	0.032	0.116	0.029	0.003	0.01	9.02
90	1350	22.50	0.2	0.021	0.115	0.019	0.002	0.01	6.01
91	1365	22.75	0.2	0.021	0.114	0.019	0.002	0.01	6.01
92	1380	23.00	0.2	0.021	0.113	0.019	0.002	0.01	6.01
93	1395	23.25	0.2	0.021	0.113	0.019	0.002	0.01	6.01
94	1410	23.50	0.2	0.021	0.112	0.019	0.002	0.01	6.01
95	1425	23.75	0.2	0.021	0.111	0.019	0.002	0.01	6.01
96	1440	24.00	0.2	0.021	0.111	0.019	0.002	0.01	6.01

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.51
FLOOD VOLUME (acft)	0.13
FLOOD VOLUME (cuft)	5847.42
REQUIRED STORAGE (acft)	0.13
REQUIRED STORAGE (cuft)	5799.07
PEAK FLOW (cfs)	0.54

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH
JOB # C2026
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS

PERCOLATION RATE	0 in/hr	0.00 cfs

MAXWELL IV DRYWELLS

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

TOTAL PERCOLATION RATE 0.00 cfs

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JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	11	23	0	23	-	23	0.00
3	15	0.06	19	42	0	42	-	42	0.00
4	20	0.15	45	87	0	87	-	87	0.00
5	25	0.15	45	132	0	132	-	132	0.00
6	30	0.32	96	228	0	228	-	228	0.01
7	35	0.15	45	274	0	274	-	274	0.01
8	40	0.32	96	370	0	370	-	370	0.01
9	45	0.32	96	466	0	466	-	466	0.01
10	50	0.15	45	512	0	512	-	512	0.01
11	55	0.21	62	574	0	574	-	574	0.01
12	60	0.32	96	670	0	670	-	670	0.02
13	65	0.55	164	834	0	834	-	834	0.02
14	70	0.55	164	998	0	998	-	998	0.02
15	75	0.55	164	1,162	0	1,162	-	1,162	0.03
16	80	0.43	130	1,292	0	1,292	-	1,292	0.03
17	85	0.77	232	1,524	0	1,524	-	1,524	0.03
18	90	0.83	249	1,773	0	1,773	-	1,773	0.04
19	95	0.66	198	1,971	0	1,971	-	1,971	0.05
20	100	0.83	249	2,220	0	2,220	-	2,220	0.05
21	105	1.17	351	2,570	0	2,570	-	2,570	0.06
22	110	1.06	317	2,887	0	2,887	-	2,887	0.07
23	115	0.94	283	3,170	0	3,170	-	3,170	0.07
24	120	1.00	300	3,469	0	3,469	-	3,469	0.08
25	125	1.06	317	3,786	0	3,786	-	3,786	0.09
26	130	1.68	503	4,289	0	4,289	-	4,289	0.10
27	135	2.13	639	4,928	0	4,928	-	4,928	0.11
28	140	1.28	384	5,312	0	5,312	-	5,312	0.12
29	145	3.15	944	6,257	0	6,257	-	6,257	0.14
30	150	3.43	1,029	7,285	0	7,285	-	7,285	0.17
31	155	3.94	1,181	8,467	0	8,467	-	8,467	0.19
32	160	2.64	791	9,258	0	9,258	-	9,258	0.21
33	165	0.43	130	9,388	0	9,388	-	9,388	0.22
34	170	0.32	96	9,484	0	9,484	-	9,484	0.22
35	175	0.32	96	9,581	0	9,581	-	9,581	0.22
36	180	0.03	10	9,591	0	9,591	-	9,591	0.22

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JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	13	24	0	24	-	24	0.00
3	15	0.04	13	37	0	37	-	37	0.00
4	20	0.04	13	50	0	50	-	50	0.00
5	25	0.04	13	63	0	63	-	63	0.00
6	30	0.05	15	79	0	79	-	79	0.00
7	35	0.05	15	94	0	94	-	94	0.00
8	40	0.05	15	109	0	109	-	109	0.00
9	45	0.05	15	124	0	124	-	124	0.00
10	50	0.05	15	140	0	140	-	140	0.00
11	55	0.05	15	155	0	155	-	155	0.00
12	60	0.06	17	172	0	172	-	172	0.00
13	65	0.06	17	190	0	190	-	190	0.00
14	70	0.06	17	207	0	207	-	207	0.00
15	75	0.06	17	225	0	225	-	225	0.01
16	80	0.06	17	242	0	242	-	242	0.01
17	85	0.06	17	260	0	260	-	260	0.01
18	90	0.06	17	277	0	277	-	277	0.01
19	95	0.06	17	295	0	295	-	295	0.01
20	100	0.06	17	312	0	312	-	312	0.01
21	105	0.06	17	329	0	329	-	329	0.01
22	110	0.06	17	347	0	347	-	347	0.01
23	115	0.06	17	364	0	364	-	364	0.01
24	120	0.07	20	384	0	384	-	384	0.01
25	125	0.06	17	401	0	401	-	401	0.01
26	130	0.07	20	421	0	421	-	421	0.01
27	135	0.07	20	441	0	441	-	441	0.01
28	140	0.07	20	460	0	460	-	460	0.01
29	145	0.07	20	480	0	480	-	480	0.01
30	150	0.07	20	500	0	500	-	500	0.01
31	155	0.07	20	519	0	519	-	519	0.01
32	160	0.07	20	539	0	539	-	539	0.01
33	165	0.03	9	548	0	548	-	548	0.01
34	170	0.03	9	557	0	557	-	557	0.01
35	175	0.03	9	566	0	566	-	566	0.01
36	180	0.03	9	576	0	576	-	576	0.01
37	185	0.03	9	585	0	585	-	585	0.01
38	190	0.10	31	616	0	616	-	616	0.01
39	195	0.10	31	647	0	647	-	647	0.01
40	200	0.10	31	678	0	678	-	678	0.02
41	205	0.18	53	731	0	731	-	731	0.02
42	210	0.25	75	805	0	805	-	805	0.02
43	215	0.32	96	902	0	902	-	902	0.02
44	220	0.32	96	998	0	998	-	998	0.02
45	225	0.39	118	1,116	0	1,116	-	1,116	0.03
46	230	0.39	118	1,235	0	1,235	-	1,235	0.03
47	235	0.47	140	1,375	0	1,375	-	1,375	0.03
48	240	0.47	140	1,515	0	1,515	-	1,515	0.03
49	245	0.54	162	1,677	0	1,677	-	1,677	0.04
50	250	0.61	184	1,860	0	1,860	-	1,860	0.04
51	255	0.69	206	2,066	0	2,066	-	2,066	0.05
52	260	0.76	227	2,293	0	2,293	-	2,293	0.05
53	265	0.83	249	2,542	0	2,542	-	2,542	0.06
54	270	0.83	249	2,791	0	2,791	-	2,791	0.06
55	275	0.90	271	3,062	0	3,062	-	3,062	0.07

1

JOB # C2026

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	0.98	293	3,355	0	3,355	-	3,355	0.08
57	285	1.05	315	3,670	0	3,670	-	3,670	0.08
58	290	1.05	315	3,984	0	3,984	-	3,984	0.09
59	295	1.12	336	4,321	0	4,321	-	4,321	0.10
60	300	1.19	358	4,679	0	4,679	-	4,679	0.11
61	305	1.56	467	5,146	0	5,146	-	5,146	0.12
62	310	1.92	576	5,723	0	5,723	-	5,723	0.13
63	315	2.14	642	6,365	0	6,365	-	6,365	0.15
64	320	2.36	707	7,072	0	7,072	-	7,072	0.16
65	325	2.72	816	7,888	0	7,888	-	7,888	0.18
66	330	3.38	1,013	8,901	0	8,901	-	8,901	0.20
67	335	0.69	206	9,107	0	9,107	-	9,107	0.21
68	340	0.07	20	9,126	0	9,126	-	9,126	0.21
69	345	0.04	13	9,139	0	9,139	-	9,139	0.21
70	350	0.04	11	9,150	0	9,150	-	9,150	0.21
71	355	0.02	7	9,157	0	9,157	-	9,157	0.21
72	360	0.01	4	9,161	0	9,161	-	9,161	0.21

1

JOB # C2026

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	6	6	0	6	-	6	0.00
2	30	0.01	9	15	0	15	-	15	0.00
3	45	0.01	9	24	0	24	-	24	0.00
4	60	0.01	12	36	0	36	-	36	0.00
5	75	0.01	9	45	0	45	-	45	0.00
6	90	0.01	9	54	0	54	-	54	0.00
7	105	0.01	9	63	0	63	-	63	0.00
8	120	0.01	12	75	0	75	-	75	0.00
9	135	0.01	12	87	0	87	-	87	0.00
10	150	0.01	12	99	0	99	-	99	0.00
11	165	0.02	15	114	0	114	-	114	0.00
12	180	0.02	15	129	0	129	-	129	0.00
13	195	0.02	15	144	0	144	-	144	0.00
14	210	0.02	15	159	0	159	-	159	0.00
15	225	0.02	15	174	0	174	-	174	0.00
16	240	0.02	18	192	0	192	-	192	0.00
17	255	0.02	18	210	0	210	-	210	0.00
18	270	0.02	21	232	0	232	-	232	0.01
19	285	0.02	21	253	0	253	-	253	0.01
20	300	0.03	24	277	0	277	-	277	0.01
21	315	0.02	18	295	0	295	-	295	0.01
22	330	0.02	21	316	0	316	-	316	0.01
23	345	0.03	24	340	0	340	-	340	0.01
24	360	0.03	24	364	0	364	-	364	0.01
25	375	0.03	27	391	0	391	-	391	0.01
26	390	0.03	27	418	0	418	-	418	0.01
27	405	0.03	30	448	0	448	-	448	0.01
28	420	0.03	30	478	0	478	-	478	0.01
29	435	0.03	30	508	0	508	-	508	0.01
30	450	0.04	33	541	0	541	-	541	0.01
31	465	0.04	36	577	0	577	-	577	0.01
32	480	0.04	39	616	0	616	-	616	0.01
33	495	0.05	45	662	0	662	-	662	0.02
34	510	0.05	45	707	0	707	-	707	0.02
35	525	0.05	48	755	0	755	-	755	0.02
36	540	0.06	51	806	0	806	-	806	0.02
37	555	0.06	57	863	0	863	-	863	0.02
38	570	0.07	60	923	0	923	-	923	0.02
39	585	0.07	63	986	0	986	-	986	0.02
40	600	0.07	66	1,052	0	1,052	-	1,052	0.02
41	615	0.05	45	1,098	0	1,098	-	1,098	0.03
42	630	0.05	45	1,143	0	1,143	-	1,143	0.03
43	645	0.07	60	1,203	0	1,203	-	1,203	0.03
44	660	0.07	60	1,263	0	1,263	-	1,263	0.03
45	675	0.06	57	1,320	0	1,320	-	1,320	0.03
46	690	0.06	57	1,377	0	1,377	-	1,377	0.03
47	705	0.06	51	1,428	0	1,428	-	1,428	0.03
48	720	0.06	54	1,482	0	1,482	-	1,482	0.03
49	735	0.19	169	1,652	0	1,652	-	1,652	0.04
50	750	0.23	208	1,860	0	1,860	-	1,860	0.04
51	765	0.31	277	2,137	0	2,137	-	2,137	0.05
52	780	0.35	316	2,452	0	2,452	-	2,452	0.06
53	795	0.53	474	2,927	0	2,927	-	2,927	0.07
54	810	0.54	483	3,409	0	3,409	-	3,409	0.08
55	825	0.18	160	3,569	0	3,569	-	3,569	0.08
56	840	0.19	168	3,737	0	3,737	-	3,737	0.09
57	855	0.33	296	4,034	0	4,034	-	4,034	0.09
58	870	0.30	274	4,308	0	4,308	-	4,308	0.10

1

JOB # C2026

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	0.31	282	4,590	0	4,590	-	4,590	0.11
60	900	0.29	260	4,849	0	4,849	-	4,849	0.11
61	915	0.26	237	5,086	0	5,086	-	5,086	0.12
62	930	0.24	214	5,301	0	5,301	-	5,301	0.12
63	945	0.11	101	5,402	0	5,402	-	5,402	0.12
64	960	0.12	109	5,510	0	5,510	-	5,510	0.13
65	975	0.01	12	5,522	0	5,522	-	5,522	0.13
66	990	0.01	12	5,534	0	5,534	-	5,534	0.13
67	1005	0.01	9	5,543	0	5,543	-	5,543	0.13
68	1020	0.01	9	5,553	0	5,553	-	5,553	0.13
69	1035	0.02	15	5,568	0	5,568	-	5,568	0.13
70	1050	0.02	15	5,583	0	5,583	-	5,583	0.13
71	1065	0.02	15	5,598	0	5,598	-	5,598	0.13
72	1080	0.01	12	5,610	0	5,610	-	5,610	0.13
73	1095	0.01	12	5,622	0	5,622	-	5,622	0.13
74	1110	0.01	12	5,634	0	5,634	-	5,634	0.13
75	1125	0.01	9	5,643	0	5,643	-	5,643	0.13
76	1140	0.01	6	5,649	0	5,649	-	5,649	0.13
77	1155	0.01	9	5,658	0	5,658	-	5,658	0.13
78	1170	0.01	12	5,670	0	5,670	-	5,670	0.13
79	1185	0.01	9	5,679	0	5,679	-	5,679	0.13
80	1200	0.01	6	5,685	0	5,685	-	5,685	0.13
81	1215	0.01	9	5,694	0	5,694	-	5,694	0.13
82	1230	0.01	9	5,703	0	5,703	-	5,703	0.13
83	1245	0.01	9	5,712	0	5,712	-	5,712	0.13
84	1260	0.01	6	5,718	0	5,718	-	5,718	0.13
85	1275	0.01	9	5,727	0	5,727	-	5,727	0.13
86	1290	0.01	6	5,733	0	5,733	-	5,733	0.13
87	1305	0.01	9	5,742	0	5,742	-	5,742	0.13
88	1320	0.01	6	5,748	0	5,748	-	5,748	0.13
89	1335	0.01	9	5,757	0	5,757	-	5,757	0.13
90	1350	0.01	6	5,763	0	5,763	-	5,763	0.13
91	1365	0.01	6	5,769	0	5,769	-	5,769	0.13
92	1380	0.01	6	5,775	0	5,775	-	5,775	0.13
93	1395	0.01	6	5,781	0	5,781	-	5,781	0.13
94	1410	0.01	6	5,787	0	5,787	-	5,787	0.13
95	1425	0.01	6	5,793	0	5,793	-	5,793	0.13
96	1440	0.01	6	5,799	0	5,799	-	5,799	0.13

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM EXIST 2 YR EVENT - SOUTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
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	0.88		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.35		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	320		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	40		
30				
31	ELEVATION OF HEADWATER	329		
32	ELEVATION OF CONCENTRATION POINT	267		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.721		
40	6-HOUR	0.953		
41	24-HOUR	1.36		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD — PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
BASIC DATA CALCULATION FORM — JOB # C2026
SHORTCUT METHOD — BY ES R. BAZUA, P.E. — DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	1.230
[4] L-FEET	320
[5] L-MILES	0.061
[6] La-FEET	40.00
[7] La-MILES	0.008
[8] ELEVATION OF HEADWATER	329
[9] ELEVATION OF CONCENTRATION POINT	267
[10] H-FEET	62
[11] S-FEET/MILE	1023.0
[12] S^0.5	31.98
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.4
[17] 100% OF LAG-MINUTES	0.4
[18] 200% OF LAG-MINUTES	0.8
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
0.72	1.230	1.00	0.72	0.95	1.230	1.00	0.95	1.36	1.230	1.00	1.36
		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]	1.23	SUM [7]	0.72	SUM [9]	1.23	SUM [11]	0.95	SUM [13]	1.23	SUM [15]	1.36
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.72				0.95				1.36

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.07	0.09	0.14
FLOOD VOLUME	(cu-ft)	320	424	607
	(acre-ft)	0.01	0.01	0.01
REQUIRED STORAGE	(cu-ft)	317	420	602
	(acre-ft)	0.01	0.01	0.01
PEAK FLOW	(cfs)	0.16	0.07	0.02
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.00	0.000	0.0000
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.88	0.715	0.5294
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.35	0.285	0.0514
					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	1.23	SUM	0.5808

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.290396341

C= 0.00538

Ft=C(24-(T/60))^1.55 = 0.00538 (24-(T/60))^1.55 + 0.29 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: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.42
UNIT TIME-PERCENT OF LAG	1202.0
TOTAL ADJUSTED STORM RAIN-INCHES	0.72
CONSTANT LOSS RATE-in/hr	0.58
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.112	0.58	0.10	0.01	0.01	4.15
2	10	0.17	1.3	0.112	0.58	0.10	0.01	0.01	4.15
3	15	0.25	1.1	0.095	0.58	0.09	0.01	0.01	3.51
4	20	0.33	1.5	0.130	0.58	0.12	0.01	0.02	4.79
5	25	0.42	1.5	0.130	0.58	0.12	0.01	0.02	4.79
6	30	0.50	1.8	0.156	0.58	0.14	0.02	0.02	5.75
7	35	0.58	1.5	0.130	0.58	0.12	0.01	0.02	4.79
8	40	0.67	1.8	0.156	0.58	0.14	0.02	0.02	5.75
9	45	0.75	1.8	0.156	0.58	0.14	0.02	0.02	5.75
10	50	0.83	1.5	0.130	0.58	0.12	0.01	0.02	4.79
11	55	0.92	1.6	0.138	0.58	0.12	0.01	0.02	5.11
12	60	1.00	1.8	0.156	0.58	0.14	0.02	0.02	5.75
13	65	1.08	2.2	0.190	0.58	0.17	0.02	0.02	7.02
14	70	1.17	2.2	0.190	0.58	0.17	0.02	0.02	7.02
15	75	1.25	2.2	0.190	0.58	0.17	0.02	0.02	7.02
16	80	1.33	2.0	0.173	0.58	0.16	0.02	0.02	6.39
17	85	1.42	2.6	0.225	0.58	0.20	0.02	0.03	8.30
18	90	1.50	2.7	0.234	0.58	0.21	0.02	0.03	8.62
19	95	1.58	2.4	0.208	0.58	0.19	0.02	0.03	7.66
20	100	1.67	2.7	0.234	0.58	0.21	0.02	0.03	8.62
21	105	1.75	3.3	0.286	0.58	0.26	0.03	0.04	10.54
22	110	1.83	3.1	0.268	0.58	0.24	0.03	0.03	9.90
23	115	1.92	2.9	0.251	0.58	0.23	0.03	0.03	9.26
24	120	2.00	3.0	0.260	0.58	0.23	0.03	0.03	9.58
25	125	2.08	3.1	0.268	0.58	0.24	0.03	0.03	9.90
26	130	2.17	4.2	0.363	0.58	0.33	0.04	0.04	13.41
27	135	2.25	5.0	0.433	0.58	0.39	0.04	0.05	15.96
28	140	2.33	3.5	0.303	0.58	0.27	0.03	0.04	11.17
29	145	2.42	6.8	0.588	0.58	0.53	0.01	0.01	2.78
30	150	2.50	7.3	0.632	0.58	0.57	0.05	0.06	18.75
31	155	2.58	8.2	0.709	0.58	0.64	0.13	0.16	47.48
32	160	2.67	5.9	0.510	0.58	0.46	0.05	0.06	18.84
33	165	2.75	2.0	0.173	0.58	0.16	0.02	0.02	6.39
34	170	2.83	1.8	0.156	0.58	0.14	0.02	0.02	5.75
35	175	2.92	1.8	0.156	0.58	0.14	0.02	0.02	5.75
36	180	3.00	0.6	0.052	0.58	0.05	0.01	0.01	1.92

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.07
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	319.72
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	317.07
PEAK FLOW RATE (cfs)	0.16

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

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOU
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.42
UNIT TIME-PERCENT OF LAG	1202.0
TOTAL ADJUSTED STORM RAIN-INCHES	0.95
CONSTANT LOSS RATE-in/hr	0.581
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.057	0.58	0.05	0.01	0.01	2.11
2	10	0.17	0.6	0.069	0.58	0.06	0.01	0.01	2.53
3	15	0.25	0.6	0.069	0.58	0.06	0.01	0.01	2.53
4	20	0.33	0.6	0.069	0.58	0.06	0.01	0.01	2.53
5	25	0.42	0.6	0.069	0.58	0.06	0.01	0.01	2.53
6	30	0.50	0.7	0.080	0.58	0.07	0.01	0.01	2.95
7	35	0.58	0.7	0.080	0.58	0.07	0.01	0.01	2.95
8	40	0.67	0.7	0.080	0.58	0.07	0.01	0.01	2.95
9	45	0.75	0.7	0.080	0.58	0.07	0.01	0.01	2.95
10	50	0.83	0.7	0.080	0.58	0.07	0.01	0.01	2.95
11	55	0.92	0.7	0.080	0.58	0.07	0.01	0.01	2.95
12	60	1.00	0.8	0.091	0.58	0.08	0.01	0.01	3.38
13	65	1.08	0.8	0.091	0.58	0.08	0.01	0.01	3.38
14	70	1.17	0.8	0.091	0.58	0.08	0.01	0.01	3.38
15	75	1.25	0.8	0.091	0.58	0.08	0.01	0.01	3.38
16	80	1.33	0.8	0.091	0.58	0.08	0.01	0.01	3.38
17	85	1.42	0.8	0.091	0.58	0.08	0.01	0.01	3.38
18	90	1.50	0.8	0.091	0.58	0.08	0.01	0.01	3.38
19	95	1.58	0.8	0.091	0.58	0.08	0.01	0.01	3.38
20	100	1.67	0.8	0.091	0.58	0.08	0.01	0.01	3.38
21	105	1.75	0.8	0.091	0.58	0.08	0.01	0.01	3.38
22	110	1.83	0.8	0.091	0.58	0.08	0.01	0.01	3.38
23	115	1.92	0.8	0.091	0.58	0.08	0.01	0.01	3.38
24	120	2.00	0.9	0.103	0.58	0.09	0.01	0.01	3.80
25	125	2.08	0.8	0.091	0.58	0.08	0.01	0.01	3.38
26	130	2.17	0.9	0.103	0.58	0.09	0.01	0.01	3.80
27	135	2.25	0.9	0.103	0.58	0.09	0.01	0.01	3.80
28	140	2.33	0.9	0.103	0.58	0.09	0.01	0.01	3.80
29	145	2.42	0.9	0.103	0.58	0.09	0.01	0.01	3.80
30	150	2.50	0.9	0.103	0.58	0.09	0.01	0.01	3.80
31	155	2.58	0.9	0.103	0.58	0.09	0.01	0.01	3.80
32	160	2.67	0.9	0.103	0.58	0.09	0.01	0.01	3.80
33	165	2.75	1.0	0.114	0.58	0.10	0.01	0.01	4.22
34	170	2.83	1.0	0.114	0.58	0.10	0.01	0.01	4.22
35	175	2.92	1.0	0.114	0.58	0.10	0.01	0.01	4.22
36	180	3.00	1.0	0.114	0.58	0.10	0.01	0.01	4.22
37	185	3.08	1.0	0.114	0.58	0.10	0.01	0.01	4.22
38	190	3.17	1.1	0.126	0.58	0.11	0.01	0.02	4.64
39	195	3.25	1.1	0.126	0.58	0.11	0.01	0.02	4.64
40	200	3.33	1.1	0.126	0.58	0.11	0.01	0.02	4.64
41	205	3.42	1.2	0.137	0.58	0.12	0.01	0.02	5.06
42	210	3.50	1.3	0.149	0.58	0.13	0.01	0.02	5.49
43	215	3.58	1.4	0.160	0.58	0.14	0.02	0.02	5.91
44	220	3.67	1.4	0.160	0.58	0.14	0.02	0.02	5.91
45	225	3.75	1.5	0.172	0.58	0.15	0.02	0.02	6.33
46	230	3.83	1.5	0.172	0.58	0.15	0.02	0.02	6.33
47	235	3.92	1.6	0.183	0.58	0.16	0.02	0.02	6.75
48	240	4.00	1.6	0.183	0.58	0.16	0.02	0.02	6.75
49	245	4.08	1.7	0.194	0.58	0.17	0.02	0.02	7.17
50	250	4.17	1.8	0.206	0.58	0.19	0.02	0.03	7.60
51	255	4.25	1.9	0.217	0.58	0.20	0.02	0.03	8.02
52	260	4.33	2.0	0.229	0.58	0.21	0.02	0.03	8.44
53	265	4.42	2.1	0.240	0.58	0.22	0.02	0.03	8.86
54	270	4.50	2.1	0.240	0.58	0.22	0.02	0.03	8.86
55	275	4.58	2.2	0.252	0.58	0.23	0.03	0.03	9.28
56	280	4.67	2.3	0.263	0.58	0.24	0.03	0.03	9.71

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOU CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.42		
UNIT TIME-PERCENT OF LAG	1202.0		
TOTAL ADJUSTED STORM RAIN-INCHES	0.95		
CONSTANT LOSS RATE-in/hr	0.581		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time		Pattern	Storm	Loss Rate in/hr		Effective	Flood Hydrograph	Required
	Minutes	Hours	Percent (Plate E-5.9)	Rain in/hr	Max	Low	Rain in/hr	Flow cfs	Storage cf
57	285	4.75	2.4	0.274	0.58	0.25	0.03	0.03	10.13
58	290	4.83	2.4	0.274	0.58	0.25	0.03	0.03	10.13
59	295	4.92	2.5	0.286	0.58	0.26	0.03	0.04	10.55
60	300	5.00	2.6	0.297	0.58	0.27	0.03	0.04	10.97
61	305	5.08	3.1	0.355	0.58	0.32	0.04	0.04	13.08
62	310	5.17	3.6	0.412	0.58	0.37	0.04	0.05	15.19
63	315	5.25	3.9	0.446	0.58	0.40	0.04	0.05	16.46
64	320	5.33	4.2	0.480	0.58	0.43	0.05	0.06	17.72
65	325	5.42	4.7	0.537	0.58	0.48	0.05	0.07	19.83
66	330	5.50	5.6	0.640	0.58	0.58	0.06	0.07	22.00
67	335	5.58	1.9	0.217	0.58	0.20	0.02	0.03	8.02
68	340	5.67	0.9	0.103	0.58	0.09	0.01	0.01	3.80
69	345	5.75	0.6	0.069	0.58	0.06	0.01	0.01	2.53
70	350	5.83	0.5	0.057	0.58	0.05	0.01	0.01	2.11
71	355	5.92	0.3	0.034	0.58	0.03	0.00	0.00	1.27
72	360	6.00	0.2	0.023	0.58	0.02	0.00	0.00	0.84

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.09
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	423.86
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	420.36
PEAK FLOW RATE (cfs)	0.07

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

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.5808
LAG TIME - MINUTES	0.42	MINIMUM LOSS RATE (for var. loss) - in/hr	0.290
UNIT TIME-PERCENT OF LAG	3606.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00538
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.011	1.026	0.010	0.001	0.00	1.20
2	30	0.50	0.3	0.016	1.014	0.015	0.002	0.00	1.81
3	45	0.75	0.3	0.016	1.002	0.015	0.002	0.00	1.81
4	60	1.00	0.4	0.022	0.990	0.020	0.002	0.00	2.41
5	75	1.25	0.3	0.016	0.978	0.015	0.002	0.00	1.81
6	90	1.50	0.3	0.016	0.967	0.015	0.002	0.00	1.81
7	105	1.75	0.3	0.016	0.955	0.015	0.002	0.00	1.81
8	120	2.00	0.4	0.022	0.944	0.020	0.002	0.00	2.41
9	135	2.25	0.4	0.022	0.932	0.020	0.002	0.00	2.41
10	150	2.50	0.4	0.022	0.921	0.020	0.002	0.00	2.41
11	165	2.75	0.5	0.027	0.910	0.024	0.003	0.00	3.01
12	180	3.00	0.5	0.027	0.899	0.024	0.003	0.00	3.01
13	195	3.25	0.5	0.027	0.887	0.024	0.003	0.00	3.01
14	210	3.50	0.5	0.027	0.876	0.024	0.003	0.00	3.01
15	225	3.75	0.5	0.027	0.865	0.024	0.003	0.00	3.01
16	240	4.00	0.6	0.033	0.855	0.029	0.003	0.00	3.61
17	255	4.25	0.6	0.033	0.844	0.029	0.003	0.00	3.61
18	270	4.50	0.7	0.038	0.833	0.034	0.004	0.00	4.22
19	285	4.75	0.7	0.038	0.822	0.034	0.004	0.00	4.22
20	300	5.00	0.8	0.044	0.812	0.039	0.004	0.01	4.82
21	315	5.25	0.6	0.033	0.801	0.029	0.003	0.00	3.61
22	330	5.50	0.7	0.038	0.791	0.034	0.004	0.00	4.22
23	345	5.75	0.8	0.044	0.780	0.039	0.004	0.01	4.82
24	360	6.00	0.8	0.044	0.770	0.039	0.004	0.01	4.82
25	375	6.25	0.9	0.049	0.760	0.044	0.005	0.01	5.42
26	390	6.50	0.9	0.049	0.750	0.044	0.005	0.01	5.42
27	405	6.75	1.0	0.054	0.740	0.049	0.005	0.01	6.02
28	420	7.00	1.0	0.054	0.730	0.049	0.005	0.01	6.02
29	435	7.25	1.0	0.054	0.720	0.049	0.005	0.01	6.02
30	450	7.50	1.1	0.060	0.710	0.054	0.006	0.01	6.62
31	465	7.75	1.2	0.065	0.700	0.059	0.007	0.01	7.23
32	480	8.00	1.3	0.071	0.691	0.064	0.007	0.01	7.83
33	495	8.25	1.5	0.082	0.681	0.073	0.008	0.01	9.03
34	510	8.50	1.5	0.082	0.671	0.073	0.008	0.01	9.03
35	525	8.75	1.6	0.087	0.662	0.078	0.009	0.01	9.64
36	540	9.00	1.7	0.092	0.653	0.083	0.009	0.01	10.24
37	555	9.25	1.9	0.103	0.644	0.093	0.010	0.01	11.44
38	570	9.50	2.0	0.109	0.634	0.098	0.011	0.01	12.04
39	585	9.75	2.1	0.114	0.625	0.103	0.011	0.01	12.65
40	600	10.00	2.2	0.120	0.616	0.108	0.012	0.01	13.25
41	615	10.25	1.5	0.082	0.607	0.073	0.008	0.01	9.03
42	630	10.50	1.5	0.082	0.599	0.073	0.008	0.01	9.03
43	645	10.75	2.0	0.109	0.590	0.098	0.011	0.01	12.04
44	660	11.00	2.0	0.109	0.581	0.098	0.011	0.01	12.04
45	675	11.25	1.9	0.103	0.573	0.093	0.010	0.01	11.44
46	690	11.50	1.9	0.103	0.564	0.093	0.010	0.01	11.44
47	705	11.75	1.7	0.092	0.556	0.083	0.009	0.01	10.24
48	720	12.00	1.8	0.098	0.548	0.088	0.010	0.01	10.84
49	735	12.25	2.5	0.136	0.539	0.122	0.014	0.02	15.06
50	750	12.50	2.6	0.141	0.531	0.127	0.014	0.02	15.66
51	765	12.75	2.8	0.152	0.523	0.137	0.015	0.02	16.86
52	780	13.00	2.9	0.158	0.515	0.142	0.016	0.02	17.46
53	795	13.25	3.4	0.185	0.508	0.166	0.018	0.02	20.48
54	810	13.50	3.4	0.185	0.500	0.166	0.018	0.02	20.48
55	825	13.75	2.3	0.125	0.492	0.113	0.013	0.02	13.85
56	840	14.00	2.3	0.125	0.485	0.113	0.013	0.02	13.85
57	855	14.25	2.7	0.147	0.478	0.132	0.015	0.02	16.26
58	870	14.50	2.6	0.141	0.470	0.127	0.014	0.02	15.66
59	885	14.75	2.6	0.141	0.463	0.127	0.014	0.02	15.66
60	900	15.00	2.5	0.136	0.456	0.122	0.014	0.02	15.06
61	915	15.25	2.4	0.131	0.449	0.118	0.013	0.02	14.45
62	930	15.50	2.3	0.125	0.442	0.113	0.013	0.02	13.85
63	945	15.75	1.9	0.103	0.435	0.093	0.010	0.01	11.44
64	960	16.00	1.9	0.103	0.429	0.093	0.010	0.01	11.44
65	975	16.25	0.4	0.022	0.422	0.020	0.002	0.00	2.41
66	990	16.50	0.4	0.022	0.416	0.020	0.002	0.00	2.41
67	1005	16.75	0.3	0.016	0.409	0.015	0.002	0.00	1.81

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.5808
LAG TIME - MINUTES	0.42	MINIMUM LOSS RATE (for var. loss) - in/hr	0.290
UNIT TIME-PERCENT OF LAG	3606.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00538
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.016	0.403	0.015	0.002	0.00	1.81
69	1035	17.25	0.5	0.027	0.397	0.024	0.003	0.00	3.01
70	1050	17.50	0.5	0.027	0.391	0.024	0.003	0.00	3.01
71	1065	17.75	0.5	0.027	0.385	0.024	0.003	0.00	3.01
72	1080	18.00	0.4	0.022	0.380	0.020	0.002	0.00	2.41
73	1095	18.25	0.4	0.022	0.374	0.020	0.002	0.00	2.41
74	1110	18.50	0.4	0.022	0.369	0.020	0.002	0.00	2.41
75	1125	18.75	0.3	0.016	0.363	0.015	0.002	0.00	1.81
76	1140	19.00	0.2	0.011	0.358	0.010	0.001	0.00	1.20
77	1155	19.25	0.3	0.016	0.353	0.015	0.002	0.00	1.81
78	1170	19.50	0.4	0.022	0.348	0.020	0.002	0.00	2.41
79	1185	19.75	0.3	0.016	0.343	0.015	0.002	0.00	1.81
80	1200	20.00	0.2	0.011	0.339	0.010	0.001	0.00	1.20
81	1215	20.25	0.3	0.016	0.334	0.015	0.002	0.00	1.81
82	1230	20.50	0.3	0.016	0.330	0.015	0.002	0.00	1.81
83	1245	20.75	0.3	0.016	0.326	0.015	0.002	0.00	1.81
84	1260	21.00	0.2	0.011	0.322	0.010	0.001	0.00	1.20
85	1275	21.25	0.3	0.016	0.318	0.015	0.002	0.00	1.81
86	1290	21.50	0.2	0.011	0.314	0.010	0.001	0.00	1.20
87	1305	21.75	0.3	0.016	0.311	0.015	0.002	0.00	1.81
88	1320	22.00	0.2	0.011	0.308	0.010	0.001	0.00	1.20
89	1335	22.25	0.3	0.016	0.305	0.015	0.002	0.00	1.81
90	1350	22.50	0.2	0.011	0.302	0.010	0.001	0.00	1.20
91	1365	22.75	0.2	0.011	0.299	0.010	0.001	0.00	1.20
92	1380	23.00	0.2	0.011	0.297	0.010	0.001	0.00	1.20
93	1395	23.25	0.2	0.011	0.295	0.010	0.001	0.00	1.20
94	1410	23.50	0.2	0.011	0.293	0.010	0.001	0.00	1.20
95	1425	23.75	0.2	0.011	0.292	0.010	0.001	0.00	1.20
96	1440	24.00	0.2	0.011	0.291	0.010	0.001	0.00	1.20

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.14
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	607.23
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	602.21
PEAK FLOW (cfs)	0.02

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
JOB # C2026
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

1

JOB # C2026

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	0.01	4	4	0	4	-	4	0.00
2	10	0.01	4	8	0	8	-	8	0.00
3	15	0.01	4	12	0	12	-	12	0.00
4	20	0.02	5	17	0	17	-	17	0.00
5	25	0.02	5	21	0	21	-	21	0.00
6	30	0.02	6	27	0	27	-	27	0.00
7	35	0.02	5	32	0	32	-	32	0.00
8	40	0.02	6	38	0	38	-	38	0.00
9	45	0.02	6	43	0	43	-	43	0.00
10	50	0.02	5	48	0	48	-	48	0.00
11	55	0.02	5	53	0	53	-	53	0.00
12	60	0.02	6	59	0	59	-	59	0.00
13	65	0.02	7	66	0	66	-	66	0.00
14	70	0.02	7	73	0	73	-	73	0.00
15	75	0.02	7	80	0	80	-	80	0.00
16	80	0.02	6	87	0	87	-	87	0.00
17	85	0.03	8	95	0	95	-	95	0.00
18	90	0.03	9	103	0	103	-	103	0.00
19	95	0.03	8	111	0	111	-	111	0.00
20	100	0.03	9	120	0	120	-	120	0.00
21	105	0.04	11	130	0	130	-	130	0.00
22	110	0.03	10	140	0	140	-	140	0.00
23	115	0.03	9	149	0	149	-	149	0.00
24	120	0.03	10	159	0	159	-	159	0.00
25	125	0.03	10	169	0	169	-	169	0.00
26	130	0.04	13	182	0	182	-	182	0.00
27	135	0.05	16	198	0	198	-	198	0.00
28	140	0.04	11	209	0	209	-	209	0.00
29	145	0.01	3	212	0	212	-	212	0.00
30	150	0.06	19	231	0	231	-	231	0.01
31	155	0.16	47	278	0	278	-	278	0.01
32	160	0.06	19	297	0	297	-	297	0.01
33	165	0.02	6	304	0	304	-	304	0.01
34	170	0.02	6	309	0	309	-	309	0.01
35	175	0.02	6	315	0	315	-	315	0.01
36	180	0.01	2	317	0	317	-	317	0.01

1

JOB # C2026

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	0.01	2	2	0	2	-	2	0.00
2	10	0.01	3	5	0	5	-	5	0.00
3	15	0.01	3	7	0	7	-	7	0.00
4	20	0.01	3	10	0	10	-	10	0.00
5	25	0.01	3	12	0	12	-	12	0.00
6	30	0.01	3	15	0	15	-	15	0.00
7	35	0.01	3	18	0	18	-	18	0.00
8	40	0.01	3	21	0	21	-	21	0.00
9	45	0.01	3	24	0	24	-	24	0.00
10	50	0.01	3	27	0	27	-	27	0.00
11	55	0.01	3	30	0	30	-	30	0.00
12	60	0.01	3	33	0	33	-	33	0.00
13	65	0.01	3	37	0	37	-	37	0.00
14	70	0.01	3	40	0	40	-	40	0.00
15	75	0.01	3	43	0	43	-	43	0.00
16	80	0.01	3	47	0	47	-	47	0.00
17	85	0.01	3	50	0	50	-	50	0.00
18	90	0.01	3	54	0	54	-	54	0.00
19	95	0.01	3	57	0	57	-	57	0.00
20	100	0.01	3	60	0	60	-	60	0.00
21	105	0.01	3	64	0	64	-	64	0.00
22	110	0.01	3	67	0	67	-	67	0.00
23	115	0.01	3	70	0	70	-	70	0.00
24	120	0.01	4	74	0	74	-	74	0.00
25	125	0.01	3	78	0	78	-	78	0.00
26	130	0.01	4	81	0	81	-	81	0.00
27	135	0.01	4	85	0	85	-	85	0.00
28	140	0.01	4	89	0	89	-	89	0.00
29	145	0.01	4	93	0	93	-	93	0.00
30	150	0.01	4	97	0	97	-	97	0.00
31	155	0.01	4	100	0	100	-	100	0.00
32	160	0.01	4	104	0	104	-	104	0.00
33	165	0.01	4	108	0	108	-	108	0.00
34	170	0.01	4	113	0	113	-	113	0.00
35	175	0.01	4	117	0	117	-	117	0.00
36	180	0.01	4	121	0	121	-	121	0.00
37	185	0.01	4	125	0	125	-	125	0.00
38	190	0.02	5	130	0	130	-	130	0.00
39	195	0.02	5	135	0	135	-	135	0.00
40	200	0.02	5	139	0	139	-	139	0.00
41	205	0.02	5	144	0	144	-	144	0.00
42	210	0.02	5	150	0	150	-	150	0.00
43	215	0.02	6	156	0	156	-	156	0.00
44	220	0.02	6	162	0	162	-	162	0.00
45	225	0.02	6	168	0	168	-	168	0.00
46	230	0.02	6	174	0	174	-	174	0.00
47	235	0.02	7	181	0	181	-	181	0.00
48	240	0.02	7	188	0	188	-	188	0.00
49	245	0.02	7	195	0	195	-	195	0.00
50	250	0.03	8	203	0	203	-	203	0.00
51	255	0.03	8	211	0	211	-	211	0.00
52	260	0.03	8	219	0	219	-	219	0.01
53	265	0.03	9	228	0	228	-	228	0.01
54	270	0.03	9	237	0	237	-	237	0.01
55	275	0.03	9	246	0	246	-	246	0.01

1

JOB # C2026

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	0.03	10	256	0	256	-	256	0.01
57	285	0.03	10	266	0	266	-	266	0.01
58	290	0.03	10	276	0	276	-	276	0.01
59	295	0.04	11	287	0	287	-	287	0.01
60	300	0.04	11	298	0	298	-	298	0.01
61	305	0.04	13	311	0	311	-	311	0.01
62	310	0.05	15	326	0	326	-	326	0.01
63	315	0.05	16	342	0	342	-	342	0.01
64	320	0.06	18	360	0	360	-	360	0.01
65	325	0.07	20	380	0	380	-	380	0.01
66	330	0.07	22	402	0	402	-	402	0.01
67	335	0.03	8	410	0	410	-	410	0.01
68	340	0.01	4	414	0	414	-	414	0.01
69	345	0.01	3	416	0	416	-	416	0.01
70	350	0.01	2	418	0	418	-	418	0.01
71	355	0.00	1	420	0	420	-	420	0.01
72	360	0.00	1	420	0	420	-	420	0.01

1

JOB # C2026

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	1	1	0	1	-	1	0.00
2	30	0.00	2	3	0	3	-	3	0.00
3	45	0.00	2	5	0	5	-	5	0.00
4	60	0.00	2	7	0	7	-	7	0.00
5	75	0.00	2	9	0	9	-	9	0.00
6	90	0.00	2	11	0	11	-	11	0.00
7	105	0.00	2	13	0	13	-	13	0.00
8	120	0.00	2	15	0	15	-	15	0.00
9	135	0.00	2	17	0	17	-	17	0.00
10	150	0.00	2	20	0	20	-	20	0.00
11	165	0.00	3	23	0	23	-	23	0.00
12	180	0.00	3	26	0	26	-	26	0.00
13	195	0.00	3	29	0	29	-	29	0.00
14	210	0.00	3	32	0	32	-	32	0.00
15	225	0.00	3	35	0	35	-	35	0.00
16	240	0.00	4	39	0	39	-	39	0.00
17	255	0.00	4	42	0	42	-	42	0.00
18	270	0.00	4	46	0	46	-	46	0.00
19	285	0.00	4	51	0	51	-	51	0.00
20	300	0.01	5	55	0	55	-	55	0.00
21	315	0.00	4	59	0	59	-	59	0.00
22	330	0.00	4	63	0	63	-	63	0.00
23	345	0.01	5	68	0	68	-	68	0.00
24	360	0.01	5	73	0	73	-	73	0.00
25	375	0.01	5	78	0	78	-	78	0.00
26	390	0.01	5	84	0	84	-	84	0.00
27	405	0.01	6	90	0	90	-	90	0.00
28	420	0.01	6	96	0	96	-	96	0.00
29	435	0.01	6	102	0	102	-	102	0.00
30	450	0.01	7	108	0	108	-	108	0.00
31	465	0.01	7	116	0	116	-	116	0.00
32	480	0.01	8	123	0	123	-	123	0.00
33	495	0.01	9	132	0	132	-	132	0.00
34	510	0.01	9	142	0	142	-	142	0.00
35	525	0.01	10	151	0	151	-	151	0.00
36	540	0.01	10	161	0	161	-	161	0.00
37	555	0.01	11	173	0	173	-	173	0.00
38	570	0.01	12	185	0	185	-	185	0.00
39	585	0.01	13	198	0	198	-	198	0.00
40	600	0.01	13	211	0	211	-	211	0.00
41	615	0.01	9	220	0	220	-	220	0.01
42	630	0.01	9	229	0	229	-	229	0.01
43	645	0.01	12	241	0	241	-	241	0.01
44	660	0.01	12	253	0	253	-	253	0.01
45	675	0.01	11	264	0	264	-	264	0.01
46	690	0.01	11	276	0	276	-	276	0.01
47	705	0.01	10	286	0	286	-	286	0.01
48	720	0.01	11	297	0	297	-	297	0.01
49	735	0.02	15	312	0	312	-	312	0.01
50	750	0.02	16	328	0	328	-	328	0.01
51	765	0.02	17	344	0	344	-	344	0.01
52	780	0.02	17	362	0	362	-	362	0.01
53	795	0.02	20	382	0	382	-	382	0.01
54	810	0.02	20	403	0	403	-	403	0.01
55	825	0.02	14	417	0	417	-	417	0.01
56	840	0.02	14	431	0	431	-	431	0.01
57	855	0.02	16	447	0	447	-	447	0.01
58	870	0.02	16	462	0	462	-	462	0.01

1

JOB # C2026

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	0.02	16	478	0	478	-	478	0.01
60	900	0.02	15	493	0	493	-	493	0.01
61	915	0.02	14	508	0	508	-	508	0.01
62	930	0.02	14	522	0	522	-	522	0.01
63	945	0.01	11	533	0	533	-	533	0.01
64	960	0.01	11	544	0	544	-	544	0.01
65	975	0.00	2	547	0	547	-	547	0.01
66	990	0.00	2	549	0	549	-	549	0.01
67	1005	0.00	2	551	0	551	-	551	0.01
68	1020	0.00	2	553	0	553	-	553	0.01
69	1035	0.00	3	556	0	556	-	556	0.01
70	1050	0.00	3	559	0	559	-	559	0.01
71	1065	0.00	3	562	0	562	-	562	0.01
72	1080	0.00	2	564	0	564	-	564	0.01
73	1095	0.00	2	567	0	567	-	567	0.01
74	1110	0.00	2	569	0	569	-	569	0.01
75	1125	0.00	2	571	0	571	-	571	0.01
76	1140	0.00	1	572	0	572	-	572	0.01
77	1155	0.00	2	574	0	574	-	574	0.01
78	1170	0.00	2	576	0	576	-	576	0.01
79	1185	0.00	2	578	0	578	-	578	0.01
80	1200	0.00	1	579	0	579	-	579	0.01
81	1215	0.00	2	581	0	581	-	581	0.01
82	1230	0.00	2	583	0	583	-	583	0.01
83	1245	0.00	2	585	0	585	-	585	0.01
84	1260	0.00	1	586	0	586	-	586	0.01
85	1275	0.00	2	588	0	588	-	588	0.01
86	1290	0.00	1	589	0	589	-	589	0.01
87	1305	0.00	2	591	0	591	-	591	0.01
88	1320	0.00	1	592	0	592	-	592	0.01
89	1335	0.00	2	594	0	594	-	594	0.01
90	1350	0.00	1	595	0	595	-	595	0.01
91	1365	0.00	1	596	0	596	-	596	0.01
92	1380	0.00	1	597	0	597	-	597	0.01
93	1395	0.00	1	599	0	599	-	599	0.01
94	1410	0.00	1	600	0	600	-	600	0.01
95	1425	0.00	1	601	0	601	-	601	0.01
96	1440	0.00	1	602	0	602	-	602	0.01

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM EXIST 10 YR EVENT - SOUTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
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	0.88		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.35		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	320		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	40		
30				
31	ELEVATION OF HEADWATER	329		
32	ELEVATION OF CONCENTRATION POINT	267		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	1.5		
40	6-HOUR	1.93		
41	24-HOUR	2.66		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	1.230
[4] L-FEET	320
[5] L-MILES	0.061
[6] La-FEET	40.00
[7] La-MILES	0.008
[8] ELEVATION OF HEADWATER	329
[9] ELEVATION OF CONCENTRATION POINT	267
[10] H-FEET	62
[11] S-FEET/MILE	1023.0
[12] S^0.5	31.98
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.4
[17] 100% OF LAG-MINUTES	0.4
[18] 200% OF LAG-MINUTES	0.8
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
1.50	1.230	1.00	1.50	1.93	1.230	1.00	1.93	2.66	1.230	1.00	2.66
		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]	1.23	SUM [7]	1.50	SUM [9]	1.23	SUM [11]	1.93	SUM [13]	1.23	SUM [15]	2.66
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.50				1.93				2.66

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.36	0.34	0.27
FLOOD VOLUME	(cu-ft)	1,605	1,497	1,188
	(acre-ft)	0.04	0.03	0.03
REQUIRED STORAGE	(cu-ft)	1,592	1,485	1,178
	(acre-ft)	0.04	0.03	0.03
PEAK FLOW	(cfs)	1.10	0.88	0.04
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.00	0.000	0.0000
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.88	0.715	0.5294
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.35	0.285	0.0514
					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 1.23		SUM 0.5808

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.290396341

C= 0.00538

Ft=C(24-(T/60))^1.55 = 0.00538 (24-(T/60))^1.55 + 0.29 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: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.42
UNIT TIME-PERCENT OF LAG	1202.0
TOTAL ADJUSTED STORM RAIN-INCHES	1.50
CONSTANT LOSS RATE-in/hr	0.58
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.234	0.58	0.21	0.02	0.03	8.63
2	10	0.17	1.3	0.234	0.58	0.21	0.02	0.03	8.63
3	15	0.25	1.1	0.198	0.58	0.18	0.02	0.02	7.31
4	20	0.33	1.5	0.270	0.58	0.24	0.03	0.03	9.96
5	25	0.42	1.5	0.270	0.58	0.24	0.03	0.03	9.96
6	30	0.50	1.8	0.324	0.58	0.29	0.03	0.04	11.96
7	35	0.58	1.5	0.270	0.58	0.24	0.03	0.03	9.96
8	40	0.67	1.8	0.324	0.58	0.29	0.03	0.04	11.96
9	45	0.75	1.8	0.324	0.58	0.29	0.03	0.04	11.96
10	50	0.83	1.5	0.270	0.58	0.24	0.03	0.03	9.96
11	55	0.92	1.6	0.288	0.58	0.26	0.03	0.04	10.63
12	60	1.00	1.8	0.324	0.58	0.29	0.03	0.04	11.96
13	65	1.08	2.2	0.396	0.58	0.36	0.04	0.05	14.61
14	70	1.17	2.2	0.396	0.58	0.36	0.04	0.05	14.61
15	75	1.25	2.2	0.396	0.58	0.36	0.04	0.05	14.61
16	80	1.33	2.0	0.360	0.58	0.32	0.04	0.04	13.28
17	85	1.42	2.6	0.468	0.58	0.42	0.05	0.06	17.27
18	90	1.50	2.7	0.486	0.58	0.44	0.05	0.06	17.93
19	95	1.58	2.4	0.432	0.58	0.39	0.04	0.05	15.94
20	100	1.67	2.7	0.486	0.58	0.44	0.05	0.06	17.93
21	105	1.75	3.3	0.594	0.58	0.53	0.01	0.02	4.87
22	110	1.83	3.1	0.558	0.58	0.50	0.06	0.07	20.59
23	115	1.92	2.9	0.522	0.58	0.47	0.05	0.06	19.26
24	120	2.00	3.0	0.540	0.58	0.49	0.05	0.07	19.93
25	125	2.08	3.1	0.558	0.58	0.50	0.06	0.07	20.59
26	130	2.17	4.2	0.756	0.58	0.68	0.18	0.22	64.65
27	135	2.25	5.0	0.900	0.58	0.81	0.32	0.39	117.79
28	140	2.33	3.5	0.630	0.58	0.57	0.05	0.06	18.16
29	145	2.42	6.8	1.224	0.58	1.10	0.64	0.79	237.34
30	150	2.50	7.3	1.314	0.58	1.18	0.73	0.90	270.55
31	155	2.58	8.2	1.476	0.58	1.33	0.90	1.10	330.33
32	160	2.67	5.9	1.062	0.58	0.96	0.48	0.59	177.57
33	165	2.75	2.0	0.360	0.58	0.32	0.04	0.04	13.28
34	170	2.83	1.8	0.324	0.58	0.29	0.03	0.04	11.96
35	175	2.92	1.8	0.324	0.58	0.29	0.03	0.04	11.96
36	180	3.00	0.6	0.108	0.58	0.10	0.01	0.01	3.99

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.36
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1605.16
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1591.89
PEAK FLOW RATE (cfs)	1.10

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

PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOU
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.42
UNIT TIME-PERCENT OF LAG	1202.0
TOTAL ADJUSTED STORM RAIN-INCHES	1.93
CONSTANT LOSS RATE-in/hr	0.581
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.116	0.58	0.10	0.01	0.01	4.27
2	10	0.17	0.6	0.139	0.58	0.13	0.01	0.02	5.13
3	15	0.25	0.6	0.139	0.58	0.13	0.01	0.02	5.13
4	20	0.33	0.6	0.139	0.58	0.13	0.01	0.02	5.13
5	25	0.42	0.6	0.139	0.58	0.13	0.01	0.02	5.13
6	30	0.50	0.7	0.162	0.58	0.15	0.02	0.02	5.98
7	35	0.58	0.7	0.162	0.58	0.15	0.02	0.02	5.98
8	40	0.67	0.7	0.162	0.58	0.15	0.02	0.02	5.98
9	45	0.75	0.7	0.162	0.58	0.15	0.02	0.02	5.98
10	50	0.83	0.7	0.162	0.58	0.15	0.02	0.02	5.98
11	55	0.92	0.7	0.162	0.58	0.15	0.02	0.02	5.98
12	60	1.00	0.8	0.185	0.58	0.17	0.02	0.02	6.84
13	65	1.08	0.8	0.185	0.58	0.17	0.02	0.02	6.84
14	70	1.17	0.8	0.185	0.58	0.17	0.02	0.02	6.84
15	75	1.25	0.8	0.185	0.58	0.17	0.02	0.02	6.84
16	80	1.33	0.8	0.185	0.58	0.17	0.02	0.02	6.84
17	85	1.42	0.8	0.185	0.58	0.17	0.02	0.02	6.84
18	90	1.50	0.8	0.185	0.58	0.17	0.02	0.02	6.84
19	95	1.58	0.8	0.185	0.58	0.17	0.02	0.02	6.84
20	100	1.67	0.8	0.185	0.58	0.17	0.02	0.02	6.84
21	105	1.75	0.8	0.185	0.58	0.17	0.02	0.02	6.84
22	110	1.83	0.8	0.185	0.58	0.17	0.02	0.02	6.84
23	115	1.92	0.8	0.185	0.58	0.17	0.02	0.02	6.84
24	120	2.00	0.9	0.208	0.58	0.19	0.02	0.03	7.69
25	125	2.08	0.8	0.185	0.58	0.17	0.02	0.02	6.84
26	130	2.17	0.9	0.208	0.58	0.19	0.02	0.03	7.69
27	135	2.25	0.9	0.208	0.58	0.19	0.02	0.03	7.69
28	140	2.33	0.9	0.208	0.58	0.19	0.02	0.03	7.69
29	145	2.42	0.9	0.208	0.58	0.19	0.02	0.03	7.69
30	150	2.50	0.9	0.208	0.58	0.19	0.02	0.03	7.69
31	155	2.58	0.9	0.208	0.58	0.19	0.02	0.03	7.69
32	160	2.67	0.9	0.208	0.58	0.19	0.02	0.03	7.69
33	165	2.75	1.0	0.232	0.58	0.21	0.02	0.03	8.55
34	170	2.83	1.0	0.232	0.58	0.21	0.02	0.03	8.55
35	175	2.92	1.0	0.232	0.58	0.21	0.02	0.03	8.55
36	180	3.00	1.0	0.232	0.58	0.21	0.02	0.03	8.55
37	185	3.08	1.0	0.232	0.58	0.21	0.02	0.03	8.55
38	190	3.17	1.1	0.255	0.58	0.23	0.03	0.03	9.40
39	195	3.25	1.1	0.255	0.58	0.23	0.03	0.03	9.40
40	200	3.33	1.1	0.255	0.58	0.23	0.03	0.03	9.40
41	205	3.42	1.2	0.278	0.58	0.25	0.03	0.03	10.26
42	210	3.50	1.3	0.301	0.58	0.27	0.03	0.04	11.11
43	215	3.58	1.4	0.324	0.58	0.29	0.03	0.04	11.96
44	220	3.67	1.4	0.324	0.58	0.29	0.03	0.04	11.96
45	225	3.75	1.5	0.347	0.58	0.31	0.03	0.04	12.82
46	230	3.83	1.5	0.347	0.58	0.31	0.03	0.04	12.82
47	235	3.92	1.6	0.371	0.58	0.33	0.04	0.05	13.67
48	240	4.00	1.6	0.371	0.58	0.33	0.04	0.05	13.67
49	245	4.08	1.7	0.394	0.58	0.35	0.04	0.05	14.53
50	250	4.17	1.8	0.417	0.58	0.38	0.04	0.05	15.38
51	255	4.25	1.9	0.440	0.58	0.40	0.04	0.05	16.24
52	260	4.33	2.0	0.463	0.58	0.42	0.05	0.06	17.09
53	265	4.42	2.1	0.486	0.58	0.44	0.05	0.06	17.95
54	270	4.50	2.1	0.486	0.58	0.44	0.05	0.06	17.95
55	275	4.58	2.2	0.510	0.58	0.46	0.05	0.06	18.80
56	280	4.67	2.3	0.533	0.58	0.48	0.05	0.07	19.66

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOU CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.42		
UNIT TIME-PERCENT OF LAG	1202.0		
TOTAL ADJUSTED STORM RAIN-INCHES	1.93		
CONSTANT LOSS RATE-in/hr	0.581		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.556	0.58	0.50	0.06	0.07	20.51
58	290	4.83	2.4	0.556	0.58	0.50	0.06	0.07	20.51
59	295	4.92	2.5	0.579	0.58	0.52	0.06	0.07	21.37
60	300	5.00	2.6	0.602	0.58	0.54	0.02	0.03	7.88
61	305	5.08	3.1	0.718	0.58	0.65	0.14	0.17	50.61
62	310	5.17	3.6	0.834	0.58	0.75	0.25	0.31	93.34
63	315	5.25	3.9	0.903	0.58	0.81	0.32	0.40	118.98
64	320	5.33	4.2	0.973	0.58	0.88	0.39	0.48	144.62
65	325	5.42	4.7	1.089	0.58	0.98	0.51	0.62	187.35
66	330	5.50	5.6	1.297	0.58	1.17	0.72	0.88	264.27
67	335	5.58	1.9	0.440	0.58	0.40	0.04	0.05	16.24
68	340	5.67	0.9	0.208	0.58	0.19	0.02	0.03	7.69
69	345	5.75	0.6	0.139	0.58	0.13	0.01	0.02	5.13
70	350	5.83	0.5	0.116	0.58	0.10	0.01	0.01	4.27
71	355	5.92	0.3	0.069	0.58	0.06	0.01	0.01	2.56
72	360	6.00	0.2	0.046	0.58	0.04	0.00	0.01	1.71

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.34
FLOOD VOLUME (acft)	0.03
FLOOD VOLUME (cuft)	1497.32
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1484.94
PEAK FLOW RATE (cfs)	0.88

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

PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.5808
LAG TIME - MINUTES	0.42	MINIMUM LOSS RATE (for var. loss) - in/hr	0.290
UNIT TIME-PERCENT OF LAG	3606.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00538
		PERCOLATION RATE (cfs)	0.00

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	0.021	1.026	0.019	0.002	0.00	2.36
2	30	0.50	0.3	0.032	1.014	0.029	0.003	0.00	3.53
3	45	0.75	0.3	0.032	1.002	0.029	0.003	0.00	3.53
4	60	1.00	0.4	0.043	0.990	0.038	0.004	0.01	4.71
5	75	1.25	0.3	0.032	0.978	0.029	0.003	0.00	3.53
6	90	1.50	0.3	0.032	0.967	0.029	0.003	0.00	3.53
7	105	1.75	0.3	0.032	0.955	0.029	0.003	0.00	3.53
8	120	2.00	0.4	0.043	0.944	0.038	0.004	0.01	4.71
9	135	2.25	0.4	0.043	0.932	0.038	0.004	0.01	4.71
10	150	2.50	0.4	0.043	0.921	0.038	0.004	0.01	4.71
11	165	2.75	0.5	0.053	0.910	0.048	0.005	0.01	5.89
12	180	3.00	0.5	0.053	0.899	0.048	0.005	0.01	5.89
13	195	3.25	0.5	0.053	0.887	0.048	0.005	0.01	5.89
14	210	3.50	0.5	0.053	0.876	0.048	0.005	0.01	5.89
15	225	3.75	0.5	0.053	0.865	0.048	0.005	0.01	5.89
16	240	4.00	0.6	0.064	0.855	0.057	0.006	0.01	7.07
17	255	4.25	0.6	0.064	0.844	0.057	0.006	0.01	7.07
18	270	4.50	0.7	0.074	0.833	0.067	0.007	0.01	8.24
19	285	4.75	0.7	0.074	0.822	0.067	0.007	0.01	8.24
20	300	5.00	0.8	0.085	0.812	0.077	0.009	0.01	9.42
21	315	5.25	0.6	0.064	0.801	0.057	0.006	0.01	7.07
22	330	5.50	0.7	0.074	0.791	0.067	0.007	0.01	8.24
23	345	5.75	0.8	0.085	0.780	0.077	0.009	0.01	9.42
24	360	6.00	0.8	0.085	0.770	0.077	0.009	0.01	9.42
25	375	6.25	0.9	0.096	0.760	0.086	0.010	0.01	10.60
26	390	6.50	0.9	0.096	0.750	0.086	0.010	0.01	10.60
27	405	6.75	1.0	0.106	0.740	0.096	0.011	0.01	11.78
28	420	7.00	1.0	0.106	0.730	0.096	0.011	0.01	11.78
29	435	7.25	1.0	0.106	0.720	0.096	0.011	0.01	11.78
30	450	7.50	1.1	0.117	0.710	0.105	0.012	0.01	12.96
31	465	7.75	1.2	0.128	0.700	0.115	0.013	0.02	14.13
32	480	8.00	1.3	0.138	0.691	0.124	0.014	0.02	15.31
33	495	8.25	1.5	0.160	0.681	0.144	0.016	0.02	17.67
34	510	8.50	1.5	0.160	0.671	0.144	0.016	0.02	17.67
35	525	8.75	1.6	0.170	0.662	0.153	0.017	0.02	18.85
36	540	9.00	1.7	0.181	0.653	0.163	0.018	0.02	20.02
37	555	9.25	1.9	0.202	0.644	0.182	0.020	0.02	22.38
38	570	9.50	2.0	0.213	0.634	0.192	0.021	0.03	23.56
39	585	9.75	2.1	0.223	0.625	0.201	0.022	0.03	24.73
40	600	10.00	2.2	0.234	0.616	0.211	0.023	0.03	25.91
41	615	10.25	1.5	0.160	0.607	0.144	0.016	0.02	17.67
42	630	10.50	1.5	0.160	0.599	0.144	0.016	0.02	17.67
43	645	10.75	2.0	0.213	0.590	0.192	0.021	0.03	23.56
44	660	11.00	2.0	0.213	0.581	0.192	0.021	0.03	23.56
45	675	11.25	1.9	0.202	0.573	0.182	0.020	0.02	22.38
46	690	11.50	1.9	0.202	0.564	0.182	0.020	0.02	22.38
47	705	11.75	1.7	0.181	0.556	0.163	0.018	0.02	20.02
48	720	12.00	1.8	0.192	0.548	0.172	0.019	0.02	21.20
49	735	12.25	2.5	0.266	0.539	0.239	0.027	0.03	29.45
50	750	12.50	2.6	0.277	0.531	0.249	0.028	0.03	30.62
51	765	12.75	2.8	0.298	0.523	0.268	0.030	0.04	32.98
52	780	13.00	2.9	0.309	0.515	0.278	0.031	0.04	34.16
53	795	13.25	3.4	0.362	0.508	0.326	0.036	0.04	40.05
54	810	13.50	3.4	0.362	0.500	0.326	0.036	0.04	40.05
55	825	13.75	2.3	0.245	0.492	0.220	0.024	0.03	27.09
56	840	14.00	2.3	0.245	0.485	0.220	0.024	0.03	27.09
57	855	14.25	2.7	0.287	0.478	0.259	0.029	0.04	31.80
58	870	14.50	2.6	0.277	0.470	0.249	0.028	0.03	30.62
59	885	14.75	2.6	0.277	0.463	0.249	0.028	0.03	30.62
60	900	15.00	2.5	0.266	0.456	0.239	0.027	0.03	29.45
61	915	15.25	2.4	0.255	0.449	0.230	0.026	0.03	28.27
62	930	15.50	2.3	0.245	0.442	0.220	0.024	0.03	27.09
63	945	15.75	1.9	0.202	0.435	0.182	0.020	0.02	22.38
64	960	16.00	1.9	0.202	0.429	0.182	0.020	0.02	22.38
65	975	16.25	0.4	0.043	0.422	0.038	0.004	0.01	4.71
66	990	16.50	0.4	0.043	0.416	0.038	0.004	0.01	4.71
67	1005	16.75	0.3	0.032	0.409	0.029	0.003	0.00	3.53

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.5808
LAG TIME - MINUTES	0.42	MINIMUM LOSS RATE (for var. loss) - in/hr	0.290
UNIT TIME-PERCENT OF LAG	3606.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00538
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.032	0.403	0.029	0.003	0.00	3.53
69	1035	17.25	0.5	0.053	0.397	0.048	0.005	0.01	5.89
70	1050	17.50	0.5	0.053	0.391	0.048	0.005	0.01	5.89
71	1065	17.75	0.5	0.053	0.385	0.048	0.005	0.01	5.89
72	1080	18.00	0.4	0.043	0.380	0.038	0.004	0.01	4.71
73	1095	18.25	0.4	0.043	0.374	0.038	0.004	0.01	4.71
74	1110	18.50	0.4	0.043	0.369	0.038	0.004	0.01	4.71
75	1125	18.75	0.3	0.032	0.363	0.029	0.003	0.00	3.53
76	1140	19.00	0.2	0.021	0.358	0.019	0.002	0.00	2.36
77	1155	19.25	0.3	0.032	0.353	0.029	0.003	0.00	3.53
78	1170	19.50	0.4	0.043	0.348	0.038	0.004	0.01	4.71
79	1185	19.75	0.3	0.032	0.343	0.029	0.003	0.00	3.53
80	1200	20.00	0.2	0.021	0.339	0.019	0.002	0.00	2.36
81	1215	20.25	0.3	0.032	0.334	0.029	0.003	0.00	3.53
82	1230	20.50	0.3	0.032	0.330	0.029	0.003	0.00	3.53
83	1245	20.75	0.3	0.032	0.326	0.029	0.003	0.00	3.53
84	1260	21.00	0.2	0.021	0.322	0.019	0.002	0.00	2.36
85	1275	21.25	0.3	0.032	0.318	0.029	0.003	0.00	3.53
86	1290	21.50	0.2	0.021	0.314	0.019	0.002	0.00	2.36
87	1305	21.75	0.3	0.032	0.311	0.029	0.003	0.00	3.53
88	1320	22.00	0.2	0.021	0.308	0.019	0.002	0.00	2.36
89	1335	22.25	0.3	0.032	0.305	0.029	0.003	0.00	3.53
90	1350	22.50	0.2	0.021	0.302	0.019	0.002	0.00	2.36
91	1365	22.75	0.2	0.021	0.299	0.019	0.002	0.00	2.36
92	1380	23.00	0.2	0.021	0.297	0.019	0.002	0.00	2.36
93	1395	23.25	0.2	0.021	0.295	0.019	0.002	0.00	2.36
94	1410	23.50	0.2	0.021	0.293	0.019	0.002	0.00	2.36
95	1425	23.75	0.2	0.021	0.292	0.019	0.002	0.00	2.36
96	1440	24.00	0.2	0.021	0.291	0.019	0.002	0.00	2.36

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.27
FLOOD VOLUME (acft)	0.03
FLOOD VOLUME (cuft)	1187.67
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1177.85
PEAK FLOW (cfs)	0.04

PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
JOB # C2026
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

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JOB # C2026

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	0.03	9	9	0	9	-	9	0.00
2	10	0.03	9	17	0	17	-	17	0.00
3	15	0.02	7	25	0	25	-	25	0.00
4	20	0.03	10	35	0	35	-	35	0.00
5	25	0.03	10	45	0	45	-	45	0.00
6	30	0.04	12	56	0	56	-	56	0.00
7	35	0.03	10	66	0	66	-	66	0.00
8	40	0.04	12	78	0	78	-	78	0.00
9	45	0.04	12	90	0	90	-	90	0.00
10	50	0.03	10	100	0	100	-	100	0.00
11	55	0.04	11	111	0	111	-	111	0.00
12	60	0.04	12	123	0	123	-	123	0.00
13	65	0.05	15	137	0	137	-	137	0.00
14	70	0.05	15	152	0	152	-	152	0.00
15	75	0.05	15	167	0	167	-	167	0.00
16	80	0.04	13	180	0	180	-	180	0.00
17	85	0.06	17	197	0	197	-	197	0.00
18	90	0.06	18	215	0	215	-	215	0.00
19	95	0.05	16	231	0	231	-	231	0.01
20	100	0.06	18	249	0	249	-	249	0.01
21	105	0.02	5	254	0	254	-	254	0.01
22	110	0.07	21	275	0	275	-	275	0.01
23	115	0.06	19	294	0	294	-	294	0.01
24	120	0.07	20	314	0	314	-	314	0.01
25	125	0.07	21	334	0	334	-	334	0.01
26	130	0.22	65	399	0	399	-	399	0.01
27	135	0.39	118	517	0	517	-	517	0.01
28	140	0.06	18	535	0	535	-	535	0.01
29	145	0.79	237	772	0	772	-	772	0.02
30	150	0.90	271	1,043	0	1,043	-	1,043	0.02
31	155	1.10	330	1,373	0	1,373	-	1,373	0.03
32	160	0.59	178	1,551	0	1,551	-	1,551	0.04
33	165	0.04	13	1,564	0	1,564	-	1,564	0.04
34	170	0.04	12	1,576	0	1,576	-	1,576	0.04
35	175	0.04	12	1,588	0	1,588	-	1,588	0.04
36	180	0.01	4	1,592	0	1,592	-	1,592	0.04

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JOB # C2026

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	0.01	4	4	0	4	-	4	0.00
2	10	0.02	5	9	0	9	-	9	0.00
3	15	0.02	5	15	0	15	-	15	0.00
4	20	0.02	5	20	0	20	-	20	0.00
5	25	0.02	5	25	0	25	-	25	0.00
6	30	0.02	6	31	0	31	-	31	0.00
7	35	0.02	6	37	0	37	-	37	0.00
8	40	0.02	6	43	0	43	-	43	0.00
9	45	0.02	6	49	0	49	-	49	0.00
10	50	0.02	6	55	0	55	-	55	0.00
11	55	0.02	6	61	0	61	-	61	0.00
12	60	0.02	7	68	0	68	-	68	0.00
13	65	0.02	7	74	0	74	-	74	0.00
14	70	0.02	7	81	0	81	-	81	0.00
15	75	0.02	7	88	0	88	-	88	0.00
16	80	0.02	7	95	0	95	-	95	0.00
17	85	0.02	7	102	0	102	-	102	0.00
18	90	0.02	7	109	0	109	-	109	0.00
19	95	0.02	7	115	0	115	-	115	0.00
20	100	0.02	7	122	0	122	-	122	0.00
21	105	0.02	7	129	0	129	-	129	0.00
22	110	0.02	7	136	0	136	-	136	0.00
23	115	0.02	7	143	0	143	-	143	0.00
24	120	0.03	8	150	0	150	-	150	0.00
25	125	0.02	7	157	0	157	-	157	0.00
26	130	0.03	8	165	0	165	-	165	0.00
27	135	0.03	8	173	0	173	-	173	0.00
28	140	0.03	8	180	0	180	-	180	0.00
29	145	0.03	8	188	0	188	-	188	0.00
30	150	0.03	8	196	0	196	-	196	0.00
31	155	0.03	8	203	0	203	-	203	0.00
32	160	0.03	8	211	0	211	-	211	0.00
33	165	0.03	9	220	0	220	-	220	0.01
34	170	0.03	9	228	0	228	-	228	0.01
35	175	0.03	9	237	0	237	-	237	0.01
36	180	0.03	9	245	0	245	-	245	0.01
37	185	0.03	9	254	0	254	-	254	0.01
38	190	0.03	9	263	0	263	-	263	0.01
39	195	0.03	9	273	0	273	-	273	0.01
40	200	0.03	9	282	0	282	-	282	0.01
41	205	0.03	10	292	0	292	-	292	0.01
42	210	0.04	11	303	0	303	-	303	0.01
43	215	0.04	12	315	0	315	-	315	0.01
44	220	0.04	12	327	0	327	-	327	0.01
45	225	0.04	13	340	0	340	-	340	0.01
46	230	0.04	13	353	0	353	-	353	0.01
47	235	0.05	14	367	0	367	-	367	0.01
48	240	0.05	14	380	0	380	-	380	0.01
49	245	0.05	15	395	0	395	-	395	0.01
50	250	0.05	15	410	0	410	-	410	0.01
51	255	0.05	16	426	0	426	-	426	0.01
52	260	0.06	17	444	0	444	-	444	0.01
53	265	0.06	18	461	0	461	-	461	0.01
54	270	0.06	18	479	0	479	-	479	0.01
55	275	0.06	19	498	0	498	-	498	0.01

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JOB # C2026

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	0.07	20	518	0	518	-	518	0.01
57	285	0.07	21	538	0	538	-	538	0.01
58	290	0.07	21	559	0	559	-	559	0.01
59	295	0.07	21	580	0	580	-	580	0.01
60	300	0.03	8	588	0	588	-	588	0.01
61	305	0.17	51	639	0	639	-	639	0.01
62	310	0.31	93	732	0	732	-	732	0.02
63	315	0.40	119	851	0	851	-	851	0.02
64	320	0.48	145	996	0	996	-	996	0.02
65	325	0.62	187	1,183	0	1,183	-	1,183	0.03
66	330	0.88	264	1,447	0	1,447	-	1,447	0.03
67	335	0.05	16	1,464	0	1,464	-	1,464	0.03
68	340	0.03	8	1,471	0	1,471	-	1,471	0.03
69	345	0.02	5	1,476	0	1,476	-	1,476	0.03
70	350	0.01	4	1,481	0	1,481	-	1,481	0.03
71	355	0.01	3	1,483	0	1,483	-	1,483	0.03
72	360	0.01	2	1,485	0	1,485	-	1,485	0.03

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JOB # C2026

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	2	2	0	2	-	2	0.00
2	30	0.00	4	6	0	6	-	6	0.00
3	45	0.00	4	9	0	9	-	9	0.00
4	60	0.01	5	14	0	14	-	14	0.00
5	75	0.00	4	18	0	18	-	18	0.00
6	90	0.00	4	21	0	21	-	21	0.00
7	105	0.00	4	25	0	25	-	25	0.00
8	120	0.01	5	29	0	29	-	29	0.00
9	135	0.01	5	34	0	34	-	34	0.00
10	150	0.01	5	39	0	39	-	39	0.00
11	165	0.01	6	45	0	45	-	45	0.00
12	180	0.01	6	51	0	51	-	51	0.00
13	195	0.01	6	57	0	57	-	57	0.00
14	210	0.01	6	62	0	62	-	62	0.00
15	225	0.01	6	68	0	68	-	68	0.00
16	240	0.01	7	75	0	75	-	75	0.00
17	255	0.01	7	82	0	82	-	82	0.00
18	270	0.01	8	91	0	91	-	91	0.00
19	285	0.01	8	99	0	99	-	99	0.00
20	300	0.01	9	108	0	108	-	108	0.00
21	315	0.01	7	115	0	115	-	115	0.00
22	330	0.01	8	124	0	124	-	124	0.00
23	345	0.01	9	133	0	133	-	133	0.00
24	360	0.01	9	143	0	143	-	143	0.00
25	375	0.01	11	153	0	153	-	153	0.00
26	390	0.01	11	164	0	164	-	164	0.00
27	405	0.01	12	175	0	175	-	175	0.00
28	420	0.01	12	187	0	187	-	187	0.00
29	435	0.01	12	199	0	199	-	199	0.00
30	450	0.01	13	212	0	212	-	212	0.00
31	465	0.02	14	226	0	226	-	226	0.01
32	480	0.02	15	241	0	241	-	241	0.01
33	495	0.02	18	259	0	259	-	259	0.01
34	510	0.02	18	277	0	277	-	277	0.01
35	525	0.02	19	296	0	296	-	296	0.01
36	540	0.02	20	316	0	316	-	316	0.01
37	555	0.02	22	338	0	338	-	338	0.01
38	570	0.03	24	362	0	362	-	362	0.01
39	585	0.03	25	386	0	386	-	386	0.01
40	600	0.03	26	412	0	412	-	412	0.01
41	615	0.02	18	430	0	430	-	430	0.01
42	630	0.02	18	448	0	448	-	448	0.01
43	645	0.03	24	471	0	471	-	471	0.01
44	660	0.03	24	495	0	495	-	495	0.01
45	675	0.02	22	517	0	517	-	517	0.01
46	690	0.02	22	539	0	539	-	539	0.01
47	705	0.02	20	559	0	559	-	559	0.01
48	720	0.02	21	581	0	581	-	581	0.01
49	735	0.03	29	610	0	610	-	610	0.01
50	750	0.03	31	641	0	641	-	641	0.01
51	765	0.04	33	674	0	674	-	674	0.02
52	780	0.04	34	708	0	708	-	708	0.02
53	795	0.04	40	748	0	748	-	748	0.02
54	810	0.04	40	788	0	788	-	788	0.02
55	825	0.03	27	815	0	815	-	815	0.02
56	840	0.03	27	842	0	842	-	842	0.02
57	855	0.04	32	874	0	874	-	874	0.02
58	870	0.03	31	905	0	905	-	905	0.02

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JOB # C2026

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	0.03	31	935	0	935	-	935	0.02
60	900	0.03	29	965	0	965	-	965	0.02
61	915	0.03	28	993	0	993	-	993	0.02
62	930	0.03	27	1,020	0	1,020	-	1,020	0.02
63	945	0.02	22	1,042	0	1,042	-	1,042	0.02
64	960	0.02	22	1,065	0	1,065	-	1,065	0.02
65	975	0.01	5	1,069	0	1,069	-	1,069	0.02
66	990	0.01	5	1,074	0	1,074	-	1,074	0.02
67	1005	0.00	4	1,078	0	1,078	-	1,078	0.02
68	1020	0.00	4	1,081	0	1,081	-	1,081	0.02
69	1035	0.01	6	1,087	0	1,087	-	1,087	0.02
70	1050	0.01	6	1,093	0	1,093	-	1,093	0.03
71	1065	0.01	6	1,099	0	1,099	-	1,099	0.03
72	1080	0.01	5	1,104	0	1,104	-	1,104	0.03
73	1095	0.01	5	1,108	0	1,108	-	1,108	0.03
74	1110	0.01	5	1,113	0	1,113	-	1,113	0.03
75	1125	0.00	4	1,117	0	1,117	-	1,117	0.03
76	1140	0.00	2	1,119	0	1,119	-	1,119	0.03
77	1155	0.00	4	1,122	0	1,122	-	1,122	0.03
78	1170	0.01	5	1,127	0	1,127	-	1,127	0.03
79	1185	0.00	4	1,131	0	1,131	-	1,131	0.03
80	1200	0.00	2	1,133	0	1,133	-	1,133	0.03
81	1215	0.00	4	1,137	0	1,137	-	1,137	0.03
82	1230	0.00	4	1,140	0	1,140	-	1,140	0.03
83	1245	0.00	4	1,144	0	1,144	-	1,144	0.03
84	1260	0.00	2	1,146	0	1,146	-	1,146	0.03
85	1275	0.00	4	1,150	0	1,150	-	1,150	0.03
86	1290	0.00	2	1,152	0	1,152	-	1,152	0.03
87	1305	0.00	4	1,155	0	1,155	-	1,155	0.03
88	1320	0.00	2	1,158	0	1,158	-	1,158	0.03
89	1335	0.00	4	1,161	0	1,161	-	1,161	0.03
90	1350	0.00	2	1,164	0	1,164	-	1,164	0.03
91	1365	0.00	2	1,166	0	1,166	-	1,166	0.03
92	1380	0.00	2	1,168	0	1,168	-	1,168	0.03
93	1395	0.00	2	1,171	0	1,171	-	1,171	0.03
94	1410	0.00	2	1,173	0	1,173	-	1,173	0.03
95	1425	0.00	2	1,175	0	1,175	-	1,175	0.03
96	1440	0.00	2	1,178	0	1,178	-	1,178	0.03

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM SOUTH PROP 2 YR EVENT		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	0.37		
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	0.51		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.35		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	315		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	15		
30				
31	ELEVATION OF HEADWATER	329		
32	ELEVATION OF CONCENTRATION POINT	267		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.721		
40	6-HOUR	0.953		
41	24-HOUR	1.36		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVENT
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	1.230
[4] L-FEET	315
[5] L-MILES	0.060
[6] La-FEET	15.00
[7] La-MILES	0.003
[8] ELEVATION OF HEADWATER	329
[9] ELEVATION OF CONCENTRATION POINT	267
[10] H-FEET	62
[11] S-FEET/MILE	1039.2
[12] S^0.5	32.24
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.00
[16] LAG TIME-MINUTES	0.3
[17] 100% OF LAG-MINUTES	0.3
[18] 200% OF LAG-MINUTES	0.6
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
0.72	1.230	1.00	0.72	0.95	1.230	1.00	0.95	1.36	1.230	1.00	1.36
		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]	1.23	SUM [7]	0.72	SUM [9]	1.23	SUM [11]	0.95	SUM [13]	1.23	SUM [15]	1.36
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.72				0.95				1.36

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.13	0.13	0.14
FLOOD VOLUME	(cu-ft)	576	560	607
	(acre-ft)	0.01	0.01	0.01
REQUIRED STORAGE	(cu-ft)	571	556	602
	(acre-ft)	0.01	0.01	0.01
PEAK FLOW	(cfs)	0.40	0.32	0.02
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT WORLD MUSEUM SOUTH PROP 2 YR EVENT
CONCENTRATION POINT: 1
BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.37	0.301	0.0223
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.51	0.415	0.3068
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.35	0.285	0.0514
					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	1.23	SUM	0.3805

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.19022561
C= 0.00352

Ft=C(24-(T/60))^1.55 = 0.00352 (24-(T/60))^1.55 + 0.19 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: WORLD MUSEUM SOUTH PROP 2 YR EVENT
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.28
UNIT TIME-PERCENT OF LAG	1760.7
TOTAL ADJUSTED STORM RAIN-INCHES	0.72
CONSTANT LOSS RATE-in/hr	0.38
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.112	0.38	0.10	0.01	0.01	4.15
2	10	0.17	1.3	0.112	0.38	0.10	0.01	0.01	4.15
3	15	0.25	1.1	0.095	0.38	0.09	0.01	0.01	3.51
4	20	0.33	1.5	0.130	0.38	0.12	0.01	0.02	4.79
5	25	0.42	1.5	0.130	0.38	0.12	0.01	0.02	4.79
6	30	0.50	1.8	0.156	0.38	0.14	0.02	0.02	5.75
7	35	0.58	1.5	0.130	0.38	0.12	0.01	0.02	4.79
8	40	0.67	1.8	0.156	0.38	0.14	0.02	0.02	5.75
9	45	0.75	1.8	0.156	0.38	0.14	0.02	0.02	5.75
10	50	0.83	1.5	0.130	0.38	0.12	0.01	0.02	4.79
11	55	0.92	1.6	0.138	0.38	0.12	0.01	0.02	5.11
12	60	1.00	1.8	0.156	0.38	0.14	0.02	0.02	5.75
13	65	1.08	2.2	0.190	0.38	0.17	0.02	0.02	7.02
14	70	1.17	2.2	0.190	0.38	0.17	0.02	0.02	7.02
15	75	1.25	2.2	0.190	0.38	0.17	0.02	0.02	7.02
16	80	1.33	2.0	0.173	0.38	0.16	0.02	0.02	6.39
17	85	1.42	2.6	0.225	0.38	0.20	0.02	0.03	8.30
18	90	1.50	2.7	0.234	0.38	0.21	0.02	0.03	8.62
19	95	1.58	2.4	0.208	0.38	0.19	0.02	0.03	7.66
20	100	1.67	2.7	0.234	0.38	0.21	0.02	0.03	8.62
21	105	1.75	3.3	0.286	0.38	0.26	0.03	0.04	10.54
22	110	1.83	3.1	0.268	0.38	0.24	0.03	0.03	9.90
23	115	1.92	2.9	0.251	0.38	0.23	0.03	0.03	9.26
24	120	2.00	3.0	0.260	0.38	0.23	0.03	0.03	9.58
25	125	2.08	3.1	0.268	0.38	0.24	0.03	0.03	9.90
26	130	2.17	4.2	0.363	0.38	0.33	0.04	0.04	13.41
27	135	2.25	5.0	0.433	0.38	0.39	0.05	0.06	19.24
28	140	2.33	3.5	0.303	0.38	0.27	0.03	0.04	11.17
29	145	2.42	6.8	0.588	0.38	0.53	0.21	0.26	76.71
30	150	2.50	7.3	0.632	0.38	0.57	0.25	0.31	92.67
31	155	2.58	8.2	0.709	0.38	0.64	0.33	0.40	121.41
32	160	2.67	5.9	0.510	0.38	0.46	0.13	0.16	47.98
33	165	2.75	2.0	0.173	0.38	0.16	0.02	0.02	6.39
34	170	2.83	1.8	0.156	0.38	0.14	0.02	0.02	5.75
35	175	2.92	1.8	0.156	0.38	0.14	0.02	0.02	5.75
36	180	3.00	0.6	0.052	0.38	0.05	0.01	0.01	1.92

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.13
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	576.03
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	571.27
PEAK FLOW RATE (cfs)	0.40

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

PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVEN
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.28
UNIT TIME-PERCENT OF LAG	1760.7
TOTAL ADJUSTED STORM RAIN-INCHES	0.95
CONSTANT LOSS RATE-in/hr	0.380
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.057	0.38	0.05	0.01	0.01	2.11
2	10	0.17	0.6	0.069	0.38	0.06	0.01	0.01	2.53
3	15	0.25	0.6	0.069	0.38	0.06	0.01	0.01	2.53
4	20	0.33	0.6	0.069	0.38	0.06	0.01	0.01	2.53
5	25	0.42	0.6	0.069	0.38	0.06	0.01	0.01	2.53
6	30	0.50	0.7	0.080	0.38	0.07	0.01	0.01	2.95
7	35	0.58	0.7	0.080	0.38	0.07	0.01	0.01	2.95
8	40	0.67	0.7	0.080	0.38	0.07	0.01	0.01	2.95
9	45	0.75	0.7	0.080	0.38	0.07	0.01	0.01	2.95
10	50	0.83	0.7	0.080	0.38	0.07	0.01	0.01	2.95
11	55	0.92	0.7	0.080	0.38	0.07	0.01	0.01	2.95
12	60	1.00	0.8	0.091	0.38	0.08	0.01	0.01	3.38
13	65	1.08	0.8	0.091	0.38	0.08	0.01	0.01	3.38
14	70	1.17	0.8	0.091	0.38	0.08	0.01	0.01	3.38
15	75	1.25	0.8	0.091	0.38	0.08	0.01	0.01	3.38
16	80	1.33	0.8	0.091	0.38	0.08	0.01	0.01	3.38
17	85	1.42	0.8	0.091	0.38	0.08	0.01	0.01	3.38
18	90	1.50	0.8	0.091	0.38	0.08	0.01	0.01	3.38
19	95	1.58	0.8	0.091	0.38	0.08	0.01	0.01	3.38
20	100	1.67	0.8	0.091	0.38	0.08	0.01	0.01	3.38
21	105	1.75	0.8	0.091	0.38	0.08	0.01	0.01	3.38
22	110	1.83	0.8	0.091	0.38	0.08	0.01	0.01	3.38
23	115	1.92	0.8	0.091	0.38	0.08	0.01	0.01	3.38
24	120	2.00	0.9	0.103	0.38	0.09	0.01	0.01	3.80
25	125	2.08	0.8	0.091	0.38	0.08	0.01	0.01	3.38
26	130	2.17	0.9	0.103	0.38	0.09	0.01	0.01	3.80
27	135	2.25	0.9	0.103	0.38	0.09	0.01	0.01	3.80
28	140	2.33	0.9	0.103	0.38	0.09	0.01	0.01	3.80
29	145	2.42	0.9	0.103	0.38	0.09	0.01	0.01	3.80
30	150	2.50	0.9	0.103	0.38	0.09	0.01	0.01	3.80
31	155	2.58	0.9	0.103	0.38	0.09	0.01	0.01	3.80
32	160	2.67	0.9	0.103	0.38	0.09	0.01	0.01	3.80
33	165	2.75	1.0	0.114	0.38	0.10	0.01	0.01	4.22
34	170	2.83	1.0	0.114	0.38	0.10	0.01	0.01	4.22
35	175	2.92	1.0	0.114	0.38	0.10	0.01	0.01	4.22
36	180	3.00	1.0	0.114	0.38	0.10	0.01	0.01	4.22
37	185	3.08	1.0	0.114	0.38	0.10	0.01	0.01	4.22
38	190	3.17	1.1	0.126	0.38	0.11	0.01	0.02	4.64
39	195	3.25	1.1	0.126	0.38	0.11	0.01	0.02	4.64
40	200	3.33	1.1	0.126	0.38	0.11	0.01	0.02	4.64
41	205	3.42	1.2	0.137	0.38	0.12	0.01	0.02	5.06
42	210	3.50	1.3	0.149	0.38	0.13	0.01	0.02	5.49
43	215	3.58	1.4	0.160	0.38	0.14	0.02	0.02	5.91
44	220	3.67	1.4	0.160	0.38	0.14	0.02	0.02	5.91
45	225	3.75	1.5	0.172	0.38	0.15	0.02	0.02	6.33
46	230	3.83	1.5	0.172	0.38	0.15	0.02	0.02	6.33
47	235	3.92	1.6	0.183	0.38	0.16	0.02	0.02	6.75
48	240	4.00	1.6	0.183	0.38	0.16	0.02	0.02	6.75
49	245	4.08	1.7	0.194	0.38	0.17	0.02	0.02	7.17
50	250	4.17	1.8	0.206	0.38	0.19	0.02	0.03	7.60
51	255	4.25	1.9	0.217	0.38	0.20	0.02	0.03	8.02
52	260	4.33	2.0	0.229	0.38	0.21	0.02	0.03	8.44
53	265	4.42	2.1	0.240	0.38	0.22	0.02	0.03	8.86
54	270	4.50	2.1	0.240	0.38	0.22	0.02	0.03	8.86
55	275	4.58	2.2	0.252	0.38	0.23	0.03	0.03	9.28
56	280	4.67	2.3	0.263	0.38	0.24	0.03	0.03	9.71

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVEN CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.28		
UNIT TIME-PERCENT OF LAG	1760.7		
TOTAL ADJUSTED STORM RAIN-INCHES	0.95		
CONSTANT LOSS RATE-in/hr	0.380		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.274	0.38	0.25	0.03	0.03	10.13
58	290	4.83	2.4	0.274	0.38	0.25	0.03	0.03	10.13
59	295	4.92	2.5	0.286	0.38	0.26	0.03	0.04	10.55
60	300	5.00	2.6	0.297	0.38	0.27	0.03	0.04	10.97
61	305	5.08	3.1	0.355	0.38	0.32	0.04	0.04	13.08
62	310	5.17	3.6	0.412	0.38	0.37	0.03	0.04	11.53
63	315	5.25	3.9	0.446	0.38	0.40	0.07	0.08	24.19
64	320	5.33	4.2	0.480	0.38	0.43	0.10	0.12	36.85
65	325	5.42	4.7	0.537	0.38	0.48	0.16	0.19	57.95
66	330	5.50	5.6	0.640	0.38	0.58	0.26	0.32	95.93
67	335	5.58	1.9	0.217	0.38	0.20	0.02	0.03	8.02
68	340	5.67	0.9	0.103	0.38	0.09	0.01	0.01	3.80
69	345	5.75	0.6	0.069	0.38	0.06	0.01	0.01	2.53
70	350	5.83	0.5	0.057	0.38	0.05	0.01	0.01	2.11
71	355	5.92	0.3	0.034	0.38	0.03	0.00	0.00	1.27
72	360	6.00	0.2	0.023	0.38	0.02	0.00	0.00	0.84

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.13
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	560.23
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	555.59
PEAK FLOW RATE (cfs)	0.32

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

PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVENT
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.3805
LAG TIME - MINUTES	0.28	MINIMUM LOSS RATE (for var. loss) - in/hr	0.190
UNIT TIME-PERCENT OF LAG	5282.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00352
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.011	0.672	0.010	0.001	0.00	1.20
2	30	0.50	0.3	0.016	0.664	0.015	0.002	0.00	1.81
3	45	0.75	0.3	0.016	0.656	0.015	0.002	0.00	1.81
4	60	1.00	0.4	0.022	0.649	0.020	0.002	0.00	2.41
5	75	1.25	0.3	0.016	0.641	0.015	0.002	0.00	1.81
6	90	1.50	0.3	0.016	0.633	0.015	0.002	0.00	1.81
7	105	1.75	0.3	0.016	0.626	0.015	0.002	0.00	1.81
8	120	2.00	0.4	0.022	0.618	0.020	0.002	0.00	2.41
9	135	2.25	0.4	0.022	0.611	0.020	0.002	0.00	2.41
10	150	2.50	0.4	0.022	0.603	0.020	0.002	0.00	2.41
11	165	2.75	0.5	0.027	0.596	0.024	0.003	0.00	3.01
12	180	3.00	0.5	0.027	0.589	0.024	0.003	0.00	3.01
13	195	3.25	0.5	0.027	0.581	0.024	0.003	0.00	3.01
14	210	3.50	0.5	0.027	0.574	0.024	0.003	0.00	3.01
15	225	3.75	0.5	0.027	0.567	0.024	0.003	0.00	3.01
16	240	4.00	0.6	0.033	0.560	0.029	0.003	0.00	3.61
17	255	4.25	0.6	0.033	0.553	0.029	0.003	0.00	3.61
18	270	4.50	0.7	0.038	0.546	0.034	0.004	0.00	4.22
19	285	4.75	0.7	0.038	0.539	0.034	0.004	0.00	4.22
20	300	5.00	0.8	0.044	0.532	0.039	0.004	0.01	4.82
21	315	5.25	0.6	0.033	0.525	0.029	0.003	0.00	3.61
22	330	5.50	0.7	0.038	0.518	0.034	0.004	0.00	4.22
23	345	5.75	0.8	0.044	0.511	0.039	0.004	0.01	4.82
24	360	6.00	0.8	0.044	0.504	0.039	0.004	0.01	4.82
25	375	6.25	0.9	0.049	0.498	0.044	0.005	0.01	5.42
26	390	6.50	0.9	0.049	0.491	0.044	0.005	0.01	5.42
27	405	6.75	1.0	0.054	0.485	0.049	0.005	0.01	6.02
28	420	7.00	1.0	0.054	0.478	0.049	0.005	0.01	6.02
29	435	7.25	1.0	0.054	0.471	0.049	0.005	0.01	6.02
30	450	7.50	1.1	0.060	0.465	0.054	0.006	0.01	6.62
31	465	7.75	1.2	0.065	0.459	0.059	0.007	0.01	7.23
32	480	8.00	1.3	0.071	0.452	0.064	0.007	0.01	7.83
33	495	8.25	1.5	0.082	0.446	0.073	0.008	0.01	9.03
34	510	8.50	1.5	0.082	0.440	0.073	0.008	0.01	9.03
35	525	8.75	1.6	0.087	0.434	0.078	0.009	0.01	9.64
36	540	9.00	1.7	0.092	0.428	0.083	0.009	0.01	10.24
37	555	9.25	1.9	0.103	0.422	0.093	0.010	0.01	11.44
38	570	9.50	2.0	0.109	0.416	0.098	0.011	0.01	12.04
39	585	9.75	2.1	0.114	0.410	0.103	0.011	0.01	12.65
40	600	10.00	2.2	0.120	0.404	0.108	0.012	0.01	13.25
41	615	10.25	1.5	0.082	0.398	0.073	0.008	0.01	9.03
42	630	10.50	1.5	0.082	0.392	0.073	0.008	0.01	9.03
43	645	10.75	2.0	0.109	0.386	0.098	0.011	0.01	12.04
44	660	11.00	2.0	0.109	0.381	0.098	0.011	0.01	12.04
45	675	11.25	1.9	0.103	0.375	0.093	0.010	0.01	11.44
46	690	11.50	1.9	0.103	0.370	0.093	0.010	0.01	11.44
47	705	11.75	1.7	0.092	0.364	0.083	0.009	0.01	10.24
48	720	12.00	1.8	0.098	0.359	0.088	0.010	0.01	10.84
49	735	12.25	2.5	0.136	0.353	0.122	0.014	0.02	15.06
50	750	12.50	2.6	0.141	0.348	0.127	0.014	0.02	15.66
51	765	12.75	2.8	0.152	0.343	0.137	0.015	0.02	16.86
52	780	13.00	2.9	0.158	0.338	0.142	0.016	0.02	17.46
53	795	13.25	3.4	0.185	0.333	0.166	0.018	0.02	20.48
54	810	13.50	3.4	0.185	0.328	0.166	0.018	0.02	20.48
55	825	13.75	2.3	0.125	0.323	0.113	0.013	0.02	13.85
56	840	14.00	2.3	0.125	0.318	0.113	0.013	0.02	13.85
57	855	14.25	2.7	0.147	0.313	0.132	0.015	0.02	16.26
58	870	14.50	2.6	0.141	0.308	0.127	0.014	0.02	15.66
59	885	14.75	2.6	0.141	0.303	0.127	0.014	0.02	15.66
60	900	15.00	2.5	0.136	0.299	0.122	0.014	0.02	15.06
61	915	15.25	2.4	0.131	0.294	0.118	0.013	0.02	14.45
62	930	15.50	2.3	0.125	0.290	0.113	0.013	0.02	13.85
63	945	15.75	1.9	0.103	0.285	0.093	0.010	0.01	11.44
64	960	16.00	1.9	0.103	0.281	0.093	0.010	0.01	11.44
65	975	16.25	0.4	0.022	0.277	0.020	0.002	0.00	2.41
66	990	16.50	0.4	0.022	0.272	0.020	0.002	0.00	2.41
67	1005	16.75	0.3	0.016	0.268	0.015	0.002	0.00	1.81

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVENT CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.3805
LAG TIME - MINUTES	0.28	MINIMUM LOSS RATE (for var. loss) - in/hr	0.190
UNIT TIME-PERCENT OF LAG	5282.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00352
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.016	0.264	0.015	0.002	0.00	1.81
69	1035	17.25	0.5	0.027	0.260	0.024	0.003	0.00	3.01
70	1050	17.50	0.5	0.027	0.256	0.024	0.003	0.00	3.01
71	1065	17.75	0.5	0.027	0.252	0.024	0.003	0.00	3.01
72	1080	18.00	0.4	0.022	0.249	0.020	0.002	0.00	2.41
73	1095	18.25	0.4	0.022	0.245	0.020	0.002	0.00	2.41
74	1110	18.50	0.4	0.022	0.241	0.020	0.002	0.00	2.41
75	1125	18.75	0.3	0.016	0.238	0.015	0.002	0.00	1.81
76	1140	19.00	0.2	0.011	0.235	0.010	0.001	0.00	1.20
77	1155	19.25	0.3	0.016	0.231	0.015	0.002	0.00	1.81
78	1170	19.50	0.4	0.022	0.228	0.020	0.002	0.00	2.41
79	1185	19.75	0.3	0.016	0.225	0.015	0.002	0.00	1.81
80	1200	20.00	0.2	0.011	0.222	0.010	0.001	0.00	1.20
81	1215	20.25	0.3	0.016	0.219	0.015	0.002	0.00	1.81
82	1230	20.50	0.3	0.016	0.216	0.015	0.002	0.00	1.81
83	1245	20.75	0.3	0.016	0.213	0.015	0.002	0.00	1.81
84	1260	21.00	0.2	0.011	0.211	0.010	0.001	0.00	1.20
85	1275	21.25	0.3	0.016	0.208	0.015	0.002	0.00	1.81
86	1290	21.50	0.2	0.011	0.206	0.010	0.001	0.00	1.20
87	1305	21.75	0.3	0.016	0.204	0.015	0.002	0.00	1.81
88	1320	22.00	0.2	0.011	0.202	0.010	0.001	0.00	1.20
89	1335	22.25	0.3	0.016	0.200	0.015	0.002	0.00	1.81
90	1350	22.50	0.2	0.011	0.198	0.010	0.001	0.00	1.20
91	1365	22.75	0.2	0.011	0.196	0.010	0.001	0.00	1.20
92	1380	23.00	0.2	0.011	0.194	0.010	0.001	0.00	1.20
93	1395	23.25	0.2	0.011	0.193	0.010	0.001	0.00	1.20
94	1410	23.50	0.2	0.011	0.192	0.010	0.001	0.00	1.20
95	1425	23.75	0.2	0.011	0.191	0.010	0.001	0.00	1.20
96	1440	24.00	0.2	0.011	0.190	0.010	0.001	0.00	1.20

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.14
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	607.23
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	602.21
PEAK FLOW (cfs)	0.02

PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVENT
JOB # C2026
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

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JOB # C2026

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	0.01	4	4	0	4	-	4	0.00
2	10	0.01	4	8	0	8	-	8	0.00
3	15	0.01	4	12	0	12	-	12	0.00
4	20	0.02	5	17	0	17	-	17	0.00
5	25	0.02	5	21	0	21	-	21	0.00
6	30	0.02	6	27	0	27	-	27	0.00
7	35	0.02	5	32	0	32	-	32	0.00
8	40	0.02	6	38	0	38	-	38	0.00
9	45	0.02	6	43	0	43	-	43	0.00
10	50	0.02	5	48	0	48	-	48	0.00
11	55	0.02	5	53	0	53	-	53	0.00
12	60	0.02	6	59	0	59	-	59	0.00
13	65	0.02	7	66	0	66	-	66	0.00
14	70	0.02	7	73	0	73	-	73	0.00
15	75	0.02	7	80	0	80	-	80	0.00
16	80	0.02	6	87	0	87	-	87	0.00
17	85	0.03	8	95	0	95	-	95	0.00
18	90	0.03	9	103	0	103	-	103	0.00
19	95	0.03	8	111	0	111	-	111	0.00
20	100	0.03	9	120	0	120	-	120	0.00
21	105	0.04	11	130	0	130	-	130	0.00
22	110	0.03	10	140	0	140	-	140	0.00
23	115	0.03	9	149	0	149	-	149	0.00
24	120	0.03	10	159	0	159	-	159	0.00
25	125	0.03	10	169	0	169	-	169	0.00
26	130	0.04	13	182	0	182	-	182	0.00
27	135	0.06	19	202	0	202	-	202	0.00
28	140	0.04	11	213	0	213	-	213	0.00
29	145	0.26	77	289	0	289	-	289	0.01
30	150	0.31	93	382	0	382	-	382	0.01
31	155	0.40	121	504	0	504	-	504	0.01
32	160	0.16	48	551	0	551	-	551	0.01
33	165	0.02	6	558	0	558	-	558	0.01
34	170	0.02	6	564	0	564	-	564	0.01
35	175	0.02	6	569	0	569	-	569	0.01
36	180	0.01	2	571	0	571	-	571	0.01

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JOB # C2026

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	0.01	2	2	0	2	-	2	0.00
2	10	0.01	3	5	0	5	-	5	0.00
3	15	0.01	3	7	0	7	-	7	0.00
4	20	0.01	3	10	0	10	-	10	0.00
5	25	0.01	3	12	0	12	-	12	0.00
6	30	0.01	3	15	0	15	-	15	0.00
7	35	0.01	3	18	0	18	-	18	0.00
8	40	0.01	3	21	0	21	-	21	0.00
9	45	0.01	3	24	0	24	-	24	0.00
10	50	0.01	3	27	0	27	-	27	0.00
11	55	0.01	3	30	0	30	-	30	0.00
12	60	0.01	3	33	0	33	-	33	0.00
13	65	0.01	3	37	0	37	-	37	0.00
14	70	0.01	3	40	0	40	-	40	0.00
15	75	0.01	3	43	0	43	-	43	0.00
16	80	0.01	3	47	0	47	-	47	0.00
17	85	0.01	3	50	0	50	-	50	0.00
18	90	0.01	3	54	0	54	-	54	0.00
19	95	0.01	3	57	0	57	-	57	0.00
20	100	0.01	3	60	0	60	-	60	0.00
21	105	0.01	3	64	0	64	-	64	0.00
22	110	0.01	3	67	0	67	-	67	0.00
23	115	0.01	3	70	0	70	-	70	0.00
24	120	0.01	4	74	0	74	-	74	0.00
25	125	0.01	3	78	0	78	-	78	0.00
26	130	0.01	4	81	0	81	-	81	0.00
27	135	0.01	4	85	0	85	-	85	0.00
28	140	0.01	4	89	0	89	-	89	0.00
29	145	0.01	4	93	0	93	-	93	0.00
30	150	0.01	4	97	0	97	-	97	0.00
31	155	0.01	4	100	0	100	-	100	0.00
32	160	0.01	4	104	0	104	-	104	0.00
33	165	0.01	4	108	0	108	-	108	0.00
34	170	0.01	4	113	0	113	-	113	0.00
35	175	0.01	4	117	0	117	-	117	0.00
36	180	0.01	4	121	0	121	-	121	0.00
37	185	0.01	4	125	0	125	-	125	0.00
38	190	0.02	5	130	0	130	-	130	0.00
39	195	0.02	5	135	0	135	-	135	0.00
40	200	0.02	5	139	0	139	-	139	0.00
41	205	0.02	5	144	0	144	-	144	0.00
42	210	0.02	5	150	0	150	-	150	0.00
43	215	0.02	6	156	0	156	-	156	0.00
44	220	0.02	6	162	0	162	-	162	0.00
45	225	0.02	6	168	0	168	-	168	0.00
46	230	0.02	6	174	0	174	-	174	0.00
47	235	0.02	7	181	0	181	-	181	0.00
48	240	0.02	7	188	0	188	-	188	0.00
49	245	0.02	7	195	0	195	-	195	0.00
50	250	0.03	8	203	0	203	-	203	0.00
51	255	0.03	8	211	0	211	-	211	0.00
52	260	0.03	8	219	0	219	-	219	0.01
53	265	0.03	9	228	0	228	-	228	0.01
54	270	0.03	9	237	0	237	-	237	0.01
55	275	0.03	9	246	0	246	-	246	0.01

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JOB # C2026

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	0.03	10	256	0	256	-	256	0.01
57	285	0.03	10	266	0	266	-	266	0.01
58	290	0.03	10	276	0	276	-	276	0.01
59	295	0.04	11	287	0	287	-	287	0.01
60	300	0.04	11	298	0	298	-	298	0.01
61	305	0.04	13	311	0	311	-	311	0.01
62	310	0.04	12	322	0	322	-	322	0.01
63	315	0.08	24	346	0	346	-	346	0.01
64	320	0.12	37	383	0	383	-	383	0.01
65	325	0.19	58	441	0	441	-	441	0.01
66	330	0.32	96	537	0	537	-	537	0.01
67	335	0.03	8	545	0	545	-	545	0.01
68	340	0.01	4	549	0	549	-	549	0.01
69	345	0.01	3	551	0	551	-	551	0.01
70	350	0.01	2	553	0	553	-	553	0.01
71	355	0.00	1	555	0	555	-	555	0.01
72	360	0.00	1	556	0	556	-	556	0.01

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JOB # C2026

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	1	1	0	1	-	1	0.00
2	30	0.00	2	3	0	3	-	3	0.00
3	45	0.00	2	5	0	5	-	5	0.00
4	60	0.00	2	7	0	7	-	7	0.00
5	75	0.00	2	9	0	9	-	9	0.00
6	90	0.00	2	11	0	11	-	11	0.00
7	105	0.00	2	13	0	13	-	13	0.00
8	120	0.00	2	15	0	15	-	15	0.00
9	135	0.00	2	17	0	17	-	17	0.00
10	150	0.00	2	20	0	20	-	20	0.00
11	165	0.00	3	23	0	23	-	23	0.00
12	180	0.00	3	26	0	26	-	26	0.00
13	195	0.00	3	29	0	29	-	29	0.00
14	210	0.00	3	32	0	32	-	32	0.00
15	225	0.00	3	35	0	35	-	35	0.00
16	240	0.00	4	39	0	39	-	39	0.00
17	255	0.00	4	42	0	42	-	42	0.00
18	270	0.00	4	46	0	46	-	46	0.00
19	285	0.00	4	51	0	51	-	51	0.00
20	300	0.01	5	55	0	55	-	55	0.00
21	315	0.00	4	59	0	59	-	59	0.00
22	330	0.00	4	63	0	63	-	63	0.00
23	345	0.01	5	68	0	68	-	68	0.00
24	360	0.01	5	73	0	73	-	73	0.00
25	375	0.01	5	78	0	78	-	78	0.00
26	390	0.01	5	84	0	84	-	84	0.00
27	405	0.01	6	90	0	90	-	90	0.00
28	420	0.01	6	96	0	96	-	96	0.00
29	435	0.01	6	102	0	102	-	102	0.00
30	450	0.01	7	108	0	108	-	108	0.00
31	465	0.01	7	116	0	116	-	116	0.00
32	480	0.01	8	123	0	123	-	123	0.00
33	495	0.01	9	132	0	132	-	132	0.00
34	510	0.01	9	142	0	142	-	142	0.00
35	525	0.01	10	151	0	151	-	151	0.00
36	540	0.01	10	161	0	161	-	161	0.00
37	555	0.01	11	173	0	173	-	173	0.00
38	570	0.01	12	185	0	185	-	185	0.00
39	585	0.01	13	198	0	198	-	198	0.00
40	600	0.01	13	211	0	211	-	211	0.00
41	615	0.01	9	220	0	220	-	220	0.01
42	630	0.01	9	229	0	229	-	229	0.01
43	645	0.01	12	241	0	241	-	241	0.01
44	660	0.01	12	253	0	253	-	253	0.01
45	675	0.01	11	264	0	264	-	264	0.01
46	690	0.01	11	276	0	276	-	276	0.01
47	705	0.01	10	286	0	286	-	286	0.01
48	720	0.01	11	297	0	297	-	297	0.01
49	735	0.02	15	312	0	312	-	312	0.01
50	750	0.02	16	328	0	328	-	328	0.01
51	765	0.02	17	344	0	344	-	344	0.01
52	780	0.02	17	362	0	362	-	362	0.01
53	795	0.02	20	382	0	382	-	382	0.01
54	810	0.02	20	403	0	403	-	403	0.01
55	825	0.02	14	417	0	417	-	417	0.01
56	840	0.02	14	431	0	431	-	431	0.01
57	855	0.02	16	447	0	447	-	447	0.01
58	870	0.02	16	462	0	462	-	462	0.01

1

JOB # C2026

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	0.02	16	478	0	478	-	478	0.01
60	900	0.02	15	493	0	493	-	493	0.01
61	915	0.02	14	508	0	508	-	508	0.01
62	930	0.02	14	522	0	522	-	522	0.01
63	945	0.01	11	533	0	533	-	533	0.01
64	960	0.01	11	544	0	544	-	544	0.01
65	975	0.00	2	547	0	547	-	547	0.01
66	990	0.00	2	549	0	549	-	549	0.01
67	1005	0.00	2	551	0	551	-	551	0.01
68	1020	0.00	2	553	0	553	-	553	0.01
69	1035	0.00	3	556	0	556	-	556	0.01
70	1050	0.00	3	559	0	559	-	559	0.01
71	1065	0.00	3	562	0	562	-	562	0.01
72	1080	0.00	2	564	0	564	-	564	0.01
73	1095	0.00	2	567	0	567	-	567	0.01
74	1110	0.00	2	569	0	569	-	569	0.01
75	1125	0.00	2	571	0	571	-	571	0.01
76	1140	0.00	1	572	0	572	-	572	0.01
77	1155	0.00	2	574	0	574	-	574	0.01
78	1170	0.00	2	576	0	576	-	576	0.01
79	1185	0.00	2	578	0	578	-	578	0.01
80	1200	0.00	1	579	0	579	-	579	0.01
81	1215	0.00	2	581	0	581	-	581	0.01
82	1230	0.00	2	583	0	583	-	583	0.01
83	1245	0.00	2	585	0	585	-	585	0.01
84	1260	0.00	1	586	0	586	-	586	0.01
85	1275	0.00	2	588	0	588	-	588	0.01
86	1290	0.00	1	589	0	589	-	589	0.01
87	1305	0.00	2	591	0	591	-	591	0.01
88	1320	0.00	1	592	0	592	-	592	0.01
89	1335	0.00	2	594	0	594	-	594	0.01
90	1350	0.00	1	595	0	595	-	595	0.01
91	1365	0.00	1	596	0	596	-	596	0.01
92	1380	0.00	1	597	0	597	-	597	0.01
93	1395	0.00	1	599	0	599	-	599	0.01
94	1410	0.00	1	600	0	600	-	600	0.01
95	1425	0.00	1	601	0	601	-	601	0.01
96	1440	0.00	1	602	0	602	-	602	0.01

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM SOUTH PROP 10 YR EVENT		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	0.37		
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	0.51		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.35		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	315		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	15		
30				
31	ELEVATION OF HEADWATER	329		
32	ELEVATION OF CONCENTRATION POINT	267		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	1.5		
40	6-HOUR	1.93		
41	24-HOUR	2.66		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD — PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVENT
BASIC DATA CALCULATION FORM — JOB # C2026
SHORTCUT METHOD — BY ES R. BAZUA, P.E. — DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	1.230
[4] L-FEET	315
[5] L-MILES	0.060
[6] La-FEET	15.00
[7] La-MILES	0.003
[8] ELEVATION OF HEADWATER	329
[9] ELEVATION OF CONCENTRATION POINT	267
[10] H-FEET	62
[11] S-FEET/MILE	1039.2
[12] S^0.5	32.24
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.00
[16] LAG TIME-MINUTES	0.3
[17] 100% OF LAG-MINUTES	0.3
[18] 200% OF LAG-MINUTES	0.6
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
1.50	1.230	1.00	1.50	1.93	1.230	1.00	1.93	2.66	1.230	1.00	2.66
		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]	1.23	SUM [7]	1.50	SUM [9]	1.23	SUM [11]	1.93	SUM [13]	1.23	SUM [15]	2.66
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.50				1.93				2.66

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.54	0.51	0.26
FLOOD VOLUME	(cu-ft)	2,398	2,283	1,178
	(acre-ft)	0.06	0.05	0.03
REQUIRED STORAGE	(cu-ft)	2,379	2,264	1,168
	(acre-ft)	0.05	0.05	0.03
PEAK FLOW	(cfs)	1.35	1.13	0.04
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM SOUTH PROP 10 YR EVENT
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.37	0.301	0.0223
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.51	0.415	0.3068
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.35	0.285	0.0514
					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	1.23	SUM	0.3805

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.19022561

C= 0.00352

Ft=C(24-(T/60))^1.55 = 0.00352 (24-(T/60))^1.55 + 0.19 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: WORLD MUSEUM SOUTH PROP 10 YR EVENT
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.28
UNIT TIME-PERCENT OF LAG	1760.7
TOTAL ADJUSTED STORM RAIN-INCHES	1.50
CONSTANT LOSS RATE-in/hr	0.38
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.234	0.38	0.21	0.02	0.03	8.63
2	10	0.17	1.3	0.234	0.38	0.21	0.02	0.03	8.63
3	15	0.25	1.1	0.198	0.38	0.18	0.02	0.02	7.31
4	20	0.33	1.5	0.270	0.38	0.24	0.03	0.03	9.96
5	25	0.42	1.5	0.270	0.38	0.24	0.03	0.03	9.96
6	30	0.50	1.8	0.324	0.38	0.29	0.03	0.04	11.96
7	35	0.58	1.5	0.270	0.38	0.24	0.03	0.03	9.96
8	40	0.67	1.8	0.324	0.38	0.29	0.03	0.04	11.96
9	45	0.75	1.8	0.324	0.38	0.29	0.03	0.04	11.96
10	50	0.83	1.5	0.270	0.38	0.24	0.03	0.03	9.96
11	55	0.92	1.6	0.288	0.38	0.26	0.03	0.04	10.63
12	60	1.00	1.8	0.324	0.38	0.29	0.03	0.04	11.96
13	65	1.08	2.2	0.396	0.38	0.36	0.02	0.02	5.74
14	70	1.17	2.2	0.396	0.38	0.36	0.02	0.02	5.74
15	75	1.25	2.2	0.396	0.38	0.36	0.02	0.02	5.74
16	80	1.33	2.0	0.360	0.38	0.32	0.04	0.04	13.28
17	85	1.42	2.6	0.468	0.38	0.42	0.09	0.11	32.31
18	90	1.50	2.7	0.486	0.38	0.44	0.11	0.13	38.95
19	95	1.58	2.4	0.432	0.38	0.39	0.05	0.06	19.02
20	100	1.67	2.7	0.486	0.38	0.44	0.11	0.13	38.95
21	105	1.75	3.3	0.594	0.38	0.53	0.21	0.26	78.80
22	110	1.83	3.1	0.558	0.38	0.50	0.18	0.22	65.52
23	115	1.92	2.9	0.522	0.38	0.47	0.14	0.17	52.23
24	120	2.00	3.0	0.540	0.38	0.49	0.16	0.20	58.87
25	125	2.08	3.1	0.558	0.38	0.50	0.18	0.22	65.52
26	130	2.17	4.2	0.756	0.38	0.68	0.38	0.46	138.58
27	135	2.25	5.0	0.900	0.38	0.81	0.52	0.64	191.71
28	140	2.33	3.5	0.630	0.38	0.57	0.25	0.31	92.08
29	145	2.42	6.8	1.224	0.38	1.10	0.84	1.04	311.27
30	150	2.50	7.3	1.314	0.38	1.18	0.93	1.15	344.48
31	155	2.58	8.2	1.476	0.38	1.33	1.10	1.35	404.26
32	160	2.67	5.9	1.062	0.38	0.96	0.68	0.84	251.49
33	165	2.75	2.0	0.360	0.38	0.32	0.04	0.04	13.28
34	170	2.83	1.8	0.324	0.38	0.29	0.03	0.04	11.96
35	175	2.92	1.8	0.324	0.38	0.29	0.03	0.04	11.96
36	180	3.00	0.6	0.108	0.38	0.10	0.01	0.01	3.99

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.54
FLOOD VOLUME (acft)	0.06
FLOOD VOLUME (cuft)	2398.41
REQUIRED STORAGE (acft)	0.05
REQUIRED STORAGE (cuft)	2378.58
PEAK FLOW RATE (cfs)	1.35

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

PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVEN
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.28
UNIT TIME-PERCENT OF LAG	1760.7
TOTAL ADJUSTED STORM RAIN-INCHES	1.93
CONSTANT LOSS RATE-in/hr	0.380
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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
1	5	0.08	0.5	0.116	0.38	0.10	0.01	0.01	4.27
2	10	0.17	0.6	0.139	0.38	0.13	0.01	0.02	5.13
3	15	0.25	0.6	0.139	0.38	0.13	0.01	0.02	5.13
4	20	0.33	0.6	0.139	0.38	0.13	0.01	0.02	5.13
5	25	0.42	0.6	0.139	0.38	0.13	0.01	0.02	5.13
6	30	0.50	0.7	0.162	0.38	0.15	0.02	0.02	5.98
7	35	0.58	0.7	0.162	0.38	0.15	0.02	0.02	5.98
8	40	0.67	0.7	0.162	0.38	0.15	0.02	0.02	5.98
9	45	0.75	0.7	0.162	0.38	0.15	0.02	0.02	5.98
10	50	0.83	0.7	0.162	0.38	0.15	0.02	0.02	5.98
11	55	0.92	0.7	0.162	0.38	0.15	0.02	0.02	5.98
12	60	1.00	0.8	0.185	0.38	0.17	0.02	0.02	6.84
13	65	1.08	0.8	0.185	0.38	0.17	0.02	0.02	6.84
14	70	1.17	0.8	0.185	0.38	0.17	0.02	0.02	6.84
15	75	1.25	0.8	0.185	0.38	0.17	0.02	0.02	6.84
16	80	1.33	0.8	0.185	0.38	0.17	0.02	0.02	6.84
17	85	1.42	0.8	0.185	0.38	0.17	0.02	0.02	6.84
18	90	1.50	0.8	0.185	0.38	0.17	0.02	0.02	6.84
19	95	1.58	0.8	0.185	0.38	0.17	0.02	0.02	6.84
20	100	1.67	0.8	0.185	0.38	0.17	0.02	0.02	6.84
21	105	1.75	0.8	0.185	0.38	0.17	0.02	0.02	6.84
22	110	1.83	0.8	0.185	0.38	0.17	0.02	0.02	6.84
23	115	1.92	0.8	0.185	0.38	0.17	0.02	0.02	6.84
24	120	2.00	0.9	0.208	0.38	0.19	0.02	0.03	7.69
25	125	2.08	0.8	0.185	0.38	0.17	0.02	0.02	6.84
26	130	2.17	0.9	0.208	0.38	0.19	0.02	0.03	7.69
27	135	2.25	0.9	0.208	0.38	0.19	0.02	0.03	7.69
28	140	2.33	0.9	0.208	0.38	0.19	0.02	0.03	7.69
29	145	2.42	0.9	0.208	0.38	0.19	0.02	0.03	7.69
30	150	2.50	0.9	0.208	0.38	0.19	0.02	0.03	7.69
31	155	2.58	0.9	0.208	0.38	0.19	0.02	0.03	7.69
32	160	2.67	0.9	0.208	0.38	0.19	0.02	0.03	7.69
33	165	2.75	1.0	0.232	0.38	0.21	0.02	0.03	8.55
34	170	2.83	1.0	0.232	0.38	0.21	0.02	0.03	8.55
35	175	2.92	1.0	0.232	0.38	0.21	0.02	0.03	8.55
36	180	3.00	1.0	0.232	0.38	0.21	0.02	0.03	8.55
37	185	3.08	1.0	0.232	0.38	0.21	0.02	0.03	8.55
38	190	3.17	1.1	0.255	0.38	0.23	0.03	0.03	9.40
39	195	3.25	1.1	0.255	0.38	0.23	0.03	0.03	9.40
40	200	3.33	1.1	0.255	0.38	0.23	0.03	0.03	9.40
41	205	3.42	1.2	0.278	0.38	0.25	0.03	0.03	10.26
42	210	3.50	1.3	0.301	0.38	0.27	0.03	0.04	11.11
43	215	3.58	1.4	0.324	0.38	0.29	0.03	0.04	11.96
44	220	3.67	1.4	0.324	0.38	0.29	0.03	0.04	11.96
45	225	3.75	1.5	0.347	0.38	0.31	0.03	0.04	12.82
46	230	3.83	1.5	0.347	0.38	0.31	0.03	0.04	12.82
47	235	3.92	1.6	0.371	0.38	0.33	0.04	0.05	13.67
48	240	4.00	1.6	0.371	0.38	0.33	0.04	0.05	13.67
49	245	4.08	1.7	0.394	0.38	0.35	0.01	0.02	4.90
50	250	4.17	1.8	0.417	0.38	0.38	0.04	0.04	13.44
51	255	4.25	1.9	0.440	0.38	0.40	0.06	0.07	21.99
52	260	4.33	2.0	0.463	0.38	0.42	0.08	0.10	30.53
53	265	4.42	2.1	0.486	0.38	0.44	0.11	0.13	39.08
54	270	4.50	2.1	0.486	0.38	0.44	0.11	0.13	39.08
55	275	4.58	2.2	0.510	0.38	0.46	0.13	0.16	47.63
56	280	4.67	2.3	0.533	0.38	0.48	0.15	0.19	56.17

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVEN CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.28		
UNIT TIME-PERCENT OF LAG	1760.7		
TOTAL ADJUSTED STORM RAIN-INCHES	1.93		
CONSTANT LOSS RATE-in/hr	0.380		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.556	0.38	0.50	0.18	0.22	64.72
58	290	4.83	2.4	0.556	0.38	0.50	0.18	0.22	64.72
59	295	4.92	2.5	0.579	0.38	0.52	0.20	0.24	73.26
60	300	5.00	2.6	0.602	0.38	0.54	0.22	0.27	81.81
61	305	5.08	3.1	0.718	0.38	0.65	0.34	0.42	124.54
62	310	5.17	3.6	0.834	0.38	0.75	0.45	0.56	167.27
63	315	5.25	3.9	0.903	0.38	0.81	0.52	0.64	192.91
64	320	5.33	4.2	0.973	0.38	0.88	0.59	0.73	218.55
65	325	5.42	4.7	1.089	0.38	0.98	0.71	0.87	261.28
66	330	5.50	5.6	1.297	0.38	1.17	0.92	1.13	338.19
67	335	5.58	1.9	0.440	0.38	0.40	0.06	0.07	21.99
68	340	5.67	0.9	0.208	0.38	0.19	0.02	0.03	7.69
69	345	5.75	0.6	0.139	0.38	0.13	0.01	0.02	5.13
70	350	5.83	0.5	0.116	0.38	0.10	0.01	0.01	4.27
71	355	5.92	0.3	0.069	0.38	0.06	0.01	0.01	2.56
72	360	6.00	0.2	0.046	0.38	0.04	0.00	0.01	1.71

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.51
FLOOD VOLUME (acft)	0.05
FLOOD VOLUME (cuft)	2282.59
REQUIRED STORAGE (acft)	0.05
REQUIRED STORAGE (cuft)	2263.72
PEAK FLOW RATE (cfs)	1.13

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

PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVENT
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.3805
LAG TIME - MINUTES	0.28	MINIMUM LOSS RATE (for var. loss) - in/hr	0.190
UNIT TIME-PERCENT OF LAG	5282.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00352
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.021	0.672	0.019	0.002	0.00	2.36
2	30	0.50	0.3	0.032	0.664	0.029	0.003	0.00	3.53
3	45	0.75	0.3	0.032	0.656	0.029	0.003	0.00	3.53
4	60	1.00	0.4	0.043	0.649	0.038	0.004	0.01	4.71
5	75	1.25	0.3	0.032	0.641	0.029	0.003	0.00	3.53
6	90	1.50	0.3	0.032	0.633	0.029	0.003	0.00	3.53
7	105	1.75	0.3	0.032	0.626	0.029	0.003	0.00	3.53
8	120	2.00	0.4	0.043	0.618	0.038	0.004	0.01	4.71
9	135	2.25	0.4	0.043	0.611	0.038	0.004	0.01	4.71
10	150	2.50	0.4	0.043	0.603	0.038	0.004	0.01	4.71
11	165	2.75	0.5	0.053	0.596	0.048	0.005	0.01	5.89
12	180	3.00	0.5	0.053	0.589	0.048	0.005	0.01	5.89
13	195	3.25	0.5	0.053	0.581	0.048	0.005	0.01	5.89
14	210	3.50	0.5	0.053	0.574	0.048	0.005	0.01	5.89
15	225	3.75	0.5	0.053	0.567	0.048	0.005	0.01	5.89
16	240	4.00	0.6	0.064	0.560	0.057	0.006	0.01	7.07
17	255	4.25	0.6	0.064	0.553	0.057	0.006	0.01	7.07
18	270	4.50	0.7	0.074	0.546	0.067	0.007	0.01	8.24
19	285	4.75	0.7	0.074	0.539	0.067	0.007	0.01	8.24
20	300	5.00	0.8	0.085	0.532	0.077	0.009	0.01	9.42
21	315	5.25	0.6	0.064	0.525	0.057	0.006	0.01	7.07
22	330	5.50	0.7	0.074	0.518	0.067	0.007	0.01	8.24
23	345	5.75	0.8	0.085	0.511	0.077	0.009	0.01	9.42
24	360	6.00	0.8	0.085	0.504	0.077	0.009	0.01	9.42
25	375	6.25	0.9	0.096	0.498	0.086	0.010	0.01	10.60
26	390	6.50	0.9	0.096	0.491	0.086	0.010	0.01	10.60
27	405	6.75	1.0	0.106	0.485	0.096	0.011	0.01	11.78
28	420	7.00	1.0	0.106	0.478	0.096	0.011	0.01	11.78
29	435	7.25	1.0	0.106	0.471	0.096	0.011	0.01	11.78
30	450	7.50	1.1	0.117	0.465	0.105	0.012	0.01	12.96
31	465	7.75	1.2	0.128	0.459	0.115	0.013	0.02	14.13
32	480	8.00	1.3	0.138	0.452	0.124	0.014	0.02	15.31
33	495	8.25	1.5	0.160	0.446	0.144	0.016	0.02	17.67
34	510	8.50	1.5	0.160	0.440	0.144	0.016	0.02	17.67
35	525	8.75	1.6	0.170	0.434	0.153	0.017	0.02	18.85
36	540	9.00	1.7	0.181	0.428	0.163	0.018	0.02	20.02
37	555	9.25	1.9	0.202	0.422	0.182	0.020	0.02	22.38
38	570	9.50	2.0	0.213	0.416	0.192	0.021	0.03	23.56
39	585	9.75	2.1	0.223	0.410	0.201	0.022	0.03	24.73
40	600	10.00	2.2	0.234	0.404	0.211	0.023	0.03	25.91
41	615	10.25	1.5	0.160	0.398	0.144	0.016	0.02	17.67
42	630	10.50	1.5	0.160	0.392	0.144	0.016	0.02	17.67
43	645	10.75	2.0	0.213	0.386	0.192	0.021	0.03	23.56
44	660	11.00	2.0	0.213	0.381	0.192	0.021	0.03	23.56
45	675	11.25	1.9	0.202	0.375	0.182	0.020	0.02	22.38
46	690	11.50	1.9	0.202	0.370	0.182	0.020	0.02	22.38
47	705	11.75	1.7	0.181	0.364	0.163	0.018	0.02	20.02
48	720	12.00	1.8	0.192	0.359	0.172	0.019	0.02	21.20
49	735	12.25	2.5	0.266	0.353	0.239	0.027	0.03	29.45
50	750	12.50	2.6	0.277	0.348	0.249	0.028	0.03	30.62
51	765	12.75	2.8	0.298	0.343	0.268	0.030	0.04	32.98
52	780	13.00	2.9	0.309	0.338	0.278	0.031	0.04	34.16
53	795	13.25	3.4	0.362	0.333	0.326	0.029	0.04	32.31
54	810	13.50	3.4	0.362	0.328	0.326	0.034	0.04	37.89
55	825	13.75	2.3	0.245	0.323	0.220	0.024	0.03	27.09
56	840	14.00	2.3	0.245	0.318	0.220	0.024	0.03	27.09
57	855	14.25	2.7	0.287	0.313	0.259	0.029	0.04	31.80
58	870	14.50	2.6	0.277	0.308	0.249	0.028	0.03	30.62
59	885	14.75	2.6	0.277	0.303	0.249	0.028	0.03	30.62
60	900	15.00	2.5	0.266	0.299	0.239	0.027	0.03	29.45
61	915	15.25	2.4	0.255	0.294	0.230	0.026	0.03	28.27
62	930	15.50	2.3	0.245	0.290	0.220	0.024	0.03	27.09
63	945	15.75	1.9	0.202	0.285	0.182	0.020	0.02	22.38
64	960	16.00	1.9	0.202	0.281	0.182	0.020	0.02	22.38
65	975	16.25	0.4	0.043	0.277	0.038	0.004	0.01	4.71
66	990	16.50	0.4	0.043	0.272	0.038	0.004	0.01	4.71
67	1005	16.75	0.3	0.032	0.268	0.029	0.003	0.00	3.53

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVENT CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.3805
LAG TIME - MINUTES	0.28	MINIMUM LOSS RATE (for var. loss) - in/hr	0.190
UNIT TIME-PERCENT OF LAG	5282.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00352
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.032	0.264	0.029	0.003	0.00	3.53
69	1035	17.25	0.5	0.053	0.260	0.048	0.005	0.01	5.89
70	1050	17.50	0.5	0.053	0.256	0.048	0.005	0.01	5.89
71	1065	17.75	0.5	0.053	0.252	0.048	0.005	0.01	5.89
72	1080	18.00	0.4	0.043	0.249	0.038	0.004	0.01	4.71
73	1095	18.25	0.4	0.043	0.245	0.038	0.004	0.01	4.71
74	1110	18.50	0.4	0.043	0.241	0.038	0.004	0.01	4.71
75	1125	18.75	0.3	0.032	0.238	0.029	0.003	0.00	3.53
76	1140	19.00	0.2	0.021	0.235	0.019	0.002	0.00	2.36
77	1155	19.25	0.3	0.032	0.231	0.029	0.003	0.00	3.53
78	1170	19.50	0.4	0.043	0.228	0.038	0.004	0.01	4.71
79	1185	19.75	0.3	0.032	0.225	0.029	0.003	0.00	3.53
80	1200	20.00	0.2	0.021	0.222	0.019	0.002	0.00	2.36
81	1215	20.25	0.3	0.032	0.219	0.029	0.003	0.00	3.53
82	1230	20.50	0.3	0.032	0.216	0.029	0.003	0.00	3.53
83	1245	20.75	0.3	0.032	0.213	0.029	0.003	0.00	3.53
84	1260	21.00	0.2	0.021	0.211	0.019	0.002	0.00	2.36
85	1275	21.25	0.3	0.032	0.208	0.029	0.003	0.00	3.53
86	1290	21.50	0.2	0.021	0.206	0.019	0.002	0.00	2.36
87	1305	21.75	0.3	0.032	0.204	0.029	0.003	0.00	3.53
88	1320	22.00	0.2	0.021	0.202	0.019	0.002	0.00	2.36
89	1335	22.25	0.3	0.032	0.200	0.029	0.003	0.00	3.53
90	1350	22.50	0.2	0.021	0.198	0.019	0.002	0.00	2.36
91	1365	22.75	0.2	0.021	0.196	0.019	0.002	0.00	2.36
92	1380	23.00	0.2	0.021	0.194	0.019	0.002	0.00	2.36
93	1395	23.25	0.2	0.021	0.193	0.019	0.002	0.00	2.36
94	1410	23.50	0.2	0.021	0.192	0.019	0.002	0.00	2.36
95	1425	23.75	0.2	0.021	0.191	0.019	0.002	0.00	2.36
96	1440	24.00	0.2	0.021	0.190	0.019	0.002	0.00	2.36

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.26
FLOOD VOLUME (acft)	0.03
FLOOD VOLUME (cuft)	1177.70
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1167.96
PEAK FLOW (cfs)	0.04

PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVENT
JOB # C2026
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

1

JOB # C2026

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	0.03	9	9	0	9	-	9	0.00
2	10	0.03	9	17	0	17	-	17	0.00
3	15	0.02	7	25	0	25	-	25	0.00
4	20	0.03	10	35	0	35	-	35	0.00
5	25	0.03	10	45	0	45	-	45	0.00
6	30	0.04	12	56	0	56	-	56	0.00
7	35	0.03	10	66	0	66	-	66	0.00
8	40	0.04	12	78	0	78	-	78	0.00
9	45	0.04	12	90	0	90	-	90	0.00
10	50	0.03	10	100	0	100	-	100	0.00
11	55	0.04	11	111	0	111	-	111	0.00
12	60	0.04	12	123	0	123	-	123	0.00
13	65	0.02	6	129	0	129	-	129	0.00
14	70	0.02	6	134	0	134	-	134	0.00
15	75	0.02	6	140	0	140	-	140	0.00
16	80	0.04	13	153	0	153	-	153	0.00
17	85	0.11	32	186	0	186	-	186	0.00
18	90	0.13	39	225	0	225	-	225	0.01
19	95	0.06	19	244	0	244	-	244	0.01
20	100	0.13	39	283	0	283	-	283	0.01
21	105	0.26	79	361	0	361	-	361	0.01
22	110	0.22	66	427	0	427	-	427	0.01
23	115	0.17	52	479	0	479	-	479	0.01
24	120	0.20	59	538	0	538	-	538	0.01
25	125	0.22	66	604	0	604	-	604	0.01
26	130	0.46	139	742	0	742	-	742	0.02
27	135	0.64	192	934	0	934	-	934	0.02
28	140	0.31	92	1,026	0	1,026	-	1,026	0.02
29	145	1.04	311	1,337	0	1,337	-	1,337	0.03
30	150	1.15	344	1,682	0	1,682	-	1,682	0.04
31	155	1.35	404	2,086	0	2,086	-	2,086	0.05
32	160	0.84	251	2,337	0	2,337	-	2,337	0.05
33	165	0.04	13	2,351	0	2,351	-	2,351	0.05
34	170	0.04	12	2,363	0	2,363	-	2,363	0.05
35	175	0.04	12	2,375	0	2,375	-	2,375	0.05
36	180	0.01	4	2,379	0	2,379	-	2,379	0.05

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JOB # C2026

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	0.01	4	4	0	4	-	4	0.00
2	10	0.02	5	9	0	9	-	9	0.00
3	15	0.02	5	15	0	15	-	15	0.00
4	20	0.02	5	20	0	20	-	20	0.00
5	25	0.02	5	25	0	25	-	25	0.00
6	30	0.02	6	31	0	31	-	31	0.00
7	35	0.02	6	37	0	37	-	37	0.00
8	40	0.02	6	43	0	43	-	43	0.00
9	45	0.02	6	49	0	49	-	49	0.00
10	50	0.02	6	55	0	55	-	55	0.00
11	55	0.02	6	61	0	61	-	61	0.00
12	60	0.02	7	68	0	68	-	68	0.00
13	65	0.02	7	74	0	74	-	74	0.00
14	70	0.02	7	81	0	81	-	81	0.00
15	75	0.02	7	88	0	88	-	88	0.00
16	80	0.02	7	95	0	95	-	95	0.00
17	85	0.02	7	102	0	102	-	102	0.00
18	90	0.02	7	109	0	109	-	109	0.00
19	95	0.02	7	115	0	115	-	115	0.00
20	100	0.02	7	122	0	122	-	122	0.00
21	105	0.02	7	129	0	129	-	129	0.00
22	110	0.02	7	136	0	136	-	136	0.00
23	115	0.02	7	143	0	143	-	143	0.00
24	120	0.03	8	150	0	150	-	150	0.00
25	125	0.02	7	157	0	157	-	157	0.00
26	130	0.03	8	165	0	165	-	165	0.00
27	135	0.03	8	173	0	173	-	173	0.00
28	140	0.03	8	180	0	180	-	180	0.00
29	145	0.03	8	188	0	188	-	188	0.00
30	150	0.03	8	196	0	196	-	196	0.00
31	155	0.03	8	203	0	203	-	203	0.00
32	160	0.03	8	211	0	211	-	211	0.00
33	165	0.03	9	220	0	220	-	220	0.01
34	170	0.03	9	228	0	228	-	228	0.01
35	175	0.03	9	237	0	237	-	237	0.01
36	180	0.03	9	245	0	245	-	245	0.01
37	185	0.03	9	254	0	254	-	254	0.01
38	190	0.03	9	263	0	263	-	263	0.01
39	195	0.03	9	273	0	273	-	273	0.01
40	200	0.03	9	282	0	282	-	282	0.01
41	205	0.03	10	292	0	292	-	292	0.01
42	210	0.04	11	303	0	303	-	303	0.01
43	215	0.04	12	315	0	315	-	315	0.01
44	220	0.04	12	327	0	327	-	327	0.01
45	225	0.04	13	340	0	340	-	340	0.01
46	230	0.04	13	353	0	353	-	353	0.01
47	235	0.05	14	367	0	367	-	367	0.01
48	240	0.05	14	380	0	380	-	380	0.01
49	245	0.02	5	385	0	385	-	385	0.01
50	250	0.04	13	399	0	399	-	399	0.01
51	255	0.07	22	421	0	421	-	421	0.01
52	260	0.10	31	451	0	451	-	451	0.01
53	265	0.13	39	490	0	490	-	490	0.01
54	270	0.13	39	529	0	529	-	529	0.01
55	275	0.16	48	577	0	577	-	577	0.01

1

JOB # C2026

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	0.19	56	633	0	633	-	633	0.01
57	285	0.22	65	698	0	698	-	698	0.02
58	290	0.22	65	763	0	763	-	763	0.02
59	295	0.24	73	836	0	836	-	836	0.02
60	300	0.27	82	918	0	918	-	918	0.02
61	305	0.42	125	1,042	0	1,042	-	1,042	0.02
62	310	0.56	167	1,209	0	1,209	-	1,209	0.03
63	315	0.64	193	1,402	0	1,402	-	1,402	0.03
64	320	0.73	219	1,621	0	1,621	-	1,621	0.04
65	325	0.87	261	1,882	0	1,882	-	1,882	0.04
66	330	1.13	338	2,220	0	2,220	-	2,220	0.05
67	335	0.07	22	2,242	0	2,242	-	2,242	0.05
68	340	0.03	8	2,250	0	2,250	-	2,250	0.05
69	345	0.02	5	2,255	0	2,255	-	2,255	0.05
70	350	0.01	4	2,259	0	2,259	-	2,259	0.05
71	355	0.01	3	2,262	0	2,262	-	2,262	0.05
72	360	0.01	2	2,264	0	2,264	-	2,264	0.05

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JOB # C2026

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	2	2	0	2	-	2	0.00
2	30	0.00	4	6	0	6	-	6	0.00
3	45	0.00	4	9	0	9	-	9	0.00
4	60	0.01	5	14	0	14	-	14	0.00
5	75	0.00	4	18	0	18	-	18	0.00
6	90	0.00	4	21	0	21	-	21	0.00
7	105	0.00	4	25	0	25	-	25	0.00
8	120	0.01	5	29	0	29	-	29	0.00
9	135	0.01	5	34	0	34	-	34	0.00
10	150	0.01	5	39	0	39	-	39	0.00
11	165	0.01	6	45	0	45	-	45	0.00
12	180	0.01	6	51	0	51	-	51	0.00
13	195	0.01	6	57	0	57	-	57	0.00
14	210	0.01	6	62	0	62	-	62	0.00
15	225	0.01	6	68	0	68	-	68	0.00
16	240	0.01	7	75	0	75	-	75	0.00
17	255	0.01	7	82	0	82	-	82	0.00
18	270	0.01	8	91	0	91	-	91	0.00
19	285	0.01	8	99	0	99	-	99	0.00
20	300	0.01	9	108	0	108	-	108	0.00
21	315	0.01	7	115	0	115	-	115	0.00
22	330	0.01	8	124	0	124	-	124	0.00
23	345	0.01	9	133	0	133	-	133	0.00
24	360	0.01	9	143	0	143	-	143	0.00
25	375	0.01	11	153	0	153	-	153	0.00
26	390	0.01	11	164	0	164	-	164	0.00
27	405	0.01	12	175	0	175	-	175	0.00
28	420	0.01	12	187	0	187	-	187	0.00
29	435	0.01	12	199	0	199	-	199	0.00
30	450	0.01	13	212	0	212	-	212	0.00
31	465	0.02	14	226	0	226	-	226	0.01
32	480	0.02	15	241	0	241	-	241	0.01
33	495	0.02	18	259	0	259	-	259	0.01
34	510	0.02	18	277	0	277	-	277	0.01
35	525	0.02	19	296	0	296	-	296	0.01
36	540	0.02	20	316	0	316	-	316	0.01
37	555	0.02	22	338	0	338	-	338	0.01
38	570	0.03	24	362	0	362	-	362	0.01
39	585	0.03	25	386	0	386	-	386	0.01
40	600	0.03	26	412	0	412	-	412	0.01
41	615	0.02	18	430	0	430	-	430	0.01
42	630	0.02	18	448	0	448	-	448	0.01
43	645	0.03	24	471	0	471	-	471	0.01
44	660	0.03	24	495	0	495	-	495	0.01
45	675	0.02	22	517	0	517	-	517	0.01
46	690	0.02	22	539	0	539	-	539	0.01
47	705	0.02	20	559	0	559	-	559	0.01
48	720	0.02	21	581	0	581	-	581	0.01
49	735	0.03	29	610	0	610	-	610	0.01
50	750	0.03	31	641	0	641	-	641	0.01
51	765	0.04	33	674	0	674	-	674	0.02
52	780	0.04	34	708	0	708	-	708	0.02
53	795	0.04	32	740	0	740	-	740	0.02
54	810	0.04	38	778	0	778	-	778	0.02
55	825	0.03	27	805	0	805	-	805	0.02
56	840	0.03	27	832	0	832	-	832	0.02
57	855	0.04	32	864	0	864	-	864	0.02
58	870	0.03	31	895	0	895	-	895	0.02

1

JOB # C2026

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	0.03	31	925	0	925	-	925	0.02
60	900	0.03	29	955	0	955	-	955	0.02
61	915	0.03	28	983	0	983	-	983	0.02
62	930	0.03	27	1,010	0	1,010	-	1,010	0.02
63	945	0.02	22	1,033	0	1,033	-	1,033	0.02
64	960	0.02	22	1,055	0	1,055	-	1,055	0.02
65	975	0.01	5	1,060	0	1,060	-	1,060	0.02
66	990	0.01	5	1,064	0	1,064	-	1,064	0.02
67	1005	0.00	4	1,068	0	1,068	-	1,068	0.02
68	1020	0.00	4	1,071	0	1,071	-	1,071	0.02
69	1035	0.01	6	1,077	0	1,077	-	1,077	0.02
70	1050	0.01	6	1,083	0	1,083	-	1,083	0.02
71	1065	0.01	6	1,089	0	1,089	-	1,089	0.03
72	1080	0.01	5	1,094	0	1,094	-	1,094	0.03
73	1095	0.01	5	1,098	0	1,098	-	1,098	0.03
74	1110	0.01	5	1,103	0	1,103	-	1,103	0.03
75	1125	0.00	4	1,107	0	1,107	-	1,107	0.03
76	1140	0.00	2	1,109	0	1,109	-	1,109	0.03
77	1155	0.00	4	1,113	0	1,113	-	1,113	0.03
78	1170	0.01	5	1,117	0	1,117	-	1,117	0.03
79	1185	0.00	4	1,121	0	1,121	-	1,121	0.03
80	1200	0.00	2	1,123	0	1,123	-	1,123	0.03
81	1215	0.00	4	1,127	0	1,127	-	1,127	0.03
82	1230	0.00	4	1,130	0	1,130	-	1,130	0.03
83	1245	0.00	4	1,134	0	1,134	-	1,134	0.03
84	1260	0.00	2	1,136	0	1,136	-	1,136	0.03
85	1275	0.00	4	1,140	0	1,140	-	1,140	0.03
86	1290	0.00	2	1,142	0	1,142	-	1,142	0.03
87	1305	0.00	4	1,146	0	1,146	-	1,146	0.03
88	1320	0.00	2	1,148	0	1,148	-	1,148	0.03
89	1335	0.00	4	1,151	0	1,151	-	1,151	0.03
90	1350	0.00	2	1,154	0	1,154	-	1,154	0.03
91	1365	0.00	2	1,156	0	1,156	-	1,156	0.03
92	1380	0.00	2	1,159	0	1,159	-	1,159	0.03
93	1395	0.00	2	1,161	0	1,161	-	1,161	0.03
94	1410	0.00	2	1,163	0	1,163	-	1,163	0.03
95	1425	0.00	2	1,166	0	1,166	-	1,166	0.03
96	1440	0.00	2	1,168	0	1,168	-	1,168	0.03

V RUNOFF DISCHARGE CALCULATIONS

NORTH

Surface runoff on generated on the northerly portion of the project site is directed to an on-site curb inlet catch basin. Under the existing condition, runoff collected in the curb inlet catch basin enters an existing 24" storm drain pipe and is conveyed off-site. Under the proposed condition, runoff collected in the curb inlet catch basin will be diverted to an underground storage facility with the capacity to store 2,439 cu.ft. of runoff volume. Any runoff that exceeds the capacity of the underground storage facility will then enter the existing 24" storm drain pipe where it will be conveyed off-site as it is under existing conditions.

The volume that enters the existing 24" storm drain pipe to be conveyed off-site is less under the proposed condition that it is under the existing condition. As the runoff volume under both conditions leaves the same conduit with equal size and slope, the discharges (Q) leaving the site for existing vs proposed conditions is proportional to the calculated volumes leaving the 24" conduit for both conditions.

	2 YR DISCHARGE (Q) (CFS) LEAVING SITE	10 YR DISCHARGE (Q) (CFS) LEAVING SITE
NORTH EXISTING	3.88	10.73
NORTH PROPOSED	0	10.13

SOUTH

Surface runoff generated on the southerly portion of the site flows in a southeasterly direction. Under the existing condition, surface runoff flows to the southeasterly property boundary, against an existing perimeter wall, then follows the wall along a mild slope toward the south and ultimately leaves the site. Under the proposed condition, surface flow is directed toward a surface infiltration type detention basin with capacity to store the total runoff generated during the 10 year rain event, therefore no runoff is discharged off of the southerly portion of the site during the 2 year and 10 year events under proposed conditions.

	2 YR DISCHARGE (Q) (CFS) LEAVING SITE	10 YR DISCHARGE (Q) (CFS) LEAVING SITE
SOUTH EXISTING	0.23	0.63
SOUTH PROPOSED	0	0

Riverside County Rational Hydrology Program

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Rational Hydrology Study Date: 03/20/25 File:NORTHEXISTING2YR.out

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NORTH EXISTING 2 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.455(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 100.000 to Point/Station 101.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 436.000(Ft.)
Top (of initial area) elevation = 356.000(Ft.)
Bottom (of initial area) elevation = 264.500(Ft.)
Difference in elevation = 91.500(Ft.)
Slope = 0.20986 s(percent)= 20.99
TC = k(0.405)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.293 min.
Rainfall intensity = 1.645(In/Hr) for a 2.0 year storm

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.270
RI index for soil(AMC 1)  =   0.00
Pervious area fraction =  0.550; Impervious fraction =  0.450
Initial subarea runoff =      3.876(CFS)
Total initial stream area =        3.800(Ac.)
Pervious area fraction = 0.550
End of computations, total study area =            3.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.550
Area averaged RI index number =   0.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:NORTHEXISTING10YR.out

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NORTH EXISTING 10 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.259(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 100.000 to Point/Station 101.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 436.000(Ft.)
Top (of initial area) elevation = 356.000(Ft.)
Bottom (of initial area) elevation = 264.500(Ft.)
Difference in elevation = 91.500(Ft.)
Slope = 0.20986 s(percent)= 20.99
TC = k(0.405)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.293 min.
Rainfall intensity = 4.553(In/Hr) for a 10.0 year storm

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.270
RI index for soil(AMC 1)  =   0.00
Pervious area fraction =  0.550; Impervious fraction =  0.450
Initial subarea runoff =     10.728(CFS)
Total initial stream area =        3.800(Ac.)
Pervious area fraction = 0.550
End of computations, total study area =            3.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.550
Area averaged RI index number =   0.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:NORTHPROPOSED2YR.out

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NORTH PROPOSED 2 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.455(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 100.000 to Point/Station 101.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 480.000(Ft.)
Top (of initial area) elevation = 356.000(Ft.)
Bottom (of initial area) elevation = 264.500(Ft.)
Difference in elevation = 91.500(Ft.)
Slope = 0.19062 s(percent)= 19.06
TC = k(0.378)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.222 min.
Rainfall intensity = 1.656(In/Hr) for a 2.0 year storm

USER INPUT of soil data for subarea
Runoff Coefficient = 0.710
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.270
RI index for soil(AMC 1) = 0.00
Pervious area fraction = 0.410; Impervious fraction = 0.590
Initial subarea runoff = 4.467(CFS)
Total initial stream area = 3.800(Ac.)
Pervious area fraction = 0.410
End of computations, total study area = 3.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.410
Area averaged RI index number = 0.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:NORTHPROPOSED10YR.out

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PROPOSED NORTH 10 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.259(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 100.000 to Point/Station 101.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 480.000(Ft.)
Top (of initial area) elevation = 356.000(Ft.)
Bottom (of initial area) elevation = 264.500(Ft.)
Difference in elevation = 91.500(Ft.)
Slope = 0.19062 s(percent)= 19.06
TC = k(0.378)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.222 min.
Rainfall intensity = 4.583(In/Hr) for a 10.0 year storm

USER INPUT of soil data for subarea
Runoff Coefficient = 0.710
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.270
RI index for soil(AMC 1) = 0.00
Pervious area fraction = 0.410; Impervious fraction = 0.590
Initial subarea runoff = 12.364(CFS)
Total initial stream area = 3.800(Ac.)
Pervious area fraction = 0.410
End of computations, total study area = 3.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.410
Area averaged RI index number = 0.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:SOUTHEXISTING2YEAR.out

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SOUTH EXISTING 2 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.455(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 200.000 to Point/Station 201.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 320.000(Ft.)
Top (of initial area) elevation = 329.000(Ft.)
Bottom (of initial area) elevation = 267.000(Ft.)
Difference in elevation = 62.000(Ft.)
Slope = 0.19375 s(percent)= 19.38
TC = k(3.290)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 45.899 min.
Rainfall intensity = 0.530(In/Hr) for a 2.0 year storm

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.350
Decimal fraction soil group A = 0.620
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.380
RI index for soil(AMC 1)  =   0.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.228(CFS)
Total initial stream area =        1.230(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            1.23 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =   0.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:SOUTHEXISTING10YEAR.out

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SOUTH EXISTING 10 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.259(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 200.000 to Point/Station 201.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 320.000(Ft.)
Top (of initial area) elevation = 329.000(Ft.)
Bottom (of initial area) elevation = 267.000(Ft.)
Difference in elevation = 62.000(Ft.)
Slope = 0.19375 s(percent)= 19.38
TC = k(3.290)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 45.899 min.
Rainfall intensity = 1.467(In/Hr) for a 10.0 year storm

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.350
Decimal fraction soil group A = 0.620
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.380
RI index for soil(AMC 1)  =   0.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.632(CFS)
Total initial stream area =        1.230(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            1.23 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =   0.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:SOUTHPROPOSED2YEAR.out

---

SOUTH PROPOSED 2 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.455(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 200.000 to Point/Station 201.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 315.000(Ft.)
Top (of initial area) elevation = 329.000(Ft.)
Bottom (of initial area) elevation = 267.000(Ft.)
Difference in elevation = 62.000(Ft.)
Slope = 0.19683 s(percent)= 19.68
TC = k(0.450)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.219 min.
Rainfall intensity = 1.656(In/Hr) for a 2.0 year storm

USER INPUT of soil data for subarea
Runoff Coefficient = 0.530
Decimal fraction soil group A = 0.620
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.380
RI index for soil(AMC 1) = 0.00
Pervious area fraction = 0.700; Impervious fraction = 0.300
Initial subarea runoff = 1.080(CFS)
Total initial stream area = 1.230(Ac.)
Pervious area fraction = 0.700
End of computations, total study area = 1.23 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.700
Area averaged RI index number = 0.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:SOUTHPROPOSED10YEAR.out

---

SOUTH PROPOSED 10 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.259(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 200.000 to Point/Station 201.000

**** INITIAL AREA EVALUATION ****

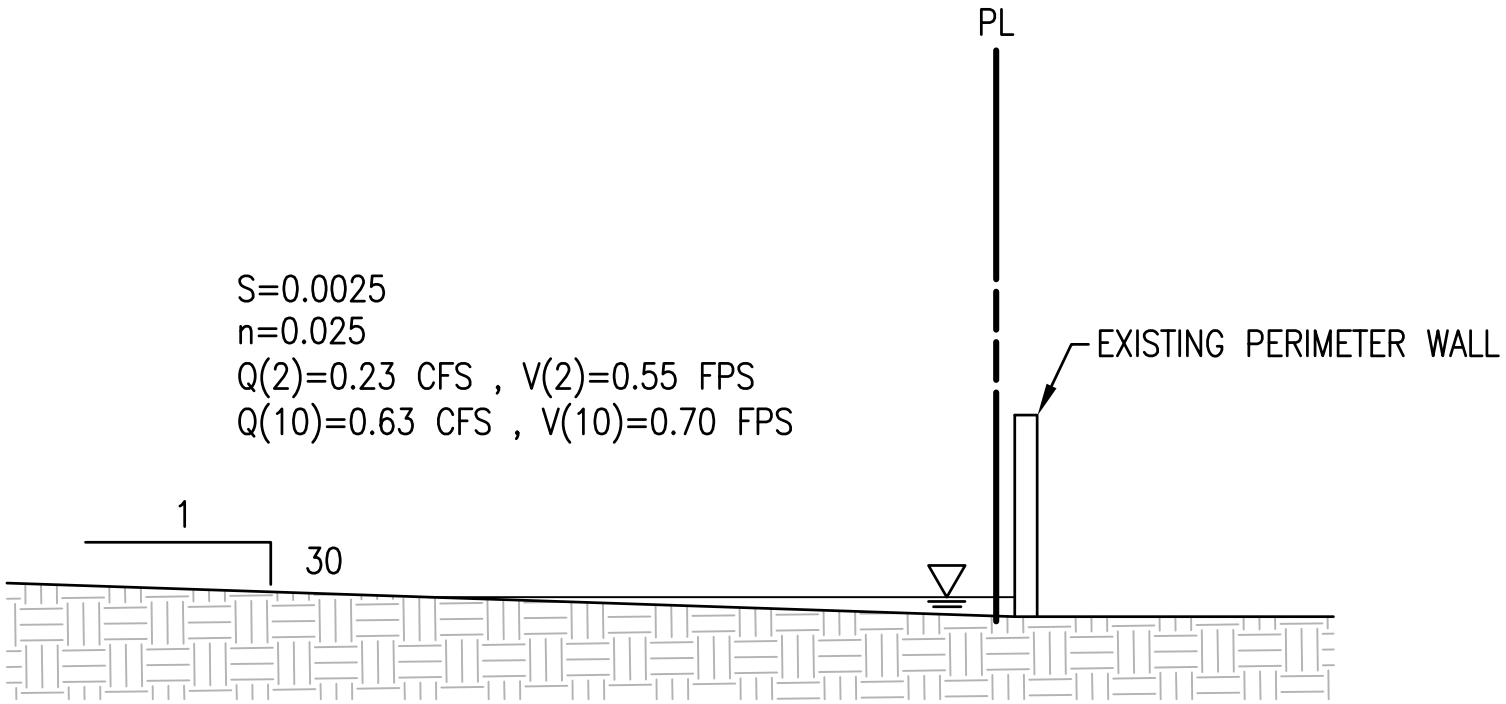
Initial area flow distance = 315.000(Ft.)
Top (of initial area) elevation = 329.000(Ft.)
Bottom (of initial area) elevation = 267.000(Ft.)
Difference in elevation = 62.000(Ft.)
Slope = 0.19683 s(percent)= 19.68
TC = k(0.450)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.219 min.
Rainfall intensity = 4.584(In/Hr) for a 10.0 year storm

USER INPUT of soil data for subarea
Runoff Coefficient = 0.530
Decimal fraction soil group A = 0.620
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.380
RI index for soil(AMC 1) = 0.00
Pervious area fraction = 0.700; Impervious fraction = 0.300
Initial subarea runoff = 2.988(CFS)
Total initial stream area = 1.230(Ac.)
Pervious area fraction = 0.700
End of computations, total study area = 1.23 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.700
Area averaged RI index number = 0.0

VI RUNOFF VELOCITY CALCULATIONS

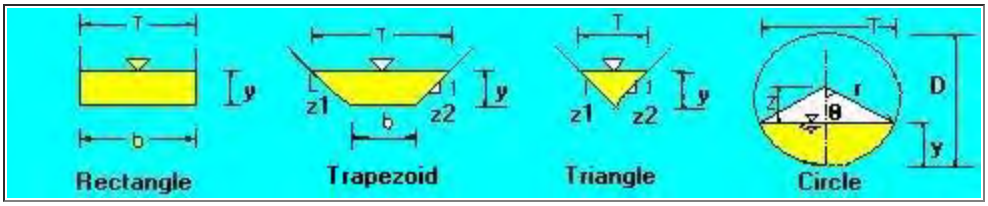
	2 YR DISCHARGE (Q) (CFS) LEAVING SITE	10 YR DISCHARGE (Q) (CFS) LEAVING SITE
SOUTH EXISTING	0.55	0.70
SOUTH PROPOSED	0	0
NORTH EXISTING	5.4	7.12
NORTH PROPOSED	0	7.01



EXISTING PARKING SOUTH OUTFLOW PATH SECTION

The open channel flow calculator

Select Channel Type: Triangle



Depth from Q

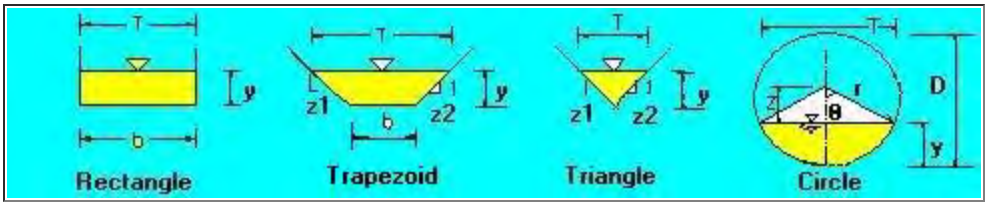
Select unit system: Feet(ft)

Channel slope: 0.0025 ft/ft	Water depth(y): 0.17 ft	Bottom W(b) 0 ft
Flow velocity 0.552442 ft/s	LeftSlope (z_1): 30 to 1 (H:V)	RightSlope (z_2): 0 to 1 (H:V)
Flow discharge 0.23 ft^3/s	Input n value 0.025 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 5.17 ft	Flow area 0.42 ft^2	Top width(T) 5 ft
Specific energy 0.17 ft	Froude number 0.34	Flow status Subcritical flow
Critical depth 0.11 ft	Critical slope 0.02 ft/ft	Velocity head 0 ft

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The open channel flow calculator

Select Channel Type: Triangle



Depth from Q

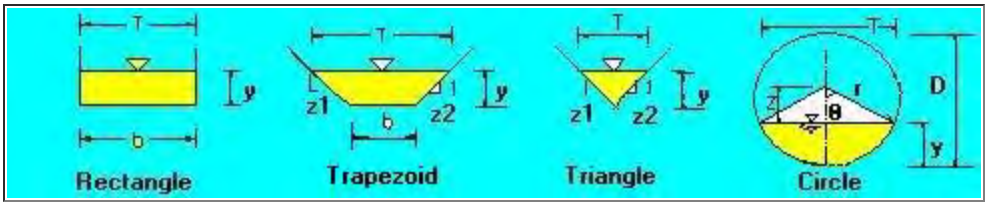
Select unit system: Feet(ft)

Channel slope: 0.0025 ft/ft	Water depth(y): 0.24 ft	Bottom W(b) 0 ft
Flow velocity 0.699708 ft/s	LeftSlope (z_1): 30 to 1 (H:V)	RightSlope (z_2): 0 to 1 (H:V)
Flow discharge 0.63 ft^3/s	Input n value 0.025 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 7.6 ft	Flow area 0.9 ft^2	Top width(T) 7.35 ft
Specific energy 0.25 ft	Froude number 0.35	Flow status Subcritical flow
Critical depth 0.16 ft	Critical slope 0.0218 ft/ft	Velocity head 0.01 ft

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The open channel flow calculator

Select Channel Type: Circle



Depth from Q

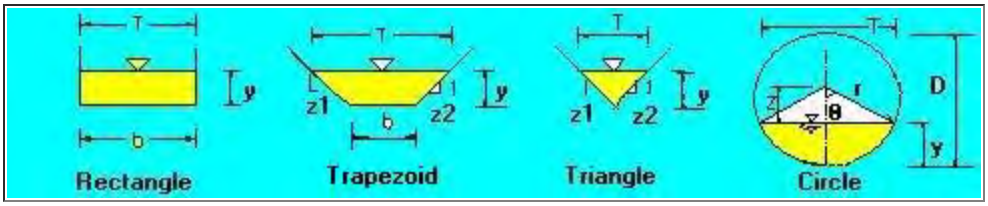
Select unit system: Feet(ft)

Channel slope: 0.01 ft/ft	Water depth(y): 0.56 ft	Radius (r) 1 ft
Flow velocity 5.398 ft/s	LeftSlope (z_1): to 1 (H:V)	RightSlope (z_2): to 1 (H:V)
Flow discharge 3.88 ft^3/s	Input n value 0.013 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 2.24 ft	Flow area 0.73 ft^2	Top width(T) 1.8 ft
Specific energy 1.02 ft	Froude number 1.5	Flow status Supercritical flow
Critical depth 0.69 ft	Critical slope 0.0045 ft/ft	Velocity head 0.45 ft

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The open channel flow calculator

Select Channel Type: Circle



Depth from Q

Select unit system: Feet(ft)

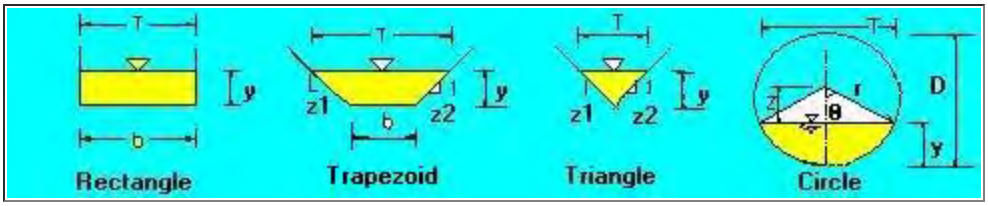
Channel slope: 0.01 ft/ft	Water depth(y): 0.97 ft	Radius (r) 1 ft
Flow velocity 7.108 ft/s	LeftSlope (z_1): to 1 (H:V)	RightSlope (z_2): to 1 (H:V)
Flow discharge 10.73 ft^3/s	Input n value 0.013 or select n clean,uncoated castiron:0.014	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 3.08 ft	Flow area 1.51 ft^2	Top width(T) 2 ft
Specific energy 1.75 ft	Froude number 1.44	Flow status Supercritical flow
Critical depth 1.18 ft	Critical slope 0.0053 ft/ft	Velocity head 0.78 ft

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DEVELOPED NORTH 10 YEAR FLOW

The open channel flow calculator

Select Channel Type: Circle



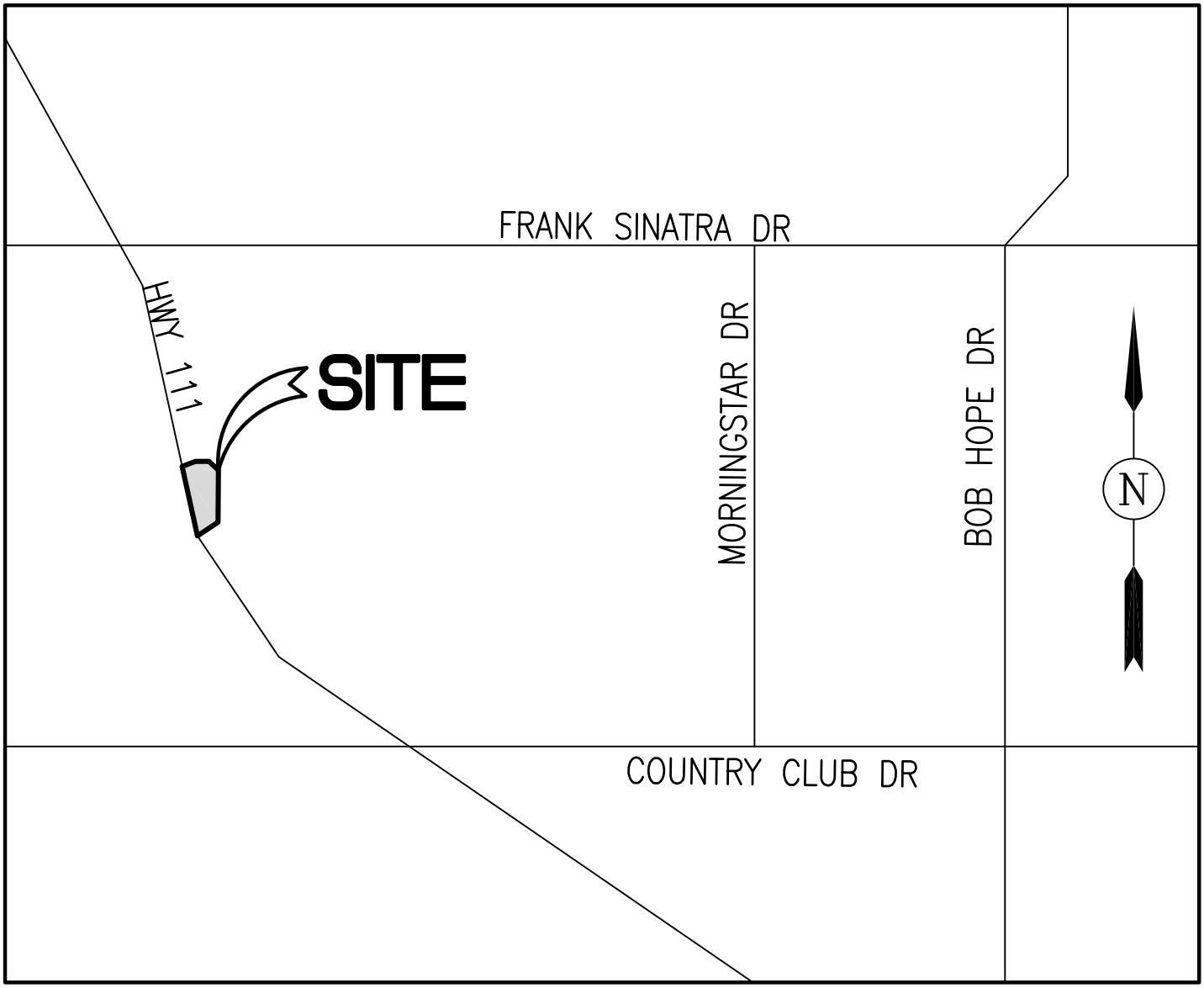
Depth from Q

Select unit system: Feet(ft)

Channel slope: 0.01 ft/ft	Water depth(y): 0.94 ft	Radius (r) 1 ft
Flow velocity 7.012 ft/s	LeftSlope (z_1): to 1 (H:V)	RightSlope (z_2): to 1 (H:V)
Flow discharge 10.13 ft^3/s	Input n value 0.013 or select n clean,uncoated castiron:0.014	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 3.02 ft	Flow area 1.45 ft^2	Top width(T) 2 ft
Specific energy 1.7 ft	Froude number 1.45	Flow status Supercritical flow
Critical depth 1.14 ft	Critical slope 0.0052 ft/ft	Velocity head 0.76 ft

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VII APPENDIX



VICINITY MAP

NOT TO SCALE

WORLD WILDLIFE MUSEUM

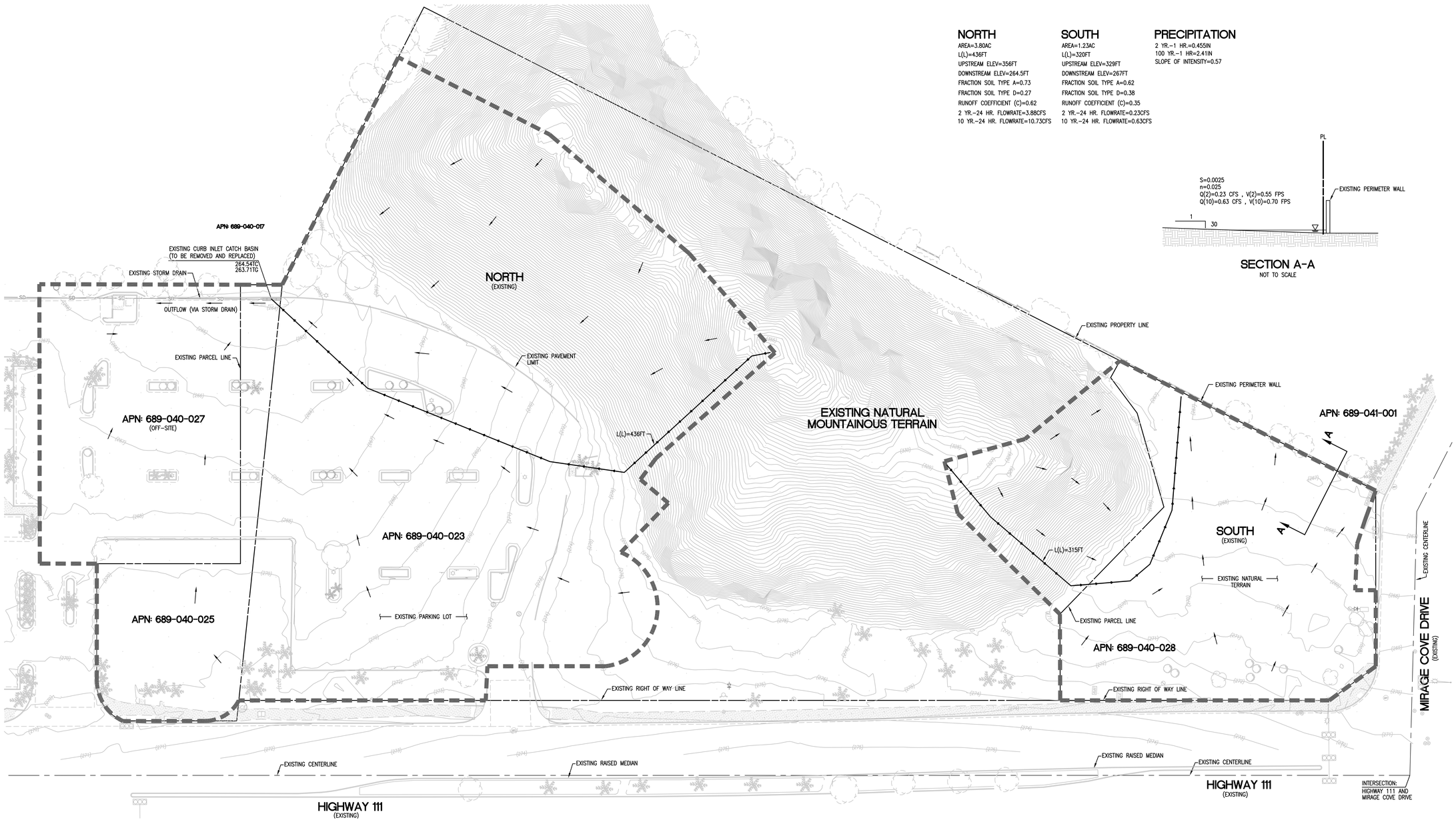
PRELIMINARY WQMP PLAN - EXISTING CONDITION

NORTH
AREA=3.80AC
L(L)=436FT
UPSTREAM ELEV=356FT
DOWNSTREAM ELEV=264.5FT
FRACTION SOIL TYPE A=0.73
FRACTION SOIL TYPE D=0.27
RUNOFF COEFFICIENT (C)=0.62
2 YR.-24 HR. FLOWRATE=3.88CFS
10 YR.-24 HR. FLOWRATE=10.73CFS

SOUTH
AREA=1.23AC
L(L)=320FT
UPSTREAM ELEV=329FT
DOWNSTREAM ELEV=267FT
FRACTION SOIL TYPE A=0.62
FRACTION SOIL TYPE D=0.38
RUNOFF COEFFICIENT (C)=0.35
2 YR.-24 HR. FLOWRATE=0.23CFS
10 YR.-24 HR. FLOWRATE=0.63CFS

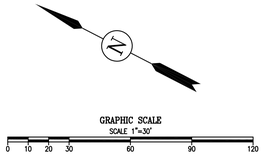
PRECIPITATION
2 YR.-1 HR.=0.455IN
100 YR.-1 HR=2.41IN
SLOPE OF INTENSITY=0.57

SECTION A-A
NOT TO SCALE



LEGEND

- SUBAREA BOUNDARY
- LONGEST LENGTH OF TRAVEL
- PROPOSED EARTHEN SWALE
- DIRECTIONAL FLOW ARROW



(NOT FOR CONSTRUCTION)

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TheAltumGroup.com

CITY OF PALM DESERT, CALIFORNIA

PRELIMINARY WQMP PLAN - EXISTING
WORLD WILDLIFE MUSEUM

FOR:

SHEET 1
OF 1

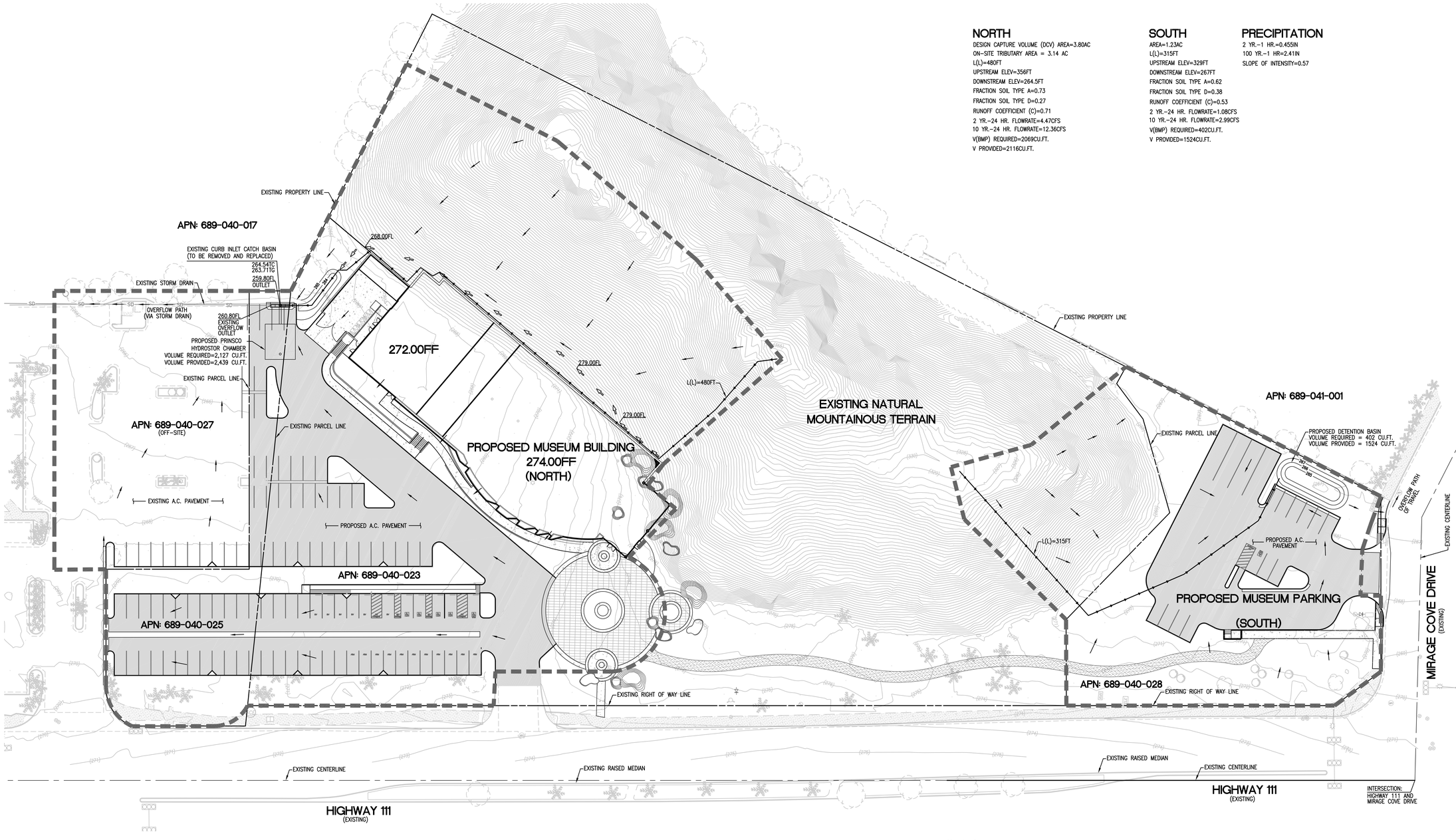
WORLD WILDLIFE MUSEUM

PRELIMINARY WQMP PLAN - DEVELOPED CONDITION

NORTH
DESIGN CAPTURE VOLUME (DCV) AREA=3.80AC
ON-SITE TRIBUTARY AREA = 3.14 AC
L(L)=480FT
UPSTREAM ELEV=356FT
DOWNSTREAM ELEV=264.5FT
FRACTION SOIL TYPE A=0.73
FRACTION SOIL TYPE D=0.27
RUNOFF COEFFICIENT (C)=0.71
2 YR.-24 HR. FLOWRATE=4.47CFS
10 YR.-24 HR. FLOWRATE=12.36CFS
V(BMP) REQUIRED=2069CU.FT.
V PROVIDED=2116CU.FT.

SOUTH
AREA=1.23AC
L(L)=315FT
UPSTREAM ELEV=329FT
DOWNSTREAM ELEV=267FT
FRACTION SOIL TYPE A=0.62
FRACTION SOIL TYPE D=0.38
RUNOFF COEFFICIENT (C)=0.53
2 YR.-24 HR. FLOWRATE=1.08CFS
10 YR.-24 HR. FLOWRATE=2.99CFS
V(BMP) REQUIRED=402CU.FT.
V PROVIDED=1524CU.FT.

PRECIPITATION
2 YR.-1 HR.=0.455IN
100 YR.-1 HR=2.41IN
SLOPE OF INTENSITY=0.57



LEGEND

- SUBAREA BOUNDARY
- LONGEST LENGTH OF TRAVEL
- PROPOSED EARTHEN SWALE
- PROPOSED A.C. PAVEMENT
- DIRECTIONAL FLOW ARROW

GRAPHIC SCALE
SCALE 1"=30'
0 10 20 30 60 90 120

(NOT FOR CONSTRUCTION)

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TheAltumGroup.com

CITY OF PALM DESERT, CALIFORNIA

PRELIMINARY WQMP PLAN - DEVELOPED
WORLD WILDLIFE MUSEUM

FOR:

SHEET 1
OF 1

NOAA Atlas 14, Volume 6, Version 2
Location name: Rancho Mirage, California, USA*
Latitude: 33.766°, Longitude: -116.443°
Elevation: 274 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	0.072 (0.060-0.087)	0.117 (0.097-0.142)	0.190 (0.157-0.231)	0.260 (0.214-0.319)	0.378 (0.301-0.479)	0.488 (0.380-0.632)	0.620 (0.471-0.824)	0.800 (0.590-1.09)	1.27 (0.901-1.82)	1.81 (1.24-2.68)
10-min	0.103 (0.086-0.124)	0.168 (0.140-0.203)	0.272 (0.226-0.330)	0.373 (0.307-0.458)	0.541 (0.431-0.687)	0.699 (0.544-0.906)	0.888 (0.675-1.18)	1.15 (0.846-1.57)	1.83 (1.29-2.61)	2.60 (1.78-3.84)
15-min	0.124 (0.104-0.150)	0.203 (0.169-0.246)	0.329 (0.273-0.400)	0.451 (0.372-0.553)	0.655 (0.521-0.831)	0.845 (0.658-1.10)	1.07 (0.816-1.43)	1.39 (1.02-1.90)	2.21 (1.56-3.15)	3.14 (2.15-4.65)
30-min	0.202 (0.169-0.245)	0.330 (0.275-0.400)	0.535 (0.444-0.650)	0.734 (0.605-0.900)	1.06 (0.848-1.35)	1.38 (1.07-1.78)	1.75 (1.33-2.32)	2.26 (1.66-3.09)	3.59 (2.54-5.13)	5.12 (3.49-7.56)
60-min	0.279 (0.233-0.338)	0.455 (0.379-0.552)	0.738 (0.613-0.898)	1.01 (0.835-1.24)	1.47 (1.17-1.87)	1.90 (1.48-2.46)	2.41 (1.83-3.21)	3.12 (2.30-4.26)	4.96 (3.51-7.08)	7.06 (4.83-10.4)
2-hr	0.374 (0.312-0.453)	0.611 (0.509-0.741)	0.969 (0.805-1.18)	1.30 (1.07-1.60)	1.82 (1.45-2.31)	2.28 (1.77-2.95)	2.80 (2.13-3.72)	3.40 (2.51-4.66)	5.01 (3.55-7.15)	7.14 (4.87-10.6)
3-hr	0.443 (0.369-0.536)	0.721 (0.601-0.875)	1.13 (0.940-1.38)	1.50 (1.24-1.84)	2.07 (1.65-2.62)	2.56 (1.99-3.31)	3.10 (2.36-4.12)	3.72 (2.75-5.09)	5.06 (3.58-7.22)	7.21 (4.92-10.7)
6-hr	0.593 (0.494-0.718)	0.953 (0.794-1.16)	1.47 (1.22-1.79)	1.93 (1.59-2.36)	2.60 (2.07-3.30)	3.17 (2.47-4.11)	3.79 (2.88-5.04)	4.48 (3.31-6.14)	5.51 (3.90-7.86)	7.28 (4.97-10.8)
12-hr	0.733 (0.611-0.888)	1.16 (0.969-1.41)	1.77 (1.47-2.15)	2.30 (1.90-2.82)	3.08 (2.45-3.91)	3.72 (2.90-4.83)	4.42 (3.36-5.88)	5.19 (3.83-7.10)	6.31 (4.46-9.00)	7.35 (5.02-10.9)
24-hr	0.867 (0.768-1.00)	1.36 (1.20-1.57)	2.06 (1.81-2.38)	2.66 (2.33-3.10)	3.54 (3.00-4.26)	4.27 (3.54-5.24)	5.05 (4.10-6.36)	5.91 (4.66-7.64)	7.16 (5.43-9.63)	8.20 (6.02-11.4)
2-day	0.996 (0.882-1.15)	1.54 (1.36-1.78)	2.32 (2.04-2.68)	2.99 (2.62-3.49)	3.98 (3.37-4.80)	4.80 (3.99-5.90)	5.69 (4.62-7.16)	6.67 (5.26-8.62)	8.09 (6.14-10.9)	9.28 (6.81-12.9)
3-day	1.06 (0.937-1.22)	1.63 (1.44-1.88)	2.44 (2.15-2.83)	3.16 (2.76-3.68)	4.21 (3.57-5.07)	5.09 (4.23-6.26)	6.05 (4.91-7.62)	7.11 (5.62-9.20)	8.67 (6.58-11.7)	9.99 (7.33-13.9)
4-day	1.09 (0.966-1.26)	1.67 (1.48-1.93)	2.51 (2.21-2.90)	3.24 (2.84-3.78)	4.33 (3.67-5.22)	5.24 (4.35-6.44)	6.24 (5.06-7.85)	7.34 (5.80-9.49)	8.97 (6.80-12.1)	10.4 (7.59-14.4)
7-day	1.19 (1.05-1.37)	1.82 (1.61-2.10)	2.73 (2.40-3.16)	3.52 (3.08-4.11)	4.71 (3.99-5.67)	5.70 (4.73-7.00)	6.78 (5.50-8.54)	7.98 (6.30-10.3)	9.76 (7.40-13.1)	11.3 (8.25-15.7)
10-day	1.26 (1.11-1.45)	1.93 (1.70-2.22)	2.89 (2.55-3.34)	3.74 (3.27-4.36)	5.00 (4.24-6.02)	6.06 (5.03-7.44)	7.21 (5.84-9.07)	8.48 (6.70-11.0)	10.4 (7.86-14.0)	12.0 (8.77-16.6)
20-day	1.38 (1.22-1.60)	2.14 (1.89-2.47)	3.23 (2.85-3.74)	4.20 (3.67-4.90)	5.65 (4.78-6.80)	6.86 (5.70-8.44)	8.20 (6.65-10.3)	9.68 (7.64-12.5)	11.9 (9.00-16.0)	13.7 (10.1-19.1)
30-day	1.55 (1.37-1.79)	2.42 (2.14-2.79)	3.68 (3.24-4.26)	4.80 (4.20-5.61)	6.49 (5.50-7.82)	7.92 (6.57-9.73)	9.48 (7.69-11.9)	11.2 (8.86-14.5)	13.8 (10.5-18.6)	16.0 (11.7-22.3)
45-day	1.70 (1.51-1.97)	2.69 (2.38-3.10)	4.12 (3.64-4.77)	5.41 (4.73-6.32)	7.36 (6.24-8.86)	9.02 (7.48-11.1)	10.8 (8.79-13.6)	12.9 (10.2-16.7)	15.9 (12.1-21.4)	18.5 (13.6-25.8)
60-day	1.83 (1.62-2.11)	2.91 (2.58-3.36)	4.50 (3.97-5.22)	5.94 (5.20-6.93)	8.12 (6.88-9.77)	9.98 (8.28-12.3)	12.0 (9.76-15.1)	14.3 (11.3-18.5)	17.8 (13.5-24.0)	20.8 (15.2-28.9)

[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.

Back to Top

PF graphical

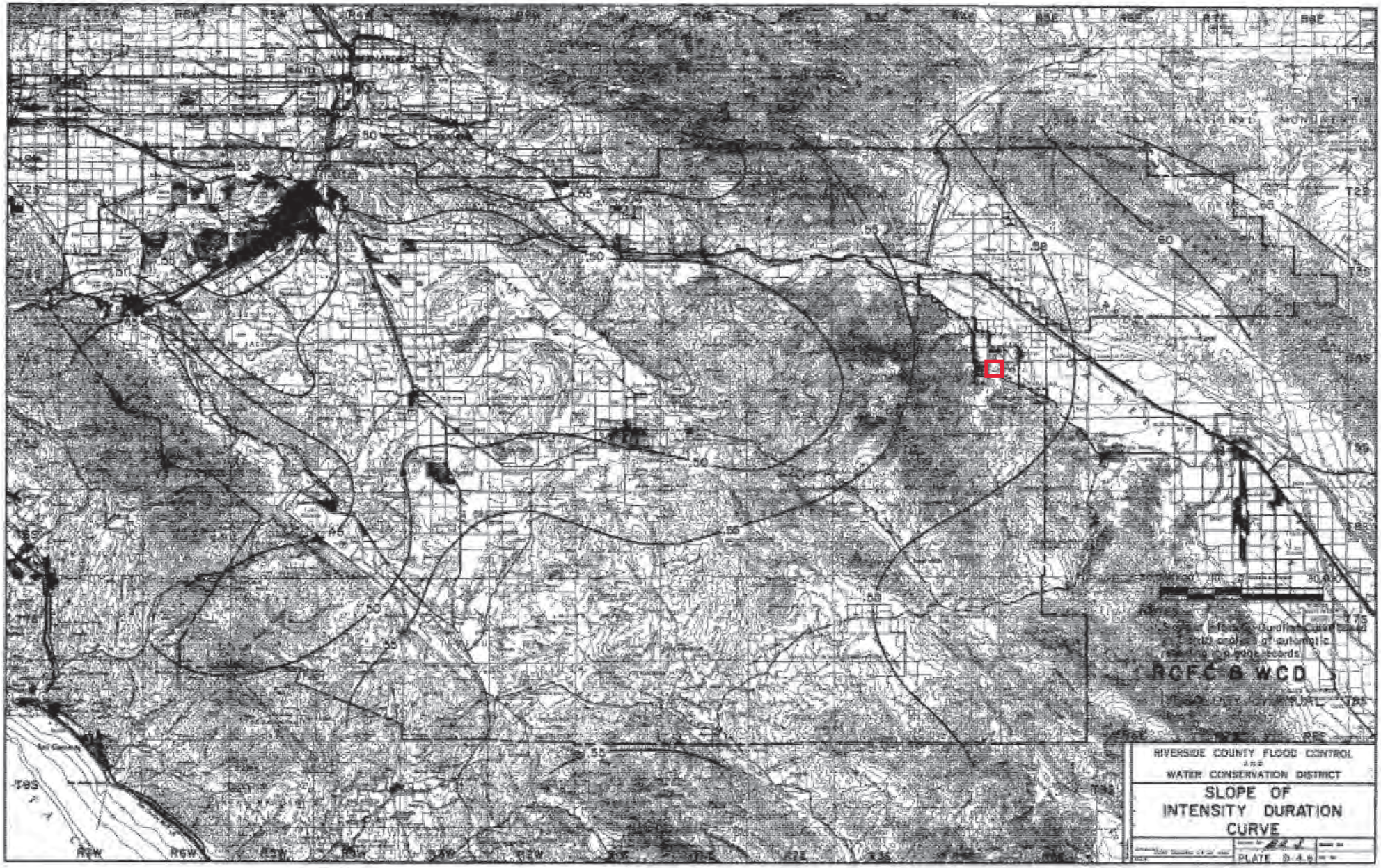
RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

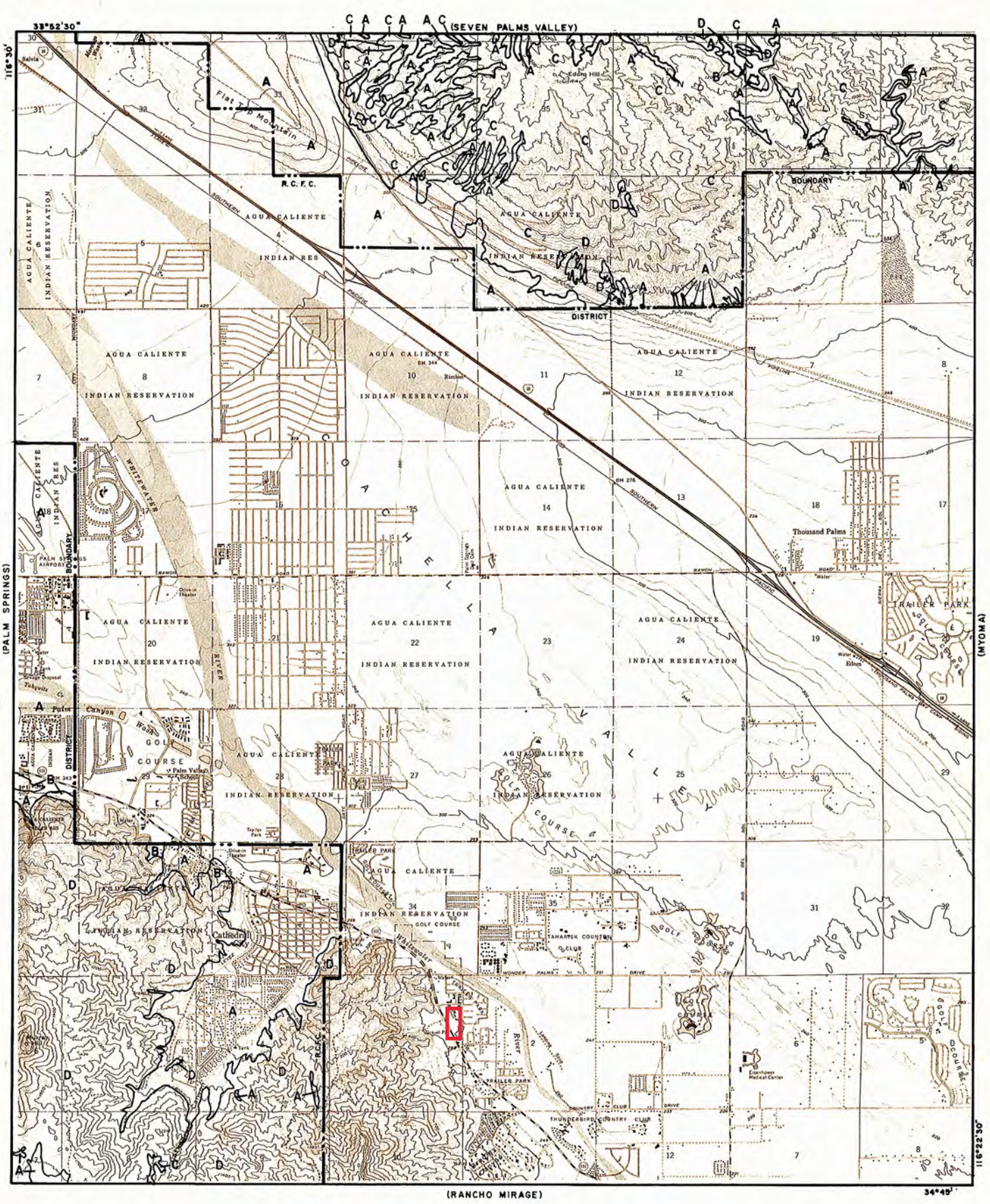
Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	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

PLATE D-5.5 (1 of 2)


RGFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
SLOPE OF
INTENSITY DURATION
CURVE
PLATE D-4.6



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR CATHEDRAL CITY

PLATE C-1.36

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

The City of Rancho Mirage Maintenance Agreement will be included in this Appendix before the approval of the Final WQMP.

Appendix H

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

N/A

Appendix I

PROJECT-SPECIFIC WQMP SUMMARY DATA FORM

Project-Specific WQMP Summary Data Form

Applicant Information	
Name and Title	James Bazua, P.E.
Company	The Altum Group
Phone	(760) 346 – 4750
Email	james.bazua@thealtumgroup.com

Project Information	
Project Name (as shown on project application/project-specific WQMP)	WORLD WILDLIFE MUSEUM
Street Address	69934 CA-111, Rancho Mirage, CA
Nearest Cross Streets	CA-111 & Frank Sinatra Drive
Municipality (City or Unincorporated County)	Rancho Mirage
Zip Code	92270
Tract Number(s) and/or Assessor Parcel Number(s)	689-040-023, 689-040-025, 689-040-028
Other (other information to help identify location of project)	
Watershed	Colorado River Region; Whitewater River

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 PWQMP Submitted	
Size of Project Area (nearest 0.1 acre)	6.78 acres
Project Area managed with Site Design or Low Impact Development (LID) BMPs (nearest 0.1 acre)	5.03 acres (1.75 acres – self treating)
Is the project subject to onsite retention by ordinance or policy?	No
Are Treatment Control BMPs required?	Not Applicable
Name of the entity that will implement, operate, and maintain the post-construction BMPs	Owner
Contact Name	
Street or Mailing Address	
City	
Zip Code	
Phone	

Space Below for Use by City/County Staff Only	
Preceding Information Verified by (consistent with information in project-specific WQMP)	**Name:** **Date:**
Date Project-Specific WQMP Approved:	
Data Entered by	**Name:** **Date:**
Other Comments	

Appendix G

Preliminary Hydrology Report

WORLD WILDLIFE MUSEUM
RANCHO MIRAGE, CA

PRELIMINARY HYDROLOGY REPORT

PREPARED FOR:
PREST VUKSIC GREENWOOD ARCHITECTS
44-530 SAN PABLO AVENUE, STE 200
PALM DESERT, CA 92260

PREPARED BY:

TheAltumGroup

44-600 VILLAGE COURT, SUITE 100
PALM DESERT, CA 92260
(760) 346-4750

MARCH 27, 2025

Prepared Under the Supervision of:

3/27/25

James Bazua, PE
R.C.E. 58394
Expiration Date: December 31, 2026



World Wildlife Museum

PRELIMINARY HYDROLOGY REPORT

TABLE OF CONTENTS:

I PROJECT DESCRIPTION

II DESIGN METHODOLOGY

III DESIGN CAPTURE VOLUME CALCULATIONS

IV RUNOFF VOLUME CALCULATIONS

V RUNOFF DISCHARGE CALCULATIONS

VI RUNOFF VELOCITY CALCULATIONS

VII APPENDIX

I. PROJECT DESCRIPTION

This report was prepared in support of the World Wildlife Museum submittal. The purpose of this preliminary hydrology report is to analyze and compare the drainage patterns for existing and proposed development conditions, to show that the project meets MS4 permit requirements.

The proposed project, 'World Wildlife Museum', is located at 69934 CA State Highway 111, Rancho Mirage, CA 92270 on a 6.78 acre site. Project activities consist of the construction of the World Wildlife Museum, a commercial museum development that will occupy a portion of Parcel 1 of Parcel Map No. 8674 (689-040-025), Parcel 2 of Parcel Map No. 8674 (689-040-023) and Lot 88, R.M. Annex No 2 (689-040-028). Construction activities will disturb approximately 3.2 acres of the 6.78 acre site.

Under existing conditions, the site is partially developed with a parking lot. The existing parking lot served a previous commercial building located on Parcel 2 which has been completely demolished. Existing drainage is designed to surface flow to a low point located in the northeasterly portion of the parking lot toward an existing combination curb inlet/grate catch basin that collects runoff in a sump condition and directs flow into an existing storm drain pipe designed to convey runoff off-site toward the existing Whitewater Evacuation Channel (receiving water) located nearby, to the northeast. Lot 88, R.M. Annex No. 2 (689-040-028) is located at the southerly end of the project boundary, is currently vacant and surface flows over pervious ground cover in a southeasterly direction toward Mirage Cove Drive, and off-site within public right of way and ultimately into Whitewater Evacuation Channel to the east.

Under post development conditions, the existing parking lot (Parcels 1 &2) will be improved and re-purposed, and a new museum building will be constructed and new separate overflow parking facilities will be constructed on Lot 88. Storm runoff generated on improved portions of Parcel 1 and Parcel 2 will continue to flow to the low point of the existing parking lot and into a new combination collection basin and underground storage system designed to replace the existing curb inlet. Storm runoff generated on the overflow parking improvements within Lot 88 will surface flow toward the east into a new surface detention basin.

II. DESIGN METHODOLOGY AND CALCULATIONS

Developments south and southwest of the Whitewater Evacuation Channel within City of Rancho are required to comply with MS4 permit WQMP treatment requirements, but are not required to retain the runoff generated during the 100 year design storm event. The World Wildlife Museum project will collect and store runoff underground (Parcels 1 & 2) and in a surface retention basin (Lot 88) in a manner that captures and treats the Design Capture Volume (DCV) and ensures that flowrates, velocities and volumes leaving the site under the proposed condition do not exceed those under the existing condition. Flows exceeding the storage capacity of the new on-site storage facilities will leave the project site, and continue to flow toward the Whitewater Evacuation Channel as they do under the existing condition.

1.) The Water Quality Management Plan (WQMP) Design Capture Volume (DCV) is calculated using worksheets provided by Riverside County Flood Control and Water Conservation District for Stormwater Quality Best Management Practices for the Riverside County Whitewater River Region.
2.) Riverside County Flood Control District Synthetic Unit Hydrograph methods are used to quantify the runoff volumes generated for the pre and post development site conditions during the 2 year-24 hour and 10 year-24 hour storm events.
3.) Flowrates (Q) generated for the pre and post development site conditions during the 2 year-24 hour and 10 year-24 hour storm events are calculated using CivilD rational method software.
4.) Flow velocities for the pre and post development site conditions during the 2 year-24 hour and 10 year-24 hour storm events are calculated using manning's equation for open channel flow and flowrate results listed in this report

DESIGN CRITERIA

The following Riverside County Flood Control District (RCFCD) parameters were used in the preparation of the analyses:

- 2 year – 1 hour Precipitation 0.455" (NOAA)
- 2 year – 3 hour Precipitation 0.721" (NOAA)
- 2 year – 6 hour Precipitation 0.953" (NOAA)
- 2 year – 24 hour Precipitation 1.36" (NOAA)
- 10 year – 3 hour Precipitation 1.50" (NOAA)
- 10 year – 6 hour Precipitation 1.93" (NOAA)
- 10 year – 24 hour Precipitation 2.66" (NOAA)
- 100 year – 1 hour Precipitation 2.41" (NOAA)
- Hydrologic Soil Type "A" (RCFC&WCD Plate C-1.36)
- Slope Intensity Duration Curve (RCFC&WCD Plate D-4.6)
- Runoff Index Number 32 (RCFC&WCD Plate D-5.5)

III DESIGN CAPTURE VOLUME CALCULATIONS

NORTH

DESIGN CAPTURE VOLUME AREA = 3.80 AC (INCLUDES OFF-SITE FLOW)

IMPERVIOUS FRACTION = 0.55

DESIGN CAPTURE VOLUME = 2,069 CU.FT.

INFILTRATION BMP VOLUME PROVIDED = 2,439 CU.FT.

SOUTH

DESIGN CAPTURE VOLUME AREA = 1.23 AC

IMPERVIOUS FRACTION = 0.30

DESIGN CAPTURE VOLUME = 402 CU.FT.

INFILTRATION BMP VOLUME PROVIDED = 1,524 CU.FT.

Whitewater Watershed

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

Legend: Required Entries / Calculated Cells

Company Name	The Altum Group	Date	3/20/2025
Designed by	James Bazua	County/City Case No	C2026
Company Project Number/Name			
Drainage Area Number/Name	WORLD WILDLIFE MUSEUM - NORTH		

Enter the Area Tributary to this Feature A_T = 3.8 acres

Determine the Effective Impervious Fraction

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

Effective Impervious Fraction I_f = 0.55

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

Use the following equation based on the WEF/ASCE Method

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

C = 0.37

Determine Design Storage Volume, V_{BMP}

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

V_u = 0.15 (in*ac)/ac

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

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

V_{BMP} = 2,069 ft^3

Notes:

Whitewater Watershed

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

Legend: Required Entries / Calculated Cells

Company Name	The Altum Group	Date	3/20/2025
Designed by	James Bazua	County/City Case No	C2026
Company Project Number/Name			
Drainage Area Number/Name	WORLD WILDLIFE MUSEUM - SOUTH		

Enter the Area Tributary to this Feature A_T = 1.23 acres

Determine the Effective Impervious Fraction

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

Effective Impervious Fraction I_f = 0.30

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

Use the following equation based on the WEF/ASCE Method

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

C = 0.23

Determine Design Storage Volume, V_{BMP}

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

V_u = 0.09 (in*ac)/ac

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

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

V_{BMP} = 402 ft^3

Notes:

IV RUNOFF VOLUME CALCULATIONS

SUBAREA	NORTH EXISTING	NORTH PROPOSED
2 YR. – 24 HR VOLUME (CU.FT.)	1537	1537
2 YR. – 24 HR VOLUME STORED ON-SITE (CU.FT.)	0	1537
2 YR. – 24 HR VOLUME LEAVING SITE (CU.FT.)	1537	0
10 YR. – 24 HR VOLUME (CU.FT.)	3560	5799
10 YR. – 24 HR VOLUME STORED ON-SITE (CU.FT.)	-	2439
10 YR. – 24 HR VOLUME LEAVING SITE (CU.FT.)	3560	3360

SUBAREA	SOUTH EXISTING	SOUTH PROPOSED
2 YR. – 24 HR VOLUME (CU.FT.)	602	602
2 YR. – 24 HR VOLUME STORED ON-SITE (CU.FT.)	0	602
2 YR. – 24 HR VOLUME LEAVING SITE (CU.FT.)	602	0
10 YR. – 24 HR VOLUME (CU.FT.)	1178	1168
10 YR. – 24 HR VOLUME STORED ON-SITE (CU.FT.)	0	1168
10 YR. – 24 HR VOLUME LEAVING SITE (CU.FT.)	1178	0

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM EXIST 2 YR EVENT - NORTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	1.24		
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			
24	GOLF COURSE			
25	MOUNTAINOUS	1.03		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	436		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	46		
30				
31	ELEVATION OF HEADWATER	356		
32	ELEVATION OF CONCENTRATION POINT	264.5		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.721		
40	6-HOUR	0.953		
41	24-HOUR	1.36		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NORTH
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	3.140
[4] L-FEET	436
[5] L-MILES	0.083
[6] La-FEET	46.00
[7] La-MILES	0.009
[8] ELEVATION OF HEADWATER	356
[9] ELEVATION OF CONCENTRATION POINT	264.5
[10] H-FEET	91.5
[11] S-FEET/MILE	1108.1
[12] S^0.5	33.29
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.5
[17] 100% OF LAG-MINUTES	0.5
[18] 200% OF LAG-MINUTES	1.0
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
0.72	3.140	1.00	0.72	0.95	3.140	1.00	0.95	1.36	3.140	1.00	1.36
		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]	3.14	SUM [7]	0.72	SUM [9]	3.14	SUM [11]	0.95	SUM [13]	3.14	SUM [15]	1.36
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.72				0.95				1.36

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.17	0.16	0.14
FLOOD VOLUME	(cu-ft)	1,896	1,843	1,550
	(acre-ft)	0.04	0.04	0.04
REQUIRED STORAGE	(cu-ft)	1,880	1,828	1,537
	(acre-ft)	0.04	0.04	0.04
PEAK FLOW	(cfs)	1.31	1.09	0.06
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM EXIST 2 YR EVENT - NORTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	1.24	0.395	0.0292
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.87	0.277	0.2050
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	1.03	0.328	0.0592
					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 3.14	SUM	0.2935

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.146731688

C= 0.00272

Ft=C(24-(T/60))^1.55 = 0.00272 (24-(T/60))^1.55 + 0.15 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: WORLD MUSEUM EXIST 2 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.49
UNIT TIME-PERCENT OF LAG	1029.0
TOTAL ADJUSTED STORM RAIN-INCHES	0.72
CONSTANT LOSS RATE-in/hr	0.29
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.112	0.29	0.10	0.01	0.04	10.60
2	10	0.17	1.3	0.112	0.29	0.10	0.01	0.04	10.60
3	15	0.25	1.1	0.095	0.29	0.09	0.01	0.03	8.97
4	20	0.33	1.5	0.130	0.29	0.12	0.01	0.04	12.23
5	25	0.42	1.5	0.130	0.29	0.12	0.01	0.04	12.23
6	30	0.50	1.8	0.156	0.29	0.14	0.02	0.05	14.67
7	35	0.58	1.5	0.130	0.29	0.12	0.01	0.04	12.23
8	40	0.67	1.8	0.156	0.29	0.14	0.02	0.05	14.67
9	45	0.75	1.8	0.156	0.29	0.14	0.02	0.05	14.67
10	50	0.83	1.5	0.130	0.29	0.12	0.01	0.04	12.23
11	55	0.92	1.6	0.138	0.29	0.12	0.01	0.04	13.04
12	60	1.00	1.8	0.156	0.29	0.14	0.02	0.05	14.67
13	65	1.08	2.2	0.190	0.29	0.17	0.02	0.06	17.93
14	70	1.17	2.2	0.190	0.29	0.17	0.02	0.06	17.93
15	75	1.25	2.2	0.190	0.29	0.17	0.02	0.06	17.93
16	80	1.33	2.0	0.173	0.29	0.16	0.02	0.05	16.30
17	85	1.42	2.6	0.225	0.29	0.20	0.02	0.07	21.19
18	90	1.50	2.7	0.234	0.29	0.21	0.02	0.07	22.01
19	95	1.58	2.4	0.208	0.29	0.19	0.02	0.07	19.56
20	100	1.67	2.7	0.234	0.29	0.21	0.02	0.07	22.01
21	105	1.75	3.3	0.286	0.29	0.26	0.03	0.09	26.90
22	110	1.83	3.1	0.268	0.29	0.24	0.03	0.08	25.27
23	115	1.92	2.9	0.251	0.29	0.23	0.03	0.08	23.64
24	120	2.00	3.0	0.260	0.29	0.23	0.03	0.08	24.45
25	125	2.08	3.1	0.268	0.29	0.24	0.03	0.08	25.27
26	130	2.17	4.2	0.363	0.29	0.33	0.07	0.22	65.87
27	135	2.25	5.0	0.433	0.29	0.39	0.14	0.44	131.07
28	140	2.33	3.5	0.303	0.29	0.27	0.01	0.03	8.81
29	145	2.42	6.8	0.588	0.29	0.53	0.29	0.93	277.77
30	150	2.50	7.3	0.632	0.29	0.57	0.34	1.06	318.52
31	155	2.58	8.2	0.709	0.29	0.64	0.42	1.31	391.87
32	160	2.67	5.9	0.510	0.29	0.46	0.22	0.68	204.42
33	165	2.75	2.0	0.173	0.29	0.16	0.02	0.05	16.30
34	170	2.83	1.8	0.156	0.29	0.14	0.02	0.05	14.67
35	175	2.92	1.8	0.156	0.29	0.14	0.02	0.05	14.67
36	180	3.00	0.6	0.052	0.29	0.05	0.01	0.02	4.89

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.17
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1895.68
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1880.00
PEAK FLOW RATE (cfs)	1.31

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

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NOR
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.49
UNIT TIME-PERCENT OF LAG	1029.0
TOTAL ADJUSTED STORM RAIN-INCHES	0.95
CONSTANT LOSS RATE-in/hr	0.293
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.057	0.29	0.05	0.01	0.02	5.39
2	10	0.17	0.6	0.069	0.29	0.06	0.01	0.02	6.46
3	15	0.25	0.6	0.069	0.29	0.06	0.01	0.02	6.46
4	20	0.33	0.6	0.069	0.29	0.06	0.01	0.02	6.46
5	25	0.42	0.6	0.069	0.29	0.06	0.01	0.02	6.46
6	30	0.50	0.7	0.080	0.29	0.07	0.01	0.03	7.54
7	35	0.58	0.7	0.080	0.29	0.07	0.01	0.03	7.54
8	40	0.67	0.7	0.080	0.29	0.07	0.01	0.03	7.54
9	45	0.75	0.7	0.080	0.29	0.07	0.01	0.03	7.54
10	50	0.83	0.7	0.080	0.29	0.07	0.01	0.03	7.54
11	55	0.92	0.7	0.080	0.29	0.07	0.01	0.03	7.54
12	60	1.00	0.8	0.091	0.29	0.08	0.01	0.03	8.62
13	65	1.08	0.8	0.091	0.29	0.08	0.01	0.03	8.62
14	70	1.17	0.8	0.091	0.29	0.08	0.01	0.03	8.62
15	75	1.25	0.8	0.091	0.29	0.08	0.01	0.03	8.62
16	80	1.33	0.8	0.091	0.29	0.08	0.01	0.03	8.62
17	85	1.42	0.8	0.091	0.29	0.08	0.01	0.03	8.62
18	90	1.50	0.8	0.091	0.29	0.08	0.01	0.03	8.62
19	95	1.58	0.8	0.091	0.29	0.08	0.01	0.03	8.62
20	100	1.67	0.8	0.091	0.29	0.08	0.01	0.03	8.62
21	105	1.75	0.8	0.091	0.29	0.08	0.01	0.03	8.62
22	110	1.83	0.8	0.091	0.29	0.08	0.01	0.03	8.62
23	115	1.92	0.8	0.091	0.29	0.08	0.01	0.03	8.62
24	120	2.00	0.9	0.103	0.29	0.09	0.01	0.03	9.70
25	125	2.08	0.8	0.091	0.29	0.08	0.01	0.03	8.62
26	130	2.17	0.9	0.103	0.29	0.09	0.01	0.03	9.70
27	135	2.25	0.9	0.103	0.29	0.09	0.01	0.03	9.70
28	140	2.33	0.9	0.103	0.29	0.09	0.01	0.03	9.70
29	145	2.42	0.9	0.103	0.29	0.09	0.01	0.03	9.70
30	150	2.50	0.9	0.103	0.29	0.09	0.01	0.03	9.70
31	155	2.58	0.9	0.103	0.29	0.09	0.01	0.03	9.70
32	160	2.67	0.9	0.103	0.29	0.09	0.01	0.03	9.70
33	165	2.75	1.0	0.114	0.29	0.10	0.01	0.04	10.77
34	170	2.83	1.0	0.114	0.29	0.10	0.01	0.04	10.77
35	175	2.92	1.0	0.114	0.29	0.10	0.01	0.04	10.77
36	180	3.00	1.0	0.114	0.29	0.10	0.01	0.04	10.77
37	185	3.08	1.0	0.114	0.29	0.10	0.01	0.04	10.77
38	190	3.17	1.1	0.126	0.29	0.11	0.01	0.04	11.85
39	195	3.25	1.1	0.126	0.29	0.11	0.01	0.04	11.85
40	200	3.33	1.1	0.126	0.29	0.11	0.01	0.04	11.85
41	205	3.42	1.2	0.137	0.29	0.12	0.01	0.04	12.93
42	210	3.50	1.3	0.149	0.29	0.13	0.01	0.05	14.00
43	215	3.58	1.4	0.160	0.29	0.14	0.02	0.05	15.08
44	220	3.67	1.4	0.160	0.29	0.14	0.02	0.05	15.08
45	225	3.75	1.5	0.172	0.29	0.15	0.02	0.05	16.16
46	230	3.83	1.5	0.172	0.29	0.15	0.02	0.05	16.16
47	235	3.92	1.6	0.183	0.29	0.16	0.02	0.06	17.24
48	240	4.00	1.6	0.183	0.29	0.16	0.02	0.06	17.24
49	245	4.08	1.7	0.194	0.29	0.17	0.02	0.06	18.31
50	250	4.17	1.8	0.206	0.29	0.19	0.02	0.06	19.39
51	255	4.25	1.9	0.217	0.29	0.20	0.02	0.07	20.47
52	260	4.33	2.0	0.229	0.29	0.21	0.02	0.07	21.55
53	265	4.42	2.1	0.240	0.29	0.22	0.02	0.08	22.62
54	270	4.50	2.1	0.240	0.29	0.22	0.02	0.08	22.62
55	275	4.58	2.2	0.252	0.29	0.23	0.03	0.08	23.70
56	280	4.67	2.3	0.263	0.29	0.24	0.03	0.08	24.78

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NOR CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.49		
UNIT TIME-PERCENT OF LAG	1029.0		
TOTAL ADJUSTED STORM RAIN-INCHES	0.95		
CONSTANT LOSS RATE-in/hr	0.293		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.274	0.29	0.25	0.03	0.09	25.85
58	290	4.83	2.4	0.274	0.29	0.25	0.03	0.09	25.85
59	295	4.92	2.5	0.286	0.29	0.26	0.03	0.09	26.93
60	300	5.00	2.6	0.297	0.29	0.27	0.00	0.01	3.65
61	305	5.08	3.1	0.355	0.29	0.32	0.06	0.19	57.51
62	310	5.17	3.6	0.412	0.29	0.37	0.12	0.37	111.38
63	315	5.25	3.9	0.446	0.29	0.40	0.15	0.48	143.69
64	320	5.33	4.2	0.480	0.29	0.43	0.19	0.59	176.01
65	325	5.42	4.7	0.537	0.29	0.48	0.24	0.77	229.87
66	330	5.50	5.6	0.640	0.29	0.58	0.35	1.09	326.83
67	335	5.58	1.9	0.217	0.29	0.20	0.02	0.07	20.47
68	340	5.67	0.9	0.103	0.29	0.09	0.01	0.03	9.70
69	345	5.75	0.6	0.069	0.29	0.06	0.01	0.02	6.46
70	350	5.83	0.5	0.057	0.29	0.05	0.01	0.02	5.39
71	355	5.92	0.3	0.034	0.29	0.03	0.00	0.01	3.23
72	360	6.00	0.2	0.023	0.29	0.02	0.00	0.01	2.15

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.16
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1843.05
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1827.81
PEAK FLOW RATE (cfs)	1.09

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

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2935
LAG TIME - MINUTES	0.49	MINIMUM LOSS RATE (for var. loss) - in/hr	0.147
UNIT TIME-PERCENT OF LAG	3086.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00272
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.011	0.518	0.010	0.001	0.00	3.07
2	30	0.50	0.3	0.016	0.512	0.015	0.002	0.01	4.61
3	45	0.75	0.3	0.016	0.506	0.015	0.002	0.01	4.61
4	60	1.00	0.4	0.022	0.500	0.020	0.002	0.01	6.15
5	75	1.25	0.3	0.016	0.494	0.015	0.002	0.01	4.61
6	90	1.50	0.3	0.016	0.489	0.015	0.002	0.01	4.61
7	105	1.75	0.3	0.016	0.483	0.015	0.002	0.01	4.61
8	120	2.00	0.4	0.022	0.477	0.020	0.002	0.01	6.15
9	135	2.25	0.4	0.022	0.471	0.020	0.002	0.01	6.15
10	150	2.50	0.4	0.022	0.465	0.020	0.002	0.01	6.15
11	165	2.75	0.5	0.027	0.460	0.024	0.003	0.01	7.69
12	180	3.00	0.5	0.027	0.454	0.024	0.003	0.01	7.69
13	195	3.25	0.5	0.027	0.448	0.024	0.003	0.01	7.69
14	210	3.50	0.5	0.027	0.443	0.024	0.003	0.01	7.69
15	225	3.75	0.5	0.027	0.437	0.024	0.003	0.01	7.69
16	240	4.00	0.6	0.033	0.432	0.029	0.003	0.01	9.22
17	255	4.25	0.6	0.033	0.426	0.029	0.003	0.01	9.22
18	270	4.50	0.7	0.038	0.421	0.034	0.004	0.01	10.76
19	285	4.75	0.7	0.038	0.415	0.034	0.004	0.01	10.76
20	300	5.00	0.8	0.044	0.410	0.039	0.004	0.01	12.30
21	315	5.25	0.6	0.033	0.405	0.029	0.003	0.01	9.22
22	330	5.50	0.7	0.038	0.400	0.034	0.004	0.01	10.76
23	345	5.75	0.8	0.044	0.394	0.039	0.004	0.01	12.30
24	360	6.00	0.8	0.044	0.389	0.039	0.004	0.01	12.30
25	375	6.25	0.9	0.049	0.384	0.044	0.005	0.02	13.84
26	390	6.50	0.9	0.049	0.379	0.044	0.005	0.02	13.84
27	405	6.75	1.0	0.054	0.374	0.049	0.005	0.02	15.37
28	420	7.00	1.0	0.054	0.369	0.049	0.005	0.02	15.37
29	435	7.25	1.0	0.054	0.364	0.049	0.005	0.02	15.37
30	450	7.50	1.1	0.060	0.359	0.054	0.006	0.02	16.91
31	465	7.75	1.2	0.065	0.354	0.059	0.007	0.02	18.45
32	480	8.00	1.3	0.071	0.349	0.064	0.007	0.02	19.99
33	495	8.25	1.5	0.082	0.344	0.073	0.008	0.03	23.06
34	510	8.50	1.5	0.082	0.339	0.073	0.008	0.03	23.06
35	525	8.75	1.6	0.087	0.335	0.078	0.009	0.03	24.60
36	540	9.00	1.7	0.092	0.330	0.083	0.009	0.03	26.13
37	555	9.25	1.9	0.103	0.325	0.093	0.010	0.03	29.21
38	570	9.50	2.0	0.109	0.321	0.098	0.011	0.03	30.75
39	585	9.75	2.1	0.114	0.316	0.103	0.011	0.04	32.28
40	600	10.00	2.2	0.120	0.311	0.108	0.012	0.04	33.82
41	615	10.25	1.5	0.082	0.307	0.073	0.008	0.03	23.06
42	630	10.50	1.5	0.082	0.302	0.073	0.008	0.03	23.06
43	645	10.75	2.0	0.109	0.298	0.098	0.011	0.03	30.75
44	660	11.00	2.0	0.109	0.294	0.098	0.011	0.03	30.75
45	675	11.25	1.9	0.103	0.289	0.093	0.010	0.03	29.21
46	690	11.50	1.9	0.103	0.285	0.093	0.010	0.03	29.21
47	705	11.75	1.7	0.092	0.281	0.083	0.009	0.03	26.13
48	720	12.00	1.8	0.098	0.277	0.088	0.010	0.03	27.67
49	735	12.25	2.5	0.136	0.273	0.122	0.014	0.04	38.43
50	750	12.50	2.6	0.141	0.268	0.127	0.014	0.04	39.97
51	765	12.75	2.8	0.152	0.264	0.137	0.015	0.05	43.05
52	780	13.00	2.9	0.158	0.260	0.142	0.016	0.05	44.58
53	795	13.25	3.4	0.185	0.257	0.166	0.018	0.06	52.27
54	810	13.50	3.4	0.185	0.253	0.166	0.018	0.06	52.27
55	825	13.75	2.3	0.125	0.249	0.113	0.013	0.04	35.36
56	840	14.00	2.3	0.125	0.245	0.113	0.013	0.04	35.36
57	855	14.25	2.7	0.147	0.241	0.132	0.015	0.05	41.51
58	870	14.50	2.6	0.141	0.238	0.127	0.014	0.04	39.97
59	885	14.75	2.6	0.141	0.234	0.127	0.014	0.04	39.97
60	900	15.00	2.5	0.136	0.230	0.122	0.014	0.04	38.43
61	915	15.25	2.4	0.131	0.227	0.118	0.013	0.04	36.90
62	930	15.50	2.3	0.125	0.223	0.113	0.013	0.04	35.36
63	945	15.75	1.9	0.103	0.220	0.093	0.010	0.03	29.21
64	960	16.00	1.9	0.103	0.217	0.093	0.010	0.03	29.21
65	975	16.25	0.4	0.022	0.213	0.020	0.002	0.01	6.15
66	990	16.50	0.4	0.022	0.210	0.020	0.002	0.01	6.15
67	1005	16.75	0.3	0.016	0.207	0.015	0.002	0.01	4.61

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NORTH CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2935
LAG TIME - MINUTES	0.49	MINIMUM LOSS RATE (for var. loss) - in/hr	0.147
UNIT TIME-PERCENT OF LAG	3086.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00272
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.016	0.204	0.015	0.002	0.01	4.61
69	1035	17.25	0.5	0.027	0.201	0.024	0.003	0.01	7.69
70	1050	17.50	0.5	0.027	0.198	0.024	0.003	0.01	7.69
71	1065	17.75	0.5	0.027	0.195	0.024	0.003	0.01	7.69
72	1080	18.00	0.4	0.022	0.192	0.020	0.002	0.01	6.15
73	1095	18.25	0.4	0.022	0.189	0.020	0.002	0.01	6.15
74	1110	18.50	0.4	0.022	0.186	0.020	0.002	0.01	6.15
75	1125	18.75	0.3	0.016	0.184	0.015	0.002	0.01	4.61
76	1140	19.00	0.2	0.011	0.181	0.010	0.001	0.00	3.07
77	1155	19.25	0.3	0.016	0.178	0.015	0.002	0.01	4.61
78	1170	19.50	0.4	0.022	0.176	0.020	0.002	0.01	6.15
79	1185	19.75	0.3	0.016	0.174	0.015	0.002	0.01	4.61
80	1200	20.00	0.2	0.011	0.171	0.010	0.001	0.00	3.07
81	1215	20.25	0.3	0.016	0.169	0.015	0.002	0.01	4.61
82	1230	20.50	0.3	0.016	0.167	0.015	0.002	0.01	4.61
83	1245	20.75	0.3	0.016	0.165	0.015	0.002	0.01	4.61
84	1260	21.00	0.2	0.011	0.163	0.010	0.001	0.00	3.07
85	1275	21.25	0.3	0.016	0.161	0.015	0.002	0.01	4.61
86	1290	21.50	0.2	0.011	0.159	0.010	0.001	0.00	3.07
87	1305	21.75	0.3	0.016	0.157	0.015	0.002	0.01	4.61
88	1320	22.00	0.2	0.011	0.155	0.010	0.001	0.00	3.07
89	1335	22.25	0.3	0.016	0.154	0.015	0.002	0.01	4.61
90	1350	22.50	0.2	0.011	0.152	0.010	0.001	0.00	3.07
91	1365	22.75	0.2	0.011	0.151	0.010	0.001	0.00	3.07
92	1380	23.00	0.2	0.011	0.150	0.010	0.001	0.00	3.07
93	1395	23.25	0.2	0.011	0.149	0.010	0.001	0.00	3.07
94	1410	23.50	0.2	0.011	0.148	0.010	0.001	0.00	3.07
95	1425	23.75	0.2	0.011	0.147	0.010	0.001	0.00	3.07
96	1440	24.00	0.2	0.011	0.147	0.010	0.001	0.00	3.07

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.14
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1550.16
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1537.34
PEAK FLOW (cfs)	0.06

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - NORTH
JOB # C2026
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

1

JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	11	21	0	21	-	21	0.00
3	15	0.03	9	30	0	30	-	30	0.00
4	20	0.04	12	42	0	42	-	42	0.00
5	25	0.04	12	55	0	55	-	55	0.00
6	30	0.05	15	69	0	69	-	69	0.00
7	35	0.04	12	82	0	82	-	82	0.00
8	40	0.05	15	96	0	96	-	96	0.00
9	45	0.05	15	111	0	111	-	111	0.00
10	50	0.04	12	123	0	123	-	123	0.00
11	55	0.04	13	136	0	136	-	136	0.00
12	60	0.05	15	151	0	151	-	151	0.00
13	65	0.06	18	169	0	169	-	169	0.00
14	70	0.06	18	187	0	187	-	187	0.00
15	75	0.06	18	205	0	205	-	205	0.00
16	80	0.05	16	221	0	221	-	221	0.01
17	85	0.07	21	242	0	242	-	242	0.01
18	90	0.07	22	264	0	264	-	264	0.01
19	95	0.07	20	284	0	284	-	284	0.01
20	100	0.07	22	306	0	306	-	306	0.01
21	105	0.09	27	333	0	333	-	333	0.01
22	110	0.08	25	358	0	358	-	358	0.01
23	115	0.08	24	381	0	381	-	381	0.01
24	120	0.08	24	406	0	406	-	406	0.01
25	125	0.08	25	431	0	431	-	431	0.01
26	130	0.22	66	497	0	497	-	497	0.01
27	135	0.44	131	628	0	628	-	628	0.01
28	140	0.03	9	637	0	637	-	637	0.01
29	145	0.93	278	915	0	915	-	915	0.02
30	150	1.06	319	1,233	0	1,233	-	1,233	0.03
31	155	1.31	392	1,625	0	1,625	-	1,625	0.04
32	160	0.68	204	1,829	0	1,829	-	1,829	0.04
33	165	0.05	16	1,846	0	1,846	-	1,846	0.04
34	170	0.05	15	1,860	0	1,860	-	1,860	0.04
35	175	0.05	15	1,875	0	1,875	-	1,875	0.04
36	180	0.02	5	1,880	0	1,880	-	1,880	0.04

1

JOB # C2026

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	5	5	0	5	-	5	0.00
2	10	0.02	6	12	0	12	-	12	0.00
3	15	0.02	6	18	0	18	-	18	0.00
4	20	0.02	6	25	0	25	-	25	0.00
5	25	0.02	6	31	0	31	-	31	0.00
6	30	0.03	8	39	0	39	-	39	0.00
7	35	0.03	8	46	0	46	-	46	0.00
8	40	0.03	8	54	0	54	-	54	0.00
9	45	0.03	8	61	0	61	-	61	0.00
10	50	0.03	8	69	0	69	-	69	0.00
11	55	0.03	8	76	0	76	-	76	0.00
12	60	0.03	9	85	0	85	-	85	0.00
13	65	0.03	9	94	0	94	-	94	0.00
14	70	0.03	9	102	0	102	-	102	0.00
15	75	0.03	9	111	0	111	-	111	0.00
16	80	0.03	9	120	0	120	-	120	0.00
17	85	0.03	9	128	0	128	-	128	0.00
18	90	0.03	9	137	0	137	-	137	0.00
19	95	0.03	9	145	0	145	-	145	0.00
20	100	0.03	9	154	0	154	-	154	0.00
21	105	0.03	9	163	0	163	-	163	0.00
22	110	0.03	9	171	0	171	-	171	0.00
23	115	0.03	9	180	0	180	-	180	0.00
24	120	0.03	10	190	0	190	-	190	0.00
25	125	0.03	9	198	0	198	-	198	0.00
26	130	0.03	10	208	0	208	-	208	0.00
27	135	0.03	10	218	0	218	-	218	0.00
28	140	0.03	10	227	0	227	-	227	0.01
29	145	0.03	10	237	0	237	-	237	0.01
30	150	0.03	10	247	0	247	-	247	0.01
31	155	0.03	10	256	0	256	-	256	0.01
32	160	0.03	10	266	0	266	-	266	0.01
33	165	0.04	11	277	0	277	-	277	0.01
34	170	0.04	11	288	0	288	-	288	0.01
35	175	0.04	11	298	0	298	-	298	0.01
36	180	0.04	11	309	0	309	-	309	0.01
37	185	0.04	11	320	0	320	-	320	0.01
38	190	0.04	12	332	0	332	-	332	0.01
39	195	0.04	12	344	0	344	-	344	0.01
40	200	0.04	12	355	0	355	-	355	0.01
41	205	0.04	13	368	0	368	-	368	0.01
42	210	0.05	14	382	0	382	-	382	0.01
43	215	0.05	15	398	0	398	-	398	0.01
44	220	0.05	15	413	0	413	-	413	0.01
45	225	0.05	16	429	0	429	-	429	0.01
46	230	0.05	16	445	0	445	-	445	0.01
47	235	0.06	17	462	0	462	-	462	0.01
48	240	0.06	17	479	0	479	-	479	0.01
49	245	0.06	18	498	0	498	-	498	0.01
50	250	0.06	19	517	0	517	-	517	0.01
51	255	0.07	20	538	0	538	-	538	0.01
52	260	0.07	22	559	0	559	-	559	0.01
53	265	0.08	23	582	0	582	-	582	0.01
54	270	0.08	23	604	0	604	-	604	0.01
55	275	0.08	24	628	0	628	-	628	0.01

1

JOB # C2026

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	0.08	25	653	0	653	-	653	0.01
57	285	0.09	26	679	0	679	-	679	0.02
58	290	0.09	26	705	0	705	-	705	0.02
59	295	0.09	27	731	0	731	-	731	0.02
60	300	0.01	4	735	0	735	-	735	0.02
61	305	0.19	58	793	0	793	-	793	0.02
62	310	0.37	111	904	0	904	-	904	0.02
63	315	0.48	144	1,048	0	1,048	-	1,048	0.02
64	320	0.59	176	1,224	0	1,224	-	1,224	0.03
65	325	0.77	230	1,454	0	1,454	-	1,454	0.03
66	330	1.09	327	1,780	0	1,780	-	1,780	0.04
67	335	0.07	20	1,801	0	1,801	-	1,801	0.04
68	340	0.03	10	1,811	0	1,811	-	1,811	0.04
69	345	0.02	6	1,817	0	1,817	-	1,817	0.04
70	350	0.02	5	1,822	0	1,822	-	1,822	0.04
71	355	0.01	3	1,826	0	1,826	-	1,826	0.04
72	360	0.01	2	1,828	0	1,828	-	1,828	0.04

1

JOB # C2026

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	3	3	0	3	-	3	0.00
2	30	0.01	5	8	0	8	-	8	0.00
3	45	0.01	5	12	0	12	-	12	0.00
4	60	0.01	6	18	0	18	-	18	0.00
5	75	0.01	5	23	0	23	-	23	0.00
6	90	0.01	5	28	0	28	-	28	0.00
7	105	0.01	5	32	0	32	-	32	0.00
8	120	0.01	6	38	0	38	-	38	0.00
9	135	0.01	6	45	0	45	-	45	0.00
10	150	0.01	6	51	0	51	-	51	0.00
11	165	0.01	8	58	0	58	-	58	0.00
12	180	0.01	8	66	0	66	-	66	0.00
13	195	0.01	8	74	0	74	-	74	0.00
14	210	0.01	8	81	0	81	-	81	0.00
15	225	0.01	8	89	0	89	-	89	0.00
16	240	0.01	9	98	0	98	-	98	0.00
17	255	0.01	9	108	0	108	-	108	0.00
18	270	0.01	11	118	0	118	-	118	0.00
19	285	0.01	11	129	0	129	-	129	0.00
20	300	0.01	12	141	0	141	-	141	0.00
21	315	0.01	9	151	0	151	-	151	0.00
22	330	0.01	11	161	0	161	-	161	0.00
23	345	0.01	12	174	0	174	-	174	0.00
24	360	0.01	12	186	0	186	-	186	0.00
25	375	0.02	14	200	0	200	-	200	0.00
26	390	0.02	14	214	0	214	-	214	0.00
27	405	0.02	15	229	0	229	-	229	0.01
28	420	0.02	15	244	0	244	-	244	0.01
29	435	0.02	15	260	0	260	-	260	0.01
30	450	0.02	17	277	0	277	-	277	0.01
31	465	0.02	18	295	0	295	-	295	0.01
32	480	0.02	20	315	0	315	-	315	0.01
33	495	0.03	23	338	0	338	-	338	0.01
34	510	0.03	23	361	0	361	-	361	0.01
35	525	0.03	25	386	0	386	-	386	0.01
36	540	0.03	26	412	0	412	-	412	0.01
37	555	0.03	29	441	0	441	-	441	0.01
38	570	0.03	31	472	0	472	-	472	0.01
39	585	0.04	32	504	0	504	-	504	0.01
40	600	0.04	34	538	0	538	-	538	0.01
41	615	0.03	23	561	0	561	-	561	0.01
42	630	0.03	23	584	0	584	-	584	0.01
43	645	0.03	31	615	0	615	-	615	0.01
44	660	0.03	31	646	0	646	-	646	0.01
45	675	0.03	29	675	0	675	-	675	0.02
46	690	0.03	29	704	0	704	-	704	0.02
47	705	0.03	26	730	0	730	-	730	0.02
48	720	0.03	28	758	0	758	-	758	0.02
49	735	0.04	38	796	0	796	-	796	0.02
50	750	0.04	40	836	0	836	-	836	0.02
51	765	0.05	43	879	0	879	-	879	0.02
52	780	0.05	45	924	0	924	-	924	0.02
53	795	0.06	52	976	0	976	-	976	0.02
54	810	0.06	52	1,028	0	1,028	-	1,028	0.02
55	825	0.04	35	1,064	0	1,064	-	1,064	0.02
56	840	0.04	35	1,099	0	1,099	-	1,099	0.03
57	855	0.05	42	1,141	0	1,141	-	1,141	0.03
58	870	0.04	40	1,181	0	1,181	-	1,181	0.03

1

JOB # C2026

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	0.04	40	1,221	0	1,221	-	1,221	0.03
60	900	0.04	38	1,259	0	1,259	-	1,259	0.03
61	915	0.04	37	1,296	0	1,296	-	1,296	0.03
62	930	0.04	35	1,331	0	1,331	-	1,331	0.03
63	945	0.03	29	1,361	0	1,361	-	1,361	0.03
64	960	0.03	29	1,390	0	1,390	-	1,390	0.03
65	975	0.01	6	1,396	0	1,396	-	1,396	0.03
66	990	0.01	6	1,402	0	1,402	-	1,402	0.03
67	1005	0.01	5	1,407	0	1,407	-	1,407	0.03
68	1020	0.01	5	1,411	0	1,411	-	1,411	0.03
69	1035	0.01	8	1,419	0	1,419	-	1,419	0.03
70	1050	0.01	8	1,427	0	1,427	-	1,427	0.03
71	1065	0.01	8	1,434	0	1,434	-	1,434	0.03
72	1080	0.01	6	1,440	0	1,440	-	1,440	0.03
73	1095	0.01	6	1,447	0	1,447	-	1,447	0.03
74	1110	0.01	6	1,453	0	1,453	-	1,453	0.03
75	1125	0.01	5	1,457	0	1,457	-	1,457	0.03
76	1140	0.00	3	1,460	0	1,460	-	1,460	0.03
77	1155	0.01	5	1,465	0	1,465	-	1,465	0.03
78	1170	0.01	6	1,471	0	1,471	-	1,471	0.03
79	1185	0.01	5	1,476	0	1,476	-	1,476	0.03
80	1200	0.00	3	1,479	0	1,479	-	1,479	0.03
81	1215	0.01	5	1,484	0	1,484	-	1,484	0.03
82	1230	0.01	5	1,488	0	1,488	-	1,488	0.03
83	1245	0.01	5	1,493	0	1,493	-	1,493	0.03
84	1260	0.00	3	1,496	0	1,496	-	1,496	0.03
85	1275	0.01	5	1,500	0	1,500	-	1,500	0.03
86	1290	0.00	3	1,504	0	1,504	-	1,504	0.03
87	1305	0.01	5	1,508	0	1,508	-	1,508	0.03
88	1320	0.00	3	1,511	0	1,511	-	1,511	0.03
89	1335	0.01	5	1,516	0	1,516	-	1,516	0.03
90	1350	0.00	3	1,519	0	1,519	-	1,519	0.03
91	1365	0.00	3	1,522	0	1,522	-	1,522	0.03
92	1380	0.00	3	1,525	0	1,525	-	1,525	0.04
93	1395	0.00	3	1,528	0	1,528	-	1,528	0.04
94	1410	0.00	3	1,531	0	1,531	-	1,531	0.04
95	1425	0.00	3	1,534	0	1,534	-	1,534	0.04
96	1440	0.00	3	1,537	0	1,537	-	1,537	0.04

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM NORTH EXIST 10 YR EVENT		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	1.24		
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			
24	GOLF COURSE			
25	MOUNTAINOUS	1.03		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	436		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	46		
30				
31	ELEVATION OF HEADWATER	356		
32	ELEVATION OF CONCENTRATION POINT	264.5		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	1.5		
40	6-HOUR	1.93		
41	24-HOUR	2.66		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVENT
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	3.140
[4] L-FEET	436
[5] L-MILES	0.083
[6] La-FEET	46.00
[7] La-MILES	0.009
[8] ELEVATION OF HEADWATER	356
[9] ELEVATION OF CONCENTRATION POINT	264.5
[10] H-FEET	91.5
[11] S-FEET/MILE	1108.1
[12] S^0.5	33.29
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.5
[17] 100% OF LAG-MINUTES	0.5
[18] 200% OF LAG-MINUTES	1.0
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
1.50	3.140	1.00	1.50	1.93	3.140	1.00	1.93	2.66	3.140	1.00	2.66
		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]	3.14	SUM [7]	1.50	SUM [9]	3.14	SUM [11]	1.93	SUM [13]	3.14	SUM [15]	2.66
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.50				1.93				2.66

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.68	0.66	0.31
FLOOD VOLUME	(cu-ft)	7,740	7,485	3,590
	(acre-ft)	0.18	0.17	0.08
REQUIRED STORAGE	(cu-ft)	7,676	7,423	3,560
	(acre-ft)	0.18	0.17	0.08
PEAK FLOW	(cfs)	3.71	3.15	0.34
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM NORTH EXIST 10 YR EVENT
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	1.24	0.395	0.0292
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.87	0.277	0.2050
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	1.03	0.328	0.0592
					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 3.14	SUM	0.2935

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.146731688

C= 0.00272

Ft=C(24-(T/60))^1.55 = 0.00272 (24-(T/60))^1.55 + 0.15 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: WORLD MUSEUM NORTH EXIST 10 YR EVENT
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.49
UNIT TIME-PERCENT OF LAG	1029.0
TOTAL ADJUSTED STORM RAIN-INCHES	1.50
CONSTANT LOSS RATE-in/hr	0.29
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.234	0.29	0.21	0.02	0.07	22.04
2	10	0.17	1.3	0.234	0.29	0.21	0.02	0.07	22.04
3	15	0.25	1.1	0.198	0.29	0.18	0.02	0.06	18.65
4	20	0.33	1.5	0.270	0.29	0.24	0.03	0.08	25.43
5	25	0.42	1.5	0.270	0.29	0.24	0.03	0.08	25.43
6	30	0.50	1.8	0.324	0.29	0.29	0.03	0.10	28.77
7	35	0.58	1.5	0.270	0.29	0.24	0.03	0.08	25.43
8	40	0.67	1.8	0.324	0.29	0.29	0.03	0.10	28.77
9	45	0.75	1.8	0.324	0.29	0.29	0.03	0.10	28.77
10	50	0.83	1.5	0.270	0.29	0.24	0.03	0.08	25.43
11	55	0.92	1.6	0.288	0.29	0.26	0.03	0.09	27.13
12	60	1.00	1.8	0.324	0.29	0.29	0.03	0.10	28.77
13	65	1.08	2.2	0.396	0.29	0.36	0.10	0.32	96.59
14	70	1.17	2.2	0.396	0.29	0.36	0.10	0.32	96.59
15	75	1.25	2.2	0.396	0.29	0.36	0.10	0.32	96.59
16	80	1.33	2.0	0.360	0.29	0.32	0.07	0.21	62.68
17	85	1.42	2.6	0.468	0.29	0.42	0.17	0.55	164.41
18	90	1.50	2.7	0.486	0.29	0.44	0.19	0.60	181.37
19	95	1.58	2.4	0.432	0.29	0.39	0.14	0.44	130.50
20	100	1.67	2.7	0.486	0.29	0.44	0.19	0.60	181.37
21	105	1.75	3.3	0.594	0.29	0.53	0.30	0.94	283.11
22	110	1.83	3.1	0.558	0.29	0.50	0.26	0.83	249.19
23	115	1.92	2.9	0.522	0.29	0.47	0.23	0.72	215.28
24	120	2.00	3.0	0.540	0.29	0.49	0.25	0.77	232.24
25	125	2.08	3.1	0.558	0.29	0.50	0.26	0.83	249.19
26	130	2.17	4.2	0.756	0.29	0.68	0.46	1.45	435.71
27	135	2.25	5.0	0.900	0.29	0.81	0.61	1.90	571.36
28	140	2.33	3.5	0.630	0.29	0.57	0.34	1.06	317.02
29	145	2.42	6.8	1.224	0.29	1.10	0.93	2.92	876.57
30	150	2.50	7.3	1.314	0.29	1.18	1.02	3.20	961.35
31	155	2.58	8.2	1.476	0.29	1.33	1.18	3.71	1113.95
32	160	2.67	5.9	1.062	0.29	0.96	0.77	2.41	723.96
33	165	2.75	2.0	0.360	0.29	0.32	0.07	0.21	62.68
34	170	2.83	1.8	0.324	0.29	0.29	0.03	0.10	28.77
35	175	2.92	1.8	0.324	0.29	0.29	0.03	0.10	28.77
36	180	3.00	0.6	0.108	0.29	0.10	0.01	0.03	10.17

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.68
FLOOD VOLUME (acft)	0.18
FLOOD VOLUME (cuft)	7740.06
REQUIRED STORAGE (acft)	0.18
REQUIRED STORAGE (cuft)	7676.06
PEAK FLOW RATE (cfs)	3.71

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

PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVE
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.49
UNIT TIME-PERCENT OF LAG	1029.0
TOTAL ADJUSTED STORM RAIN-INCHES	1.93
CONSTANT LOSS RATE-in/hr	0.293
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.116	0.29	0.10	0.01	0.04	10.91
2	10	0.17	0.6	0.139	0.29	0.13	0.01	0.04	13.09
3	15	0.25	0.6	0.139	0.29	0.13	0.01	0.04	13.09
4	20	0.33	0.6	0.139	0.29	0.13	0.01	0.04	13.09
5	25	0.42	0.6	0.139	0.29	0.13	0.01	0.04	13.09
6	30	0.50	0.7	0.162	0.29	0.15	0.02	0.05	15.27
7	35	0.58	0.7	0.162	0.29	0.15	0.02	0.05	15.27
8	40	0.67	0.7	0.162	0.29	0.15	0.02	0.05	15.27
9	45	0.75	0.7	0.162	0.29	0.15	0.02	0.05	15.27
10	50	0.83	0.7	0.162	0.29	0.15	0.02	0.05	15.27
11	55	0.92	0.7	0.162	0.29	0.15	0.02	0.05	15.27
12	60	1.00	0.8	0.185	0.29	0.17	0.02	0.06	17.45
13	65	1.08	0.8	0.185	0.29	0.17	0.02	0.06	17.45
14	70	1.17	0.8	0.185	0.29	0.17	0.02	0.06	17.45
15	75	1.25	0.8	0.185	0.29	0.17	0.02	0.06	17.45
16	80	1.33	0.8	0.185	0.29	0.17	0.02	0.06	17.45
17	85	1.42	0.8	0.185	0.29	0.17	0.02	0.06	17.45
18	90	1.50	0.8	0.185	0.29	0.17	0.02	0.06	17.45
19	95	1.58	0.8	0.185	0.29	0.17	0.02	0.06	17.45
20	100	1.67	0.8	0.185	0.29	0.17	0.02	0.06	17.45
21	105	1.75	0.8	0.185	0.29	0.17	0.02	0.06	17.45
22	110	1.83	0.8	0.185	0.29	0.17	0.02	0.06	17.45
23	115	1.92	0.8	0.185	0.29	0.17	0.02	0.06	17.45
24	120	2.00	0.9	0.208	0.29	0.19	0.02	0.07	19.64
25	125	2.08	0.8	0.185	0.29	0.17	0.02	0.06	17.45
26	130	2.17	0.9	0.208	0.29	0.19	0.02	0.07	19.64
27	135	2.25	0.9	0.208	0.29	0.19	0.02	0.07	19.64
28	140	2.33	0.9	0.208	0.29	0.19	0.02	0.07	19.64
29	145	2.42	0.9	0.208	0.29	0.19	0.02	0.07	19.64
30	150	2.50	0.9	0.208	0.29	0.19	0.02	0.07	19.64
31	155	2.58	0.9	0.208	0.29	0.19	0.02	0.07	19.64
32	160	2.67	0.9	0.208	0.29	0.19	0.02	0.07	19.64
33	165	2.75	1.0	0.232	0.29	0.21	0.02	0.07	21.82
34	170	2.83	1.0	0.232	0.29	0.21	0.02	0.07	21.82
35	175	2.92	1.0	0.232	0.29	0.21	0.02	0.07	21.82
36	180	3.00	1.0	0.232	0.29	0.21	0.02	0.07	21.82
37	185	3.08	1.0	0.232	0.29	0.21	0.02	0.07	21.82
38	190	3.17	1.1	0.255	0.29	0.23	0.03	0.08	24.00
39	195	3.25	1.1	0.255	0.29	0.23	0.03	0.08	24.00
40	200	3.33	1.1	0.255	0.29	0.23	0.03	0.08	24.00
41	205	3.42	1.2	0.278	0.29	0.25	0.03	0.09	26.18
42	210	3.50	1.3	0.301	0.29	0.27	0.01	0.02	7.17
43	215	3.58	1.4	0.324	0.29	0.29	0.03	0.10	28.99
44	220	3.67	1.4	0.324	0.29	0.29	0.03	0.10	28.99
45	225	3.75	1.5	0.347	0.29	0.31	0.05	0.17	50.81
46	230	3.83	1.5	0.347	0.29	0.31	0.05	0.17	50.81
47	235	3.92	1.6	0.371	0.29	0.33	0.08	0.24	72.63
48	240	4.00	1.6	0.371	0.29	0.33	0.08	0.24	72.63
49	245	4.08	1.7	0.394	0.29	0.35	0.10	0.31	94.44
50	250	4.17	1.8	0.417	0.29	0.38	0.12	0.39	116.26
51	255	4.25	1.9	0.440	0.29	0.40	0.15	0.46	138.08
52	260	4.33	2.0	0.463	0.29	0.42	0.17	0.53	159.89
53	265	4.42	2.1	0.486	0.29	0.44	0.19	0.61	181.71
54	270	4.50	2.1	0.486	0.29	0.44	0.19	0.61	181.71
55	275	4.58	2.2	0.510	0.29	0.46	0.22	0.68	203.53
56	280	4.67	2.3	0.533	0.29	0.48	0.24	0.75	225.34

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVE CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.49		
UNIT TIME-PERCENT OF LAG	1029.0		
TOTAL ADJUSTED STORM RAIN-INCHES	1.93		
CONSTANT LOSS RATE-in/hr	0.293		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time		Pattern	Storm	Loss Rate		Effective	Flood	Required
	Minutes	Hours	Percent	Rain in/hr	in/hr		Rain	Hydrograph Flow	Storage
			(Plate E-5.9)		Max	Low	in/hr	cfs	cf
57	285	4.75	2.4	0.556	0.29	0.50	0.26	0.82	247.16
58	290	4.83	2.4	0.556	0.29	0.50	0.26	0.82	247.16
59	295	4.92	2.5	0.579	0.29	0.52	0.29	0.90	268.98
60	300	5.00	2.6	0.602	0.29	0.54	0.31	0.97	290.79
61	305	5.08	3.1	0.718	0.29	0.65	0.42	1.33	399.88
62	310	5.17	3.6	0.834	0.29	0.75	0.54	1.70	508.96
63	315	5.25	3.9	0.903	0.29	0.81	0.61	1.91	574.41
64	320	5.33	4.2	0.973	0.29	0.88	0.68	2.13	639.86
65	325	5.42	4.7	1.089	0.29	0.98	0.80	2.50	748.94
66	330	5.50	5.6	1.297	0.29	1.17	1.00	3.15	945.29
67	335	5.58	1.9	0.440	0.29	0.40	0.15	0.46	138.08
68	340	5.67	0.9	0.208	0.29	0.19	0.02	0.07	19.64
69	345	5.75	0.6	0.139	0.29	0.13	0.01	0.04	13.09
70	350	5.83	0.5	0.116	0.29	0.10	0.01	0.04	10.91
71	355	5.92	0.3	0.069	0.29	0.06	0.01	0.02	6.55
72	360	6.00	0.2	0.046	0.29	0.04	0.00	0.01	4.36

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.66
FLOOD VOLUME (acft)	0.17
FLOOD VOLUME (cuft)	7485.04
REQUIRED STORAGE (acft)	0.17
REQUIRED STORAGE (cuft)	7423.15
PEAK FLOW RATE (cfs)	3.15

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

PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVENT
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2935
LAG TIME - MINUTES	0.49	MINIMUM LOSS RATE (for var. loss) - in/hr	0.147
UNIT TIME-PERCENT OF LAG	3086.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00272
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.021	0.518	0.019	0.002	0.01	6.01
2	30	0.50	0.3	0.032	0.512	0.029	0.003	0.01	9.02
3	45	0.75	0.3	0.032	0.506	0.029	0.003	0.01	9.02
4	60	1.00	0.4	0.043	0.500	0.038	0.004	0.01	12.03
5	75	1.25	0.3	0.032	0.494	0.029	0.003	0.01	9.02
6	90	1.50	0.3	0.032	0.489	0.029	0.003	0.01	9.02
7	105	1.75	0.3	0.032	0.483	0.029	0.003	0.01	9.02
8	120	2.00	0.4	0.043	0.477	0.038	0.004	0.01	12.03
9	135	2.25	0.4	0.043	0.471	0.038	0.004	0.01	12.03
10	150	2.50	0.4	0.043	0.465	0.038	0.004	0.01	12.03
11	165	2.75	0.5	0.053	0.460	0.048	0.005	0.02	15.03
12	180	3.00	0.5	0.053	0.454	0.048	0.005	0.02	15.03
13	195	3.25	0.5	0.053	0.448	0.048	0.005	0.02	15.03
14	210	3.50	0.5	0.053	0.443	0.048	0.005	0.02	15.03
15	225	3.75	0.5	0.053	0.437	0.048	0.005	0.02	15.03
16	240	4.00	0.6	0.064	0.432	0.057	0.006	0.02	18.04
17	255	4.25	0.6	0.064	0.426	0.057	0.006	0.02	18.04
18	270	4.50	0.7	0.074	0.421	0.067	0.007	0.02	21.05
19	285	4.75	0.7	0.074	0.415	0.067	0.007	0.02	21.05
20	300	5.00	0.8	0.085	0.410	0.077	0.009	0.03	24.05
21	315	5.25	0.6	0.064	0.405	0.057	0.006	0.02	18.04
22	330	5.50	0.7	0.074	0.400	0.067	0.007	0.02	21.05
23	345	5.75	0.8	0.085	0.394	0.077	0.009	0.03	24.05
24	360	6.00	0.8	0.085	0.389	0.077	0.009	0.03	24.05
25	375	6.25	0.9	0.096	0.384	0.086	0.010	0.03	27.06
26	390	6.50	0.9	0.096	0.379	0.086	0.010	0.03	27.06
27	405	6.75	1.0	0.106	0.374	0.096	0.011	0.03	30.07
28	420	7.00	1.0	0.106	0.369	0.096	0.011	0.03	30.07
29	435	7.25	1.0	0.106	0.364	0.096	0.011	0.03	30.07
30	450	7.50	1.1	0.117	0.359	0.105	0.012	0.04	33.08
31	465	7.75	1.2	0.128	0.354	0.115	0.013	0.04	36.08
32	480	8.00	1.3	0.138	0.349	0.124	0.014	0.04	39.09
33	495	8.25	1.5	0.160	0.344	0.144	0.016	0.05	45.10
34	510	8.50	1.5	0.160	0.339	0.144	0.016	0.05	45.10
35	525	8.75	1.6	0.170	0.335	0.153	0.017	0.05	48.11
36	540	9.00	1.7	0.181	0.330	0.163	0.018	0.06	51.12
37	555	9.25	1.9	0.202	0.325	0.182	0.020	0.06	57.13
38	570	9.50	2.0	0.213	0.321	0.192	0.021	0.07	60.14
39	585	9.75	2.1	0.223	0.316	0.201	0.022	0.07	63.14
40	600	10.00	2.2	0.234	0.311	0.211	0.023	0.07	66.15
41	615	10.25	1.5	0.160	0.307	0.144	0.016	0.05	45.10
42	630	10.50	1.5	0.160	0.302	0.144	0.016	0.05	45.10
43	645	10.75	2.0	0.213	0.298	0.192	0.021	0.07	60.14
44	660	11.00	2.0	0.213	0.294	0.192	0.021	0.07	60.14
45	675	11.25	1.9	0.202	0.289	0.182	0.020	0.06	57.13
46	690	11.50	1.9	0.202	0.285	0.182	0.020	0.06	57.13
47	705	11.75	1.7	0.181	0.281	0.163	0.018	0.06	51.12
48	720	12.00	1.8	0.192	0.277	0.172	0.019	0.06	54.12
49	735	12.25	2.5	0.266	0.273	0.239	0.027	0.08	75.17
50	750	12.50	2.6	0.277	0.268	0.249	0.008	0.03	23.04
51	765	12.75	2.8	0.298	0.264	0.268	0.033	0.11	94.58
52	780	13.00	2.9	0.309	0.260	0.278	0.048	0.15	135.91
53	795	13.25	3.4	0.362	0.257	0.326	0.105	0.33	297.38
54	810	13.50	3.4	0.362	0.253	0.326	0.109	0.34	308.37
55	825	13.75	2.3	0.245	0.249	0.220	0.024	0.08	69.16
56	840	14.00	2.3	0.245	0.245	0.220	0.024	0.08	69.16
57	855	14.25	2.7	0.287	0.241	0.259	0.046	0.14	129.99
58	870	14.50	2.6	0.277	0.238	0.249	0.039	0.12	110.33
59	885	14.75	2.6	0.277	0.234	0.249	0.043	0.13	120.60
60	900	15.00	2.5	0.266	0.230	0.239	0.036	0.11	100.64
61	915	15.25	2.4	0.255	0.227	0.230	0.028	0.09	80.54
62	930	15.50	2.3	0.245	0.223	0.220	0.021	0.07	60.28
63	945	15.75	1.9	0.202	0.220	0.182	0.020	0.06	57.13
64	960	16.00	1.9	0.202	0.217	0.182	0.020	0.06	57.13
65	975	16.25	0.4	0.043	0.213	0.038	0.004	0.01	12.03
66	990	16.50	0.4	0.043	0.210	0.038	0.004	0.01	12.03
67	1005	16.75	0.3	0.032	0.207	0.029	0.003	0.01	9.02

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVENT CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2935
LAG TIME - MINUTES	0.49	MINIMUM LOSS RATE (for var. loss) - in/hr	0.147
UNIT TIME-PERCENT OF LAG	3086.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00272
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.032	0.204	0.029	0.003	0.01	9.02
69	1035	17.25	0.5	0.053	0.201	0.048	0.005	0.02	15.03
70	1050	17.50	0.5	0.053	0.198	0.048	0.005	0.02	15.03
71	1065	17.75	0.5	0.053	0.195	0.048	0.005	0.02	15.03
72	1080	18.00	0.4	0.043	0.192	0.038	0.004	0.01	12.03
73	1095	18.25	0.4	0.043	0.189	0.038	0.004	0.01	12.03
74	1110	18.50	0.4	0.043	0.186	0.038	0.004	0.01	12.03
75	1125	18.75	0.3	0.032	0.184	0.029	0.003	0.01	9.02
76	1140	19.00	0.2	0.021	0.181	0.019	0.002	0.01	6.01
77	1155	19.25	0.3	0.032	0.178	0.029	0.003	0.01	9.02
78	1170	19.50	0.4	0.043	0.176	0.038	0.004	0.01	12.03
79	1185	19.75	0.3	0.032	0.174	0.029	0.003	0.01	9.02
80	1200	20.00	0.2	0.021	0.171	0.019	0.002	0.01	6.01
81	1215	20.25	0.3	0.032	0.169	0.029	0.003	0.01	9.02
82	1230	20.50	0.3	0.032	0.167	0.029	0.003	0.01	9.02
83	1245	20.75	0.3	0.032	0.165	0.029	0.003	0.01	9.02
84	1260	21.00	0.2	0.021	0.163	0.019	0.002	0.01	6.01
85	1275	21.25	0.3	0.032	0.161	0.029	0.003	0.01	9.02
86	1290	21.50	0.2	0.021	0.159	0.019	0.002	0.01	6.01
87	1305	21.75	0.3	0.032	0.157	0.029	0.003	0.01	9.02
88	1320	22.00	0.2	0.021	0.155	0.019	0.002	0.01	6.01
89	1335	22.25	0.3	0.032	0.154	0.029	0.003	0.01	9.02
90	1350	22.50	0.2	0.021	0.152	0.019	0.002	0.01	6.01
91	1365	22.75	0.2	0.021	0.151	0.019	0.002	0.01	6.01
92	1380	23.00	0.2	0.021	0.150	0.019	0.002	0.01	6.01
93	1395	23.25	0.2	0.021	0.149	0.019	0.002	0.01	6.01
94	1410	23.50	0.2	0.021	0.148	0.019	0.002	0.01	6.01
95	1425	23.75	0.2	0.021	0.147	0.019	0.002	0.01	6.01
96	1440	24.00	0.2	0.021	0.147	0.019	0.002	0.01	6.01

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.31
FLOOD VOLUME (acft)	0.08
FLOOD VOLUME (cuft)	3590.13
REQUIRED STORAGE (acft)	0.08
REQUIRED STORAGE (cuft)	3560.45
PEAK FLOW (cfs)	0.34

PROJECT: WORLD MUSEUM NORTH EXIST 10 YR EVENT
JOB # C2026
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

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JOB # C2026

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	0.07	22	22	0	22	-	22	0.00
2	10	0.07	22	44	0	44	-	44	0.00
3	15	0.06	19	63	0	63	-	63	0.00
4	20	0.08	25	88	0	88	-	88	0.00
5	25	0.08	25	114	0	114	-	114	0.00
6	30	0.10	29	142	0	142	-	142	0.00
7	35	0.08	25	168	0	168	-	168	0.00
8	40	0.10	29	197	0	197	-	197	0.00
9	45	0.10	29	225	0	225	-	225	0.01
10	50	0.08	25	251	0	251	-	251	0.01
11	55	0.09	27	278	0	278	-	278	0.01
12	60	0.10	29	307	0	307	-	307	0.01
13	65	0.32	97	403	0	403	-	403	0.01
14	70	0.32	97	500	0	500	-	500	0.01
15	75	0.32	97	596	0	596	-	596	0.01
16	80	0.21	63	659	0	659	-	659	0.02
17	85	0.55	164	824	0	824	-	824	0.02
18	90	0.60	181	1,005	0	1,005	-	1,005	0.02
19	95	0.44	131	1,135	0	1,135	-	1,135	0.03
20	100	0.60	181	1,317	0	1,317	-	1,317	0.03
21	105	0.94	283	1,600	0	1,600	-	1,600	0.04
22	110	0.83	249	1,849	0	1,849	-	1,849	0.04
23	115	0.72	215	2,064	0	2,064	-	2,064	0.05
24	120	0.77	232	2,297	0	2,297	-	2,297	0.05
25	125	0.83	249	2,546	0	2,546	-	2,546	0.06
26	130	1.45	436	2,981	0	2,981	-	2,981	0.07
27	135	1.90	571	3,553	0	3,553	-	3,553	0.08
28	140	1.06	317	3,870	0	3,870	-	3,870	0.09
29	145	2.92	877	4,746	0	4,746	-	4,746	0.11
30	150	3.20	961	5,708	0	5,708	-	5,708	0.13
31	155	3.71	1,114	6,822	0	6,822	-	6,822	0.16
32	160	2.41	724	7,546	0	7,546	-	7,546	0.17
33	165	0.21	63	7,608	0	7,608	-	7,608	0.17
34	170	0.10	29	7,637	0	7,637	-	7,637	0.18
35	175	0.10	29	7,666	0	7,666	-	7,666	0.18
36	180	0.03	10	7,676	0	7,676	-	7,676	0.18

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JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	13	24	0	24	-	24	0.00
3	15	0.04	13	37	0	37	-	37	0.00
4	20	0.04	13	50	0	50	-	50	0.00
5	25	0.04	13	63	0	63	-	63	0.00
6	30	0.05	15	79	0	79	-	79	0.00
7	35	0.05	15	94	0	94	-	94	0.00
8	40	0.05	15	109	0	109	-	109	0.00
9	45	0.05	15	124	0	124	-	124	0.00
10	50	0.05	15	140	0	140	-	140	0.00
11	55	0.05	15	155	0	155	-	155	0.00
12	60	0.06	17	172	0	172	-	172	0.00
13	65	0.06	17	190	0	190	-	190	0.00
14	70	0.06	17	207	0	207	-	207	0.00
15	75	0.06	17	225	0	225	-	225	0.01
16	80	0.06	17	242	0	242	-	242	0.01
17	85	0.06	17	260	0	260	-	260	0.01
18	90	0.06	17	277	0	277	-	277	0.01
19	95	0.06	17	295	0	295	-	295	0.01
20	100	0.06	17	312	0	312	-	312	0.01
21	105	0.06	17	329	0	329	-	329	0.01
22	110	0.06	17	347	0	347	-	347	0.01
23	115	0.06	17	364	0	364	-	364	0.01
24	120	0.07	20	384	0	384	-	384	0.01
25	125	0.06	17	401	0	401	-	401	0.01
26	130	0.07	20	421	0	421	-	421	0.01
27	135	0.07	20	441	0	441	-	441	0.01
28	140	0.07	20	460	0	460	-	460	0.01
29	145	0.07	20	480	0	480	-	480	0.01
30	150	0.07	20	500	0	500	-	500	0.01
31	155	0.07	20	519	0	519	-	519	0.01
32	160	0.07	20	539	0	539	-	539	0.01
33	165	0.07	22	561	0	561	-	561	0.01
34	170	0.07	22	583	0	583	-	583	0.01
35	175	0.07	22	604	0	604	-	604	0.01
36	180	0.07	22	626	0	626	-	626	0.01
37	185	0.07	22	648	0	648	-	648	0.01
38	190	0.08	24	672	0	672	-	672	0.02
39	195	0.08	24	696	0	696	-	696	0.02
40	200	0.08	24	720	0	720	-	720	0.02
41	205	0.09	26	746	0	746	-	746	0.02
42	210	0.02	7	753	0	753	-	753	0.02
43	215	0.10	29	782	0	782	-	782	0.02
44	220	0.10	29	811	0	811	-	811	0.02
45	225	0.17	51	862	0	862	-	862	0.02
46	230	0.17	51	913	0	913	-	913	0.02
47	235	0.24	73	986	0	986	-	986	0.02
48	240	0.24	73	1,058	0	1,058	-	1,058	0.02
49	245	0.31	94	1,153	0	1,153	-	1,153	0.03
50	250	0.39	116	1,269	0	1,269	-	1,269	0.03
51	255	0.46	138	1,407	0	1,407	-	1,407	0.03
52	260	0.53	160	1,567	0	1,567	-	1,567	0.04
53	265	0.61	182	1,749	0	1,749	-	1,749	0.04
54	270	0.61	182	1,930	0	1,930	-	1,930	0.04
55	275	0.68	204	2,134	0	2,134	-	2,134	0.05

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JOB # C2026

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	0.75	225	2,359	0	2,359	-	2,359	0.05
57	285	0.82	247	2,606	0	2,606	-	2,606	0.06
58	290	0.82	247	2,853	0	2,853	-	2,853	0.07
59	295	0.90	269	3,122	0	3,122	-	3,122	0.07
60	300	0.97	291	3,413	0	3,413	-	3,413	0.08
61	305	1.33	400	3,813	0	3,813	-	3,813	0.09
62	310	1.70	509	4,322	0	4,322	-	4,322	0.10
63	315	1.91	574	4,896	0	4,896	-	4,896	0.11
64	320	2.13	640	5,536	0	5,536	-	5,536	0.13
65	325	2.50	749	6,285	0	6,285	-	6,285	0.14
66	330	3.15	945	7,231	0	7,231	-	7,231	0.17
67	335	0.46	138	7,369	0	7,369	-	7,369	0.17
68	340	0.07	20	7,388	0	7,388	-	7,388	0.17
69	345	0.04	13	7,401	0	7,401	-	7,401	0.17
70	350	0.04	11	7,412	0	7,412	-	7,412	0.17
71	355	0.02	7	7,419	0	7,419	-	7,419	0.17
72	360	0.01	4	7,423	0	7,423	-	7,423	0.17

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JOB # C2026

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	6	6	0	6	-	6	0.00
2	30	0.01	9	15	0	15	-	15	0.00
3	45	0.01	9	24	0	24	-	24	0.00
4	60	0.01	12	36	0	36	-	36	0.00
5	75	0.01	9	45	0	45	-	45	0.00
6	90	0.01	9	54	0	54	-	54	0.00
7	105	0.01	9	63	0	63	-	63	0.00
8	120	0.01	12	75	0	75	-	75	0.00
9	135	0.01	12	87	0	87	-	87	0.00
10	150	0.01	12	99	0	99	-	99	0.00
11	165	0.02	15	114	0	114	-	114	0.00
12	180	0.02	15	129	0	129	-	129	0.00
13	195	0.02	15	144	0	144	-	144	0.00
14	210	0.02	15	159	0	159	-	159	0.00
15	225	0.02	15	174	0	174	-	174	0.00
16	240	0.02	18	192	0	192	-	192	0.00
17	255	0.02	18	210	0	210	-	210	0.00
18	270	0.02	21	232	0	232	-	232	0.01
19	285	0.02	21	253	0	253	-	253	0.01
20	300	0.03	24	277	0	277	-	277	0.01
21	315	0.02	18	295	0	295	-	295	0.01
22	330	0.02	21	316	0	316	-	316	0.01
23	345	0.03	24	340	0	340	-	340	0.01
24	360	0.03	24	364	0	364	-	364	0.01
25	375	0.03	27	391	0	391	-	391	0.01
26	390	0.03	27	418	0	418	-	418	0.01
27	405	0.03	30	448	0	448	-	448	0.01
28	420	0.03	30	478	0	478	-	478	0.01
29	435	0.03	30	508	0	508	-	508	0.01
30	450	0.04	33	541	0	541	-	541	0.01
31	465	0.04	36	577	0	577	-	577	0.01
32	480	0.04	39	616	0	616	-	616	0.01
33	495	0.05	45	662	0	662	-	662	0.02
34	510	0.05	45	707	0	707	-	707	0.02
35	525	0.05	48	755	0	755	-	755	0.02
36	540	0.06	51	806	0	806	-	806	0.02
37	555	0.06	57	863	0	863	-	863	0.02
38	570	0.07	60	923	0	923	-	923	0.02
39	585	0.07	63	986	0	986	-	986	0.02
40	600	0.07	66	1,052	0	1,052	-	1,052	0.02
41	615	0.05	45	1,098	0	1,098	-	1,098	0.03
42	630	0.05	45	1,143	0	1,143	-	1,143	0.03
43	645	0.07	60	1,203	0	1,203	-	1,203	0.03
44	660	0.07	60	1,263	0	1,263	-	1,263	0.03
45	675	0.06	57	1,320	0	1,320	-	1,320	0.03
46	690	0.06	57	1,377	0	1,377	-	1,377	0.03
47	705	0.06	51	1,428	0	1,428	-	1,428	0.03
48	720	0.06	54	1,482	0	1,482	-	1,482	0.03
49	735	0.08	75	1,558	0	1,558	-	1,558	0.04
50	750	0.03	23	1,581	0	1,581	-	1,581	0.04
51	765	0.11	95	1,675	0	1,675	-	1,675	0.04
52	780	0.15	136	1,811	0	1,811	-	1,811	0.04
53	795	0.33	297	2,108	0	2,108	-	2,108	0.05
54	810	0.34	308	2,417	0	2,417	-	2,417	0.06
55	825	0.08	69	2,486	0	2,486	-	2,486	0.06
56	840	0.08	69	2,555	0	2,555	-	2,555	0.06
57	855	0.14	130	2,685	0	2,685	-	2,685	0.06
58	870	0.12	110	2,795	0	2,795	-	2,795	0.06

1

JOB # C2026

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	0.13	121	2,916	0	2,916	-	2,916	0.07
60	900	0.11	101	3,017	0	3,017	-	3,017	0.07
61	915	0.09	81	3,097	0	3,097	-	3,097	0.07
62	930	0.07	60	3,158	0	3,158	-	3,158	0.07
63	945	0.06	57	3,215	0	3,215	-	3,215	0.07
64	960	0.06	57	3,272	0	3,272	-	3,272	0.08
65	975	0.01	12	3,284	0	3,284	-	3,284	0.08
66	990	0.01	12	3,296	0	3,296	-	3,296	0.08
67	1005	0.01	9	3,305	0	3,305	-	3,305	0.08
68	1020	0.01	9	3,314	0	3,314	-	3,314	0.08
69	1035	0.02	15	3,329	0	3,329	-	3,329	0.08
70	1050	0.02	15	3,344	0	3,344	-	3,344	0.08
71	1065	0.02	15	3,359	0	3,359	-	3,359	0.08
72	1080	0.01	12	3,371	0	3,371	-	3,371	0.08
73	1095	0.01	12	3,383	0	3,383	-	3,383	0.08
74	1110	0.01	12	3,395	0	3,395	-	3,395	0.08
75	1125	0.01	9	3,404	0	3,404	-	3,404	0.08
76	1140	0.01	6	3,410	0	3,410	-	3,410	0.08
77	1155	0.01	9	3,419	0	3,419	-	3,419	0.08
78	1170	0.01	12	3,431	0	3,431	-	3,431	0.08
79	1185	0.01	9	3,440	0	3,440	-	3,440	0.08
80	1200	0.01	6	3,446	0	3,446	-	3,446	0.08
81	1215	0.01	9	3,455	0	3,455	-	3,455	0.08
82	1230	0.01	9	3,464	0	3,464	-	3,464	0.08
83	1245	0.01	9	3,473	0	3,473	-	3,473	0.08
84	1260	0.01	6	3,479	0	3,479	-	3,479	0.08
85	1275	0.01	9	3,488	0	3,488	-	3,488	0.08
86	1290	0.01	6	3,494	0	3,494	-	3,494	0.08
87	1305	0.01	9	3,503	0	3,503	-	3,503	0.08
88	1320	0.01	6	3,509	0	3,509	-	3,509	0.08
89	1335	0.01	9	3,518	0	3,518	-	3,518	0.08
90	1350	0.01	6	3,524	0	3,524	-	3,524	0.08
91	1365	0.01	6	3,530	0	3,530	-	3,530	0.08
92	1380	0.01	6	3,536	0	3,536	-	3,536	0.08
93	1395	0.01	6	3,542	0	3,542	-	3,542	0.08
94	1410	0.01	6	3,548	0	3,548	-	3,548	0.08
95	1425	0.01	6	3,554	0	3,554	-	3,554	0.08
96	1440	0.01	6	3,560	0	3,560	-	3,560	0.08

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM PROP 2 YR EVENT - NORTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	1.67		
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	0.55		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.92		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	480		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	75		
30				
31	ELEVATION OF HEADWATER	356		
32	ELEVATION OF CONCENTRATION POINT	264.5		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.721		
40	6-HOUR	0.953		
41	24-HOUR	1.36		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD — PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH
BASIC DATA CALCULATION FORM — JOB # C2026
SHORTCUT METHOD — BY ES R. BAZUA, P.E. — DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	3.140
[4] L-FEET	480
[5] L-MILES	0.091
[6] La-FEET	75.00
[7] La-MILES	0.014
[8] ELEVATION OF HEADWATER	356
[9] ELEVATION OF CONCENTRATION POINT	264.5
[10] H-FEET	91.5
[11] S-FEET/MILE	1006.5
[12] S^0.5	31.73
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.6
[17] 100% OF LAG-MINUTES	0.6
[18] 200% OF LAG-MINUTES	1.2
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
0.72	3.140	1.00	0.72	0.95	3.140	1.00	0.95	1.36	3.140	1.00	1.36
		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]	3.14	SUM [7]	0.72	SUM [9]	3.14	SUM [11]	0.95	SUM [13]	3.14	SUM [15]	1.36
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.72				0.95				1.36

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.21	0.21	0.14
FLOOD VOLUME	(cu-ft)	2,417	2,393	1,550
	(acre-ft)	0.06	0.05	0.04
REQUIRED STORAGE	(cu-ft)	2,397	2,373	1,537
	(acre-ft)	0.06	0.05	0.04
PEAK FLOW	(cfs)	1.53	1.31	0.06
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM PROP 2 YR EVENT - NORTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	1.67	0.532	0.0394
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.55	0.175	0.1296
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.92	0.293	0.0529
					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 3.14	SUM	0.2219

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.110929936

C= 0.00205

Ft=C(24-(T/60))^1.55 = 0.00205 (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
100 YEAR - 3 HOUR STORM EVENT

PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.62
UNIT TIME-PERCENT OF LAG	808.9
TOTAL ADJUSTED STORM RAIN-INCHES	0.72
CONSTANT LOSS RATE-in/hr	0.22
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.112	0.22	0.10	0.01	0.04	10.60
2	10	0.17	1.3	0.112	0.22	0.10	0.01	0.04	10.60
3	15	0.25	1.1	0.095	0.22	0.09	0.01	0.03	8.97
4	20	0.33	1.5	0.130	0.22	0.12	0.01	0.04	12.23
5	25	0.42	1.5	0.130	0.22	0.12	0.01	0.04	12.23
6	30	0.50	1.8	0.156	0.22	0.14	0.02	0.05	14.67
7	35	0.58	1.5	0.130	0.22	0.12	0.01	0.04	12.23
8	40	0.67	1.8	0.156	0.22	0.14	0.02	0.05	14.67
9	45	0.75	1.8	0.156	0.22	0.14	0.02	0.05	14.67
10	50	0.83	1.5	0.130	0.22	0.12	0.01	0.04	12.23
11	55	0.92	1.6	0.138	0.22	0.12	0.01	0.04	13.04
12	60	1.00	1.8	0.156	0.22	0.14	0.02	0.05	14.67
13	65	1.08	2.2	0.190	0.22	0.17	0.02	0.06	17.93
14	70	1.17	2.2	0.190	0.22	0.17	0.02	0.06	17.93
15	75	1.25	2.2	0.190	0.22	0.17	0.02	0.06	17.93
16	80	1.33	2.0	0.173	0.22	0.16	0.02	0.05	16.30
17	85	1.42	2.6	0.225	0.22	0.20	0.00	0.01	2.91
18	90	1.50	2.7	0.234	0.22	0.21	0.01	0.04	11.06
19	95	1.58	2.4	0.208	0.22	0.19	0.02	0.07	19.56
20	100	1.67	2.7	0.234	0.22	0.21	0.01	0.04	11.06
21	105	1.75	3.3	0.286	0.22	0.26	0.06	0.20	59.96
22	110	1.83	3.1	0.268	0.22	0.24	0.05	0.15	43.66
23	115	1.92	2.9	0.251	0.22	0.23	0.03	0.09	27.36
24	120	2.00	3.0	0.260	0.22	0.23	0.04	0.12	35.51
25	125	2.08	3.1	0.268	0.22	0.24	0.05	0.15	43.66
26	130	2.17	4.2	0.363	0.22	0.33	0.14	0.44	133.32
27	135	2.25	5.0	0.433	0.22	0.39	0.21	0.66	198.52
28	140	2.33	3.5	0.303	0.22	0.27	0.08	0.25	76.26
29	145	2.42	6.8	0.588	0.22	0.53	0.37	1.15	345.22
30	150	2.50	7.3	0.632	0.22	0.57	0.41	1.29	385.97
31	155	2.58	8.2	0.709	0.22	0.64	0.49	1.53	459.32
32	160	2.67	5.9	0.510	0.22	0.46	0.29	0.91	271.87
33	165	2.75	2.0	0.173	0.22	0.16	0.02	0.05	16.30
34	170	2.83	1.8	0.156	0.22	0.14	0.02	0.05	14.67
35	175	2.92	1.8	0.156	0.22	0.14	0.02	0.05	14.67
36	180	3.00	0.6	0.052	0.22	0.05	0.01	0.02	4.89

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.21
FLOOD VOLUME (acft)	0.06
FLOOD VOLUME (cuft)	2416.63
REQUIRED STORAGE (acft)	0.06
REQUIRED STORAGE (cuft)	2396.65
PEAK FLOW RATE (cfs)	1.53

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

PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NOR
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.62
UNIT TIME-PERCENT OF LAG	808.9
TOTAL ADJUSTED STORM RAIN-INCHES	0.95
CONSTANT LOSS RATE-in/hr	0.222
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.057	0.22	0.05	0.01	0.02	5.39
2	10	0.17	0.6	0.069	0.22	0.06	0.01	0.02	6.46
3	15	0.25	0.6	0.069	0.22	0.06	0.01	0.02	6.46
4	20	0.33	0.6	0.069	0.22	0.06	0.01	0.02	6.46
5	25	0.42	0.6	0.069	0.22	0.06	0.01	0.02	6.46
6	30	0.50	0.7	0.080	0.22	0.07	0.01	0.03	7.54
7	35	0.58	0.7	0.080	0.22	0.07	0.01	0.03	7.54
8	40	0.67	0.7	0.080	0.22	0.07	0.01	0.03	7.54
9	45	0.75	0.7	0.080	0.22	0.07	0.01	0.03	7.54
10	50	0.83	0.7	0.080	0.22	0.07	0.01	0.03	7.54
11	55	0.92	0.7	0.080	0.22	0.07	0.01	0.03	7.54
12	60	1.00	0.8	0.091	0.22	0.08	0.01	0.03	8.62
13	65	1.08	0.8	0.091	0.22	0.08	0.01	0.03	8.62
14	70	1.17	0.8	0.091	0.22	0.08	0.01	0.03	8.62
15	75	1.25	0.8	0.091	0.22	0.08	0.01	0.03	8.62
16	80	1.33	0.8	0.091	0.22	0.08	0.01	0.03	8.62
17	85	1.42	0.8	0.091	0.22	0.08	0.01	0.03	8.62
18	90	1.50	0.8	0.091	0.22	0.08	0.01	0.03	8.62
19	95	1.58	0.8	0.091	0.22	0.08	0.01	0.03	8.62
20	100	1.67	0.8	0.091	0.22	0.08	0.01	0.03	8.62
21	105	1.75	0.8	0.091	0.22	0.08	0.01	0.03	8.62
22	110	1.83	0.8	0.091	0.22	0.08	0.01	0.03	8.62
23	115	1.92	0.8	0.091	0.22	0.08	0.01	0.03	8.62
24	120	2.00	0.9	0.103	0.22	0.09	0.01	0.03	9.70
25	125	2.08	0.8	0.091	0.22	0.08	0.01	0.03	8.62
26	130	2.17	0.9	0.103	0.22	0.09	0.01	0.03	9.70
27	135	2.25	0.9	0.103	0.22	0.09	0.01	0.03	9.70
28	140	2.33	0.9	0.103	0.22	0.09	0.01	0.03	9.70
29	145	2.42	0.9	0.103	0.22	0.09	0.01	0.03	9.70
30	150	2.50	0.9	0.103	0.22	0.09	0.01	0.03	9.70
31	155	2.58	0.9	0.103	0.22	0.09	0.01	0.03	9.70
32	160	2.67	0.9	0.103	0.22	0.09	0.01	0.03	9.70
33	165	2.75	1.0	0.114	0.22	0.10	0.01	0.04	10.77
34	170	2.83	1.0	0.114	0.22	0.10	0.01	0.04	10.77
35	175	2.92	1.0	0.114	0.22	0.10	0.01	0.04	10.77
36	180	3.00	1.0	0.114	0.22	0.10	0.01	0.04	10.77
37	185	3.08	1.0	0.114	0.22	0.10	0.01	0.04	10.77
38	190	3.17	1.1	0.126	0.22	0.11	0.01	0.04	11.85
39	195	3.25	1.1	0.126	0.22	0.11	0.01	0.04	11.85
40	200	3.33	1.1	0.126	0.22	0.11	0.01	0.04	11.85
41	205	3.42	1.2	0.137	0.22	0.12	0.01	0.04	12.93
42	210	3.50	1.3	0.149	0.22	0.13	0.01	0.05	14.00
43	215	3.58	1.4	0.160	0.22	0.14	0.02	0.05	15.08
44	220	3.67	1.4	0.160	0.22	0.14	0.02	0.05	15.08
45	225	3.75	1.5	0.172	0.22	0.15	0.02	0.05	16.16
46	230	3.83	1.5	0.172	0.22	0.15	0.02	0.05	16.16
47	235	3.92	1.6	0.183	0.22	0.16	0.02	0.06	17.24
48	240	4.00	1.6	0.183	0.22	0.16	0.02	0.06	17.24
49	245	4.08	1.7	0.194	0.22	0.17	0.02	0.06	18.31
50	250	4.17	1.8	0.206	0.22	0.19	0.02	0.06	19.39
51	255	4.25	1.9	0.217	0.22	0.20	0.02	0.07	20.47
52	260	4.33	2.0	0.229	0.22	0.21	0.01	0.02	6.46
53	265	4.42	2.1	0.240	0.22	0.22	0.02	0.06	17.23
54	270	4.50	2.1	0.240	0.22	0.22	0.02	0.06	17.23
55	275	4.58	2.2	0.252	0.22	0.23	0.03	0.09	28.01
56	280	4.67	2.3	0.263	0.22	0.24	0.04	0.13	38.78

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NOR CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.62		
UNIT TIME-PERCENT OF LAG	808.9		
TOTAL ADJUSTED STORM RAIN-INCHES	0.95		
CONSTANT LOSS RATE-in/hr	0.222		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time		Pattern	Storm	Loss Rate		Effective	Flood	Required
	Minutes	Hours	Percent	Rain in/hr	in/hr		Rain	Hydrograph Flow	Storage
			(Plate E-5.9)		Max	Low	in/hr	cfs	cf
57	285	4.75	2.4	0.274	0.22	0.25	0.05	0.17	49.55
58	290	4.83	2.4	0.274	0.22	0.25	0.05	0.17	49.55
59	295	4.92	2.5	0.286	0.22	0.26	0.06	0.20	60.33
60	300	5.00	2.6	0.297	0.22	0.27	0.08	0.24	71.10
61	305	5.08	3.1	0.355	0.22	0.32	0.13	0.42	124.96
62	310	5.17	3.6	0.412	0.22	0.37	0.19	0.60	178.83
63	315	5.25	3.9	0.446	0.22	0.40	0.22	0.70	211.14
64	320	5.33	4.2	0.480	0.22	0.43	0.26	0.81	243.46
65	325	5.42	4.7	0.537	0.22	0.48	0.32	0.99	297.33
66	330	5.50	5.6	0.640	0.22	0.58	0.42	1.31	394.28
67	335	5.58	1.9	0.217	0.22	0.20	0.02	0.07	20.47
68	340	5.67	0.9	0.103	0.22	0.09	0.01	0.03	9.70
69	345	5.75	0.6	0.069	0.22	0.06	0.01	0.02	6.46
70	350	5.83	0.5	0.057	0.22	0.05	0.01	0.02	5.39
71	355	5.92	0.3	0.034	0.22	0.03	0.00	0.01	3.23
72	360	6.00	0.2	0.023	0.22	0.02	0.00	0.01	2.15

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.21
FLOOD VOLUME (acft)	0.05
FLOOD VOLUME (cuft)	2392.99
REQUIRED STORAGE (acft)	0.05
REQUIRED STORAGE (cuft)	2373.21
PEAK FLOW RATE (cfs)	1.31

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

PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2219
LAG TIME - MINUTES	0.62	MINIMUM LOSS RATE (for var. loss) - in/hr	0.111
UNIT TIME-PERCENT OF LAG	2426.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00205
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.011	0.392	0.010	0.001	0.00	3.07
2	30	0.50	0.3	0.016	0.387	0.015	0.002	0.01	4.61
3	45	0.75	0.3	0.016	0.383	0.015	0.002	0.01	4.61
4	60	1.00	0.4	0.022	0.378	0.020	0.002	0.01	6.15
5	75	1.25	0.3	0.016	0.374	0.015	0.002	0.01	4.61
6	90	1.50	0.3	0.016	0.369	0.015	0.002	0.01	4.61
7	105	1.75	0.3	0.016	0.365	0.015	0.002	0.01	4.61
8	120	2.00	0.4	0.022	0.361	0.020	0.002	0.01	6.15
9	135	2.25	0.4	0.022	0.356	0.020	0.002	0.01	6.15
10	150	2.50	0.4	0.022	0.352	0.020	0.002	0.01	6.15
11	165	2.75	0.5	0.027	0.348	0.024	0.003	0.01	7.69
12	180	3.00	0.5	0.027	0.343	0.024	0.003	0.01	7.69
13	195	3.25	0.5	0.027	0.339	0.024	0.003	0.01	7.69
14	210	3.50	0.5	0.027	0.335	0.024	0.003	0.01	7.69
15	225	3.75	0.5	0.027	0.331	0.024	0.003	0.01	7.69
16	240	4.00	0.6	0.033	0.326	0.029	0.003	0.01	9.22
17	255	4.25	0.6	0.033	0.322	0.029	0.003	0.01	9.22
18	270	4.50	0.7	0.038	0.318	0.034	0.004	0.01	10.76
19	285	4.75	0.7	0.038	0.314	0.034	0.004	0.01	10.76
20	300	5.00	0.8	0.044	0.310	0.039	0.004	0.01	12.30
21	315	5.25	0.6	0.033	0.306	0.029	0.003	0.01	9.22
22	330	5.50	0.7	0.038	0.302	0.034	0.004	0.01	10.76
23	345	5.75	0.8	0.044	0.298	0.039	0.004	0.01	12.30
24	360	6.00	0.8	0.044	0.294	0.039	0.004	0.01	12.30
25	375	6.25	0.9	0.049	0.290	0.044	0.005	0.02	13.84
26	390	6.50	0.9	0.049	0.286	0.044	0.005	0.02	13.84
27	405	6.75	1.0	0.054	0.283	0.049	0.005	0.02	15.37
28	420	7.00	1.0	0.054	0.279	0.049	0.005	0.02	15.37
29	435	7.25	1.0	0.054	0.275	0.049	0.005	0.02	15.37
30	450	7.50	1.1	0.060	0.271	0.054	0.006	0.02	16.91
31	465	7.75	1.2	0.065	0.267	0.059	0.007	0.02	18.45
32	480	8.00	1.3	0.071	0.264	0.064	0.007	0.02	19.99
33	495	8.25	1.5	0.082	0.260	0.073	0.008	0.03	23.06
34	510	8.50	1.5	0.082	0.257	0.073	0.008	0.03	23.06
35	525	8.75	1.6	0.087	0.253	0.078	0.009	0.03	24.60
36	540	9.00	1.7	0.092	0.249	0.083	0.009	0.03	26.13
37	555	9.25	1.9	0.103	0.246	0.093	0.010	0.03	29.21
38	570	9.50	2.0	0.109	0.242	0.098	0.011	0.03	30.75
39	585	9.75	2.1	0.114	0.239	0.103	0.011	0.04	32.28
40	600	10.00	2.2	0.120	0.235	0.108	0.012	0.04	33.82
41	615	10.25	1.5	0.082	0.232	0.073	0.008	0.03	23.06
42	630	10.50	1.5	0.082	0.229	0.073	0.008	0.03	23.06
43	645	10.75	2.0	0.109	0.225	0.098	0.011	0.03	30.75
44	660	11.00	2.0	0.109	0.222	0.098	0.011	0.03	30.75
45	675	11.25	1.9	0.103	0.219	0.093	0.010	0.03	29.21
46	690	11.50	1.9	0.103	0.216	0.093	0.010	0.03	29.21
47	705	11.75	1.7	0.092	0.212	0.083	0.009	0.03	26.13
48	720	12.00	1.8	0.098	0.209	0.088	0.010	0.03	27.67
49	735	12.25	2.5	0.136	0.206	0.122	0.014	0.04	38.43
50	750	12.50	2.6	0.141	0.203	0.127	0.014	0.04	39.97
51	765	12.75	2.8	0.152	0.200	0.137	0.015	0.05	43.05
52	780	13.00	2.9	0.158	0.197	0.142	0.016	0.05	44.58
53	795	13.25	3.4	0.185	0.194	0.166	0.018	0.06	52.27
54	810	13.50	3.4	0.185	0.191	0.166	0.018	0.06	52.27
55	825	13.75	2.3	0.125	0.188	0.113	0.013	0.04	35.36
56	840	14.00	2.3	0.125	0.185	0.113	0.013	0.04	35.36
57	855	14.25	2.7	0.147	0.182	0.132	0.015	0.05	41.51
58	870	14.50	2.6	0.141	0.180	0.127	0.014	0.04	39.97
59	885	14.75	2.6	0.141	0.177	0.127	0.014	0.04	39.97
60	900	15.00	2.5	0.136	0.174	0.122	0.014	0.04	38.43
61	915	15.25	2.4	0.131	0.172	0.118	0.013	0.04	36.90
62	930	15.50	2.3	0.125	0.169	0.113	0.013	0.04	35.36
63	945	15.75	1.9	0.103	0.166	0.093	0.010	0.03	29.21
64	960	16.00	1.9	0.103	0.164	0.093	0.010	0.03	29.21
65	975	16.25	0.4	0.022	0.161	0.020	0.002	0.01	6.15
66	990	16.50	0.4	0.022	0.159	0.020	0.002	0.01	6.15
67	1005	16.75	0.3	0.016	0.156	0.015	0.002	0.01	4.61

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2219
LAG TIME - MINUTES	0.62	MINIMUM LOSS RATE (for var. loss) - in/hr	0.111
UNIT TIME-PERCENT OF LAG	2426.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00205
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.016	0.154	0.015	0.002	0.01	4.61
69	1035	17.25	0.5	0.027	0.152	0.024	0.003	0.01	7.69
70	1050	17.50	0.5	0.027	0.149	0.024	0.003	0.01	7.69
71	1065	17.75	0.5	0.027	0.147	0.024	0.003	0.01	7.69
72	1080	18.00	0.4	0.022	0.145	0.020	0.002	0.01	6.15
73	1095	18.25	0.4	0.022	0.143	0.020	0.002	0.01	6.15
74	1110	18.50	0.4	0.022	0.141	0.020	0.002	0.01	6.15
75	1125	18.75	0.3	0.016	0.139	0.015	0.002	0.01	4.61
76	1140	19.00	0.2	0.011	0.137	0.010	0.001	0.00	3.07
77	1155	19.25	0.3	0.016	0.135	0.015	0.002	0.01	4.61
78	1170	19.50	0.4	0.022	0.133	0.020	0.002	0.01	6.15
79	1185	19.75	0.3	0.016	0.131	0.015	0.002	0.01	4.61
80	1200	20.00	0.2	0.011	0.129	0.010	0.001	0.00	3.07
81	1215	20.25	0.3	0.016	0.128	0.015	0.002	0.01	4.61
82	1230	20.50	0.3	0.016	0.126	0.015	0.002	0.01	4.61
83	1245	20.75	0.3	0.016	0.124	0.015	0.002	0.01	4.61
84	1260	21.00	0.2	0.011	0.123	0.010	0.001	0.00	3.07
85	1275	21.25	0.3	0.016	0.121	0.015	0.002	0.01	4.61
86	1290	21.50	0.2	0.011	0.120	0.010	0.001	0.00	3.07
87	1305	21.75	0.3	0.016	0.119	0.015	0.002	0.01	4.61
88	1320	22.00	0.2	0.011	0.118	0.010	0.001	0.00	3.07
89	1335	22.25	0.3	0.016	0.116	0.015	0.002	0.01	4.61
90	1350	22.50	0.2	0.011	0.115	0.010	0.001	0.00	3.07
91	1365	22.75	0.2	0.011	0.114	0.010	0.001	0.00	3.07
92	1380	23.00	0.2	0.011	0.113	0.010	0.001	0.00	3.07
93	1395	23.25	0.2	0.011	0.113	0.010	0.001	0.00	3.07
94	1410	23.50	0.2	0.011	0.112	0.010	0.001	0.00	3.07
95	1425	23.75	0.2	0.011	0.111	0.010	0.001	0.00	3.07
96	1440	24.00	0.2	0.011	0.111	0.010	0.001	0.00	3.07

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.14
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1550.16
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1537.34
PEAK FLOW (cfs)	0.06

PROJECT: WORLD MUSEUM PROP 2 YR EVENT - NORTH
JOB # C2026
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

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JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	11	21	0	21	-	21	0.00
3	15	0.03	9	30	0	30	-	30	0.00
4	20	0.04	12	42	0	42	-	42	0.00
5	25	0.04	12	55	0	55	-	55	0.00
6	30	0.05	15	69	0	69	-	69	0.00
7	35	0.04	12	82	0	82	-	82	0.00
8	40	0.05	15	96	0	96	-	96	0.00
9	45	0.05	15	111	0	111	-	111	0.00
10	50	0.04	12	123	0	123	-	123	0.00
11	55	0.04	13	136	0	136	-	136	0.00
12	60	0.05	15	151	0	151	-	151	0.00
13	65	0.06	18	169	0	169	-	169	0.00
14	70	0.06	18	187	0	187	-	187	0.00
15	75	0.06	18	205	0	205	-	205	0.00
16	80	0.05	16	221	0	221	-	221	0.01
17	85	0.01	3	224	0	224	-	224	0.01
18	90	0.04	11	235	0	235	-	235	0.01
19	95	0.07	20	254	0	254	-	254	0.01
20	100	0.04	11	265	0	265	-	265	0.01
21	105	0.20	60	325	0	325	-	325	0.01
22	110	0.15	44	369	0	369	-	369	0.01
23	115	0.09	27	396	0	396	-	396	0.01
24	120	0.12	36	432	0	432	-	432	0.01
25	125	0.15	44	476	0	476	-	476	0.01
26	130	0.44	133	609	0	609	-	609	0.01
27	135	0.66	199	807	0	807	-	807	0.02
28	140	0.25	76	884	0	884	-	884	0.02
29	145	1.15	345	1,229	0	1,229	-	1,229	0.03
30	150	1.29	386	1,615	0	1,615	-	1,615	0.04
31	155	1.53	459	2,074	0	2,074	-	2,074	0.05
32	160	0.91	272	2,346	0	2,346	-	2,346	0.05
33	165	0.05	16	2,362	0	2,362	-	2,362	0.05
34	170	0.05	15	2,377	0	2,377	-	2,377	0.05
35	175	0.05	15	2,392	0	2,392	-	2,392	0.05
36	180	0.02	5	2,397	0	2,397	-	2,397	0.06

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JOB # C2026

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	5	5	0	5	-	5	0.00
2	10	0.02	6	12	0	12	-	12	0.00
3	15	0.02	6	18	0	18	-	18	0.00
4	20	0.02	6	25	0	25	-	25	0.00
5	25	0.02	6	31	0	31	-	31	0.00
6	30	0.03	8	39	0	39	-	39	0.00
7	35	0.03	8	46	0	46	-	46	0.00
8	40	0.03	8	54	0	54	-	54	0.00
9	45	0.03	8	61	0	61	-	61	0.00
10	50	0.03	8	69	0	69	-	69	0.00
11	55	0.03	8	76	0	76	-	76	0.00
12	60	0.03	9	85	0	85	-	85	0.00
13	65	0.03	9	94	0	94	-	94	0.00
14	70	0.03	9	102	0	102	-	102	0.00
15	75	0.03	9	111	0	111	-	111	0.00
16	80	0.03	9	120	0	120	-	120	0.00
17	85	0.03	9	128	0	128	-	128	0.00
18	90	0.03	9	137	0	137	-	137	0.00
19	95	0.03	9	145	0	145	-	145	0.00
20	100	0.03	9	154	0	154	-	154	0.00
21	105	0.03	9	163	0	163	-	163	0.00
22	110	0.03	9	171	0	171	-	171	0.00
23	115	0.03	9	180	0	180	-	180	0.00
24	120	0.03	10	190	0	190	-	190	0.00
25	125	0.03	9	198	0	198	-	198	0.00
26	130	0.03	10	208	0	208	-	208	0.00
27	135	0.03	10	218	0	218	-	218	0.00
28	140	0.03	10	227	0	227	-	227	0.01
29	145	0.03	10	237	0	237	-	237	0.01
30	150	0.03	10	247	0	247	-	247	0.01
31	155	0.03	10	256	0	256	-	256	0.01
32	160	0.03	10	266	0	266	-	266	0.01
33	165	0.04	11	277	0	277	-	277	0.01
34	170	0.04	11	288	0	288	-	288	0.01
35	175	0.04	11	298	0	298	-	298	0.01
36	180	0.04	11	309	0	309	-	309	0.01
37	185	0.04	11	320	0	320	-	320	0.01
38	190	0.04	12	332	0	332	-	332	0.01
39	195	0.04	12	344	0	344	-	344	0.01
40	200	0.04	12	355	0	355	-	355	0.01
41	205	0.04	13	368	0	368	-	368	0.01
42	210	0.05	14	382	0	382	-	382	0.01
43	215	0.05	15	398	0	398	-	398	0.01
44	220	0.05	15	413	0	413	-	413	0.01
45	225	0.05	16	429	0	429	-	429	0.01
46	230	0.05	16	445	0	445	-	445	0.01
47	235	0.06	17	462	0	462	-	462	0.01
48	240	0.06	17	479	0	479	-	479	0.01
49	245	0.06	18	498	0	498	-	498	0.01
50	250	0.06	19	517	0	517	-	517	0.01
51	255	0.07	20	538	0	538	-	538	0.01
52	260	0.02	6	544	0	544	-	544	0.01
53	265	0.06	17	561	0	561	-	561	0.01
54	270	0.06	17	578	0	578	-	578	0.01
55	275	0.09	28	606	0	606	-	606	0.01

1

JOB # C2026

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	0.13	39	645	0	645	-	645	0.01
57	285	0.17	50	695	0	695	-	695	0.02
58	290	0.17	50	744	0	744	-	744	0.02
59	295	0.20	60	805	0	805	-	805	0.02
60	300	0.24	71	876	0	876	-	876	0.02
61	305	0.42	125	1,001	0	1,001	-	1,001	0.02
62	310	0.60	179	1,180	0	1,180	-	1,180	0.03
63	315	0.70	211	1,391	0	1,391	-	1,391	0.03
64	320	0.81	243	1,634	0	1,634	-	1,634	0.04
65	325	0.99	297	1,932	0	1,932	-	1,932	0.04
66	330	1.31	394	2,326	0	2,326	-	2,326	0.05
67	335	0.07	20	2,346	0	2,346	-	2,346	0.05
68	340	0.03	10	2,356	0	2,356	-	2,356	0.05
69	345	0.02	6	2,362	0	2,362	-	2,362	0.05
70	350	0.02	5	2,368	0	2,368	-	2,368	0.05
71	355	0.01	3	2,371	0	2,371	-	2,371	0.05
72	360	0.01	2	2,373	0	2,373	-	2,373	0.05

1

JOB # C2026

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	3	3	0	3	-	3	0.00
2	30	0.01	5	8	0	8	-	8	0.00
3	45	0.01	5	12	0	12	-	12	0.00
4	60	0.01	6	18	0	18	-	18	0.00
5	75	0.01	5	23	0	23	-	23	0.00
6	90	0.01	5	28	0	28	-	28	0.00
7	105	0.01	5	32	0	32	-	32	0.00
8	120	0.01	6	38	0	38	-	38	0.00
9	135	0.01	6	45	0	45	-	45	0.00
10	150	0.01	6	51	0	51	-	51	0.00
11	165	0.01	8	58	0	58	-	58	0.00
12	180	0.01	8	66	0	66	-	66	0.00
13	195	0.01	8	74	0	74	-	74	0.00
14	210	0.01	8	81	0	81	-	81	0.00
15	225	0.01	8	89	0	89	-	89	0.00
16	240	0.01	9	98	0	98	-	98	0.00
17	255	0.01	9	108	0	108	-	108	0.00
18	270	0.01	11	118	0	118	-	118	0.00
19	285	0.01	11	129	0	129	-	129	0.00
20	300	0.01	12	141	0	141	-	141	0.00
21	315	0.01	9	151	0	151	-	151	0.00
22	330	0.01	11	161	0	161	-	161	0.00
23	345	0.01	12	174	0	174	-	174	0.00
24	360	0.01	12	186	0	186	-	186	0.00
25	375	0.02	14	200	0	200	-	200	0.00
26	390	0.02	14	214	0	214	-	214	0.00
27	405	0.02	15	229	0	229	-	229	0.01
28	420	0.02	15	244	0	244	-	244	0.01
29	435	0.02	15	260	0	260	-	260	0.01
30	450	0.02	17	277	0	277	-	277	0.01
31	465	0.02	18	295	0	295	-	295	0.01
32	480	0.02	20	315	0	315	-	315	0.01
33	495	0.03	23	338	0	338	-	338	0.01
34	510	0.03	23	361	0	361	-	361	0.01
35	525	0.03	25	386	0	386	-	386	0.01
36	540	0.03	26	412	0	412	-	412	0.01
37	555	0.03	29	441	0	441	-	441	0.01
38	570	0.03	31	472	0	472	-	472	0.01
39	585	0.04	32	504	0	504	-	504	0.01
40	600	0.04	34	538	0	538	-	538	0.01
41	615	0.03	23	561	0	561	-	561	0.01
42	630	0.03	23	584	0	584	-	584	0.01
43	645	0.03	31	615	0	615	-	615	0.01
44	660	0.03	31	646	0	646	-	646	0.01
45	675	0.03	29	675	0	675	-	675	0.02
46	690	0.03	29	704	0	704	-	704	0.02
47	705	0.03	26	730	0	730	-	730	0.02
48	720	0.03	28	758	0	758	-	758	0.02
49	735	0.04	38	796	0	796	-	796	0.02
50	750	0.04	40	836	0	836	-	836	0.02
51	765	0.05	43	879	0	879	-	879	0.02
52	780	0.05	45	924	0	924	-	924	0.02
53	795	0.06	52	976	0	976	-	976	0.02
54	810	0.06	52	1,028	0	1,028	-	1,028	0.02
55	825	0.04	35	1,064	0	1,064	-	1,064	0.02
56	840	0.04	35	1,099	0	1,099	-	1,099	0.03
57	855	0.05	42	1,141	0	1,141	-	1,141	0.03
58	870	0.04	40	1,181	0	1,181	-	1,181	0.03

1

JOB # C2026

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	0.04	40	1,221	0	1,221	-	1,221	0.03
60	900	0.04	38	1,259	0	1,259	-	1,259	0.03
61	915	0.04	37	1,296	0	1,296	-	1,296	0.03
62	930	0.04	35	1,331	0	1,331	-	1,331	0.03
63	945	0.03	29	1,361	0	1,361	-	1,361	0.03
64	960	0.03	29	1,390	0	1,390	-	1,390	0.03
65	975	0.01	6	1,396	0	1,396	-	1,396	0.03
66	990	0.01	6	1,402	0	1,402	-	1,402	0.03
67	1005	0.01	5	1,407	0	1,407	-	1,407	0.03
68	1020	0.01	5	1,411	0	1,411	-	1,411	0.03
69	1035	0.01	8	1,419	0	1,419	-	1,419	0.03
70	1050	0.01	8	1,427	0	1,427	-	1,427	0.03
71	1065	0.01	8	1,434	0	1,434	-	1,434	0.03
72	1080	0.01	6	1,440	0	1,440	-	1,440	0.03
73	1095	0.01	6	1,447	0	1,447	-	1,447	0.03
74	1110	0.01	6	1,453	0	1,453	-	1,453	0.03
75	1125	0.01	5	1,457	0	1,457	-	1,457	0.03
76	1140	0.00	3	1,460	0	1,460	-	1,460	0.03
77	1155	0.01	5	1,465	0	1,465	-	1,465	0.03
78	1170	0.01	6	1,471	0	1,471	-	1,471	0.03
79	1185	0.01	5	1,476	0	1,476	-	1,476	0.03
80	1200	0.00	3	1,479	0	1,479	-	1,479	0.03
81	1215	0.01	5	1,484	0	1,484	-	1,484	0.03
82	1230	0.01	5	1,488	0	1,488	-	1,488	0.03
83	1245	0.01	5	1,493	0	1,493	-	1,493	0.03
84	1260	0.00	3	1,496	0	1,496	-	1,496	0.03
85	1275	0.01	5	1,500	0	1,500	-	1,500	0.03
86	1290	0.00	3	1,504	0	1,504	-	1,504	0.03
87	1305	0.01	5	1,508	0	1,508	-	1,508	0.03
88	1320	0.00	3	1,511	0	1,511	-	1,511	0.03
89	1335	0.01	5	1,516	0	1,516	-	1,516	0.03
90	1350	0.00	3	1,519	0	1,519	-	1,519	0.03
91	1365	0.00	3	1,522	0	1,522	-	1,522	0.03
92	1380	0.00	3	1,525	0	1,525	-	1,525	0.04
93	1395	0.00	3	1,528	0	1,528	-	1,528	0.04
94	1410	0.00	3	1,531	0	1,531	-	1,531	0.04
95	1425	0.00	3	1,534	0	1,534	-	1,534	0.04
96	1440	0.00	3	1,537	0	1,537	-	1,537	0.04

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM PROP 10 YR EVENT - NORTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	1.67		
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	0.55		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.92		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	480		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	75		
30				
31	ELEVATION OF HEADWATER	356		
32	ELEVATION OF CONCENTRATION POINT	264.5		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	1.5		
40	6-HOUR	1.93		
41	24-HOUR	2.66		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	3.140
[4] L-FEET	480
[5] L-MILES	0.091
[6] La-FEET	75.00
[7] La-MILES	0.014
[8] ELEVATION OF HEADWATER	356
[9] ELEVATION OF CONCENTRATION POINT	264.5
[10] H-FEET	91.5
[11] S-FEET/MILE	1006.5
[12] S^0.5	31.73
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.6
[17] 100% OF LAG-MINUTES	0.6
[18] 200% OF LAG-MINUTES	1.2
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
1.50	3.140	1.00	1.50	1.93	3.140	1.00	1.93	2.66	3.140	1.00	2.66
		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]	3.14	SUM [7]	1.50	SUM [9]	3.14	SUM [11]	1.93	SUM [13]	3.14	SUM [15]	2.66
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.50				1.93				2.66

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.85	0.81	0.51
FLOOD VOLUME	(cu-ft)	9,671	9,238	5,847
	(acre-ft)	0.22	0.21	0.13
REQUIRED STORAGE	(cu-ft)	9,591	9,161	5,799
	(acre-ft)	0.22	0.21	0.13
PEAK FLOW	(cfs)	3.94	3.38	0.54
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM PROP 10 YR EVENT - NORTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	1.67	0.532	0.0394
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.55	0.175	0.1296
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.92	0.293	0.0529
					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	3.14	SUM	0.2219

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.110929936

C= 0.00205

Ft=C(24-(T/60))^1.55 = 0.00205 (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
100 YEAR - 3 HOUR STORM EVENT

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.62
UNIT TIME-PERCENT OF LAG	808.9
TOTAL ADJUSTED STORM RAIN-INCHES	1.50
CONSTANT LOSS RATE-in/hr	0.22
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.234	0.22	0.21	0.01	0.04	11.44
2	10	0.17	1.3	0.234	0.22	0.21	0.01	0.04	11.44
3	15	0.25	1.1	0.198	0.22	0.18	0.02	0.06	18.65
4	20	0.33	1.5	0.270	0.22	0.24	0.05	0.15	45.35
5	25	0.42	1.5	0.270	0.22	0.24	0.05	0.15	45.35
6	30	0.50	1.8	0.324	0.22	0.29	0.10	0.32	96.22
7	35	0.58	1.5	0.270	0.22	0.24	0.05	0.15	45.35
8	40	0.67	1.8	0.324	0.22	0.29	0.10	0.32	96.22
9	45	0.75	1.8	0.324	0.22	0.29	0.10	0.32	96.22
10	50	0.83	1.5	0.270	0.22	0.24	0.05	0.15	45.35
11	55	0.92	1.6	0.288	0.22	0.26	0.07	0.21	62.30
12	60	1.00	1.8	0.324	0.22	0.29	0.10	0.32	96.22
13	65	1.08	2.2	0.396	0.22	0.36	0.17	0.55	164.04
14	70	1.17	2.2	0.396	0.22	0.36	0.17	0.55	164.04
15	75	1.25	2.2	0.396	0.22	0.36	0.17	0.55	164.04
16	80	1.33	2.0	0.360	0.22	0.32	0.14	0.43	130.13
17	85	1.42	2.6	0.468	0.22	0.42	0.25	0.77	231.86
18	90	1.50	2.7	0.486	0.22	0.44	0.26	0.83	248.82
19	95	1.58	2.4	0.432	0.22	0.39	0.21	0.66	197.95
20	100	1.67	2.7	0.486	0.22	0.44	0.26	0.83	248.82
21	105	1.75	3.3	0.594	0.22	0.53	0.37	1.17	350.56
22	110	1.83	3.1	0.558	0.22	0.50	0.34	1.06	316.64
23	115	1.92	2.9	0.522	0.22	0.47	0.30	0.94	282.73
24	120	2.00	3.0	0.540	0.22	0.49	0.32	1.00	299.69
25	125	2.08	3.1	0.558	0.22	0.50	0.34	1.06	316.64
26	130	2.17	4.2	0.756	0.22	0.68	0.53	1.68	503.16
27	135	2.25	5.0	0.900	0.22	0.81	0.68	2.13	638.81
28	140	2.33	3.5	0.630	0.22	0.57	0.41	1.28	384.47
29	145	2.42	6.8	1.224	0.22	1.10	1.00	3.15	944.02
30	150	2.50	7.3	1.314	0.22	1.18	1.09	3.43	1028.80
31	155	2.58	8.2	1.476	0.22	1.33	1.25	3.94	1181.40
32	160	2.67	5.9	1.062	0.22	0.96	0.84	2.64	791.41
33	165	2.75	2.0	0.360	0.22	0.32	0.14	0.43	130.13
34	170	2.83	1.8	0.324	0.22	0.29	0.10	0.32	96.22
35	175	2.92	1.8	0.324	0.22	0.29	0.10	0.32	96.22
36	180	3.00	0.6	0.108	0.22	0.10	0.01	0.03	10.17

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.85
FLOOD VOLUME (acft)	0.22
FLOOD VOLUME (cuft)	9670.81
REQUIRED STORAGE (acft)	0.22
REQUIRED STORAGE (cuft)	9590.85
PEAK FLOW RATE (cfs)	3.94

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

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NOF
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.62
UNIT TIME-PERCENT OF LAG	808.9
TOTAL ADJUSTED STORM RAIN-INCHES	1.93
CONSTANT LOSS RATE-in/hr	0.222
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.116	0.22	0.10	0.01	0.04	10.91
2	10	0.17	0.6	0.139	0.22	0.13	0.01	0.04	13.09
3	15	0.25	0.6	0.139	0.22	0.13	0.01	0.04	13.09
4	20	0.33	0.6	0.139	0.22	0.13	0.01	0.04	13.09
5	25	0.42	0.6	0.139	0.22	0.13	0.01	0.04	13.09
6	30	0.50	0.7	0.162	0.22	0.15	0.02	0.05	15.27
7	35	0.58	0.7	0.162	0.22	0.15	0.02	0.05	15.27
8	40	0.67	0.7	0.162	0.22	0.15	0.02	0.05	15.27
9	45	0.75	0.7	0.162	0.22	0.15	0.02	0.05	15.27
10	50	0.83	0.7	0.162	0.22	0.15	0.02	0.05	15.27
11	55	0.92	0.7	0.162	0.22	0.15	0.02	0.05	15.27
12	60	1.00	0.8	0.185	0.22	0.17	0.02	0.06	17.45
13	65	1.08	0.8	0.185	0.22	0.17	0.02	0.06	17.45
14	70	1.17	0.8	0.185	0.22	0.17	0.02	0.06	17.45
15	75	1.25	0.8	0.185	0.22	0.17	0.02	0.06	17.45
16	80	1.33	0.8	0.185	0.22	0.17	0.02	0.06	17.45
17	85	1.42	0.8	0.185	0.22	0.17	0.02	0.06	17.45
18	90	1.50	0.8	0.185	0.22	0.17	0.02	0.06	17.45
19	95	1.58	0.8	0.185	0.22	0.17	0.02	0.06	17.45
20	100	1.67	0.8	0.185	0.22	0.17	0.02	0.06	17.45
21	105	1.75	0.8	0.185	0.22	0.17	0.02	0.06	17.45
22	110	1.83	0.8	0.185	0.22	0.17	0.02	0.06	17.45
23	115	1.92	0.8	0.185	0.22	0.17	0.02	0.06	17.45
24	120	2.00	0.9	0.208	0.22	0.19	0.02	0.07	19.64
25	125	2.08	0.8	0.185	0.22	0.17	0.02	0.06	17.45
26	130	2.17	0.9	0.208	0.22	0.19	0.02	0.07	19.64
27	135	2.25	0.9	0.208	0.22	0.19	0.02	0.07	19.64
28	140	2.33	0.9	0.208	0.22	0.19	0.02	0.07	19.64
29	145	2.42	0.9	0.208	0.22	0.19	0.02	0.07	19.64
30	150	2.50	0.9	0.208	0.22	0.19	0.02	0.07	19.64
31	155	2.58	0.9	0.208	0.22	0.19	0.02	0.07	19.64
32	160	2.67	0.9	0.208	0.22	0.19	0.02	0.07	19.64
33	165	2.75	1.0	0.232	0.22	0.21	0.01	0.03	9.18
34	170	2.83	1.0	0.232	0.22	0.21	0.01	0.03	9.18
35	175	2.92	1.0	0.232	0.22	0.21	0.01	0.03	9.18
36	180	3.00	1.0	0.232	0.22	0.21	0.01	0.03	9.18
37	185	3.08	1.0	0.232	0.22	0.21	0.01	0.03	9.18
38	190	3.17	1.1	0.255	0.22	0.23	0.03	0.10	30.99
39	195	3.25	1.1	0.255	0.22	0.23	0.03	0.10	30.99
40	200	3.33	1.1	0.255	0.22	0.23	0.03	0.10	30.99
41	205	3.42	1.2	0.278	0.22	0.25	0.06	0.18	52.81
42	210	3.50	1.3	0.301	0.22	0.27	0.08	0.25	74.63
43	215	3.58	1.4	0.324	0.22	0.29	0.10	0.32	96.44
44	220	3.67	1.4	0.324	0.22	0.29	0.10	0.32	96.44
45	225	3.75	1.5	0.347	0.22	0.31	0.13	0.39	118.26
46	230	3.83	1.5	0.347	0.22	0.31	0.13	0.39	118.26
47	235	3.92	1.6	0.371	0.22	0.33	0.15	0.47	140.08
48	240	4.00	1.6	0.371	0.22	0.33	0.15	0.47	140.08
49	245	4.08	1.7	0.394	0.22	0.35	0.17	0.54	161.89
50	250	4.17	1.8	0.417	0.22	0.38	0.20	0.61	183.71
51	255	4.25	1.9	0.440	0.22	0.40	0.22	0.69	205.53
52	260	4.33	2.0	0.463	0.22	0.42	0.24	0.76	227.34
53	265	4.42	2.1	0.486	0.22	0.44	0.26	0.83	249.16
54	270	4.50	2.1	0.486	0.22	0.44	0.26	0.83	249.16
55	275	4.58	2.2	0.510	0.22	0.46	0.29	0.90	270.98
56	280	4.67	2.3	0.533	0.22	0.48	0.31	0.98	292.79

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NOF CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.14		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.62		
UNIT TIME-PERCENT OF LAG	808.9		
TOTAL ADJUSTED STORM RAIN-INCHES	1.93		
CONSTANT LOSS RATE-in/hr	0.222		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.556	0.22	0.50	0.33	1.05	314.61
58	290	4.83	2.4	0.556	0.22	0.50	0.33	1.05	314.61
59	295	4.92	2.5	0.579	0.22	0.52	0.36	1.12	336.43
60	300	5.00	2.6	0.602	0.22	0.54	0.38	1.19	358.24
61	305	5.08	3.1	0.718	0.22	0.65	0.50	1.56	467.33
62	310	5.17	3.6	0.834	0.22	0.75	0.61	1.92	576.41
63	315	5.25	3.9	0.903	0.22	0.81	0.68	2.14	641.86
64	320	5.33	4.2	0.973	0.22	0.88	0.75	2.36	707.31
65	325	5.42	4.7	1.089	0.22	0.98	0.87	2.72	816.39
66	330	5.50	5.6	1.297	0.22	1.17	1.08	3.38	1012.74
67	335	5.58	1.9	0.440	0.22	0.40	0.22	0.69	205.53
68	340	5.67	0.9	0.208	0.22	0.19	0.02	0.07	19.64
69	345	5.75	0.6	0.139	0.22	0.13	0.01	0.04	13.09
70	350	5.83	0.5	0.116	0.22	0.10	0.01	0.04	10.91
71	355	5.92	0.3	0.069	0.22	0.06	0.01	0.02	6.55
72	360	6.00	0.2	0.046	0.22	0.04	0.00	0.01	4.36

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.81
FLOOD VOLUME (acft)	0.21
FLOOD VOLUME (cuft)	9237.65
REQUIRED STORAGE (acft)	0.21
REQUIRED STORAGE (cuft)	9161.27
PEAK FLOW RATE (cfs)	3.38

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

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2219
LAG TIME - MINUTES	0.62	MINIMUM LOSS RATE (for var. loss) - in/hr	0.111
UNIT TIME-PERCENT OF LAG	2426.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00205
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.021	0.392	0.019	0.002	0.01	6.01
2	30	0.50	0.3	0.032	0.387	0.029	0.003	0.01	9.02
3	45	0.75	0.3	0.032	0.383	0.029	0.003	0.01	9.02
4	60	1.00	0.4	0.043	0.378	0.038	0.004	0.01	12.03
5	75	1.25	0.3	0.032	0.374	0.029	0.003	0.01	9.02
6	90	1.50	0.3	0.032	0.369	0.029	0.003	0.01	9.02
7	105	1.75	0.3	0.032	0.365	0.029	0.003	0.01	9.02
8	120	2.00	0.4	0.043	0.361	0.038	0.004	0.01	12.03
9	135	2.25	0.4	0.043	0.356	0.038	0.004	0.01	12.03
10	150	2.50	0.4	0.043	0.352	0.038	0.004	0.01	12.03
11	165	2.75	0.5	0.053	0.348	0.048	0.005	0.02	15.03
12	180	3.00	0.5	0.053	0.343	0.048	0.005	0.02	15.03
13	195	3.25	0.5	0.053	0.339	0.048	0.005	0.02	15.03
14	210	3.50	0.5	0.053	0.335	0.048	0.005	0.02	15.03
15	225	3.75	0.5	0.053	0.331	0.048	0.005	0.02	15.03
16	240	4.00	0.6	0.064	0.326	0.057	0.006	0.02	18.04
17	255	4.25	0.6	0.064	0.322	0.057	0.006	0.02	18.04
18	270	4.50	0.7	0.074	0.318	0.067	0.007	0.02	21.05
19	285	4.75	0.7	0.074	0.314	0.067	0.007	0.02	21.05
20	300	5.00	0.8	0.085	0.310	0.077	0.009	0.03	24.05
21	315	5.25	0.6	0.064	0.306	0.057	0.006	0.02	18.04
22	330	5.50	0.7	0.074	0.302	0.067	0.007	0.02	21.05
23	345	5.75	0.8	0.085	0.298	0.077	0.009	0.03	24.05
24	360	6.00	0.8	0.085	0.294	0.077	0.009	0.03	24.05
25	375	6.25	0.9	0.096	0.290	0.086	0.010	0.03	27.06
26	390	6.50	0.9	0.096	0.286	0.086	0.010	0.03	27.06
27	405	6.75	1.0	0.106	0.283	0.096	0.011	0.03	30.07
28	420	7.00	1.0	0.106	0.279	0.096	0.011	0.03	30.07
29	435	7.25	1.0	0.106	0.275	0.096	0.011	0.03	30.07
30	450	7.50	1.1	0.117	0.271	0.105	0.012	0.04	33.08
31	465	7.75	1.2	0.128	0.267	0.115	0.013	0.04	36.08
32	480	8.00	1.3	0.138	0.264	0.124	0.014	0.04	39.09
33	495	8.25	1.5	0.160	0.260	0.144	0.016	0.05	45.10
34	510	8.50	1.5	0.160	0.257	0.144	0.016	0.05	45.10
35	525	8.75	1.6	0.170	0.253	0.153	0.017	0.05	48.11
36	540	9.00	1.7	0.181	0.249	0.163	0.018	0.06	51.12
37	555	9.25	1.9	0.202	0.246	0.182	0.020	0.06	57.13
38	570	9.50	2.0	0.213	0.242	0.192	0.021	0.07	60.14
39	585	9.75	2.1	0.223	0.239	0.201	0.022	0.07	63.14
40	600	10.00	2.2	0.234	0.235	0.211	0.023	0.07	66.15
41	615	10.25	1.5	0.160	0.232	0.144	0.016	0.05	45.10
42	630	10.50	1.5	0.160	0.229	0.144	0.016	0.05	45.10
43	645	10.75	2.0	0.213	0.225	0.192	0.021	0.07	60.14
44	660	11.00	2.0	0.213	0.222	0.192	0.021	0.07	60.14
45	675	11.25	1.9	0.202	0.219	0.182	0.020	0.06	57.13
46	690	11.50	1.9	0.202	0.216	0.182	0.020	0.06	57.13
47	705	11.75	1.7	0.181	0.212	0.163	0.018	0.06	51.12
48	720	12.00	1.8	0.192	0.209	0.172	0.019	0.06	54.12
49	735	12.25	2.5	0.266	0.206	0.239	0.060	0.19	169.38
50	750	12.50	2.6	0.277	0.203	0.249	0.074	0.23	208.17
51	765	12.75	2.8	0.298	0.200	0.268	0.098	0.31	276.93
52	780	13.00	2.9	0.309	0.197	0.278	0.112	0.35	315.51
53	795	13.25	3.4	0.362	0.194	0.326	0.168	0.53	474.26
54	810	13.50	3.4	0.362	0.191	0.326	0.171	0.54	482.57
55	825	13.75	2.3	0.245	0.188	0.220	0.057	0.18	160.01
56	840	14.00	2.3	0.245	0.185	0.220	0.059	0.19	168.11
57	855	14.25	2.7	0.287	0.182	0.259	0.105	0.33	296.36
58	870	14.50	2.6	0.277	0.180	0.249	0.097	0.30	274.16
59	885	14.75	2.6	0.277	0.177	0.249	0.100	0.31	281.92
60	900	15.00	2.5	0.266	0.174	0.239	0.092	0.29	259.50
61	915	15.25	2.4	0.255	0.172	0.230	0.084	0.26	236.97
62	930	15.50	2.3	0.245	0.169	0.220	0.076	0.24	214.31
63	945	15.75	1.9	0.202	0.166	0.182	0.036	0.11	101.34
64	960	16.00	1.9	0.202	0.164	0.182	0.038	0.12	108.52
65	975	16.25	0.4	0.043	0.161	0.038	0.004	0.01	12.03
66	990	16.50	0.4	0.043	0.159	0.038	0.004	0.01	12.03
67	1005	16.75	0.3	0.032	0.156	0.029	0.003	0.01	9.02

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	3.140	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.2219
LAG TIME - MINUTES	0.62	MINIMUM LOSS RATE (for var. loss) - in/hr	0.111
UNIT TIME-PERCENT OF LAG	2426.8	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00205
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.032	0.154	0.029	0.003	0.01	9.02
69	1035	17.25	0.5	0.053	0.152	0.048	0.005	0.02	15.03
70	1050	17.50	0.5	0.053	0.149	0.048	0.005	0.02	15.03
71	1065	17.75	0.5	0.053	0.147	0.048	0.005	0.02	15.03
72	1080	18.00	0.4	0.043	0.145	0.038	0.004	0.01	12.03
73	1095	18.25	0.4	0.043	0.143	0.038	0.004	0.01	12.03
74	1110	18.50	0.4	0.043	0.141	0.038	0.004	0.01	12.03
75	1125	18.75	0.3	0.032	0.139	0.029	0.003	0.01	9.02
76	1140	19.00	0.2	0.021	0.137	0.019	0.002	0.01	6.01
77	1155	19.25	0.3	0.032	0.135	0.029	0.003	0.01	9.02
78	1170	19.50	0.4	0.043	0.133	0.038	0.004	0.01	12.03
79	1185	19.75	0.3	0.032	0.131	0.029	0.003	0.01	9.02
80	1200	20.00	0.2	0.021	0.129	0.019	0.002	0.01	6.01
81	1215	20.25	0.3	0.032	0.128	0.029	0.003	0.01	9.02
82	1230	20.50	0.3	0.032	0.126	0.029	0.003	0.01	9.02
83	1245	20.75	0.3	0.032	0.124	0.029	0.003	0.01	9.02
84	1260	21.00	0.2	0.021	0.123	0.019	0.002	0.01	6.01
85	1275	21.25	0.3	0.032	0.121	0.029	0.003	0.01	9.02
86	1290	21.50	0.2	0.021	0.120	0.019	0.002	0.01	6.01
87	1305	21.75	0.3	0.032	0.119	0.029	0.003	0.01	9.02
88	1320	22.00	0.2	0.021	0.118	0.019	0.002	0.01	6.01
89	1335	22.25	0.3	0.032	0.116	0.029	0.003	0.01	9.02
90	1350	22.50	0.2	0.021	0.115	0.019	0.002	0.01	6.01
91	1365	22.75	0.2	0.021	0.114	0.019	0.002	0.01	6.01
92	1380	23.00	0.2	0.021	0.113	0.019	0.002	0.01	6.01
93	1395	23.25	0.2	0.021	0.113	0.019	0.002	0.01	6.01
94	1410	23.50	0.2	0.021	0.112	0.019	0.002	0.01	6.01
95	1425	23.75	0.2	0.021	0.111	0.019	0.002	0.01	6.01
96	1440	24.00	0.2	0.021	0.111	0.019	0.002	0.01	6.01

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.51
FLOOD VOLUME (acft)	0.13
FLOOD VOLUME (cuft)	5847.42
REQUIRED STORAGE (acft)	0.13
REQUIRED STORAGE (cuft)	5799.07
PEAK FLOW (cfs)	0.54

PROJECT: WORLD MUSEUM PROP 10 YR EVENT - NORTH
JOB # C2026
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS

PERCOLATION RATE	0 in/hr	0.00 cfs

MAXWELL IV DRYWELLS

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

TOTAL PERCOLATION RATE 0.00 cfs

1

JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	11	23	0	23	-	23	0.00
3	15	0.06	19	42	0	42	-	42	0.00
4	20	0.15	45	87	0	87	-	87	0.00
5	25	0.15	45	132	0	132	-	132	0.00
6	30	0.32	96	228	0	228	-	228	0.01
7	35	0.15	45	274	0	274	-	274	0.01
8	40	0.32	96	370	0	370	-	370	0.01
9	45	0.32	96	466	0	466	-	466	0.01
10	50	0.15	45	512	0	512	-	512	0.01
11	55	0.21	62	574	0	574	-	574	0.01
12	60	0.32	96	670	0	670	-	670	0.02
13	65	0.55	164	834	0	834	-	834	0.02
14	70	0.55	164	998	0	998	-	998	0.02
15	75	0.55	164	1,162	0	1,162	-	1,162	0.03
16	80	0.43	130	1,292	0	1,292	-	1,292	0.03
17	85	0.77	232	1,524	0	1,524	-	1,524	0.03
18	90	0.83	249	1,773	0	1,773	-	1,773	0.04
19	95	0.66	198	1,971	0	1,971	-	1,971	0.05
20	100	0.83	249	2,220	0	2,220	-	2,220	0.05
21	105	1.17	351	2,570	0	2,570	-	2,570	0.06
22	110	1.06	317	2,887	0	2,887	-	2,887	0.07
23	115	0.94	283	3,170	0	3,170	-	3,170	0.07
24	120	1.00	300	3,469	0	3,469	-	3,469	0.08
25	125	1.06	317	3,786	0	3,786	-	3,786	0.09
26	130	1.68	503	4,289	0	4,289	-	4,289	0.10
27	135	2.13	639	4,928	0	4,928	-	4,928	0.11
28	140	1.28	384	5,312	0	5,312	-	5,312	0.12
29	145	3.15	944	6,257	0	6,257	-	6,257	0.14
30	150	3.43	1,029	7,285	0	7,285	-	7,285	0.17
31	155	3.94	1,181	8,467	0	8,467	-	8,467	0.19
32	160	2.64	791	9,258	0	9,258	-	9,258	0.21
33	165	0.43	130	9,388	0	9,388	-	9,388	0.22
34	170	0.32	96	9,484	0	9,484	-	9,484	0.22
35	175	0.32	96	9,581	0	9,581	-	9,581	0.22
36	180	0.03	10	9,591	0	9,591	-	9,591	0.22

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JOB # C2026

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	11	11	0	11	-	11	0.00
2	10	0.04	13	24	0	24	-	24	0.00
3	15	0.04	13	37	0	37	-	37	0.00
4	20	0.04	13	50	0	50	-	50	0.00
5	25	0.04	13	63	0	63	-	63	0.00
6	30	0.05	15	79	0	79	-	79	0.00
7	35	0.05	15	94	0	94	-	94	0.00
8	40	0.05	15	109	0	109	-	109	0.00
9	45	0.05	15	124	0	124	-	124	0.00
10	50	0.05	15	140	0	140	-	140	0.00
11	55	0.05	15	155	0	155	-	155	0.00
12	60	0.06	17	172	0	172	-	172	0.00
13	65	0.06	17	190	0	190	-	190	0.00
14	70	0.06	17	207	0	207	-	207	0.00
15	75	0.06	17	225	0	225	-	225	0.01
16	80	0.06	17	242	0	242	-	242	0.01
17	85	0.06	17	260	0	260	-	260	0.01
18	90	0.06	17	277	0	277	-	277	0.01
19	95	0.06	17	295	0	295	-	295	0.01
20	100	0.06	17	312	0	312	-	312	0.01
21	105	0.06	17	329	0	329	-	329	0.01
22	110	0.06	17	347	0	347	-	347	0.01
23	115	0.06	17	364	0	364	-	364	0.01
24	120	0.07	20	384	0	384	-	384	0.01
25	125	0.06	17	401	0	401	-	401	0.01
26	130	0.07	20	421	0	421	-	421	0.01
27	135	0.07	20	441	0	441	-	441	0.01
28	140	0.07	20	460	0	460	-	460	0.01
29	145	0.07	20	480	0	480	-	480	0.01
30	150	0.07	20	500	0	500	-	500	0.01
31	155	0.07	20	519	0	519	-	519	0.01
32	160	0.07	20	539	0	539	-	539	0.01
33	165	0.03	9	548	0	548	-	548	0.01
34	170	0.03	9	557	0	557	-	557	0.01
35	175	0.03	9	566	0	566	-	566	0.01
36	180	0.03	9	576	0	576	-	576	0.01
37	185	0.03	9	585	0	585	-	585	0.01
38	190	0.10	31	616	0	616	-	616	0.01
39	195	0.10	31	647	0	647	-	647	0.01
40	200	0.10	31	678	0	678	-	678	0.02
41	205	0.18	53	731	0	731	-	731	0.02
42	210	0.25	75	805	0	805	-	805	0.02
43	215	0.32	96	902	0	902	-	902	0.02
44	220	0.32	96	998	0	998	-	998	0.02
45	225	0.39	118	1,116	0	1,116	-	1,116	0.03
46	230	0.39	118	1,235	0	1,235	-	1,235	0.03
47	235	0.47	140	1,375	0	1,375	-	1,375	0.03
48	240	0.47	140	1,515	0	1,515	-	1,515	0.03
49	245	0.54	162	1,677	0	1,677	-	1,677	0.04
50	250	0.61	184	1,860	0	1,860	-	1,860	0.04
51	255	0.69	206	2,066	0	2,066	-	2,066	0.05
52	260	0.76	227	2,293	0	2,293	-	2,293	0.05
53	265	0.83	249	2,542	0	2,542	-	2,542	0.06
54	270	0.83	249	2,791	0	2,791	-	2,791	0.06
55	275	0.90	271	3,062	0	3,062	-	3,062	0.07

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JOB # C2026

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	0.98	293	3,355	0	3,355	-	3,355	0.08
57	285	1.05	315	3,670	0	3,670	-	3,670	0.08
58	290	1.05	315	3,984	0	3,984	-	3,984	0.09
59	295	1.12	336	4,321	0	4,321	-	4,321	0.10
60	300	1.19	358	4,679	0	4,679	-	4,679	0.11
61	305	1.56	467	5,146	0	5,146	-	5,146	0.12
62	310	1.92	576	5,723	0	5,723	-	5,723	0.13
63	315	2.14	642	6,365	0	6,365	-	6,365	0.15
64	320	2.36	707	7,072	0	7,072	-	7,072	0.16
65	325	2.72	816	7,888	0	7,888	-	7,888	0.18
66	330	3.38	1,013	8,901	0	8,901	-	8,901	0.20
67	335	0.69	206	9,107	0	9,107	-	9,107	0.21
68	340	0.07	20	9,126	0	9,126	-	9,126	0.21
69	345	0.04	13	9,139	0	9,139	-	9,139	0.21
70	350	0.04	11	9,150	0	9,150	-	9,150	0.21
71	355	0.02	7	9,157	0	9,157	-	9,157	0.21
72	360	0.01	4	9,161	0	9,161	-	9,161	0.21

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JOB # C2026

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	6	6	0	6	-	6	0.00
2	30	0.01	9	15	0	15	-	15	0.00
3	45	0.01	9	24	0	24	-	24	0.00
4	60	0.01	12	36	0	36	-	36	0.00
5	75	0.01	9	45	0	45	-	45	0.00
6	90	0.01	9	54	0	54	-	54	0.00
7	105	0.01	9	63	0	63	-	63	0.00
8	120	0.01	12	75	0	75	-	75	0.00
9	135	0.01	12	87	0	87	-	87	0.00
10	150	0.01	12	99	0	99	-	99	0.00
11	165	0.02	15	114	0	114	-	114	0.00
12	180	0.02	15	129	0	129	-	129	0.00
13	195	0.02	15	144	0	144	-	144	0.00
14	210	0.02	15	159	0	159	-	159	0.00
15	225	0.02	15	174	0	174	-	174	0.00
16	240	0.02	18	192	0	192	-	192	0.00
17	255	0.02	18	210	0	210	-	210	0.00
18	270	0.02	21	232	0	232	-	232	0.01
19	285	0.02	21	253	0	253	-	253	0.01
20	300	0.03	24	277	0	277	-	277	0.01
21	315	0.02	18	295	0	295	-	295	0.01
22	330	0.02	21	316	0	316	-	316	0.01
23	345	0.03	24	340	0	340	-	340	0.01
24	360	0.03	24	364	0	364	-	364	0.01
25	375	0.03	27	391	0	391	-	391	0.01
26	390	0.03	27	418	0	418	-	418	0.01
27	405	0.03	30	448	0	448	-	448	0.01
28	420	0.03	30	478	0	478	-	478	0.01
29	435	0.03	30	508	0	508	-	508	0.01
30	450	0.04	33	541	0	541	-	541	0.01
31	465	0.04	36	577	0	577	-	577	0.01
32	480	0.04	39	616	0	616	-	616	0.01
33	495	0.05	45	662	0	662	-	662	0.02
34	510	0.05	45	707	0	707	-	707	0.02
35	525	0.05	48	755	0	755	-	755	0.02
36	540	0.06	51	806	0	806	-	806	0.02
37	555	0.06	57	863	0	863	-	863	0.02
38	570	0.07	60	923	0	923	-	923	0.02
39	585	0.07	63	986	0	986	-	986	0.02
40	600	0.07	66	1,052	0	1,052	-	1,052	0.02
41	615	0.05	45	1,098	0	1,098	-	1,098	0.03
42	630	0.05	45	1,143	0	1,143	-	1,143	0.03
43	645	0.07	60	1,203	0	1,203	-	1,203	0.03
44	660	0.07	60	1,263	0	1,263	-	1,263	0.03
45	675	0.06	57	1,320	0	1,320	-	1,320	0.03
46	690	0.06	57	1,377	0	1,377	-	1,377	0.03
47	705	0.06	51	1,428	0	1,428	-	1,428	0.03
48	720	0.06	54	1,482	0	1,482	-	1,482	0.03
49	735	0.19	169	1,652	0	1,652	-	1,652	0.04
50	750	0.23	208	1,860	0	1,860	-	1,860	0.04
51	765	0.31	277	2,137	0	2,137	-	2,137	0.05
52	780	0.35	316	2,452	0	2,452	-	2,452	0.06
53	795	0.53	474	2,927	0	2,927	-	2,927	0.07
54	810	0.54	483	3,409	0	3,409	-	3,409	0.08
55	825	0.18	160	3,569	0	3,569	-	3,569	0.08
56	840	0.19	168	3,737	0	3,737	-	3,737	0.09
57	855	0.33	296	4,034	0	4,034	-	4,034	0.09
58	870	0.30	274	4,308	0	4,308	-	4,308	0.10

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JOB # C2026

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	0.31	282	4,590	0	4,590	-	4,590	0.11
60	900	0.29	260	4,849	0	4,849	-	4,849	0.11
61	915	0.26	237	5,086	0	5,086	-	5,086	0.12
62	930	0.24	214	5,301	0	5,301	-	5,301	0.12
63	945	0.11	101	5,402	0	5,402	-	5,402	0.12
64	960	0.12	109	5,510	0	5,510	-	5,510	0.13
65	975	0.01	12	5,522	0	5,522	-	5,522	0.13
66	990	0.01	12	5,534	0	5,534	-	5,534	0.13
67	1005	0.01	9	5,543	0	5,543	-	5,543	0.13
68	1020	0.01	9	5,553	0	5,553	-	5,553	0.13
69	1035	0.02	15	5,568	0	5,568	-	5,568	0.13
70	1050	0.02	15	5,583	0	5,583	-	5,583	0.13
71	1065	0.02	15	5,598	0	5,598	-	5,598	0.13
72	1080	0.01	12	5,610	0	5,610	-	5,610	0.13
73	1095	0.01	12	5,622	0	5,622	-	5,622	0.13
74	1110	0.01	12	5,634	0	5,634	-	5,634	0.13
75	1125	0.01	9	5,643	0	5,643	-	5,643	0.13
76	1140	0.01	6	5,649	0	5,649	-	5,649	0.13
77	1155	0.01	9	5,658	0	5,658	-	5,658	0.13
78	1170	0.01	12	5,670	0	5,670	-	5,670	0.13
79	1185	0.01	9	5,679	0	5,679	-	5,679	0.13
80	1200	0.01	6	5,685	0	5,685	-	5,685	0.13
81	1215	0.01	9	5,694	0	5,694	-	5,694	0.13
82	1230	0.01	9	5,703	0	5,703	-	5,703	0.13
83	1245	0.01	9	5,712	0	5,712	-	5,712	0.13
84	1260	0.01	6	5,718	0	5,718	-	5,718	0.13
85	1275	0.01	9	5,727	0	5,727	-	5,727	0.13
86	1290	0.01	6	5,733	0	5,733	-	5,733	0.13
87	1305	0.01	9	5,742	0	5,742	-	5,742	0.13
88	1320	0.01	6	5,748	0	5,748	-	5,748	0.13
89	1335	0.01	9	5,757	0	5,757	-	5,757	0.13
90	1350	0.01	6	5,763	0	5,763	-	5,763	0.13
91	1365	0.01	6	5,769	0	5,769	-	5,769	0.13
92	1380	0.01	6	5,775	0	5,775	-	5,775	0.13
93	1395	0.01	6	5,781	0	5,781	-	5,781	0.13
94	1410	0.01	6	5,787	0	5,787	-	5,787	0.13
95	1425	0.01	6	5,793	0	5,793	-	5,793	0.13
96	1440	0.01	6	5,799	0	5,799	-	5,799	0.13

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM EXIST 2 YR EVENT - SOUTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
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	0.88		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.35		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	320		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	40		
30				
31	ELEVATION OF HEADWATER	329		
32	ELEVATION OF CONCENTRATION POINT	267		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.721		
40	6-HOUR	0.953		
41	24-HOUR	1.36		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD — PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
BASIC DATA CALCULATION FORM — JOB # C2026
SHORTCUT METHOD — BY ES R. BAZUA, P.E. — DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	1.230
[4] L-FEET	320
[5] L-MILES	0.061
[6] La-FEET	40.00
[7] La-MILES	0.008
[8] ELEVATION OF HEADWATER	329
[9] ELEVATION OF CONCENTRATION POINT	267
[10] H-FEET	62
[11] S-FEET/MILE	1023.0
[12] S^0.5	31.98
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.4
[17] 100% OF LAG-MINUTES	0.4
[18] 200% OF LAG-MINUTES	0.8
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
0.72	1.230	1.00	0.72	0.95	1.230	1.00	0.95	1.36	1.230	1.00	1.36
		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]	1.23	SUM [7]	0.72	SUM [9]	1.23	SUM [11]	0.95	SUM [13]	1.23	SUM [15]	1.36
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.72				0.95				1.36

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.07	0.09	0.14
FLOOD VOLUME	(cu-ft)	320	424	607
	(acre-ft)	0.01	0.01	0.01
REQUIRED STORAGE	(cu-ft)	317	420	602
	(acre-ft)	0.01	0.01	0.01
PEAK FLOW	(cfs)	0.16	0.07	0.02
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.00	0.000	0.0000
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.88	0.715	0.5294
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.35	0.285	0.0514
					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	1.23	SUM	0.5808

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.290396341

C= 0.00538

Ft=C(24-(T/60))^1.55 = 0.00538 (24-(T/60))^1.55 + 0.29 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: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.42
UNIT TIME-PERCENT OF LAG	1202.0
TOTAL ADJUSTED STORM RAIN-INCHES	0.72
CONSTANT LOSS RATE-in/hr	0.58
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.112	0.58	0.10	0.01	0.01	4.15
2	10	0.17	1.3	0.112	0.58	0.10	0.01	0.01	4.15
3	15	0.25	1.1	0.095	0.58	0.09	0.01	0.01	3.51
4	20	0.33	1.5	0.130	0.58	0.12	0.01	0.02	4.79
5	25	0.42	1.5	0.130	0.58	0.12	0.01	0.02	4.79
6	30	0.50	1.8	0.156	0.58	0.14	0.02	0.02	5.75
7	35	0.58	1.5	0.130	0.58	0.12	0.01	0.02	4.79
8	40	0.67	1.8	0.156	0.58	0.14	0.02	0.02	5.75
9	45	0.75	1.8	0.156	0.58	0.14	0.02	0.02	5.75
10	50	0.83	1.5	0.130	0.58	0.12	0.01	0.02	4.79
11	55	0.92	1.6	0.138	0.58	0.12	0.01	0.02	5.11
12	60	1.00	1.8	0.156	0.58	0.14	0.02	0.02	5.75
13	65	1.08	2.2	0.190	0.58	0.17	0.02	0.02	7.02
14	70	1.17	2.2	0.190	0.58	0.17	0.02	0.02	7.02
15	75	1.25	2.2	0.190	0.58	0.17	0.02	0.02	7.02
16	80	1.33	2.0	0.173	0.58	0.16	0.02	0.02	6.39
17	85	1.42	2.6	0.225	0.58	0.20	0.02	0.03	8.30
18	90	1.50	2.7	0.234	0.58	0.21	0.02	0.03	8.62
19	95	1.58	2.4	0.208	0.58	0.19	0.02	0.03	7.66
20	100	1.67	2.7	0.234	0.58	0.21	0.02	0.03	8.62
21	105	1.75	3.3	0.286	0.58	0.26	0.03	0.04	10.54
22	110	1.83	3.1	0.268	0.58	0.24	0.03	0.03	9.90
23	115	1.92	2.9	0.251	0.58	0.23	0.03	0.03	9.26
24	120	2.00	3.0	0.260	0.58	0.23	0.03	0.03	9.58
25	125	2.08	3.1	0.268	0.58	0.24	0.03	0.03	9.90
26	130	2.17	4.2	0.363	0.58	0.33	0.04	0.04	13.41
27	135	2.25	5.0	0.433	0.58	0.39	0.04	0.05	15.96
28	140	2.33	3.5	0.303	0.58	0.27	0.03	0.04	11.17
29	145	2.42	6.8	0.588	0.58	0.53	0.01	0.01	2.78
30	150	2.50	7.3	0.632	0.58	0.57	0.05	0.06	18.75
31	155	2.58	8.2	0.709	0.58	0.64	0.13	0.16	47.48
32	160	2.67	5.9	0.510	0.58	0.46	0.05	0.06	18.84
33	165	2.75	2.0	0.173	0.58	0.16	0.02	0.02	6.39
34	170	2.83	1.8	0.156	0.58	0.14	0.02	0.02	5.75
35	175	2.92	1.8	0.156	0.58	0.14	0.02	0.02	5.75
36	180	3.00	0.6	0.052	0.58	0.05	0.01	0.01	1.92

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.07
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	319.72
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	317.07
PEAK FLOW RATE (cfs)	0.16

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

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOU
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.42
UNIT TIME-PERCENT OF LAG	1202.0
TOTAL ADJUSTED STORM RAIN-INCHES	0.95
CONSTANT LOSS RATE-in/hr	0.581
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.057	0.58	0.05	0.01	0.01	2.11
2	10	0.17	0.6	0.069	0.58	0.06	0.01	0.01	2.53
3	15	0.25	0.6	0.069	0.58	0.06	0.01	0.01	2.53
4	20	0.33	0.6	0.069	0.58	0.06	0.01	0.01	2.53
5	25	0.42	0.6	0.069	0.58	0.06	0.01	0.01	2.53
6	30	0.50	0.7	0.080	0.58	0.07	0.01	0.01	2.95
7	35	0.58	0.7	0.080	0.58	0.07	0.01	0.01	2.95
8	40	0.67	0.7	0.080	0.58	0.07	0.01	0.01	2.95
9	45	0.75	0.7	0.080	0.58	0.07	0.01	0.01	2.95
10	50	0.83	0.7	0.080	0.58	0.07	0.01	0.01	2.95
11	55	0.92	0.7	0.080	0.58	0.07	0.01	0.01	2.95
12	60	1.00	0.8	0.091	0.58	0.08	0.01	0.01	3.38
13	65	1.08	0.8	0.091	0.58	0.08	0.01	0.01	3.38
14	70	1.17	0.8	0.091	0.58	0.08	0.01	0.01	3.38
15	75	1.25	0.8	0.091	0.58	0.08	0.01	0.01	3.38
16	80	1.33	0.8	0.091	0.58	0.08	0.01	0.01	3.38
17	85	1.42	0.8	0.091	0.58	0.08	0.01	0.01	3.38
18	90	1.50	0.8	0.091	0.58	0.08	0.01	0.01	3.38
19	95	1.58	0.8	0.091	0.58	0.08	0.01	0.01	3.38
20	100	1.67	0.8	0.091	0.58	0.08	0.01	0.01	3.38
21	105	1.75	0.8	0.091	0.58	0.08	0.01	0.01	3.38
22	110	1.83	0.8	0.091	0.58	0.08	0.01	0.01	3.38
23	115	1.92	0.8	0.091	0.58	0.08	0.01	0.01	3.38
24	120	2.00	0.9	0.103	0.58	0.09	0.01	0.01	3.80
25	125	2.08	0.8	0.091	0.58	0.08	0.01	0.01	3.38
26	130	2.17	0.9	0.103	0.58	0.09	0.01	0.01	3.80
27	135	2.25	0.9	0.103	0.58	0.09	0.01	0.01	3.80
28	140	2.33	0.9	0.103	0.58	0.09	0.01	0.01	3.80
29	145	2.42	0.9	0.103	0.58	0.09	0.01	0.01	3.80
30	150	2.50	0.9	0.103	0.58	0.09	0.01	0.01	3.80
31	155	2.58	0.9	0.103	0.58	0.09	0.01	0.01	3.80
32	160	2.67	0.9	0.103	0.58	0.09	0.01	0.01	3.80
33	165	2.75	1.0	0.114	0.58	0.10	0.01	0.01	4.22
34	170	2.83	1.0	0.114	0.58	0.10	0.01	0.01	4.22
35	175	2.92	1.0	0.114	0.58	0.10	0.01	0.01	4.22
36	180	3.00	1.0	0.114	0.58	0.10	0.01	0.01	4.22
37	185	3.08	1.0	0.114	0.58	0.10	0.01	0.01	4.22
38	190	3.17	1.1	0.126	0.58	0.11	0.01	0.02	4.64
39	195	3.25	1.1	0.126	0.58	0.11	0.01	0.02	4.64
40	200	3.33	1.1	0.126	0.58	0.11	0.01	0.02	4.64
41	205	3.42	1.2	0.137	0.58	0.12	0.01	0.02	5.06
42	210	3.50	1.3	0.149	0.58	0.13	0.01	0.02	5.49
43	215	3.58	1.4	0.160	0.58	0.14	0.02	0.02	5.91
44	220	3.67	1.4	0.160	0.58	0.14	0.02	0.02	5.91
45	225	3.75	1.5	0.172	0.58	0.15	0.02	0.02	6.33
46	230	3.83	1.5	0.172	0.58	0.15	0.02	0.02	6.33
47	235	3.92	1.6	0.183	0.58	0.16	0.02	0.02	6.75
48	240	4.00	1.6	0.183	0.58	0.16	0.02	0.02	6.75
49	245	4.08	1.7	0.194	0.58	0.17	0.02	0.02	7.17
50	250	4.17	1.8	0.206	0.58	0.19	0.02	0.03	7.60
51	255	4.25	1.9	0.217	0.58	0.20	0.02	0.03	8.02
52	260	4.33	2.0	0.229	0.58	0.21	0.02	0.03	8.44
53	265	4.42	2.1	0.240	0.58	0.22	0.02	0.03	8.86
54	270	4.50	2.1	0.240	0.58	0.22	0.02	0.03	8.86
55	275	4.58	2.2	0.252	0.58	0.23	0.03	0.03	9.28
56	280	4.67	2.3	0.263	0.58	0.24	0.03	0.03	9.71

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOU CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.42		
UNIT TIME-PERCENT OF LAG	1202.0		
TOTAL ADJUSTED STORM RAIN-INCHES	0.95		
CONSTANT LOSS RATE-in/hr	0.581		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 cfs

Unit Time Period	Time		Pattern	Storm	Loss Rate in/hr		Effective	Flood Hydrograph	Required
	Minutes	Hours	Percent (Plate E-5.9)	Rain in/hr	Max	Low	Rain in/hr	Flow cfs	Storage cf
57	285	4.75	2.4	0.274	0.58	0.25	0.03	0.03	10.13
58	290	4.83	2.4	0.274	0.58	0.25	0.03	0.03	10.13
59	295	4.92	2.5	0.286	0.58	0.26	0.03	0.04	10.55
60	300	5.00	2.6	0.297	0.58	0.27	0.03	0.04	10.97
61	305	5.08	3.1	0.355	0.58	0.32	0.04	0.04	13.08
62	310	5.17	3.6	0.412	0.58	0.37	0.04	0.05	15.19
63	315	5.25	3.9	0.446	0.58	0.40	0.04	0.05	16.46
64	320	5.33	4.2	0.480	0.58	0.43	0.05	0.06	17.72
65	325	5.42	4.7	0.537	0.58	0.48	0.05	0.07	19.83
66	330	5.50	5.6	0.640	0.58	0.58	0.06	0.07	22.00
67	335	5.58	1.9	0.217	0.58	0.20	0.02	0.03	8.02
68	340	5.67	0.9	0.103	0.58	0.09	0.01	0.01	3.80
69	345	5.75	0.6	0.069	0.58	0.06	0.01	0.01	2.53
70	350	5.83	0.5	0.057	0.58	0.05	0.01	0.01	2.11
71	355	5.92	0.3	0.034	0.58	0.03	0.00	0.00	1.27
72	360	6.00	0.2	0.023	0.58	0.02	0.00	0.00	0.84

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.09
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	423.86
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	420.36
PEAK FLOW RATE (cfs)	0.07

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

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.5808
LAG TIME - MINUTES	0.42	MINIMUM LOSS RATE (for var. loss) - in/hr	0.290
UNIT TIME-PERCENT OF LAG	3606.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00538
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.011	1.026	0.010	0.001	0.00	1.20
2	30	0.50	0.3	0.016	1.014	0.015	0.002	0.00	1.81
3	45	0.75	0.3	0.016	1.002	0.015	0.002	0.00	1.81
4	60	1.00	0.4	0.022	0.990	0.020	0.002	0.00	2.41
5	75	1.25	0.3	0.016	0.978	0.015	0.002	0.00	1.81
6	90	1.50	0.3	0.016	0.967	0.015	0.002	0.00	1.81
7	105	1.75	0.3	0.016	0.955	0.015	0.002	0.00	1.81
8	120	2.00	0.4	0.022	0.944	0.020	0.002	0.00	2.41
9	135	2.25	0.4	0.022	0.932	0.020	0.002	0.00	2.41
10	150	2.50	0.4	0.022	0.921	0.020	0.002	0.00	2.41
11	165	2.75	0.5	0.027	0.910	0.024	0.003	0.00	3.01
12	180	3.00	0.5	0.027	0.899	0.024	0.003	0.00	3.01
13	195	3.25	0.5	0.027	0.887	0.024	0.003	0.00	3.01
14	210	3.50	0.5	0.027	0.876	0.024	0.003	0.00	3.01
15	225	3.75	0.5	0.027	0.865	0.024	0.003	0.00	3.01
16	240	4.00	0.6	0.033	0.855	0.029	0.003	0.00	3.61
17	255	4.25	0.6	0.033	0.844	0.029	0.003	0.00	3.61
18	270	4.50	0.7	0.038	0.833	0.034	0.004	0.00	4.22
19	285	4.75	0.7	0.038	0.822	0.034	0.004	0.00	4.22
20	300	5.00	0.8	0.044	0.812	0.039	0.004	0.01	4.82
21	315	5.25	0.6	0.033	0.801	0.029	0.003	0.00	3.61
22	330	5.50	0.7	0.038	0.791	0.034	0.004	0.00	4.22
23	345	5.75	0.8	0.044	0.780	0.039	0.004	0.01	4.82
24	360	6.00	0.8	0.044	0.770	0.039	0.004	0.01	4.82
25	375	6.25	0.9	0.049	0.760	0.044	0.005	0.01	5.42
26	390	6.50	0.9	0.049	0.750	0.044	0.005	0.01	5.42
27	405	6.75	1.0	0.054	0.740	0.049	0.005	0.01	6.02
28	420	7.00	1.0	0.054	0.730	0.049	0.005	0.01	6.02
29	435	7.25	1.0	0.054	0.720	0.049	0.005	0.01	6.02
30	450	7.50	1.1	0.060	0.710	0.054	0.006	0.01	6.62
31	465	7.75	1.2	0.065	0.700	0.059	0.007	0.01	7.23
32	480	8.00	1.3	0.071	0.691	0.064	0.007	0.01	7.83
33	495	8.25	1.5	0.082	0.681	0.073	0.008	0.01	9.03
34	510	8.50	1.5	0.082	0.671	0.073	0.008	0.01	9.03
35	525	8.75	1.6	0.087	0.662	0.078	0.009	0.01	9.64
36	540	9.00	1.7	0.092	0.653	0.083	0.009	0.01	10.24
37	555	9.25	1.9	0.103	0.644	0.093	0.010	0.01	11.44
38	570	9.50	2.0	0.109	0.634	0.098	0.011	0.01	12.04
39	585	9.75	2.1	0.114	0.625	0.103	0.011	0.01	12.65
40	600	10.00	2.2	0.120	0.616	0.108	0.012	0.01	13.25
41	615	10.25	1.5	0.082	0.607	0.073	0.008	0.01	9.03
42	630	10.50	1.5	0.082	0.599	0.073	0.008	0.01	9.03
43	645	10.75	2.0	0.109	0.590	0.098	0.011	0.01	12.04
44	660	11.00	2.0	0.109	0.581	0.098	0.011	0.01	12.04
45	675	11.25	1.9	0.103	0.573	0.093	0.010	0.01	11.44
46	690	11.50	1.9	0.103	0.564	0.093	0.010	0.01	11.44
47	705	11.75	1.7	0.092	0.556	0.083	0.009	0.01	10.24
48	720	12.00	1.8	0.098	0.548	0.088	0.010	0.01	10.84
49	735	12.25	2.5	0.136	0.539	0.122	0.014	0.02	15.06
50	750	12.50	2.6	0.141	0.531	0.127	0.014	0.02	15.66
51	765	12.75	2.8	0.152	0.523	0.137	0.015	0.02	16.86
52	780	13.00	2.9	0.158	0.515	0.142	0.016	0.02	17.46
53	795	13.25	3.4	0.185	0.508	0.166	0.018	0.02	20.48
54	810	13.50	3.4	0.185	0.500	0.166	0.018	0.02	20.48
55	825	13.75	2.3	0.125	0.492	0.113	0.013	0.02	13.85
56	840	14.00	2.3	0.125	0.485	0.113	0.013	0.02	13.85
57	855	14.25	2.7	0.147	0.478	0.132	0.015	0.02	16.26
58	870	14.50	2.6	0.141	0.470	0.127	0.014	0.02	15.66
59	885	14.75	2.6	0.141	0.463	0.127	0.014	0.02	15.66
60	900	15.00	2.5	0.136	0.456	0.122	0.014	0.02	15.06
61	915	15.25	2.4	0.131	0.449	0.118	0.013	0.02	14.45
62	930	15.50	2.3	0.125	0.442	0.113	0.013	0.02	13.85
63	945	15.75	1.9	0.103	0.435	0.093	0.010	0.01	11.44
64	960	16.00	1.9	0.103	0.429	0.093	0.010	0.01	11.44
65	975	16.25	0.4	0.022	0.422	0.020	0.002	0.00	2.41
66	990	16.50	0.4	0.022	0.416	0.020	0.002	0.00	2.41
67	1005	16.75	0.3	0.016	0.409	0.015	0.002	0.00	1.81

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.5808
LAG TIME - MINUTES	0.42	MINIMUM LOSS RATE (for var. loss) - in/hr	0.290
UNIT TIME-PERCENT OF LAG	3606.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00538
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.016	0.403	0.015	0.002	0.00	1.81
69	1035	17.25	0.5	0.027	0.397	0.024	0.003	0.00	3.01
70	1050	17.50	0.5	0.027	0.391	0.024	0.003	0.00	3.01
71	1065	17.75	0.5	0.027	0.385	0.024	0.003	0.00	3.01
72	1080	18.00	0.4	0.022	0.380	0.020	0.002	0.00	2.41
73	1095	18.25	0.4	0.022	0.374	0.020	0.002	0.00	2.41
74	1110	18.50	0.4	0.022	0.369	0.020	0.002	0.00	2.41
75	1125	18.75	0.3	0.016	0.363	0.015	0.002	0.00	1.81
76	1140	19.00	0.2	0.011	0.358	0.010	0.001	0.00	1.20
77	1155	19.25	0.3	0.016	0.353	0.015	0.002	0.00	1.81
78	1170	19.50	0.4	0.022	0.348	0.020	0.002	0.00	2.41
79	1185	19.75	0.3	0.016	0.343	0.015	0.002	0.00	1.81
80	1200	20.00	0.2	0.011	0.339	0.010	0.001	0.00	1.20
81	1215	20.25	0.3	0.016	0.334	0.015	0.002	0.00	1.81
82	1230	20.50	0.3	0.016	0.330	0.015	0.002	0.00	1.81
83	1245	20.75	0.3	0.016	0.326	0.015	0.002	0.00	1.81
84	1260	21.00	0.2	0.011	0.322	0.010	0.001	0.00	1.20
85	1275	21.25	0.3	0.016	0.318	0.015	0.002	0.00	1.81
86	1290	21.50	0.2	0.011	0.314	0.010	0.001	0.00	1.20
87	1305	21.75	0.3	0.016	0.311	0.015	0.002	0.00	1.81
88	1320	22.00	0.2	0.011	0.308	0.010	0.001	0.00	1.20
89	1335	22.25	0.3	0.016	0.305	0.015	0.002	0.00	1.81
90	1350	22.50	0.2	0.011	0.302	0.010	0.001	0.00	1.20
91	1365	22.75	0.2	0.011	0.299	0.010	0.001	0.00	1.20
92	1380	23.00	0.2	0.011	0.297	0.010	0.001	0.00	1.20
93	1395	23.25	0.2	0.011	0.295	0.010	0.001	0.00	1.20
94	1410	23.50	0.2	0.011	0.293	0.010	0.001	0.00	1.20
95	1425	23.75	0.2	0.011	0.292	0.010	0.001	0.00	1.20
96	1440	24.00	0.2	0.011	0.291	0.010	0.001	0.00	1.20

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.14
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	607.23
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	602.21
PEAK FLOW (cfs)	0.02

PROJECT: WORLD MUSEUM EXIST 2 YR EVENT - SOUTH
JOB # C2026
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

1

JOB # C2026

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	0.01	4	4	0	4	-	4	0.00
2	10	0.01	4	8	0	8	-	8	0.00
3	15	0.01	4	12	0	12	-	12	0.00
4	20	0.02	5	17	0	17	-	17	0.00
5	25	0.02	5	21	0	21	-	21	0.00
6	30	0.02	6	27	0	27	-	27	0.00
7	35	0.02	5	32	0	32	-	32	0.00
8	40	0.02	6	38	0	38	-	38	0.00
9	45	0.02	6	43	0	43	-	43	0.00
10	50	0.02	5	48	0	48	-	48	0.00
11	55	0.02	5	53	0	53	-	53	0.00
12	60	0.02	6	59	0	59	-	59	0.00
13	65	0.02	7	66	0	66	-	66	0.00
14	70	0.02	7	73	0	73	-	73	0.00
15	75	0.02	7	80	0	80	-	80	0.00
16	80	0.02	6	87	0	87	-	87	0.00
17	85	0.03	8	95	0	95	-	95	0.00
18	90	0.03	9	103	0	103	-	103	0.00
19	95	0.03	8	111	0	111	-	111	0.00
20	100	0.03	9	120	0	120	-	120	0.00
21	105	0.04	11	130	0	130	-	130	0.00
22	110	0.03	10	140	0	140	-	140	0.00
23	115	0.03	9	149	0	149	-	149	0.00
24	120	0.03	10	159	0	159	-	159	0.00
25	125	0.03	10	169	0	169	-	169	0.00
26	130	0.04	13	182	0	182	-	182	0.00
27	135	0.05	16	198	0	198	-	198	0.00
28	140	0.04	11	209	0	209	-	209	0.00
29	145	0.01	3	212	0	212	-	212	0.00
30	150	0.06	19	231	0	231	-	231	0.01
31	155	0.16	47	278	0	278	-	278	0.01
32	160	0.06	19	297	0	297	-	297	0.01
33	165	0.02	6	304	0	304	-	304	0.01
34	170	0.02	6	309	0	309	-	309	0.01
35	175	0.02	6	315	0	315	-	315	0.01
36	180	0.01	2	317	0	317	-	317	0.01

1

JOB # C2026

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	0.01	2	2	0	2	-	2	0.00
2	10	0.01	3	5	0	5	-	5	0.00
3	15	0.01	3	7	0	7	-	7	0.00
4	20	0.01	3	10	0	10	-	10	0.00
5	25	0.01	3	12	0	12	-	12	0.00
6	30	0.01	3	15	0	15	-	15	0.00
7	35	0.01	3	18	0	18	-	18	0.00
8	40	0.01	3	21	0	21	-	21	0.00
9	45	0.01	3	24	0	24	-	24	0.00
10	50	0.01	3	27	0	27	-	27	0.00
11	55	0.01	3	30	0	30	-	30	0.00
12	60	0.01	3	33	0	33	-	33	0.00
13	65	0.01	3	37	0	37	-	37	0.00
14	70	0.01	3	40	0	40	-	40	0.00
15	75	0.01	3	43	0	43	-	43	0.00
16	80	0.01	3	47	0	47	-	47	0.00
17	85	0.01	3	50	0	50	-	50	0.00
18	90	0.01	3	54	0	54	-	54	0.00
19	95	0.01	3	57	0	57	-	57	0.00
20	100	0.01	3	60	0	60	-	60	0.00
21	105	0.01	3	64	0	64	-	64	0.00
22	110	0.01	3	67	0	67	-	67	0.00
23	115	0.01	3	70	0	70	-	70	0.00
24	120	0.01	4	74	0	74	-	74	0.00
25	125	0.01	3	78	0	78	-	78	0.00
26	130	0.01	4	81	0	81	-	81	0.00
27	135	0.01	4	85	0	85	-	85	0.00
28	140	0.01	4	89	0	89	-	89	0.00
29	145	0.01	4	93	0	93	-	93	0.00
30	150	0.01	4	97	0	97	-	97	0.00
31	155	0.01	4	100	0	100	-	100	0.00
32	160	0.01	4	104	0	104	-	104	0.00
33	165	0.01	4	108	0	108	-	108	0.00
34	170	0.01	4	113	0	113	-	113	0.00
35	175	0.01	4	117	0	117	-	117	0.00
36	180	0.01	4	121	0	121	-	121	0.00
37	185	0.01	4	125	0	125	-	125	0.00
38	190	0.02	5	130	0	130	-	130	0.00
39	195	0.02	5	135	0	135	-	135	0.00
40	200	0.02	5	139	0	139	-	139	0.00
41	205	0.02	5	144	0	144	-	144	0.00
42	210	0.02	5	150	0	150	-	150	0.00
43	215	0.02	6	156	0	156	-	156	0.00
44	220	0.02	6	162	0	162	-	162	0.00
45	225	0.02	6	168	0	168	-	168	0.00
46	230	0.02	6	174	0	174	-	174	0.00
47	235	0.02	7	181	0	181	-	181	0.00
48	240	0.02	7	188	0	188	-	188	0.00
49	245	0.02	7	195	0	195	-	195	0.00
50	250	0.03	8	203	0	203	-	203	0.00
51	255	0.03	8	211	0	211	-	211	0.00
52	260	0.03	8	219	0	219	-	219	0.01
53	265	0.03	9	228	0	228	-	228	0.01
54	270	0.03	9	237	0	237	-	237	0.01
55	275	0.03	9	246	0	246	-	246	0.01

1

JOB # C2026

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	0.03	10	256	0	256	-	256	0.01
57	285	0.03	10	266	0	266	-	266	0.01
58	290	0.03	10	276	0	276	-	276	0.01
59	295	0.04	11	287	0	287	-	287	0.01
60	300	0.04	11	298	0	298	-	298	0.01
61	305	0.04	13	311	0	311	-	311	0.01
62	310	0.05	15	326	0	326	-	326	0.01
63	315	0.05	16	342	0	342	-	342	0.01
64	320	0.06	18	360	0	360	-	360	0.01
65	325	0.07	20	380	0	380	-	380	0.01
66	330	0.07	22	402	0	402	-	402	0.01
67	335	0.03	8	410	0	410	-	410	0.01
68	340	0.01	4	414	0	414	-	414	0.01
69	345	0.01	3	416	0	416	-	416	0.01
70	350	0.01	2	418	0	418	-	418	0.01
71	355	0.00	1	420	0	420	-	420	0.01
72	360	0.00	1	420	0	420	-	420	0.01

1

JOB # C2026

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	1	1	0	1	-	1	0.00
2	30	0.00	2	3	0	3	-	3	0.00
3	45	0.00	2	5	0	5	-	5	0.00
4	60	0.00	2	7	0	7	-	7	0.00
5	75	0.00	2	9	0	9	-	9	0.00
6	90	0.00	2	11	0	11	-	11	0.00
7	105	0.00	2	13	0	13	-	13	0.00
8	120	0.00	2	15	0	15	-	15	0.00
9	135	0.00	2	17	0	17	-	17	0.00
10	150	0.00	2	20	0	20	-	20	0.00
11	165	0.00	3	23	0	23	-	23	0.00
12	180	0.00	3	26	0	26	-	26	0.00
13	195	0.00	3	29	0	29	-	29	0.00
14	210	0.00	3	32	0	32	-	32	0.00
15	225	0.00	3	35	0	35	-	35	0.00
16	240	0.00	4	39	0	39	-	39	0.00
17	255	0.00	4	42	0	42	-	42	0.00
18	270	0.00	4	46	0	46	-	46	0.00
19	285	0.00	4	51	0	51	-	51	0.00
20	300	0.01	5	55	0	55	-	55	0.00
21	315	0.00	4	59	0	59	-	59	0.00
22	330	0.00	4	63	0	63	-	63	0.00
23	345	0.01	5	68	0	68	-	68	0.00
24	360	0.01	5	73	0	73	-	73	0.00
25	375	0.01	5	78	0	78	-	78	0.00
26	390	0.01	5	84	0	84	-	84	0.00
27	405	0.01	6	90	0	90	-	90	0.00
28	420	0.01	6	96	0	96	-	96	0.00
29	435	0.01	6	102	0	102	-	102	0.00
30	450	0.01	7	108	0	108	-	108	0.00
31	465	0.01	7	116	0	116	-	116	0.00
32	480	0.01	8	123	0	123	-	123	0.00
33	495	0.01	9	132	0	132	-	132	0.00
34	510	0.01	9	142	0	142	-	142	0.00
35	525	0.01	10	151	0	151	-	151	0.00
36	540	0.01	10	161	0	161	-	161	0.00
37	555	0.01	11	173	0	173	-	173	0.00
38	570	0.01	12	185	0	185	-	185	0.00
39	585	0.01	13	198	0	198	-	198	0.00
40	600	0.01	13	211	0	211	-	211	0.00
41	615	0.01	9	220	0	220	-	220	0.01
42	630	0.01	9	229	0	229	-	229	0.01
43	645	0.01	12	241	0	241	-	241	0.01
44	660	0.01	12	253	0	253	-	253	0.01
45	675	0.01	11	264	0	264	-	264	0.01
46	690	0.01	11	276	0	276	-	276	0.01
47	705	0.01	10	286	0	286	-	286	0.01
48	720	0.01	11	297	0	297	-	297	0.01
49	735	0.02	15	312	0	312	-	312	0.01
50	750	0.02	16	328	0	328	-	328	0.01
51	765	0.02	17	344	0	344	-	344	0.01
52	780	0.02	17	362	0	362	-	362	0.01
53	795	0.02	20	382	0	382	-	382	0.01
54	810	0.02	20	403	0	403	-	403	0.01
55	825	0.02	14	417	0	417	-	417	0.01
56	840	0.02	14	431	0	431	-	431	0.01
57	855	0.02	16	447	0	447	-	447	0.01
58	870	0.02	16	462	0	462	-	462	0.01

1

JOB # C2026

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	0.02	16	478	0	478	-	478	0.01
60	900	0.02	15	493	0	493	-	493	0.01
61	915	0.02	14	508	0	508	-	508	0.01
62	930	0.02	14	522	0	522	-	522	0.01
63	945	0.01	11	533	0	533	-	533	0.01
64	960	0.01	11	544	0	544	-	544	0.01
65	975	0.00	2	547	0	547	-	547	0.01
66	990	0.00	2	549	0	549	-	549	0.01
67	1005	0.00	2	551	0	551	-	551	0.01
68	1020	0.00	2	553	0	553	-	553	0.01
69	1035	0.00	3	556	0	556	-	556	0.01
70	1050	0.00	3	559	0	559	-	559	0.01
71	1065	0.00	3	562	0	562	-	562	0.01
72	1080	0.00	2	564	0	564	-	564	0.01
73	1095	0.00	2	567	0	567	-	567	0.01
74	1110	0.00	2	569	0	569	-	569	0.01
75	1125	0.00	2	571	0	571	-	571	0.01
76	1140	0.00	1	572	0	572	-	572	0.01
77	1155	0.00	2	574	0	574	-	574	0.01
78	1170	0.00	2	576	0	576	-	576	0.01
79	1185	0.00	2	578	0	578	-	578	0.01
80	1200	0.00	1	579	0	579	-	579	0.01
81	1215	0.00	2	581	0	581	-	581	0.01
82	1230	0.00	2	583	0	583	-	583	0.01
83	1245	0.00	2	585	0	585	-	585	0.01
84	1260	0.00	1	586	0	586	-	586	0.01
85	1275	0.00	2	588	0	588	-	588	0.01
86	1290	0.00	1	589	0	589	-	589	0.01
87	1305	0.00	2	591	0	591	-	591	0.01
88	1320	0.00	1	592	0	592	-	592	0.01
89	1335	0.00	2	594	0	594	-	594	0.01
90	1350	0.00	1	595	0	595	-	595	0.01
91	1365	0.00	1	596	0	596	-	596	0.01
92	1380	0.00	1	597	0	597	-	597	0.01
93	1395	0.00	1	599	0	599	-	599	0.01
94	1410	0.00	1	600	0	600	-	600	0.01
95	1425	0.00	1	601	0	601	-	601	0.01
96	1440	0.00	1	602	0	602	-	602	0.01

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM EXIST 10 YR EVENT - SOUTH		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
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	0.88		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.35		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	320		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	40		
30				
31	ELEVATION OF HEADWATER	329		
32	ELEVATION OF CONCENTRATION POINT	267		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	1.5		
40	6-HOUR	1.93		
41	24-HOUR	2.66		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	1.230
[4] L-FEET	320
[5] L-MILES	0.061
[6] La-FEET	40.00
[7] La-MILES	0.008
[8] ELEVATION OF HEADWATER	329
[9] ELEVATION OF CONCENTRATION POINT	267
[10] H-FEET	62
[11] S-FEET/MILE	1023.0
[12] S^0.5	31.98
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.4
[17] 100% OF LAG-MINUTES	0.4
[18] 200% OF LAG-MINUTES	0.8
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
1.50	1.230	1.00	1.50	1.93	1.230	1.00	1.93	2.66	1.230	1.00	2.66
		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]	1.23	SUM [7]	1.50	SUM [9]	1.23	SUM [11]	1.93	SUM [13]	1.23	SUM [15]	2.66
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.50				1.93				2.66

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.36	0.34	0.27
FLOOD VOLUME	(cu-ft)	1,605	1,497	1,188
	(acre-ft)	0.04	0.03	0.03
REQUIRED STORAGE	(cu-ft)	1,592	1,485	1,178
	(acre-ft)	0.04	0.03	0.03
PEAK FLOW	(cfs)	1.10	0.88	0.04
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.00	0.000	0.0000
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.88	0.715	0.5294
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.35	0.285	0.0514
					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 1.23		SUM 0.5808

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.290396341

C= 0.00538

Ft=C(24-(T/60))^1.55 = 0.00538 (24-(T/60))^1.55 + 0.29 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: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.42
UNIT TIME-PERCENT OF LAG	1202.0
TOTAL ADJUSTED STORM RAIN-INCHES	1.50
CONSTANT LOSS RATE-in/hr	0.58
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.234	0.58	0.21	0.02	0.03	8.63
2	10	0.17	1.3	0.234	0.58	0.21	0.02	0.03	8.63
3	15	0.25	1.1	0.198	0.58	0.18	0.02	0.02	7.31
4	20	0.33	1.5	0.270	0.58	0.24	0.03	0.03	9.96
5	25	0.42	1.5	0.270	0.58	0.24	0.03	0.03	9.96
6	30	0.50	1.8	0.324	0.58	0.29	0.03	0.04	11.96
7	35	0.58	1.5	0.270	0.58	0.24	0.03	0.03	9.96
8	40	0.67	1.8	0.324	0.58	0.29	0.03	0.04	11.96
9	45	0.75	1.8	0.324	0.58	0.29	0.03	0.04	11.96
10	50	0.83	1.5	0.270	0.58	0.24	0.03	0.03	9.96
11	55	0.92	1.6	0.288	0.58	0.26	0.03	0.04	10.63
12	60	1.00	1.8	0.324	0.58	0.29	0.03	0.04	11.96
13	65	1.08	2.2	0.396	0.58	0.36	0.04	0.05	14.61
14	70	1.17	2.2	0.396	0.58	0.36	0.04	0.05	14.61
15	75	1.25	2.2	0.396	0.58	0.36	0.04	0.05	14.61
16	80	1.33	2.0	0.360	0.58	0.32	0.04	0.04	13.28
17	85	1.42	2.6	0.468	0.58	0.42	0.05	0.06	17.27
18	90	1.50	2.7	0.486	0.58	0.44	0.05	0.06	17.93
19	95	1.58	2.4	0.432	0.58	0.39	0.04	0.05	15.94
20	100	1.67	2.7	0.486	0.58	0.44	0.05	0.06	17.93
21	105	1.75	3.3	0.594	0.58	0.53	0.01	0.02	4.87
22	110	1.83	3.1	0.558	0.58	0.50	0.06	0.07	20.59
23	115	1.92	2.9	0.522	0.58	0.47	0.05	0.06	19.26
24	120	2.00	3.0	0.540	0.58	0.49	0.05	0.07	19.93
25	125	2.08	3.1	0.558	0.58	0.50	0.06	0.07	20.59
26	130	2.17	4.2	0.756	0.58	0.68	0.18	0.22	64.65
27	135	2.25	5.0	0.900	0.58	0.81	0.32	0.39	117.79
28	140	2.33	3.5	0.630	0.58	0.57	0.05	0.06	18.16
29	145	2.42	6.8	1.224	0.58	1.10	0.64	0.79	237.34
30	150	2.50	7.3	1.314	0.58	1.18	0.73	0.90	270.55
31	155	2.58	8.2	1.476	0.58	1.33	0.90	1.10	330.33
32	160	2.67	5.9	1.062	0.58	0.96	0.48	0.59	177.57
33	165	2.75	2.0	0.360	0.58	0.32	0.04	0.04	13.28
34	170	2.83	1.8	0.324	0.58	0.29	0.03	0.04	11.96
35	175	2.92	1.8	0.324	0.58	0.29	0.03	0.04	11.96
36	180	3.00	0.6	0.108	0.58	0.10	0.01	0.01	3.99

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.36
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1605.16
REQUIRED STORAGE (acft)	0.04
REQUIRED STORAGE (cuft)	1591.89
PEAK FLOW RATE (cfs)	1.10

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

PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOU
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.42
UNIT TIME-PERCENT OF LAG	1202.0
TOTAL ADJUSTED STORM RAIN-INCHES	1.93
CONSTANT LOSS RATE-in/hr	0.581
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.116	0.58	0.10	0.01	0.01	4.27
2	10	0.17	0.6	0.139	0.58	0.13	0.01	0.02	5.13
3	15	0.25	0.6	0.139	0.58	0.13	0.01	0.02	5.13
4	20	0.33	0.6	0.139	0.58	0.13	0.01	0.02	5.13
5	25	0.42	0.6	0.139	0.58	0.13	0.01	0.02	5.13
6	30	0.50	0.7	0.162	0.58	0.15	0.02	0.02	5.98
7	35	0.58	0.7	0.162	0.58	0.15	0.02	0.02	5.98
8	40	0.67	0.7	0.162	0.58	0.15	0.02	0.02	5.98
9	45	0.75	0.7	0.162	0.58	0.15	0.02	0.02	5.98
10	50	0.83	0.7	0.162	0.58	0.15	0.02	0.02	5.98
11	55	0.92	0.7	0.162	0.58	0.15	0.02	0.02	5.98
12	60	1.00	0.8	0.185	0.58	0.17	0.02	0.02	6.84
13	65	1.08	0.8	0.185	0.58	0.17	0.02	0.02	6.84
14	70	1.17	0.8	0.185	0.58	0.17	0.02	0.02	6.84
15	75	1.25	0.8	0.185	0.58	0.17	0.02	0.02	6.84
16	80	1.33	0.8	0.185	0.58	0.17	0.02	0.02	6.84
17	85	1.42	0.8	0.185	0.58	0.17	0.02	0.02	6.84
18	90	1.50	0.8	0.185	0.58	0.17	0.02	0.02	6.84
19	95	1.58	0.8	0.185	0.58	0.17	0.02	0.02	6.84
20	100	1.67	0.8	0.185	0.58	0.17	0.02	0.02	6.84
21	105	1.75	0.8	0.185	0.58	0.17	0.02	0.02	6.84
22	110	1.83	0.8	0.185	0.58	0.17	0.02	0.02	6.84
23	115	1.92	0.8	0.185	0.58	0.17	0.02	0.02	6.84
24	120	2.00	0.9	0.208	0.58	0.19	0.02	0.03	7.69
25	125	2.08	0.8	0.185	0.58	0.17	0.02	0.02	6.84
26	130	2.17	0.9	0.208	0.58	0.19	0.02	0.03	7.69
27	135	2.25	0.9	0.208	0.58	0.19	0.02	0.03	7.69
28	140	2.33	0.9	0.208	0.58	0.19	0.02	0.03	7.69
29	145	2.42	0.9	0.208	0.58	0.19	0.02	0.03	7.69
30	150	2.50	0.9	0.208	0.58	0.19	0.02	0.03	7.69
31	155	2.58	0.9	0.208	0.58	0.19	0.02	0.03	7.69
32	160	2.67	0.9	0.208	0.58	0.19	0.02	0.03	7.69
33	165	2.75	1.0	0.232	0.58	0.21	0.02	0.03	8.55
34	170	2.83	1.0	0.232	0.58	0.21	0.02	0.03	8.55
35	175	2.92	1.0	0.232	0.58	0.21	0.02	0.03	8.55
36	180	3.00	1.0	0.232	0.58	0.21	0.02	0.03	8.55
37	185	3.08	1.0	0.232	0.58	0.21	0.02	0.03	8.55
38	190	3.17	1.1	0.255	0.58	0.23	0.03	0.03	9.40
39	195	3.25	1.1	0.255	0.58	0.23	0.03	0.03	9.40
40	200	3.33	1.1	0.255	0.58	0.23	0.03	0.03	9.40
41	205	3.42	1.2	0.278	0.58	0.25	0.03	0.03	10.26
42	210	3.50	1.3	0.301	0.58	0.27	0.03	0.04	11.11
43	215	3.58	1.4	0.324	0.58	0.29	0.03	0.04	11.96
44	220	3.67	1.4	0.324	0.58	0.29	0.03	0.04	11.96
45	225	3.75	1.5	0.347	0.58	0.31	0.03	0.04	12.82
46	230	3.83	1.5	0.347	0.58	0.31	0.03	0.04	12.82
47	235	3.92	1.6	0.371	0.58	0.33	0.04	0.05	13.67
48	240	4.00	1.6	0.371	0.58	0.33	0.04	0.05	13.67
49	245	4.08	1.7	0.394	0.58	0.35	0.04	0.05	14.53
50	250	4.17	1.8	0.417	0.58	0.38	0.04	0.05	15.38
51	255	4.25	1.9	0.440	0.58	0.40	0.04	0.05	16.24
52	260	4.33	2.0	0.463	0.58	0.42	0.05	0.06	17.09
53	265	4.42	2.1	0.486	0.58	0.44	0.05	0.06	17.95
54	270	4.50	2.1	0.486	0.58	0.44	0.05	0.06	17.95
55	275	4.58	2.2	0.510	0.58	0.46	0.05	0.06	18.80
56	280	4.67	2.3	0.533	0.58	0.48	0.05	0.07	19.66

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOU CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.42		
UNIT TIME-PERCENT OF LAG	1202.0		
TOTAL ADJUSTED STORM RAIN-INCHES	1.93		
CONSTANT LOSS RATE-in/hr	0.581		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.556	0.58	0.50	0.06	0.07	20.51
58	290	4.83	2.4	0.556	0.58	0.50	0.06	0.07	20.51
59	295	4.92	2.5	0.579	0.58	0.52	0.06	0.07	21.37
60	300	5.00	2.6	0.602	0.58	0.54	0.02	0.03	7.88
61	305	5.08	3.1	0.718	0.58	0.65	0.14	0.17	50.61
62	310	5.17	3.6	0.834	0.58	0.75	0.25	0.31	93.34
63	315	5.25	3.9	0.903	0.58	0.81	0.32	0.40	118.98
64	320	5.33	4.2	0.973	0.58	0.88	0.39	0.48	144.62
65	325	5.42	4.7	1.089	0.58	0.98	0.51	0.62	187.35
66	330	5.50	5.6	1.297	0.58	1.17	0.72	0.88	264.27
67	335	5.58	1.9	0.440	0.58	0.40	0.04	0.05	16.24
68	340	5.67	0.9	0.208	0.58	0.19	0.02	0.03	7.69
69	345	5.75	0.6	0.139	0.58	0.13	0.01	0.02	5.13
70	350	5.83	0.5	0.116	0.58	0.10	0.01	0.01	4.27
71	355	5.92	0.3	0.069	0.58	0.06	0.01	0.01	2.56
72	360	6.00	0.2	0.046	0.58	0.04	0.00	0.01	1.71

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.34
FLOOD VOLUME (acft)	0.03
FLOOD VOLUME (cuft)	1497.32
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1484.94
PEAK FLOW RATE (cfs)	0.88

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

PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.5808
LAG TIME - MINUTES	0.42	MINIMUM LOSS RATE (for var. loss) - in/hr	0.290
UNIT TIME-PERCENT OF LAG	3606.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00538
		PERCOLATION RATE (cfs)	0.00

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	0.021	1.026	0.019	0.002	0.00	2.36
2	30	0.50	0.3	0.032	1.014	0.029	0.003	0.00	3.53
3	45	0.75	0.3	0.032	1.002	0.029	0.003	0.00	3.53
4	60	1.00	0.4	0.043	0.990	0.038	0.004	0.01	4.71
5	75	1.25	0.3	0.032	0.978	0.029	0.003	0.00	3.53
6	90	1.50	0.3	0.032	0.967	0.029	0.003	0.00	3.53
7	105	1.75	0.3	0.032	0.955	0.029	0.003	0.00	3.53
8	120	2.00	0.4	0.043	0.944	0.038	0.004	0.01	4.71
9	135	2.25	0.4	0.043	0.932	0.038	0.004	0.01	4.71
10	150	2.50	0.4	0.043	0.921	0.038	0.004	0.01	4.71
11	165	2.75	0.5	0.053	0.910	0.048	0.005	0.01	5.89
12	180	3.00	0.5	0.053	0.899	0.048	0.005	0.01	5.89
13	195	3.25	0.5	0.053	0.887	0.048	0.005	0.01	5.89
14	210	3.50	0.5	0.053	0.876	0.048	0.005	0.01	5.89
15	225	3.75	0.5	0.053	0.865	0.048	0.005	0.01	5.89
16	240	4.00	0.6	0.064	0.855	0.057	0.006	0.01	7.07
17	255	4.25	0.6	0.064	0.844	0.057	0.006	0.01	7.07
18	270	4.50	0.7	0.074	0.833	0.067	0.007	0.01	8.24
19	285	4.75	0.7	0.074	0.822	0.067	0.007	0.01	8.24
20	300	5.00	0.8	0.085	0.812	0.077	0.009	0.01	9.42
21	315	5.25	0.6	0.064	0.801	0.057	0.006	0.01	7.07
22	330	5.50	0.7	0.074	0.791	0.067	0.007	0.01	8.24
23	345	5.75	0.8	0.085	0.780	0.077	0.009	0.01	9.42
24	360	6.00	0.8	0.085	0.770	0.077	0.009	0.01	9.42
25	375	6.25	0.9	0.096	0.760	0.086	0.010	0.01	10.60
26	390	6.50	0.9	0.096	0.750	0.086	0.010	0.01	10.60
27	405	6.75	1.0	0.106	0.740	0.096	0.011	0.01	11.78
28	420	7.00	1.0	0.106	0.730	0.096	0.011	0.01	11.78
29	435	7.25	1.0	0.106	0.720	0.096	0.011	0.01	11.78
30	450	7.50	1.1	0.117	0.710	0.105	0.012	0.01	12.96
31	465	7.75	1.2	0.128	0.700	0.115	0.013	0.02	14.13
32	480	8.00	1.3	0.138	0.691	0.124	0.014	0.02	15.31
33	495	8.25	1.5	0.160	0.681	0.144	0.016	0.02	17.67
34	510	8.50	1.5	0.160	0.671	0.144	0.016	0.02	17.67
35	525	8.75	1.6	0.170	0.662	0.153	0.017	0.02	18.85
36	540	9.00	1.7	0.181	0.653	0.163	0.018	0.02	20.02
37	555	9.25	1.9	0.202	0.644	0.182	0.020	0.02	22.38
38	570	9.50	2.0	0.213	0.634	0.192	0.021	0.03	23.56
39	585	9.75	2.1	0.223	0.625	0.201	0.022	0.03	24.73
40	600	10.00	2.2	0.234	0.616	0.211	0.023	0.03	25.91
41	615	10.25	1.5	0.160	0.607	0.144	0.016	0.02	17.67
42	630	10.50	1.5	0.160	0.599	0.144	0.016	0.02	17.67
43	645	10.75	2.0	0.213	0.590	0.192	0.021	0.03	23.56
44	660	11.00	2.0	0.213	0.581	0.192	0.021	0.03	23.56
45	675	11.25	1.9	0.202	0.573	0.182	0.020	0.02	22.38
46	690	11.50	1.9	0.202	0.564	0.182	0.020	0.02	22.38
47	705	11.75	1.7	0.181	0.556	0.163	0.018	0.02	20.02
48	720	12.00	1.8	0.192	0.548	0.172	0.019	0.02	21.20
49	735	12.25	2.5	0.266	0.539	0.239	0.027	0.03	29.45
50	750	12.50	2.6	0.277	0.531	0.249	0.028	0.03	30.62
51	765	12.75	2.8	0.298	0.523	0.268	0.030	0.04	32.98
52	780	13.00	2.9	0.309	0.515	0.278	0.031	0.04	34.16
53	795	13.25	3.4	0.362	0.508	0.326	0.036	0.04	40.05
54	810	13.50	3.4	0.362	0.500	0.326	0.036	0.04	40.05
55	825	13.75	2.3	0.245	0.492	0.220	0.024	0.03	27.09
56	840	14.00	2.3	0.245	0.485	0.220	0.024	0.03	27.09
57	855	14.25	2.7	0.287	0.478	0.259	0.029	0.04	31.80
58	870	14.50	2.6	0.277	0.470	0.249	0.028	0.03	30.62
59	885	14.75	2.6	0.277	0.463	0.249	0.028	0.03	30.62
60	900	15.00	2.5	0.266	0.456	0.239	0.027	0.03	29.45
61	915	15.25	2.4	0.255	0.449	0.230	0.026	0.03	28.27
62	930	15.50	2.3	0.245	0.442	0.220	0.024	0.03	27.09
63	945	15.75	1.9	0.202	0.435	0.182	0.020	0.02	22.38
64	960	16.00	1.9	0.202	0.429	0.182	0.020	0.02	22.38
65	975	16.25	0.4	0.043	0.422	0.038	0.004	0.01	4.71
66	990	16.50	0.4	0.043	0.416	0.038	0.004	0.01	4.71
67	1005	16.75	0.3	0.032	0.409	0.029	0.003	0.00	3.53

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.5808
LAG TIME - MINUTES	0.42	MINIMUM LOSS RATE (for var. loss) - in/hr	0.290
UNIT TIME-PERCENT OF LAG	3606.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00538
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.032	0.403	0.029	0.003	0.00	3.53
69	1035	17.25	0.5	0.053	0.397	0.048	0.005	0.01	5.89
70	1050	17.50	0.5	0.053	0.391	0.048	0.005	0.01	5.89
71	1065	17.75	0.5	0.053	0.385	0.048	0.005	0.01	5.89
72	1080	18.00	0.4	0.043	0.380	0.038	0.004	0.01	4.71
73	1095	18.25	0.4	0.043	0.374	0.038	0.004	0.01	4.71
74	1110	18.50	0.4	0.043	0.369	0.038	0.004	0.01	4.71
75	1125	18.75	0.3	0.032	0.363	0.029	0.003	0.00	3.53
76	1140	19.00	0.2	0.021	0.358	0.019	0.002	0.00	2.36
77	1155	19.25	0.3	0.032	0.353	0.029	0.003	0.00	3.53
78	1170	19.50	0.4	0.043	0.348	0.038	0.004	0.01	4.71
79	1185	19.75	0.3	0.032	0.343	0.029	0.003	0.00	3.53
80	1200	20.00	0.2	0.021	0.339	0.019	0.002	0.00	2.36
81	1215	20.25	0.3	0.032	0.334	0.029	0.003	0.00	3.53
82	1230	20.50	0.3	0.032	0.330	0.029	0.003	0.00	3.53
83	1245	20.75	0.3	0.032	0.326	0.029	0.003	0.00	3.53
84	1260	21.00	0.2	0.021	0.322	0.019	0.002	0.00	2.36
85	1275	21.25	0.3	0.032	0.318	0.029	0.003	0.00	3.53
86	1290	21.50	0.2	0.021	0.314	0.019	0.002	0.00	2.36
87	1305	21.75	0.3	0.032	0.311	0.029	0.003	0.00	3.53
88	1320	22.00	0.2	0.021	0.308	0.019	0.002	0.00	2.36
89	1335	22.25	0.3	0.032	0.305	0.029	0.003	0.00	3.53
90	1350	22.50	0.2	0.021	0.302	0.019	0.002	0.00	2.36
91	1365	22.75	0.2	0.021	0.299	0.019	0.002	0.00	2.36
92	1380	23.00	0.2	0.021	0.297	0.019	0.002	0.00	2.36
93	1395	23.25	0.2	0.021	0.295	0.019	0.002	0.00	2.36
94	1410	23.50	0.2	0.021	0.293	0.019	0.002	0.00	2.36
95	1425	23.75	0.2	0.021	0.292	0.019	0.002	0.00	2.36
96	1440	24.00	0.2	0.021	0.291	0.019	0.002	0.00	2.36

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.27
FLOOD VOLUME (acft)	0.03
FLOOD VOLUME (cuft)	1187.67
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1177.85
PEAK FLOW (cfs)	0.04

PROJECT: WORLD MUSEUM EXIST 10 YR EVENT - SOUTH
JOB # C2026
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BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

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JOB # C2026

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	0.03	9	9	0	9	-	9	0.00
2	10	0.03	9	17	0	17	-	17	0.00
3	15	0.02	7	25	0	25	-	25	0.00
4	20	0.03	10	35	0	35	-	35	0.00
5	25	0.03	10	45	0	45	-	45	0.00
6	30	0.04	12	56	0	56	-	56	0.00
7	35	0.03	10	66	0	66	-	66	0.00
8	40	0.04	12	78	0	78	-	78	0.00
9	45	0.04	12	90	0	90	-	90	0.00
10	50	0.03	10	100	0	100	-	100	0.00
11	55	0.04	11	111	0	111	-	111	0.00
12	60	0.04	12	123	0	123	-	123	0.00
13	65	0.05	15	137	0	137	-	137	0.00
14	70	0.05	15	152	0	152	-	152	0.00
15	75	0.05	15	167	0	167	-	167	0.00
16	80	0.04	13	180	0	180	-	180	0.00
17	85	0.06	17	197	0	197	-	197	0.00
18	90	0.06	18	215	0	215	-	215	0.00
19	95	0.05	16	231	0	231	-	231	0.01
20	100	0.06	18	249	0	249	-	249	0.01
21	105	0.02	5	254	0	254	-	254	0.01
22	110	0.07	21	275	0	275	-	275	0.01
23	115	0.06	19	294	0	294	-	294	0.01
24	120	0.07	20	314	0	314	-	314	0.01
25	125	0.07	21	334	0	334	-	334	0.01
26	130	0.22	65	399	0	399	-	399	0.01
27	135	0.39	118	517	0	517	-	517	0.01
28	140	0.06	18	535	0	535	-	535	0.01
29	145	0.79	237	772	0	772	-	772	0.02
30	150	0.90	271	1,043	0	1,043	-	1,043	0.02
31	155	1.10	330	1,373	0	1,373	-	1,373	0.03
32	160	0.59	178	1,551	0	1,551	-	1,551	0.04
33	165	0.04	13	1,564	0	1,564	-	1,564	0.04
34	170	0.04	12	1,576	0	1,576	-	1,576	0.04
35	175	0.04	12	1,588	0	1,588	-	1,588	0.04
36	180	0.01	4	1,592	0	1,592	-	1,592	0.04

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JOB # C2026

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	0.01	4	4	0	4	-	4	0.00
2	10	0.02	5	9	0	9	-	9	0.00
3	15	0.02	5	15	0	15	-	15	0.00
4	20	0.02	5	20	0	20	-	20	0.00
5	25	0.02	5	25	0	25	-	25	0.00
6	30	0.02	6	31	0	31	-	31	0.00
7	35	0.02	6	37	0	37	-	37	0.00
8	40	0.02	6	43	0	43	-	43	0.00
9	45	0.02	6	49	0	49	-	49	0.00
10	50	0.02	6	55	0	55	-	55	0.00
11	55	0.02	6	61	0	61	-	61	0.00
12	60	0.02	7	68	0	68	-	68	0.00
13	65	0.02	7	74	0	74	-	74	0.00
14	70	0.02	7	81	0	81	-	81	0.00
15	75	0.02	7	88	0	88	-	88	0.00
16	80	0.02	7	95	0	95	-	95	0.00
17	85	0.02	7	102	0	102	-	102	0.00
18	90	0.02	7	109	0	109	-	109	0.00
19	95	0.02	7	115	0	115	-	115	0.00
20	100	0.02	7	122	0	122	-	122	0.00
21	105	0.02	7	129	0	129	-	129	0.00
22	110	0.02	7	136	0	136	-	136	0.00
23	115	0.02	7	143	0	143	-	143	0.00
24	120	0.03	8	150	0	150	-	150	0.00
25	125	0.02	7	157	0	157	-	157	0.00
26	130	0.03	8	165	0	165	-	165	0.00
27	135	0.03	8	173	0	173	-	173	0.00
28	140	0.03	8	180	0	180	-	180	0.00
29	145	0.03	8	188	0	188	-	188	0.00
30	150	0.03	8	196	0	196	-	196	0.00
31	155	0.03	8	203	0	203	-	203	0.00
32	160	0.03	8	211	0	211	-	211	0.00
33	165	0.03	9	220	0	220	-	220	0.01
34	170	0.03	9	228	0	228	-	228	0.01
35	175	0.03	9	237	0	237	-	237	0.01
36	180	0.03	9	245	0	245	-	245	0.01
37	185	0.03	9	254	0	254	-	254	0.01
38	190	0.03	9	263	0	263	-	263	0.01
39	195	0.03	9	273	0	273	-	273	0.01
40	200	0.03	9	282	0	282	-	282	0.01
41	205	0.03	10	292	0	292	-	292	0.01
42	210	0.04	11	303	0	303	-	303	0.01
43	215	0.04	12	315	0	315	-	315	0.01
44	220	0.04	12	327	0	327	-	327	0.01
45	225	0.04	13	340	0	340	-	340	0.01
46	230	0.04	13	353	0	353	-	353	0.01
47	235	0.05	14	367	0	367	-	367	0.01
48	240	0.05	14	380	0	380	-	380	0.01
49	245	0.05	15	395	0	395	-	395	0.01
50	250	0.05	15	410	0	410	-	410	0.01
51	255	0.05	16	426	0	426	-	426	0.01
52	260	0.06	17	444	0	444	-	444	0.01
53	265	0.06	18	461	0	461	-	461	0.01
54	270	0.06	18	479	0	479	-	479	0.01
55	275	0.06	19	498	0	498	-	498	0.01

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JOB # C2026

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	0.07	20	518	0	518	-	518	0.01
57	285	0.07	21	538	0	538	-	538	0.01
58	290	0.07	21	559	0	559	-	559	0.01
59	295	0.07	21	580	0	580	-	580	0.01
60	300	0.03	8	588	0	588	-	588	0.01
61	305	0.17	51	639	0	639	-	639	0.01
62	310	0.31	93	732	0	732	-	732	0.02
63	315	0.40	119	851	0	851	-	851	0.02
64	320	0.48	145	996	0	996	-	996	0.02
65	325	0.62	187	1,183	0	1,183	-	1,183	0.03
66	330	0.88	264	1,447	0	1,447	-	1,447	0.03
67	335	0.05	16	1,464	0	1,464	-	1,464	0.03
68	340	0.03	8	1,471	0	1,471	-	1,471	0.03
69	345	0.02	5	1,476	0	1,476	-	1,476	0.03
70	350	0.01	4	1,481	0	1,481	-	1,481	0.03
71	355	0.01	3	1,483	0	1,483	-	1,483	0.03
72	360	0.01	2	1,485	0	1,485	-	1,485	0.03

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JOB # C2026

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	2	2	0	2	-	2	0.00
2	30	0.00	4	6	0	6	-	6	0.00
3	45	0.00	4	9	0	9	-	9	0.00
4	60	0.01	5	14	0	14	-	14	0.00
5	75	0.00	4	18	0	18	-	18	0.00
6	90	0.00	4	21	0	21	-	21	0.00
7	105	0.00	4	25	0	25	-	25	0.00
8	120	0.01	5	29	0	29	-	29	0.00
9	135	0.01	5	34	0	34	-	34	0.00
10	150	0.01	5	39	0	39	-	39	0.00
11	165	0.01	6	45	0	45	-	45	0.00
12	180	0.01	6	51	0	51	-	51	0.00
13	195	0.01	6	57	0	57	-	57	0.00
14	210	0.01	6	62	0	62	-	62	0.00
15	225	0.01	6	68	0	68	-	68	0.00
16	240	0.01	7	75	0	75	-	75	0.00
17	255	0.01	7	82	0	82	-	82	0.00
18	270	0.01	8	91	0	91	-	91	0.00
19	285	0.01	8	99	0	99	-	99	0.00
20	300	0.01	9	108	0	108	-	108	0.00
21	315	0.01	7	115	0	115	-	115	0.00
22	330	0.01	8	124	0	124	-	124	0.00
23	345	0.01	9	133	0	133	-	133	0.00
24	360	0.01	9	143	0	143	-	143	0.00
25	375	0.01	11	153	0	153	-	153	0.00
26	390	0.01	11	164	0	164	-	164	0.00
27	405	0.01	12	175	0	175	-	175	0.00
28	420	0.01	12	187	0	187	-	187	0.00
29	435	0.01	12	199	0	199	-	199	0.00
30	450	0.01	13	212	0	212	-	212	0.00
31	465	0.02	14	226	0	226	-	226	0.01
32	480	0.02	15	241	0	241	-	241	0.01
33	495	0.02	18	259	0	259	-	259	0.01
34	510	0.02	18	277	0	277	-	277	0.01
35	525	0.02	19	296	0	296	-	296	0.01
36	540	0.02	20	316	0	316	-	316	0.01
37	555	0.02	22	338	0	338	-	338	0.01
38	570	0.03	24	362	0	362	-	362	0.01
39	585	0.03	25	386	0	386	-	386	0.01
40	600	0.03	26	412	0	412	-	412	0.01
41	615	0.02	18	430	0	430	-	430	0.01
42	630	0.02	18	448	0	448	-	448	0.01
43	645	0.03	24	471	0	471	-	471	0.01
44	660	0.03	24	495	0	495	-	495	0.01
45	675	0.02	22	517	0	517	-	517	0.01
46	690	0.02	22	539	0	539	-	539	0.01
47	705	0.02	20	559	0	559	-	559	0.01
48	720	0.02	21	581	0	581	-	581	0.01
49	735	0.03	29	610	0	610	-	610	0.01
50	750	0.03	31	641	0	641	-	641	0.01
51	765	0.04	33	674	0	674	-	674	0.02
52	780	0.04	34	708	0	708	-	708	0.02
53	795	0.04	40	748	0	748	-	748	0.02
54	810	0.04	40	788	0	788	-	788	0.02
55	825	0.03	27	815	0	815	-	815	0.02
56	840	0.03	27	842	0	842	-	842	0.02
57	855	0.04	32	874	0	874	-	874	0.02
58	870	0.03	31	905	0	905	-	905	0.02

1

JOB # C2026

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	0.03	31	935	0	935	-	935	0.02
60	900	0.03	29	965	0	965	-	965	0.02
61	915	0.03	28	993	0	993	-	993	0.02
62	930	0.03	27	1,020	0	1,020	-	1,020	0.02
63	945	0.02	22	1,042	0	1,042	-	1,042	0.02
64	960	0.02	22	1,065	0	1,065	-	1,065	0.02
65	975	0.01	5	1,069	0	1,069	-	1,069	0.02
66	990	0.01	5	1,074	0	1,074	-	1,074	0.02
67	1005	0.00	4	1,078	0	1,078	-	1,078	0.02
68	1020	0.00	4	1,081	0	1,081	-	1,081	0.02
69	1035	0.01	6	1,087	0	1,087	-	1,087	0.02
70	1050	0.01	6	1,093	0	1,093	-	1,093	0.03
71	1065	0.01	6	1,099	0	1,099	-	1,099	0.03
72	1080	0.01	5	1,104	0	1,104	-	1,104	0.03
73	1095	0.01	5	1,108	0	1,108	-	1,108	0.03
74	1110	0.01	5	1,113	0	1,113	-	1,113	0.03
75	1125	0.00	4	1,117	0	1,117	-	1,117	0.03
76	1140	0.00	2	1,119	0	1,119	-	1,119	0.03
77	1155	0.00	4	1,122	0	1,122	-	1,122	0.03
78	1170	0.01	5	1,127	0	1,127	-	1,127	0.03
79	1185	0.00	4	1,131	0	1,131	-	1,131	0.03
80	1200	0.00	2	1,133	0	1,133	-	1,133	0.03
81	1215	0.00	4	1,137	0	1,137	-	1,137	0.03
82	1230	0.00	4	1,140	0	1,140	-	1,140	0.03
83	1245	0.00	4	1,144	0	1,144	-	1,144	0.03
84	1260	0.00	2	1,146	0	1,146	-	1,146	0.03
85	1275	0.00	4	1,150	0	1,150	-	1,150	0.03
86	1290	0.00	2	1,152	0	1,152	-	1,152	0.03
87	1305	0.00	4	1,155	0	1,155	-	1,155	0.03
88	1320	0.00	2	1,158	0	1,158	-	1,158	0.03
89	1335	0.00	4	1,161	0	1,161	-	1,161	0.03
90	1350	0.00	2	1,164	0	1,164	-	1,164	0.03
91	1365	0.00	2	1,166	0	1,166	-	1,166	0.03
92	1380	0.00	2	1,168	0	1,168	-	1,168	0.03
93	1395	0.00	2	1,171	0	1,171	-	1,171	0.03
94	1410	0.00	2	1,173	0	1,173	-	1,173	0.03
95	1425	0.00	2	1,175	0	1,175	-	1,175	0.03
96	1440	0.00	2	1,178	0	1,178	-	1,178	0.03

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM SOUTH PROP 2 YR EVENT		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	0.37		
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	0.51		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.35		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	315		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	15		
30				
31	ELEVATION OF HEADWATER	329		
32	ELEVATION OF CONCENTRATION POINT	267		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	0.721		
40	6-HOUR	0.953		
41	24-HOUR	1.36		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
BASIC DATA CALCULATION FORM
SHORTCUT METHOD

PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVENT
JOB # C2026
BY ES R. BAZUA, P.E. DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	1.230
[4] L-FEET	315
[5] L-MILES	0.060
[6] La-FEET	15.00
[7] La-MILES	0.003
[8] ELEVATION OF HEADWATER	329
[9] ELEVATION OF CONCENTRATION POINT	267
[10] H-FEET	62
[11] S-FEET/MILE	1039.2
[12] S^0.5	32.24
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.00
[16] LAG TIME-MINUTES	0.3
[17] 100% OF LAG-MINUTES	0.3
[18] 200% OF LAG-MINUTES	0.6
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
0.72	1.230	1.00	0.72	0.95	1.230	1.00	0.95	1.36	1.230	1.00	1.36
		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]	1.23	SUM [7]	0.72	SUM [9]	1.23	SUM [11]	0.95	SUM [13]	1.23	SUM [15]	1.36
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			0.72				0.95				1.36

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.13	0.13	0.14
FLOOD VOLUME	(cu-ft)	576	560	607
	(acre-ft)	0.01	0.01	0.01
REQUIRED STORAGE	(cu-ft)	571	556	602
	(acre-ft)	0.01	0.01	0.01
PEAK FLOW	(cfs)	0.40	0.32	0.02
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT WORLD MUSEUM SOUTH PROP 2 YR EVENT
CONCENTRATION POINT: 1
BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.37	0.301	0.0223
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.51	0.415	0.3068
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.35	0.285	0.0514
					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	1.23	SUM	0.3805

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.19022561
C= 0.00352

Ft=C(24-(T/60))^1.55 = 0.00352 (24-(T/60))^1.55 + 0.19 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: WORLD MUSEUM SOUTH PROP 2 YR EVENT
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.28
UNIT TIME-PERCENT OF LAG	1760.7
TOTAL ADJUSTED STORM RAIN-INCHES	0.72
CONSTANT LOSS RATE-in/hr	0.38
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.112	0.38	0.10	0.01	0.01	4.15
2	10	0.17	1.3	0.112	0.38	0.10	0.01	0.01	4.15
3	15	0.25	1.1	0.095	0.38	0.09	0.01	0.01	3.51
4	20	0.33	1.5	0.130	0.38	0.12	0.01	0.02	4.79
5	25	0.42	1.5	0.130	0.38	0.12	0.01	0.02	4.79
6	30	0.50	1.8	0.156	0.38	0.14	0.02	0.02	5.75
7	35	0.58	1.5	0.130	0.38	0.12	0.01	0.02	4.79
8	40	0.67	1.8	0.156	0.38	0.14	0.02	0.02	5.75
9	45	0.75	1.8	0.156	0.38	0.14	0.02	0.02	5.75
10	50	0.83	1.5	0.130	0.38	0.12	0.01	0.02	4.79
11	55	0.92	1.6	0.138	0.38	0.12	0.01	0.02	5.11
12	60	1.00	1.8	0.156	0.38	0.14	0.02	0.02	5.75
13	65	1.08	2.2	0.190	0.38	0.17	0.02	0.02	7.02
14	70	1.17	2.2	0.190	0.38	0.17	0.02	0.02	7.02
15	75	1.25	2.2	0.190	0.38	0.17	0.02	0.02	7.02
16	80	1.33	2.0	0.173	0.38	0.16	0.02	0.02	6.39
17	85	1.42	2.6	0.225	0.38	0.20	0.02	0.03	8.30
18	90	1.50	2.7	0.234	0.38	0.21	0.02	0.03	8.62
19	95	1.58	2.4	0.208	0.38	0.19	0.02	0.03	7.66
20	100	1.67	2.7	0.234	0.38	0.21	0.02	0.03	8.62
21	105	1.75	3.3	0.286	0.38	0.26	0.03	0.04	10.54
22	110	1.83	3.1	0.268	0.38	0.24	0.03	0.03	9.90
23	115	1.92	2.9	0.251	0.38	0.23	0.03	0.03	9.26
24	120	2.00	3.0	0.260	0.38	0.23	0.03	0.03	9.58
25	125	2.08	3.1	0.268	0.38	0.24	0.03	0.03	9.90
26	130	2.17	4.2	0.363	0.38	0.33	0.04	0.04	13.41
27	135	2.25	5.0	0.433	0.38	0.39	0.05	0.06	19.24
28	140	2.33	3.5	0.303	0.38	0.27	0.03	0.04	11.17
29	145	2.42	6.8	0.588	0.38	0.53	0.21	0.26	76.71
30	150	2.50	7.3	0.632	0.38	0.57	0.25	0.31	92.67
31	155	2.58	8.2	0.709	0.38	0.64	0.33	0.40	121.41
32	160	2.67	5.9	0.510	0.38	0.46	0.13	0.16	47.98
33	165	2.75	2.0	0.173	0.38	0.16	0.02	0.02	6.39
34	170	2.83	1.8	0.156	0.38	0.14	0.02	0.02	5.75
35	175	2.92	1.8	0.156	0.38	0.14	0.02	0.02	5.75
36	180	3.00	0.6	0.052	0.38	0.05	0.01	0.01	1.92

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.13
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	576.03
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	571.27
PEAK FLOW RATE (cfs)	0.40

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

PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVEN
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.28
UNIT TIME-PERCENT OF LAG	1760.7
TOTAL ADJUSTED STORM RAIN-INCHES	0.95
CONSTANT LOSS RATE-in/hr	0.380
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.057	0.38	0.05	0.01	0.01	2.11
2	10	0.17	0.6	0.069	0.38	0.06	0.01	0.01	2.53
3	15	0.25	0.6	0.069	0.38	0.06	0.01	0.01	2.53
4	20	0.33	0.6	0.069	0.38	0.06	0.01	0.01	2.53
5	25	0.42	0.6	0.069	0.38	0.06	0.01	0.01	2.53
6	30	0.50	0.7	0.080	0.38	0.07	0.01	0.01	2.95
7	35	0.58	0.7	0.080	0.38	0.07	0.01	0.01	2.95
8	40	0.67	0.7	0.080	0.38	0.07	0.01	0.01	2.95
9	45	0.75	0.7	0.080	0.38	0.07	0.01	0.01	2.95
10	50	0.83	0.7	0.080	0.38	0.07	0.01	0.01	2.95
11	55	0.92	0.7	0.080	0.38	0.07	0.01	0.01	2.95
12	60	1.00	0.8	0.091	0.38	0.08	0.01	0.01	3.38
13	65	1.08	0.8	0.091	0.38	0.08	0.01	0.01	3.38
14	70	1.17	0.8	0.091	0.38	0.08	0.01	0.01	3.38
15	75	1.25	0.8	0.091	0.38	0.08	0.01	0.01	3.38
16	80	1.33	0.8	0.091	0.38	0.08	0.01	0.01	3.38
17	85	1.42	0.8	0.091	0.38	0.08	0.01	0.01	3.38
18	90	1.50	0.8	0.091	0.38	0.08	0.01	0.01	3.38
19	95	1.58	0.8	0.091	0.38	0.08	0.01	0.01	3.38
20	100	1.67	0.8	0.091	0.38	0.08	0.01	0.01	3.38
21	105	1.75	0.8	0.091	0.38	0.08	0.01	0.01	3.38
22	110	1.83	0.8	0.091	0.38	0.08	0.01	0.01	3.38
23	115	1.92	0.8	0.091	0.38	0.08	0.01	0.01	3.38
24	120	2.00	0.9	0.103	0.38	0.09	0.01	0.01	3.80
25	125	2.08	0.8	0.091	0.38	0.08	0.01	0.01	3.38
26	130	2.17	0.9	0.103	0.38	0.09	0.01	0.01	3.80
27	135	2.25	0.9	0.103	0.38	0.09	0.01	0.01	3.80
28	140	2.33	0.9	0.103	0.38	0.09	0.01	0.01	3.80
29	145	2.42	0.9	0.103	0.38	0.09	0.01	0.01	3.80
30	150	2.50	0.9	0.103	0.38	0.09	0.01	0.01	3.80
31	155	2.58	0.9	0.103	0.38	0.09	0.01	0.01	3.80
32	160	2.67	0.9	0.103	0.38	0.09	0.01	0.01	3.80
33	165	2.75	1.0	0.114	0.38	0.10	0.01	0.01	4.22
34	170	2.83	1.0	0.114	0.38	0.10	0.01	0.01	4.22
35	175	2.92	1.0	0.114	0.38	0.10	0.01	0.01	4.22
36	180	3.00	1.0	0.114	0.38	0.10	0.01	0.01	4.22
37	185	3.08	1.0	0.114	0.38	0.10	0.01	0.01	4.22
38	190	3.17	1.1	0.126	0.38	0.11	0.01	0.02	4.64
39	195	3.25	1.1	0.126	0.38	0.11	0.01	0.02	4.64
40	200	3.33	1.1	0.126	0.38	0.11	0.01	0.02	4.64
41	205	3.42	1.2	0.137	0.38	0.12	0.01	0.02	5.06
42	210	3.50	1.3	0.149	0.38	0.13	0.01	0.02	5.49
43	215	3.58	1.4	0.160	0.38	0.14	0.02	0.02	5.91
44	220	3.67	1.4	0.160	0.38	0.14	0.02	0.02	5.91
45	225	3.75	1.5	0.172	0.38	0.15	0.02	0.02	6.33
46	230	3.83	1.5	0.172	0.38	0.15	0.02	0.02	6.33
47	235	3.92	1.6	0.183	0.38	0.16	0.02	0.02	6.75
48	240	4.00	1.6	0.183	0.38	0.16	0.02	0.02	6.75
49	245	4.08	1.7	0.194	0.38	0.17	0.02	0.02	7.17
50	250	4.17	1.8	0.206	0.38	0.19	0.02	0.03	7.60
51	255	4.25	1.9	0.217	0.38	0.20	0.02	0.03	8.02
52	260	4.33	2.0	0.229	0.38	0.21	0.02	0.03	8.44
53	265	4.42	2.1	0.240	0.38	0.22	0.02	0.03	8.86
54	270	4.50	2.1	0.240	0.38	0.22	0.02	0.03	8.86
55	275	4.58	2.2	0.252	0.38	0.23	0.03	0.03	9.28
56	280	4.67	2.3	0.263	0.38	0.24	0.03	0.03	9.71

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVEN CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.28		
UNIT TIME-PERCENT OF LAG	1760.7		
TOTAL ADJUSTED STORM RAIN-INCHES	0.95		
CONSTANT LOSS RATE-in/hr	0.380		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.274	0.38	0.25	0.03	0.03	10.13
58	290	4.83	2.4	0.274	0.38	0.25	0.03	0.03	10.13
59	295	4.92	2.5	0.286	0.38	0.26	0.03	0.04	10.55
60	300	5.00	2.6	0.297	0.38	0.27	0.03	0.04	10.97
61	305	5.08	3.1	0.355	0.38	0.32	0.04	0.04	13.08
62	310	5.17	3.6	0.412	0.38	0.37	0.03	0.04	11.53
63	315	5.25	3.9	0.446	0.38	0.40	0.07	0.08	24.19
64	320	5.33	4.2	0.480	0.38	0.43	0.10	0.12	36.85
65	325	5.42	4.7	0.537	0.38	0.48	0.16	0.19	57.95
66	330	5.50	5.6	0.640	0.38	0.58	0.26	0.32	95.93
67	335	5.58	1.9	0.217	0.38	0.20	0.02	0.03	8.02
68	340	5.67	0.9	0.103	0.38	0.09	0.01	0.01	3.80
69	345	5.75	0.6	0.069	0.38	0.06	0.01	0.01	2.53
70	350	5.83	0.5	0.057	0.38	0.05	0.01	0.01	2.11
71	355	5.92	0.3	0.034	0.38	0.03	0.00	0.00	1.27
72	360	6.00	0.2	0.023	0.38	0.02	0.00	0.00	0.84

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.13
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	560.23
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	555.59
PEAK FLOW RATE (cfs)	0.32

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

PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVENT
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.3805
LAG TIME - MINUTES	0.28	MINIMUM LOSS RATE (for var. loss) - in/hr	0.190
UNIT TIME-PERCENT OF LAG	5282.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00352
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.011	0.672	0.010	0.001	0.00	1.20
2	30	0.50	0.3	0.016	0.664	0.015	0.002	0.00	1.81
3	45	0.75	0.3	0.016	0.656	0.015	0.002	0.00	1.81
4	60	1.00	0.4	0.022	0.649	0.020	0.002	0.00	2.41
5	75	1.25	0.3	0.016	0.641	0.015	0.002	0.00	1.81
6	90	1.50	0.3	0.016	0.633	0.015	0.002	0.00	1.81
7	105	1.75	0.3	0.016	0.626	0.015	0.002	0.00	1.81
8	120	2.00	0.4	0.022	0.618	0.020	0.002	0.00	2.41
9	135	2.25	0.4	0.022	0.611	0.020	0.002	0.00	2.41
10	150	2.50	0.4	0.022	0.603	0.020	0.002	0.00	2.41
11	165	2.75	0.5	0.027	0.596	0.024	0.003	0.00	3.01
12	180	3.00	0.5	0.027	0.589	0.024	0.003	0.00	3.01
13	195	3.25	0.5	0.027	0.581	0.024	0.003	0.00	3.01
14	210	3.50	0.5	0.027	0.574	0.024	0.003	0.00	3.01
15	225	3.75	0.5	0.027	0.567	0.024	0.003	0.00	3.01
16	240	4.00	0.6	0.033	0.560	0.029	0.003	0.00	3.61
17	255	4.25	0.6	0.033	0.553	0.029	0.003	0.00	3.61
18	270	4.50	0.7	0.038	0.546	0.034	0.004	0.00	4.22
19	285	4.75	0.7	0.038	0.539	0.034	0.004	0.00	4.22
20	300	5.00	0.8	0.044	0.532	0.039	0.004	0.01	4.82
21	315	5.25	0.6	0.033	0.525	0.029	0.003	0.00	3.61
22	330	5.50	0.7	0.038	0.518	0.034	0.004	0.00	4.22
23	345	5.75	0.8	0.044	0.511	0.039	0.004	0.01	4.82
24	360	6.00	0.8	0.044	0.504	0.039	0.004	0.01	4.82
25	375	6.25	0.9	0.049	0.498	0.044	0.005	0.01	5.42
26	390	6.50	0.9	0.049	0.491	0.044	0.005	0.01	5.42
27	405	6.75	1.0	0.054	0.485	0.049	0.005	0.01	6.02
28	420	7.00	1.0	0.054	0.478	0.049	0.005	0.01	6.02
29	435	7.25	1.0	0.054	0.471	0.049	0.005	0.01	6.02
30	450	7.50	1.1	0.060	0.465	0.054	0.006	0.01	6.62
31	465	7.75	1.2	0.065	0.459	0.059	0.007	0.01	7.23
32	480	8.00	1.3	0.071	0.452	0.064	0.007	0.01	7.83
33	495	8.25	1.5	0.082	0.446	0.073	0.008	0.01	9.03
34	510	8.50	1.5	0.082	0.440	0.073	0.008	0.01	9.03
35	525	8.75	1.6	0.087	0.434	0.078	0.009	0.01	9.64
36	540	9.00	1.7	0.092	0.428	0.083	0.009	0.01	10.24
37	555	9.25	1.9	0.103	0.422	0.093	0.010	0.01	11.44
38	570	9.50	2.0	0.109	0.416	0.098	0.011	0.01	12.04
39	585	9.75	2.1	0.114	0.410	0.103	0.011	0.01	12.65
40	600	10.00	2.2	0.120	0.404	0.108	0.012	0.01	13.25
41	615	10.25	1.5	0.082	0.398	0.073	0.008	0.01	9.03
42	630	10.50	1.5	0.082	0.392	0.073	0.008	0.01	9.03
43	645	10.75	2.0	0.109	0.386	0.098	0.011	0.01	12.04
44	660	11.00	2.0	0.109	0.381	0.098	0.011	0.01	12.04
45	675	11.25	1.9	0.103	0.375	0.093	0.010	0.01	11.44
46	690	11.50	1.9	0.103	0.370	0.093	0.010	0.01	11.44
47	705	11.75	1.7	0.092	0.364	0.083	0.009	0.01	10.24
48	720	12.00	1.8	0.098	0.359	0.088	0.010	0.01	10.84
49	735	12.25	2.5	0.136	0.353	0.122	0.014	0.02	15.06
50	750	12.50	2.6	0.141	0.348	0.127	0.014	0.02	15.66
51	765	12.75	2.8	0.152	0.343	0.137	0.015	0.02	16.86
52	780	13.00	2.9	0.158	0.338	0.142	0.016	0.02	17.46
53	795	13.25	3.4	0.185	0.333	0.166	0.018	0.02	20.48
54	810	13.50	3.4	0.185	0.328	0.166	0.018	0.02	20.48
55	825	13.75	2.3	0.125	0.323	0.113	0.013	0.02	13.85
56	840	14.00	2.3	0.125	0.318	0.113	0.013	0.02	13.85
57	855	14.25	2.7	0.147	0.313	0.132	0.015	0.02	16.26
58	870	14.50	2.6	0.141	0.308	0.127	0.014	0.02	15.66
59	885	14.75	2.6	0.141	0.303	0.127	0.014	0.02	15.66
60	900	15.00	2.5	0.136	0.299	0.122	0.014	0.02	15.06
61	915	15.25	2.4	0.131	0.294	0.118	0.013	0.02	14.45
62	930	15.50	2.3	0.125	0.290	0.113	0.013	0.02	13.85
63	945	15.75	1.9	0.103	0.285	0.093	0.010	0.01	11.44
64	960	16.00	1.9	0.103	0.281	0.093	0.010	0.01	11.44
65	975	16.25	0.4	0.022	0.277	0.020	0.002	0.00	2.41
66	990	16.50	0.4	0.022	0.272	0.020	0.002	0.00	2.41
67	1005	16.75	0.3	0.016	0.268	0.015	0.002	0.00	1.81

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVENT CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.3805
LAG TIME - MINUTES	0.28	MINIMUM LOSS RATE (for var. loss) - in/hr	0.190
UNIT TIME-PERCENT OF LAG	5282.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	1.36	C	0.00352
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.016	0.264	0.015	0.002	0.00	1.81
69	1035	17.25	0.5	0.027	0.260	0.024	0.003	0.00	3.01
70	1050	17.50	0.5	0.027	0.256	0.024	0.003	0.00	3.01
71	1065	17.75	0.5	0.027	0.252	0.024	0.003	0.00	3.01
72	1080	18.00	0.4	0.022	0.249	0.020	0.002	0.00	2.41
73	1095	18.25	0.4	0.022	0.245	0.020	0.002	0.00	2.41
74	1110	18.50	0.4	0.022	0.241	0.020	0.002	0.00	2.41
75	1125	18.75	0.3	0.016	0.238	0.015	0.002	0.00	1.81
76	1140	19.00	0.2	0.011	0.235	0.010	0.001	0.00	1.20
77	1155	19.25	0.3	0.016	0.231	0.015	0.002	0.00	1.81
78	1170	19.50	0.4	0.022	0.228	0.020	0.002	0.00	2.41
79	1185	19.75	0.3	0.016	0.225	0.015	0.002	0.00	1.81
80	1200	20.00	0.2	0.011	0.222	0.010	0.001	0.00	1.20
81	1215	20.25	0.3	0.016	0.219	0.015	0.002	0.00	1.81
82	1230	20.50	0.3	0.016	0.216	0.015	0.002	0.00	1.81
83	1245	20.75	0.3	0.016	0.213	0.015	0.002	0.00	1.81
84	1260	21.00	0.2	0.011	0.211	0.010	0.001	0.00	1.20
85	1275	21.25	0.3	0.016	0.208	0.015	0.002	0.00	1.81
86	1290	21.50	0.2	0.011	0.206	0.010	0.001	0.00	1.20
87	1305	21.75	0.3	0.016	0.204	0.015	0.002	0.00	1.81
88	1320	22.00	0.2	0.011	0.202	0.010	0.001	0.00	1.20
89	1335	22.25	0.3	0.016	0.200	0.015	0.002	0.00	1.81
90	1350	22.50	0.2	0.011	0.198	0.010	0.001	0.00	1.20
91	1365	22.75	0.2	0.011	0.196	0.010	0.001	0.00	1.20
92	1380	23.00	0.2	0.011	0.194	0.010	0.001	0.00	1.20
93	1395	23.25	0.2	0.011	0.193	0.010	0.001	0.00	1.20
94	1410	23.50	0.2	0.011	0.192	0.010	0.001	0.00	1.20
95	1425	23.75	0.2	0.011	0.191	0.010	0.001	0.00	1.20
96	1440	24.00	0.2	0.011	0.190	0.010	0.001	0.00	1.20

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.14
FLOOD VOLUME (acft)	0.01
FLOOD VOLUME (cuft)	607.23
REQUIRED STORAGE (acft)	0.01
REQUIRED STORAGE (cuft)	602.21
PEAK FLOW (cfs)	0.02

PROJECT: WORLD MUSEUM SOUTH PROP 2 YR EVENT
JOB # C2026
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

1

JOB # C2026

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	0.01	4	4	0	4	-	4	0.00
2	10	0.01	4	8	0	8	-	8	0.00
3	15	0.01	4	12	0	12	-	12	0.00
4	20	0.02	5	17	0	17	-	17	0.00
5	25	0.02	5	21	0	21	-	21	0.00
6	30	0.02	6	27	0	27	-	27	0.00
7	35	0.02	5	32	0	32	-	32	0.00
8	40	0.02	6	38	0	38	-	38	0.00
9	45	0.02	6	43	0	43	-	43	0.00
10	50	0.02	5	48	0	48	-	48	0.00
11	55	0.02	5	53	0	53	-	53	0.00
12	60	0.02	6	59	0	59	-	59	0.00
13	65	0.02	7	66	0	66	-	66	0.00
14	70	0.02	7	73	0	73	-	73	0.00
15	75	0.02	7	80	0	80	-	80	0.00
16	80	0.02	6	87	0	87	-	87	0.00
17	85	0.03	8	95	0	95	-	95	0.00
18	90	0.03	9	103	0	103	-	103	0.00
19	95	0.03	8	111	0	111	-	111	0.00
20	100	0.03	9	120	0	120	-	120	0.00
21	105	0.04	11	130	0	130	-	130	0.00
22	110	0.03	10	140	0	140	-	140	0.00
23	115	0.03	9	149	0	149	-	149	0.00
24	120	0.03	10	159	0	159	-	159	0.00
25	125	0.03	10	169	0	169	-	169	0.00
26	130	0.04	13	182	0	182	-	182	0.00
27	135	0.06	19	202	0	202	-	202	0.00
28	140	0.04	11	213	0	213	-	213	0.00
29	145	0.26	77	289	0	289	-	289	0.01
30	150	0.31	93	382	0	382	-	382	0.01
31	155	0.40	121	504	0	504	-	504	0.01
32	160	0.16	48	551	0	551	-	551	0.01
33	165	0.02	6	558	0	558	-	558	0.01
34	170	0.02	6	564	0	564	-	564	0.01
35	175	0.02	6	569	0	569	-	569	0.01
36	180	0.01	2	571	0	571	-	571	0.01

1

JOB # C2026

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	0.01	2	2	0	2	-	2	0.00
2	10	0.01	3	5	0	5	-	5	0.00
3	15	0.01	3	7	0	7	-	7	0.00
4	20	0.01	3	10	0	10	-	10	0.00
5	25	0.01	3	12	0	12	-	12	0.00
6	30	0.01	3	15	0	15	-	15	0.00
7	35	0.01	3	18	0	18	-	18	0.00
8	40	0.01	3	21	0	21	-	21	0.00
9	45	0.01	3	24	0	24	-	24	0.00
10	50	0.01	3	27	0	27	-	27	0.00
11	55	0.01	3	30	0	30	-	30	0.00
12	60	0.01	3	33	0	33	-	33	0.00
13	65	0.01	3	37	0	37	-	37	0.00
14	70	0.01	3	40	0	40	-	40	0.00
15	75	0.01	3	43	0	43	-	43	0.00
16	80	0.01	3	47	0	47	-	47	0.00
17	85	0.01	3	50	0	50	-	50	0.00
18	90	0.01	3	54	0	54	-	54	0.00
19	95	0.01	3	57	0	57	-	57	0.00
20	100	0.01	3	60	0	60	-	60	0.00
21	105	0.01	3	64	0	64	-	64	0.00
22	110	0.01	3	67	0	67	-	67	0.00
23	115	0.01	3	70	0	70	-	70	0.00
24	120	0.01	4	74	0	74	-	74	0.00
25	125	0.01	3	78	0	78	-	78	0.00
26	130	0.01	4	81	0	81	-	81	0.00
27	135	0.01	4	85	0	85	-	85	0.00
28	140	0.01	4	89	0	89	-	89	0.00
29	145	0.01	4	93	0	93	-	93	0.00
30	150	0.01	4	97	0	97	-	97	0.00
31	155	0.01	4	100	0	100	-	100	0.00
32	160	0.01	4	104	0	104	-	104	0.00
33	165	0.01	4	108	0	108	-	108	0.00
34	170	0.01	4	113	0	113	-	113	0.00
35	175	0.01	4	117	0	117	-	117	0.00
36	180	0.01	4	121	0	121	-	121	0.00
37	185	0.01	4	125	0	125	-	125	0.00
38	190	0.02	5	130	0	130	-	130	0.00
39	195	0.02	5	135	0	135	-	135	0.00
40	200	0.02	5	139	0	139	-	139	0.00
41	205	0.02	5	144	0	144	-	144	0.00
42	210	0.02	5	150	0	150	-	150	0.00
43	215	0.02	6	156	0	156	-	156	0.00
44	220	0.02	6	162	0	162	-	162	0.00
45	225	0.02	6	168	0	168	-	168	0.00
46	230	0.02	6	174	0	174	-	174	0.00
47	235	0.02	7	181	0	181	-	181	0.00
48	240	0.02	7	188	0	188	-	188	0.00
49	245	0.02	7	195	0	195	-	195	0.00
50	250	0.03	8	203	0	203	-	203	0.00
51	255	0.03	8	211	0	211	-	211	0.00
52	260	0.03	8	219	0	219	-	219	0.01
53	265	0.03	9	228	0	228	-	228	0.01
54	270	0.03	9	237	0	237	-	237	0.01
55	275	0.03	9	246	0	246	-	246	0.01

1

JOB # C2026

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	0.03	10	256	0	256	-	256	0.01
57	285	0.03	10	266	0	266	-	266	0.01
58	290	0.03	10	276	0	276	-	276	0.01
59	295	0.04	11	287	0	287	-	287	0.01
60	300	0.04	11	298	0	298	-	298	0.01
61	305	0.04	13	311	0	311	-	311	0.01
62	310	0.04	12	322	0	322	-	322	0.01
63	315	0.08	24	346	0	346	-	346	0.01
64	320	0.12	37	383	0	383	-	383	0.01
65	325	0.19	58	441	0	441	-	441	0.01
66	330	0.32	96	537	0	537	-	537	0.01
67	335	0.03	8	545	0	545	-	545	0.01
68	340	0.01	4	549	0	549	-	549	0.01
69	345	0.01	3	551	0	551	-	551	0.01
70	350	0.01	2	553	0	553	-	553	0.01
71	355	0.00	1	555	0	555	-	555	0.01
72	360	0.00	1	556	0	556	-	556	0.01

1

JOB # C2026

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	1	1	0	1	-	1	0.00
2	30	0.00	2	3	0	3	-	3	0.00
3	45	0.00	2	5	0	5	-	5	0.00
4	60	0.00	2	7	0	7	-	7	0.00
5	75	0.00	2	9	0	9	-	9	0.00
6	90	0.00	2	11	0	11	-	11	0.00
7	105	0.00	2	13	0	13	-	13	0.00
8	120	0.00	2	15	0	15	-	15	0.00
9	135	0.00	2	17	0	17	-	17	0.00
10	150	0.00	2	20	0	20	-	20	0.00
11	165	0.00	3	23	0	23	-	23	0.00
12	180	0.00	3	26	0	26	-	26	0.00
13	195	0.00	3	29	0	29	-	29	0.00
14	210	0.00	3	32	0	32	-	32	0.00
15	225	0.00	3	35	0	35	-	35	0.00
16	240	0.00	4	39	0	39	-	39	0.00
17	255	0.00	4	42	0	42	-	42	0.00
18	270	0.00	4	46	0	46	-	46	0.00
19	285	0.00	4	51	0	51	-	51	0.00
20	300	0.01	5	55	0	55	-	55	0.00
21	315	0.00	4	59	0	59	-	59	0.00
22	330	0.00	4	63	0	63	-	63	0.00
23	345	0.01	5	68	0	68	-	68	0.00
24	360	0.01	5	73	0	73	-	73	0.00
25	375	0.01	5	78	0	78	-	78	0.00
26	390	0.01	5	84	0	84	-	84	0.00
27	405	0.01	6	90	0	90	-	90	0.00
28	420	0.01	6	96	0	96	-	96	0.00
29	435	0.01	6	102	0	102	-	102	0.00
30	450	0.01	7	108	0	108	-	108	0.00
31	465	0.01	7	116	0	116	-	116	0.00
32	480	0.01	8	123	0	123	-	123	0.00
33	495	0.01	9	132	0	132	-	132	0.00
34	510	0.01	9	142	0	142	-	142	0.00
35	525	0.01	10	151	0	151	-	151	0.00
36	540	0.01	10	161	0	161	-	161	0.00
37	555	0.01	11	173	0	173	-	173	0.00
38	570	0.01	12	185	0	185	-	185	0.00
39	585	0.01	13	198	0	198	-	198	0.00
40	600	0.01	13	211	0	211	-	211	0.00
41	615	0.01	9	220	0	220	-	220	0.01
42	630	0.01	9	229	0	229	-	229	0.01
43	645	0.01	12	241	0	241	-	241	0.01
44	660	0.01	12	253	0	253	-	253	0.01
45	675	0.01	11	264	0	264	-	264	0.01
46	690	0.01	11	276	0	276	-	276	0.01
47	705	0.01	10	286	0	286	-	286	0.01
48	720	0.01	11	297	0	297	-	297	0.01
49	735	0.02	15	312	0	312	-	312	0.01
50	750	0.02	16	328	0	328	-	328	0.01
51	765	0.02	17	344	0	344	-	344	0.01
52	780	0.02	17	362	0	362	-	362	0.01
53	795	0.02	20	382	0	382	-	382	0.01
54	810	0.02	20	403	0	403	-	403	0.01
55	825	0.02	14	417	0	417	-	417	0.01
56	840	0.02	14	431	0	431	-	431	0.01
57	855	0.02	16	447	0	447	-	447	0.01
58	870	0.02	16	462	0	462	-	462	0.01

1

JOB # C2026

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	0.02	16	478	0	478	-	478	0.01
60	900	0.02	15	493	0	493	-	493	0.01
61	915	0.02	14	508	0	508	-	508	0.01
62	930	0.02	14	522	0	522	-	522	0.01
63	945	0.01	11	533	0	533	-	533	0.01
64	960	0.01	11	544	0	544	-	544	0.01
65	975	0.00	2	547	0	547	-	547	0.01
66	990	0.00	2	549	0	549	-	549	0.01
67	1005	0.00	2	551	0	551	-	551	0.01
68	1020	0.00	2	553	0	553	-	553	0.01
69	1035	0.00	3	556	0	556	-	556	0.01
70	1050	0.00	3	559	0	559	-	559	0.01
71	1065	0.00	3	562	0	562	-	562	0.01
72	1080	0.00	2	564	0	564	-	564	0.01
73	1095	0.00	2	567	0	567	-	567	0.01
74	1110	0.00	2	569	0	569	-	569	0.01
75	1125	0.00	2	571	0	571	-	571	0.01
76	1140	0.00	1	572	0	572	-	572	0.01
77	1155	0.00	2	574	0	574	-	574	0.01
78	1170	0.00	2	576	0	576	-	576	0.01
79	1185	0.00	2	578	0	578	-	578	0.01
80	1200	0.00	1	579	0	579	-	579	0.01
81	1215	0.00	2	581	0	581	-	581	0.01
82	1230	0.00	2	583	0	583	-	583	0.01
83	1245	0.00	2	585	0	585	-	585	0.01
84	1260	0.00	1	586	0	586	-	586	0.01
85	1275	0.00	2	588	0	588	-	588	0.01
86	1290	0.00	1	589	0	589	-	589	0.01
87	1305	0.00	2	591	0	591	-	591	0.01
88	1320	0.00	1	592	0	592	-	592	0.01
89	1335	0.00	2	594	0	594	-	594	0.01
90	1350	0.00	1	595	0	595	-	595	0.01
91	1365	0.00	1	596	0	596	-	596	0.01
92	1380	0.00	1	597	0	597	-	597	0.01
93	1395	0.00	1	599	0	599	-	599	0.01
94	1410	0.00	1	600	0	600	-	600	0.01
95	1425	0.00	1	601	0	601	-	601	0.01
96	1440	0.00	1	602	0	602	-	602	0.01

	A	B	C	D
1	**RCFC&WCD SHORTCUT UNIT HYDROGRAPH METHOD**			
2	DATA INPUT SHEET			
3				
4	WORKSHEET PREPARED BY:	JAMES R. BAZUA, P.E.		
5				
6	PROJECT NAME	WORLD MUSEUM SOUTH PROP 10 YR EVENT		
7	JOB #	C2026		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ON-SITE		
11				
12	TRIBUTARY AREAS	ACRES		
13				
14	COMMERCIAL			
15	PAVING/HARDSCAPE	0.37		
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	0.51		
23	RETENTION BASIN			
24	GOLF COURSE			
25	MOUNTAINOUS	0.35		
26	LOW LOSS RATE (PERCENT)	90%		
27				
28	LENGTH OF WATERCOURSE (L)	315		
29	LENGTH TO POINT OPPOSITE CENTROID (Lca)	15		
30				
31	ELEVATION OF HEADWATER	329		
32	ELEVATION OF CONCENTRATION POINT	267		
33				
34	AVERAGE MANNINGS 'N' VALUE	0.02		
35				
36	STORM FREQUENCY (YEAR)	100		
37				
38	POINT RAIN			
39	3-HOUR	1.5		
40	6-HOUR	1.93		
41	24-HOUR	2.66		
42				
43	BASIN CHARACTERISTICS:	ELEVATION	AREA	
44				
45				
46				
47				
48				
49				
50				
51				
52	PERCOLATION RATE (in/hr)			
53				
54	DRYWELL DATA			
55	NUMBER USED			
56	PERCOLATION RATE (cfs)			

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD — PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVENT
BASIC DATA CALCULATION FORM — JOB # C2026
SHORTCUT METHOD — BY ES R. BAZUA, P.E. — DATE 3/28/2025

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ON-SITE
[3] AREA - ACRES	1.230
[4] L-FEET	315
[5] L-MILES	0.060
[6] La-FEET	15.00
[7] La-MILES	0.003
[8] ELEVATION OF HEADWATER	329
[9] ELEVATION OF CONCENTRATION POINT	267
[10] H-FEET	62
[11] S-FEET/MILE	1039.2
[12] S^0.5	32.24
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.00
[16] LAG TIME-MINUTES	0.3
[17] 100% OF LAG-MINUTES	0.3
[18] 200% OF LAG-MINUTES	0.6
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.00

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
1.50	1.230	1.00	1.50	1.93	1.230	1.00	1.93	2.66	1.230	1.00	2.66
		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]	1.23	SUM [7]	1.50	SUM [9]	1.23	SUM [11]	1.93	SUM [13]	1.23	SUM [15]	2.66
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.50				1.93				2.66

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.54	0.51	0.26
FLOOD VOLUME	(cu-ft)	2,398	2,283	1,178
	(acre-ft)	0.06	0.05	0.03
REQUIRED STORAGE	(cu-ft)	2,379	2,264	1,168
	(acre-ft)	0.05	0.05	0.03
PEAK FLOW	(cfs)	1.35	1.13	0.04
MAXIMUM WSEL	(ft)	-	-	-

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD	PROJECT WORLD MUSEUM SOUTH PROP 10 YR EVENT
	CONCENTRATION POINT: 1
	BY MES R. BAZUA, P.E. DATE 3/28/2025

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)
A	COMMERCIAL	32	0.74	90%	0.14	0.00	0.000	0.0000
A	PAVING/HARDSCAPE	32	0.74	100%	0.07	0.37	0.301	0.0223
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.74	0%	0.74	0.51	0.415	0.3068
A	RETENTION BASINS	32	0.74	0%	0.74	0.00	0.000	0.0000
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.35	0.285	0.0514
					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	1.23	SUM	0.3805

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.19022561

C= 0.00352

Ft=C(24-(T/60))^1.55 = 0.00352 (24-(T/60))^1.55 + 0.19 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: WORLD MUSEUM SOUTH PROP 10 YR EVENT
CONCENTRATION POINT: 1

BY: IES R. BAZUA, DATE 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.28
UNIT TIME-PERCENT OF LAG	1760.7
TOTAL ADJUSTED STORM RAIN-INCHES	1.50
CONSTANT LOSS RATE-in/hr	0.38
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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	0.234	0.38	0.21	0.02	0.03	8.63
2	10	0.17	1.3	0.234	0.38	0.21	0.02	0.03	8.63
3	15	0.25	1.1	0.198	0.38	0.18	0.02	0.02	7.31
4	20	0.33	1.5	0.270	0.38	0.24	0.03	0.03	9.96
5	25	0.42	1.5	0.270	0.38	0.24	0.03	0.03	9.96
6	30	0.50	1.8	0.324	0.38	0.29	0.03	0.04	11.96
7	35	0.58	1.5	0.270	0.38	0.24	0.03	0.03	9.96
8	40	0.67	1.8	0.324	0.38	0.29	0.03	0.04	11.96
9	45	0.75	1.8	0.324	0.38	0.29	0.03	0.04	11.96
10	50	0.83	1.5	0.270	0.38	0.24	0.03	0.03	9.96
11	55	0.92	1.6	0.288	0.38	0.26	0.03	0.04	10.63
12	60	1.00	1.8	0.324	0.38	0.29	0.03	0.04	11.96
13	65	1.08	2.2	0.396	0.38	0.36	0.02	0.02	5.74
14	70	1.17	2.2	0.396	0.38	0.36	0.02	0.02	5.74
15	75	1.25	2.2	0.396	0.38	0.36	0.02	0.02	5.74
16	80	1.33	2.0	0.360	0.38	0.32	0.04	0.04	13.28
17	85	1.42	2.6	0.468	0.38	0.42	0.09	0.11	32.31
18	90	1.50	2.7	0.486	0.38	0.44	0.11	0.13	38.95
19	95	1.58	2.4	0.432	0.38	0.39	0.05	0.06	19.02
20	100	1.67	2.7	0.486	0.38	0.44	0.11	0.13	38.95
21	105	1.75	3.3	0.594	0.38	0.53	0.21	0.26	78.80
22	110	1.83	3.1	0.558	0.38	0.50	0.18	0.22	65.52
23	115	1.92	2.9	0.522	0.38	0.47	0.14	0.17	52.23
24	120	2.00	3.0	0.540	0.38	0.49	0.16	0.20	58.87
25	125	2.08	3.1	0.558	0.38	0.50	0.18	0.22	65.52
26	130	2.17	4.2	0.756	0.38	0.68	0.38	0.46	138.58
27	135	2.25	5.0	0.900	0.38	0.81	0.52	0.64	191.71
28	140	2.33	3.5	0.630	0.38	0.57	0.25	0.31	92.08
29	145	2.42	6.8	1.224	0.38	1.10	0.84	1.04	311.27
30	150	2.50	7.3	1.314	0.38	1.18	0.93	1.15	344.48
31	155	2.58	8.2	1.476	0.38	1.33	1.10	1.35	404.26
32	160	2.67	5.9	1.062	0.38	0.96	0.68	0.84	251.49
33	165	2.75	2.0	0.360	0.38	0.32	0.04	0.04	13.28
34	170	2.83	1.8	0.324	0.38	0.29	0.03	0.04	11.96
35	175	2.92	1.8	0.324	0.38	0.29	0.03	0.04	11.96
36	180	3.00	0.6	0.108	0.38	0.10	0.01	0.01	3.99

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.54
FLOOD VOLUME (acft)	0.06
FLOOD VOLUME (cuft)	2398.41
REQUIRED STORAGE (acft)	0.05
REQUIRED STORAGE (cuft)	2378.58
PEAK FLOW RATE (cfs)	1.35

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

PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVEN
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.28
UNIT TIME-PERCENT OF LAG	1760.7
TOTAL ADJUSTED STORM RAIN-INCHES	1.93
CONSTANT LOSS RATE-in/hr	0.380
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.00 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
1	5	0.08	0.5	0.116	0.38	0.10	0.01	0.01	4.27
2	10	0.17	0.6	0.139	0.38	0.13	0.01	0.02	5.13
3	15	0.25	0.6	0.139	0.38	0.13	0.01	0.02	5.13
4	20	0.33	0.6	0.139	0.38	0.13	0.01	0.02	5.13
5	25	0.42	0.6	0.139	0.38	0.13	0.01	0.02	5.13
6	30	0.50	0.7	0.162	0.38	0.15	0.02	0.02	5.98
7	35	0.58	0.7	0.162	0.38	0.15	0.02	0.02	5.98
8	40	0.67	0.7	0.162	0.38	0.15	0.02	0.02	5.98
9	45	0.75	0.7	0.162	0.38	0.15	0.02	0.02	5.98
10	50	0.83	0.7	0.162	0.38	0.15	0.02	0.02	5.98
11	55	0.92	0.7	0.162	0.38	0.15	0.02	0.02	5.98
12	60	1.00	0.8	0.185	0.38	0.17	0.02	0.02	6.84
13	65	1.08	0.8	0.185	0.38	0.17	0.02	0.02	6.84
14	70	1.17	0.8	0.185	0.38	0.17	0.02	0.02	6.84
15	75	1.25	0.8	0.185	0.38	0.17	0.02	0.02	6.84
16	80	1.33	0.8	0.185	0.38	0.17	0.02	0.02	6.84
17	85	1.42	0.8	0.185	0.38	0.17	0.02	0.02	6.84
18	90	1.50	0.8	0.185	0.38	0.17	0.02	0.02	6.84
19	95	1.58	0.8	0.185	0.38	0.17	0.02	0.02	6.84
20	100	1.67	0.8	0.185	0.38	0.17	0.02	0.02	6.84
21	105	1.75	0.8	0.185	0.38	0.17	0.02	0.02	6.84
22	110	1.83	0.8	0.185	0.38	0.17	0.02	0.02	6.84
23	115	1.92	0.8	0.185	0.38	0.17	0.02	0.02	6.84
24	120	2.00	0.9	0.208	0.38	0.19	0.02	0.03	7.69
25	125	2.08	0.8	0.185	0.38	0.17	0.02	0.02	6.84
26	130	2.17	0.9	0.208	0.38	0.19	0.02	0.03	7.69
27	135	2.25	0.9	0.208	0.38	0.19	0.02	0.03	7.69
28	140	2.33	0.9	0.208	0.38	0.19	0.02	0.03	7.69
29	145	2.42	0.9	0.208	0.38	0.19	0.02	0.03	7.69
30	150	2.50	0.9	0.208	0.38	0.19	0.02	0.03	7.69
31	155	2.58	0.9	0.208	0.38	0.19	0.02	0.03	7.69
32	160	2.67	0.9	0.208	0.38	0.19	0.02	0.03	7.69
33	165	2.75	1.0	0.232	0.38	0.21	0.02	0.03	8.55
34	170	2.83	1.0	0.232	0.38	0.21	0.02	0.03	8.55
35	175	2.92	1.0	0.232	0.38	0.21	0.02	0.03	8.55
36	180	3.00	1.0	0.232	0.38	0.21	0.02	0.03	8.55
37	185	3.08	1.0	0.232	0.38	0.21	0.02	0.03	8.55
38	190	3.17	1.1	0.255	0.38	0.23	0.03	0.03	9.40
39	195	3.25	1.1	0.255	0.38	0.23	0.03	0.03	9.40
40	200	3.33	1.1	0.255	0.38	0.23	0.03	0.03	9.40
41	205	3.42	1.2	0.278	0.38	0.25	0.03	0.03	10.26
42	210	3.50	1.3	0.301	0.38	0.27	0.03	0.04	11.11
43	215	3.58	1.4	0.324	0.38	0.29	0.03	0.04	11.96
44	220	3.67	1.4	0.324	0.38	0.29	0.03	0.04	11.96
45	225	3.75	1.5	0.347	0.38	0.31	0.03	0.04	12.82
46	230	3.83	1.5	0.347	0.38	0.31	0.03	0.04	12.82
47	235	3.92	1.6	0.371	0.38	0.33	0.04	0.05	13.67
48	240	4.00	1.6	0.371	0.38	0.33	0.04	0.05	13.67
49	245	4.08	1.7	0.394	0.38	0.35	0.01	0.02	4.90
50	250	4.17	1.8	0.417	0.38	0.38	0.04	0.04	13.44
51	255	4.25	1.9	0.440	0.38	0.40	0.06	0.07	21.99
52	260	4.33	2.0	0.463	0.38	0.42	0.08	0.10	30.53
53	265	4.42	2.1	0.486	0.38	0.44	0.11	0.13	39.08
54	270	4.50	2.1	0.486	0.38	0.44	0.11	0.13	39.08
55	275	4.58	2.2	0.510	0.38	0.46	0.13	0.16	47.63
56	280	4.67	2.3	0.533	0.38	0.48	0.15	0.19	56.17

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVEN CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.23		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.28		
UNIT TIME-PERCENT OF LAG	1760.7		
TOTAL ADJUSTED STORM RAIN-INCHES	1.93		
CONSTANT LOSS RATE-in/hr	0.380		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.00 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	0.556	0.38	0.50	0.18	0.22	64.72
58	290	4.83	2.4	0.556	0.38	0.50	0.18	0.22	64.72
59	295	4.92	2.5	0.579	0.38	0.52	0.20	0.24	73.26
60	300	5.00	2.6	0.602	0.38	0.54	0.22	0.27	81.81
61	305	5.08	3.1	0.718	0.38	0.65	0.34	0.42	124.54
62	310	5.17	3.6	0.834	0.38	0.75	0.45	0.56	167.27
63	315	5.25	3.9	0.903	0.38	0.81	0.52	0.64	192.91
64	320	5.33	4.2	0.973	0.38	0.88	0.59	0.73	218.55
65	325	5.42	4.7	1.089	0.38	0.98	0.71	0.87	261.28
66	330	5.50	5.6	1.297	0.38	1.17	0.92	1.13	338.19
67	335	5.58	1.9	0.440	0.38	0.40	0.06	0.07	21.99
68	340	5.67	0.9	0.208	0.38	0.19	0.02	0.03	7.69
69	345	5.75	0.6	0.139	0.38	0.13	0.01	0.02	5.13
70	350	5.83	0.5	0.116	0.38	0.10	0.01	0.01	4.27
71	355	5.92	0.3	0.069	0.38	0.06	0.01	0.01	2.56
72	360	6.00	0.2	0.046	0.38	0.04	0.00	0.01	1.71

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.51
FLOOD VOLUME (acft)	0.05
FLOOD VOLUME (cuft)	2282.59
REQUIRED STORAGE (acft)	0.05
REQUIRED STORAGE (cuft)	2263.72
PEAK FLOW RATE (cfs)	1.13

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

PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVENT
CONCENTRATION POINT: 1

BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.3805
LAG TIME - MINUTES	0.28	MINIMUM LOSS RATE (for var. loss) - in/hr	0.190
UNIT TIME-PERCENT OF LAG	5282.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00352
		PERCOLATION RATE (cfs)	0.00

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			
1	15	0.25	0.2	0.021	0.672	0.019	0.002	0.00	2.36
2	30	0.50	0.3	0.032	0.664	0.029	0.003	0.00	3.53
3	45	0.75	0.3	0.032	0.656	0.029	0.003	0.00	3.53
4	60	1.00	0.4	0.043	0.649	0.038	0.004	0.01	4.71
5	75	1.25	0.3	0.032	0.641	0.029	0.003	0.00	3.53
6	90	1.50	0.3	0.032	0.633	0.029	0.003	0.00	3.53
7	105	1.75	0.3	0.032	0.626	0.029	0.003	0.00	3.53
8	120	2.00	0.4	0.043	0.618	0.038	0.004	0.01	4.71
9	135	2.25	0.4	0.043	0.611	0.038	0.004	0.01	4.71
10	150	2.50	0.4	0.043	0.603	0.038	0.004	0.01	4.71
11	165	2.75	0.5	0.053	0.596	0.048	0.005	0.01	5.89
12	180	3.00	0.5	0.053	0.589	0.048	0.005	0.01	5.89
13	195	3.25	0.5	0.053	0.581	0.048	0.005	0.01	5.89
14	210	3.50	0.5	0.053	0.574	0.048	0.005	0.01	5.89
15	225	3.75	0.5	0.053	0.567	0.048	0.005	0.01	5.89
16	240	4.00	0.6	0.064	0.560	0.057	0.006	0.01	7.07
17	255	4.25	0.6	0.064	0.553	0.057	0.006	0.01	7.07
18	270	4.50	0.7	0.074	0.546	0.067	0.007	0.01	8.24
19	285	4.75	0.7	0.074	0.539	0.067	0.007	0.01	8.24
20	300	5.00	0.8	0.085	0.532	0.077	0.009	0.01	9.42
21	315	5.25	0.6	0.064	0.525	0.057	0.006	0.01	7.07
22	330	5.50	0.7	0.074	0.518	0.067	0.007	0.01	8.24
23	345	5.75	0.8	0.085	0.511	0.077	0.009	0.01	9.42
24	360	6.00	0.8	0.085	0.504	0.077	0.009	0.01	9.42
25	375	6.25	0.9	0.096	0.498	0.086	0.010	0.01	10.60
26	390	6.50	0.9	0.096	0.491	0.086	0.010	0.01	10.60
27	405	6.75	1.0	0.106	0.485	0.096	0.011	0.01	11.78
28	420	7.00	1.0	0.106	0.478	0.096	0.011	0.01	11.78
29	435	7.25	1.0	0.106	0.471	0.096	0.011	0.01	11.78
30	450	7.50	1.1	0.117	0.465	0.105	0.012	0.01	12.96
31	465	7.75	1.2	0.128	0.459	0.115	0.013	0.02	14.13
32	480	8.00	1.3	0.138	0.452	0.124	0.014	0.02	15.31
33	495	8.25	1.5	0.160	0.446	0.144	0.016	0.02	17.67
34	510	8.50	1.5	0.160	0.440	0.144	0.016	0.02	17.67
35	525	8.75	1.6	0.170	0.434	0.153	0.017	0.02	18.85
36	540	9.00	1.7	0.181	0.428	0.163	0.018	0.02	20.02
37	555	9.25	1.9	0.202	0.422	0.182	0.020	0.02	22.38
38	570	9.50	2.0	0.213	0.416	0.192	0.021	0.03	23.56
39	585	9.75	2.1	0.223	0.410	0.201	0.022	0.03	24.73
40	600	10.00	2.2	0.234	0.404	0.211	0.023	0.03	25.91
41	615	10.25	1.5	0.160	0.398	0.144	0.016	0.02	17.67
42	630	10.50	1.5	0.160	0.392	0.144	0.016	0.02	17.67
43	645	10.75	2.0	0.213	0.386	0.192	0.021	0.03	23.56
44	660	11.00	2.0	0.213	0.381	0.192	0.021	0.03	23.56
45	675	11.25	1.9	0.202	0.375	0.182	0.020	0.02	22.38
46	690	11.50	1.9	0.202	0.370	0.182	0.020	0.02	22.38
47	705	11.75	1.7	0.181	0.364	0.163	0.018	0.02	20.02
48	720	12.00	1.8	0.192	0.359	0.172	0.019	0.02	21.20
49	735	12.25	2.5	0.266	0.353	0.239	0.027	0.03	29.45
50	750	12.50	2.6	0.277	0.348	0.249	0.028	0.03	30.62
51	765	12.75	2.8	0.298	0.343	0.268	0.030	0.04	32.98
52	780	13.00	2.9	0.309	0.338	0.278	0.031	0.04	34.16
53	795	13.25	3.4	0.362	0.333	0.326	0.029	0.04	32.31
54	810	13.50	3.4	0.362	0.328	0.326	0.034	0.04	37.89
55	825	13.75	2.3	0.245	0.323	0.220	0.024	0.03	27.09
56	840	14.00	2.3	0.245	0.318	0.220	0.024	0.03	27.09
57	855	14.25	2.7	0.287	0.313	0.259	0.029	0.04	31.80
58	870	14.50	2.6	0.277	0.308	0.249	0.028	0.03	30.62
59	885	14.75	2.6	0.277	0.303	0.249	0.028	0.03	30.62
60	900	15.00	2.5	0.266	0.299	0.239	0.027	0.03	29.45
61	915	15.25	2.4	0.255	0.294	0.230	0.026	0.03	28.27
62	930	15.50	2.3	0.245	0.290	0.220	0.024	0.03	27.09
63	945	15.75	1.9	0.202	0.285	0.182	0.020	0.02	22.38
64	960	16.00	1.9	0.202	0.281	0.182	0.020	0.02	22.38
65	975	16.25	0.4	0.043	0.277	0.038	0.004	0.01	4.71
66	990	16.50	0.4	0.043	0.272	0.038	0.004	0.01	4.71
67	1005	16.75	0.3	0.032	0.268	0.029	0.003	0.00	3.53

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVENT CONCENTRATION POINT: 1 BY: JAMES R. BAZ DATE: 3/28/2025

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	1.230	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.3805
LAG TIME - MINUTES	0.28	MINIMUM LOSS RATE (for var. loss) - in/hr	0.190
UNIT TIME-PERCENT OF LAG	5282.1	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.66	C	0.00352
		PERCOLATION RATE (cfs)	0.00

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
68	1020	17.00	0.3	0.032	0.264	0.029	0.003	0.00	3.53
69	1035	17.25	0.5	0.053	0.260	0.048	0.005	0.01	5.89
70	1050	17.50	0.5	0.053	0.256	0.048	0.005	0.01	5.89
71	1065	17.75	0.5	0.053	0.252	0.048	0.005	0.01	5.89
72	1080	18.00	0.4	0.043	0.249	0.038	0.004	0.01	4.71
73	1095	18.25	0.4	0.043	0.245	0.038	0.004	0.01	4.71
74	1110	18.50	0.4	0.043	0.241	0.038	0.004	0.01	4.71
75	1125	18.75	0.3	0.032	0.238	0.029	0.003	0.00	3.53
76	1140	19.00	0.2	0.021	0.235	0.019	0.002	0.00	2.36
77	1155	19.25	0.3	0.032	0.231	0.029	0.003	0.00	3.53
78	1170	19.50	0.4	0.043	0.228	0.038	0.004	0.01	4.71
79	1185	19.75	0.3	0.032	0.225	0.029	0.003	0.00	3.53
80	1200	20.00	0.2	0.021	0.222	0.019	0.002	0.00	2.36
81	1215	20.25	0.3	0.032	0.219	0.029	0.003	0.00	3.53
82	1230	20.50	0.3	0.032	0.216	0.029	0.003	0.00	3.53
83	1245	20.75	0.3	0.032	0.213	0.029	0.003	0.00	3.53
84	1260	21.00	0.2	0.021	0.211	0.019	0.002	0.00	2.36
85	1275	21.25	0.3	0.032	0.208	0.029	0.003	0.00	3.53
86	1290	21.50	0.2	0.021	0.206	0.019	0.002	0.00	2.36
87	1305	21.75	0.3	0.032	0.204	0.029	0.003	0.00	3.53
88	1320	22.00	0.2	0.021	0.202	0.019	0.002	0.00	2.36
89	1335	22.25	0.3	0.032	0.200	0.029	0.003	0.00	3.53
90	1350	22.50	0.2	0.021	0.198	0.019	0.002	0.00	2.36
91	1365	22.75	0.2	0.021	0.196	0.019	0.002	0.00	2.36
92	1380	23.00	0.2	0.021	0.194	0.019	0.002	0.00	2.36
93	1395	23.25	0.2	0.021	0.193	0.019	0.002	0.00	2.36
94	1410	23.50	0.2	0.021	0.192	0.019	0.002	0.00	2.36
95	1425	23.75	0.2	0.021	0.191	0.019	0.002	0.00	2.36
96	1440	24.00	0.2	0.021	0.190	0.019	0.002	0.00	2.36

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.26
FLOOD VOLUME (acft)	0.03
FLOOD VOLUME (cuft)	1177.70
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1167.96
PEAK FLOW (cfs)	0.04

PROJECT: WORLD MUSEUM SOUTH PROP 10 YR EVENT
JOB # C2026
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
0	0	0		0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00
0	0	0	0	0	0	0	0.00

PERCOLATION CALCULATIONS
PERCOLATION RATE 0 in/hr 0.00 cfs

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

TOTAL PERCOLATION RATE 0.00 cfs

1

JOB # C2026

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	0.03	9	9	0	9	-	9	0.00
2	10	0.03	9	17	0	17	-	17	0.00
3	15	0.02	7	25	0	25	-	25	0.00
4	20	0.03	10	35	0	35	-	35	0.00
5	25	0.03	10	45	0	45	-	45	0.00
6	30	0.04	12	56	0	56	-	56	0.00
7	35	0.03	10	66	0	66	-	66	0.00
8	40	0.04	12	78	0	78	-	78	0.00
9	45	0.04	12	90	0	90	-	90	0.00
10	50	0.03	10	100	0	100	-	100	0.00
11	55	0.04	11	111	0	111	-	111	0.00
12	60	0.04	12	123	0	123	-	123	0.00
13	65	0.02	6	129	0	129	-	129	0.00
14	70	0.02	6	134	0	134	-	134	0.00
15	75	0.02	6	140	0	140	-	140	0.00
16	80	0.04	13	153	0	153	-	153	0.00
17	85	0.11	32	186	0	186	-	186	0.00
18	90	0.13	39	225	0	225	-	225	0.01
19	95	0.06	19	244	0	244	-	244	0.01
20	100	0.13	39	283	0	283	-	283	0.01
21	105	0.26	79	361	0	361	-	361	0.01
22	110	0.22	66	427	0	427	-	427	0.01
23	115	0.17	52	479	0	479	-	479	0.01
24	120	0.20	59	538	0	538	-	538	0.01
25	125	0.22	66	604	0	604	-	604	0.01
26	130	0.46	139	742	0	742	-	742	0.02
27	135	0.64	192	934	0	934	-	934	0.02
28	140	0.31	92	1,026	0	1,026	-	1,026	0.02
29	145	1.04	311	1,337	0	1,337	-	1,337	0.03
30	150	1.15	344	1,682	0	1,682	-	1,682	0.04
31	155	1.35	404	2,086	0	2,086	-	2,086	0.05
32	160	0.84	251	2,337	0	2,337	-	2,337	0.05
33	165	0.04	13	2,351	0	2,351	-	2,351	0.05
34	170	0.04	12	2,363	0	2,363	-	2,363	0.05
35	175	0.04	12	2,375	0	2,375	-	2,375	0.05
36	180	0.01	4	2,379	0	2,379	-	2,379	0.05

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JOB # C2026

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	0.01	4	4	0	4	-	4	0.00
2	10	0.02	5	9	0	9	-	9	0.00
3	15	0.02	5	15	0	15	-	15	0.00
4	20	0.02	5	20	0	20	-	20	0.00
5	25	0.02	5	25	0	25	-	25	0.00
6	30	0.02	6	31	0	31	-	31	0.00
7	35	0.02	6	37	0	37	-	37	0.00
8	40	0.02	6	43	0	43	-	43	0.00
9	45	0.02	6	49	0	49	-	49	0.00
10	50	0.02	6	55	0	55	-	55	0.00
11	55	0.02	6	61	0	61	-	61	0.00
12	60	0.02	7	68	0	68	-	68	0.00
13	65	0.02	7	74	0	74	-	74	0.00
14	70	0.02	7	81	0	81	-	81	0.00
15	75	0.02	7	88	0	88	-	88	0.00
16	80	0.02	7	95	0	95	-	95	0.00
17	85	0.02	7	102	0	102	-	102	0.00
18	90	0.02	7	109	0	109	-	109	0.00
19	95	0.02	7	115	0	115	-	115	0.00
20	100	0.02	7	122	0	122	-	122	0.00
21	105	0.02	7	129	0	129	-	129	0.00
22	110	0.02	7	136	0	136	-	136	0.00
23	115	0.02	7	143	0	143	-	143	0.00
24	120	0.03	8	150	0	150	-	150	0.00
25	125	0.02	7	157	0	157	-	157	0.00
26	130	0.03	8	165	0	165	-	165	0.00
27	135	0.03	8	173	0	173	-	173	0.00
28	140	0.03	8	180	0	180	-	180	0.00
29	145	0.03	8	188	0	188	-	188	0.00
30	150	0.03	8	196	0	196	-	196	0.00
31	155	0.03	8	203	0	203	-	203	0.00
32	160	0.03	8	211	0	211	-	211	0.00
33	165	0.03	9	220	0	220	-	220	0.01
34	170	0.03	9	228	0	228	-	228	0.01
35	175	0.03	9	237	0	237	-	237	0.01
36	180	0.03	9	245	0	245	-	245	0.01
37	185	0.03	9	254	0	254	-	254	0.01
38	190	0.03	9	263	0	263	-	263	0.01
39	195	0.03	9	273	0	273	-	273	0.01
40	200	0.03	9	282	0	282	-	282	0.01
41	205	0.03	10	292	0	292	-	292	0.01
42	210	0.04	11	303	0	303	-	303	0.01
43	215	0.04	12	315	0	315	-	315	0.01
44	220	0.04	12	327	0	327	-	327	0.01
45	225	0.04	13	340	0	340	-	340	0.01
46	230	0.04	13	353	0	353	-	353	0.01
47	235	0.05	14	367	0	367	-	367	0.01
48	240	0.05	14	380	0	380	-	380	0.01
49	245	0.02	5	385	0	385	-	385	0.01
50	250	0.04	13	399	0	399	-	399	0.01
51	255	0.07	22	421	0	421	-	421	0.01
52	260	0.10	31	451	0	451	-	451	0.01
53	265	0.13	39	490	0	490	-	490	0.01
54	270	0.13	39	529	0	529	-	529	0.01
55	275	0.16	48	577	0	577	-	577	0.01

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JOB # C2026

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	0.19	56	633	0	633	-	633	0.01
57	285	0.22	65	698	0	698	-	698	0.02
58	290	0.22	65	763	0	763	-	763	0.02
59	295	0.24	73	836	0	836	-	836	0.02
60	300	0.27	82	918	0	918	-	918	0.02
61	305	0.42	125	1,042	0	1,042	-	1,042	0.02
62	310	0.56	167	1,209	0	1,209	-	1,209	0.03
63	315	0.64	193	1,402	0	1,402	-	1,402	0.03
64	320	0.73	219	1,621	0	1,621	-	1,621	0.04
65	325	0.87	261	1,882	0	1,882	-	1,882	0.04
66	330	1.13	338	2,220	0	2,220	-	2,220	0.05
67	335	0.07	22	2,242	0	2,242	-	2,242	0.05
68	340	0.03	8	2,250	0	2,250	-	2,250	0.05
69	345	0.02	5	2,255	0	2,255	-	2,255	0.05
70	350	0.01	4	2,259	0	2,259	-	2,259	0.05
71	355	0.01	3	2,262	0	2,262	-	2,262	0.05
72	360	0.01	2	2,264	0	2,264	-	2,264	0.05

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JOB # C2026

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	2	2	0	2	-	2	0.00
2	30	0.00	4	6	0	6	-	6	0.00
3	45	0.00	4	9	0	9	-	9	0.00
4	60	0.01	5	14	0	14	-	14	0.00
5	75	0.00	4	18	0	18	-	18	0.00
6	90	0.00	4	21	0	21	-	21	0.00
7	105	0.00	4	25	0	25	-	25	0.00
8	120	0.01	5	29	0	29	-	29	0.00
9	135	0.01	5	34	0	34	-	34	0.00
10	150	0.01	5	39	0	39	-	39	0.00
11	165	0.01	6	45	0	45	-	45	0.00
12	180	0.01	6	51	0	51	-	51	0.00
13	195	0.01	6	57	0	57	-	57	0.00
14	210	0.01	6	62	0	62	-	62	0.00
15	225	0.01	6	68	0	68	-	68	0.00
16	240	0.01	7	75	0	75	-	75	0.00
17	255	0.01	7	82	0	82	-	82	0.00
18	270	0.01	8	91	0	91	-	91	0.00
19	285	0.01	8	99	0	99	-	99	0.00
20	300	0.01	9	108	0	108	-	108	0.00
21	315	0.01	7	115	0	115	-	115	0.00
22	330	0.01	8	124	0	124	-	124	0.00
23	345	0.01	9	133	0	133	-	133	0.00
24	360	0.01	9	143	0	143	-	143	0.00
25	375	0.01	11	153	0	153	-	153	0.00
26	390	0.01	11	164	0	164	-	164	0.00
27	405	0.01	12	175	0	175	-	175	0.00
28	420	0.01	12	187	0	187	-	187	0.00
29	435	0.01	12	199	0	199	-	199	0.00
30	450	0.01	13	212	0	212	-	212	0.00
31	465	0.02	14	226	0	226	-	226	0.01
32	480	0.02	15	241	0	241	-	241	0.01
33	495	0.02	18	259	0	259	-	259	0.01
34	510	0.02	18	277	0	277	-	277	0.01
35	525	0.02	19	296	0	296	-	296	0.01
36	540	0.02	20	316	0	316	-	316	0.01
37	555	0.02	22	338	0	338	-	338	0.01
38	570	0.03	24	362	0	362	-	362	0.01
39	585	0.03	25	386	0	386	-	386	0.01
40	600	0.03	26	412	0	412	-	412	0.01
41	615	0.02	18	430	0	430	-	430	0.01
42	630	0.02	18	448	0	448	-	448	0.01
43	645	0.03	24	471	0	471	-	471	0.01
44	660	0.03	24	495	0	495	-	495	0.01
45	675	0.02	22	517	0	517	-	517	0.01
46	690	0.02	22	539	0	539	-	539	0.01
47	705	0.02	20	559	0	559	-	559	0.01
48	720	0.02	21	581	0	581	-	581	0.01
49	735	0.03	29	610	0	610	-	610	0.01
50	750	0.03	31	641	0	641	-	641	0.01
51	765	0.04	33	674	0	674	-	674	0.02
52	780	0.04	34	708	0	708	-	708	0.02
53	795	0.04	32	740	0	740	-	740	0.02
54	810	0.04	38	778	0	778	-	778	0.02
55	825	0.03	27	805	0	805	-	805	0.02
56	840	0.03	27	832	0	832	-	832	0.02
57	855	0.04	32	864	0	864	-	864	0.02
58	870	0.03	31	895	0	895	-	895	0.02

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JOB # C2026

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	0.03	31	925	0	925	-	925	0.02
60	900	0.03	29	955	0	955	-	955	0.02
61	915	0.03	28	983	0	983	-	983	0.02
62	930	0.03	27	1,010	0	1,010	-	1,010	0.02
63	945	0.02	22	1,033	0	1,033	-	1,033	0.02
64	960	0.02	22	1,055	0	1,055	-	1,055	0.02
65	975	0.01	5	1,060	0	1,060	-	1,060	0.02
66	990	0.01	5	1,064	0	1,064	-	1,064	0.02
67	1005	0.00	4	1,068	0	1,068	-	1,068	0.02
68	1020	0.00	4	1,071	0	1,071	-	1,071	0.02
69	1035	0.01	6	1,077	0	1,077	-	1,077	0.02
70	1050	0.01	6	1,083	0	1,083	-	1,083	0.02
71	1065	0.01	6	1,089	0	1,089	-	1,089	0.03
72	1080	0.01	5	1,094	0	1,094	-	1,094	0.03
73	1095	0.01	5	1,098	0	1,098	-	1,098	0.03
74	1110	0.01	5	1,103	0	1,103	-	1,103	0.03
75	1125	0.00	4	1,107	0	1,107	-	1,107	0.03
76	1140	0.00	2	1,109	0	1,109	-	1,109	0.03
77	1155	0.00	4	1,113	0	1,113	-	1,113	0.03
78	1170	0.01	5	1,117	0	1,117	-	1,117	0.03
79	1185	0.00	4	1,121	0	1,121	-	1,121	0.03
80	1200	0.00	2	1,123	0	1,123	-	1,123	0.03
81	1215	0.00	4	1,127	0	1,127	-	1,127	0.03
82	1230	0.00	4	1,130	0	1,130	-	1,130	0.03
83	1245	0.00	4	1,134	0	1,134	-	1,134	0.03
84	1260	0.00	2	1,136	0	1,136	-	1,136	0.03
85	1275	0.00	4	1,140	0	1,140	-	1,140	0.03
86	1290	0.00	2	1,142	0	1,142	-	1,142	0.03
87	1305	0.00	4	1,146	0	1,146	-	1,146	0.03
88	1320	0.00	2	1,148	0	1,148	-	1,148	0.03
89	1335	0.00	4	1,151	0	1,151	-	1,151	0.03
90	1350	0.00	2	1,154	0	1,154	-	1,154	0.03
91	1365	0.00	2	1,156	0	1,156	-	1,156	0.03
92	1380	0.00	2	1,159	0	1,159	-	1,159	0.03
93	1395	0.00	2	1,161	0	1,161	-	1,161	0.03
94	1410	0.00	2	1,163	0	1,163	-	1,163	0.03
95	1425	0.00	2	1,166	0	1,166	-	1,166	0.03
96	1440	0.00	2	1,168	0	1,168	-	1,168	0.03

V RUNOFF DISCHARGE CALCULATIONS

NORTH

Surface runoff on generated on the northerly portion of the project site is directed to an on-site curb inlet catch basin. Under the existing condition, runoff collected in the curb inlet catch basin enters an existing 24" storm drain pipe and is conveyed off-site. Under the proposed condition, runoff collected in the curb inlet catch basin will be diverted to an underground storage facility with the capacity to store 2,439 cu.ft. of runoff volume. Any runoff that exceeds the capacity of the underground storage facility will then enter the existing 24" storm drain pipe where it will be conveyed off-site as it is under existing conditions.

The volume that enters the existing 24" storm drain pipe to be conveyed off-site is less under the proposed condition that it is under the existing condition. As the runoff volume under both conditions leaves the same conduit with equal size and slope, the discharges (Q) leaving the site for existing vs proposed conditions is proportional to the calculated volumes leaving the 24" conduit for both conditions.

	2 YR DISCHARGE (Q) (CFS) LEAVING SITE	10 YR DISCHARGE (Q) (CFS) LEAVING SITE
NORTH EXISTING	3.88	10.73
NORTH PROPOSED	0	10.13

SOUTH

Surface runoff generated on the southerly portion of the site flows in a southeasterly direction. Under the existing condition, surface runoff flows to the southeasterly property boundary, against an existing perimeter wall, then follows the wall along a mild slope toward the south and ultimately leaves the site. Under the proposed condition, surface flow is directed toward a surface infiltration type detention basin with capacity to store the total runoff generated during the 10 year rain event, therefore no runoff is discharged off of the southerly portion of the site during the 2 year and 10 year events under proposed conditions.

	2 YR DISCHARGE (Q) (CFS) LEAVING SITE	10 YR DISCHARGE (Q) (CFS) LEAVING SITE
SOUTH EXISTING	0.23	0.63
SOUTH PROPOSED	0	0

Riverside County Rational Hydrology Program

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Rational Hydrology Study Date: 03/20/25 File:NORTHEXISTING2YR.out

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NORTH EXISTING 2 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.455(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 100.000 to Point/Station 101.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 436.000(Ft.)
Top (of initial area) elevation = 356.000(Ft.)
Bottom (of initial area) elevation = 264.500(Ft.)
Difference in elevation = 91.500(Ft.)
Slope = 0.20986 s(percent)= 20.99
TC = k(0.405)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.293 min.
Rainfall intensity = 1.645(In/Hr) for a 2.0 year storm

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.270
RI index for soil(AMC 1)  =   0.00
Pervious area fraction =  0.550; Impervious fraction =  0.450
Initial subarea runoff =      3.876(CFS)
Total initial stream area =        3.800(Ac.)
Pervious area fraction = 0.550
End of computations, total study area =            3.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.550
Area averaged RI index number =   0.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:NORTHEXISTING10YR.out

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NORTH EXISTING 10 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.259(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 100.000 to Point/Station 101.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 436.000(Ft.)
Top (of initial area) elevation = 356.000(Ft.)
Bottom (of initial area) elevation = 264.500(Ft.)
Difference in elevation = 91.500(Ft.)
Slope = 0.20986 s(percent)= 20.99
TC = k(0.405)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.293 min.
Rainfall intensity = 4.553(In/Hr) for a 10.0 year storm

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.620
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.270
RI index for soil(AMC 1)  =   0.00
Pervious area fraction =  0.550; Impervious fraction =  0.450
Initial subarea runoff =     10.728(CFS)
Total initial stream area =        3.800(Ac.)
Pervious area fraction = 0.550
End of computations, total study area =            3.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.550
Area averaged RI index number =   0.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:NORTHPROPOSED2YR.out

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NORTH PROPOSED 2 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.455(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 100.000 to Point/Station 101.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 480.000(Ft.)
Top (of initial area) elevation = 356.000(Ft.)
Bottom (of initial area) elevation = 264.500(Ft.)
Difference in elevation = 91.500(Ft.)
Slope = 0.19062 s(percent)= 19.06
TC = k(0.378)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.222 min.
Rainfall intensity = 1.656(In/Hr) for a 2.0 year storm

USER INPUT of soil data for subarea
Runoff Coefficient = 0.710
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.270
RI index for soil(AMC 1) = 0.00
Pervious area fraction = 0.410; Impervious fraction = 0.590
Initial subarea runoff = 4.467(CFS)
Total initial stream area = 3.800(Ac.)
Pervious area fraction = 0.410
End of computations, total study area = 3.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.410
Area averaged RI index number = 0.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:NORTHPROPOSED10YR.out

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PROPOSED NORTH 10 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.259(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 100.000 to Point/Station 101.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 480.000(Ft.)
Top (of initial area) elevation = 356.000(Ft.)
Bottom (of initial area) elevation = 264.500(Ft.)
Difference in elevation = 91.500(Ft.)
Slope = 0.19062 s(percent)= 19.06
TC = k(0.378)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.222 min.
Rainfall intensity = 4.583(In/Hr) for a 10.0 year storm

USER INPUT of soil data for subarea
Runoff Coefficient = 0.710
Decimal fraction soil group A = 0.730
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.270
RI index for soil(AMC 1) = 0.00
Pervious area fraction = 0.410; Impervious fraction = 0.590
Initial subarea runoff = 12.364(CFS)
Total initial stream area = 3.800(Ac.)
Pervious area fraction = 0.410
End of computations, total study area = 3.80 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.410
Area averaged RI index number = 0.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:SOUTHEXISTING2YEAR.out

---

SOUTH EXISTING 2 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.455(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 200.000 to Point/Station 201.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 320.000(Ft.)
Top (of initial area) elevation = 329.000(Ft.)
Bottom (of initial area) elevation = 267.000(Ft.)
Difference in elevation = 62.000(Ft.)
Slope = 0.19375 s(percent)= 19.38
TC = k(3.290)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 45.899 min.
Rainfall intensity = 0.530(In/Hr) for a 2.0 year storm

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.350
Decimal fraction soil group A = 0.620
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.380
RI index for soil(AMC 1)  =   0.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.228(CFS)
Total initial stream area =        1.230(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            1.23 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =   0.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:SOUTHEXISTING10YEAR.out

---

SOUTH EXISTING 10 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.259(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 200.000 to Point/Station 201.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 320.000(Ft.)
Top (of initial area) elevation = 329.000(Ft.)
Bottom (of initial area) elevation = 267.000(Ft.)
Difference in elevation = 62.000(Ft.)
Slope = 0.19375 s(percent)= 19.38
TC = k(3.290)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 45.899 min.
Rainfall intensity = 1.467(In/Hr) for a 10.0 year storm

```
USER INPUT of soil data for subarea
Runoff Coefficient = 0.350
Decimal fraction soil group A = 0.620
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.380
RI index for soil(AMC 1)  =   0.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.632(CFS)
Total initial stream area =        1.230(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            1.23 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =   0.0
```

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:SOUTHPROPOSED2YEAR.out

---

SOUTH PROPOSED 2 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 2.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 2.0
Calculated rainfall intensity data:
1 hour intensity = 0.455(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 200.000 to Point/Station 201.000

**** INITIAL AREA EVALUATION ****

Initial area flow distance = 315.000(Ft.)
Top (of initial area) elevation = 329.000(Ft.)
Bottom (of initial area) elevation = 267.000(Ft.)
Difference in elevation = 62.000(Ft.)
Slope = 0.19683 s(percent)= 19.68
TC = k(0.450)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.219 min.
Rainfall intensity = 1.656(In/Hr) for a 2.0 year storm

USER INPUT of soil data for subarea
Runoff Coefficient = 0.530
Decimal fraction soil group A = 0.620
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.380
RI index for soil(AMC 1) = 0.00
Pervious area fraction = 0.700; Impervious fraction = 0.300
Initial subarea runoff = 1.080(CFS)
Total initial stream area = 1.230(Ac.)
Pervious area fraction = 0.700
End of computations, total study area = 1.23 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.700
Area averaged RI index number = 0.0

Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1

Rational Hydrology Study Date: 03/20/25 File:SOUTHPROPOSED10YEAR.out

---

SOUTH PROPOSED 10 YEAR DISCHARGE

********* Hydrology Study Control Information **********

English (in-lb) Units used in input data file

Program License Serial Number 6253

Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) = 10.00 Antecedent Moisture Condition = 1

2 year, 1 hour precipitation = 0.455(In.)
100 year, 1 hour precipitation = 2.410(In.)

Storm event year = 10.0
Calculated rainfall intensity data:
1 hour intensity = 1.259(In/Hr)
Slope of intensity duration curve = 0.5700

++

Process from Point/Station 200.000 to Point/Station 201.000

**** INITIAL AREA EVALUATION ****

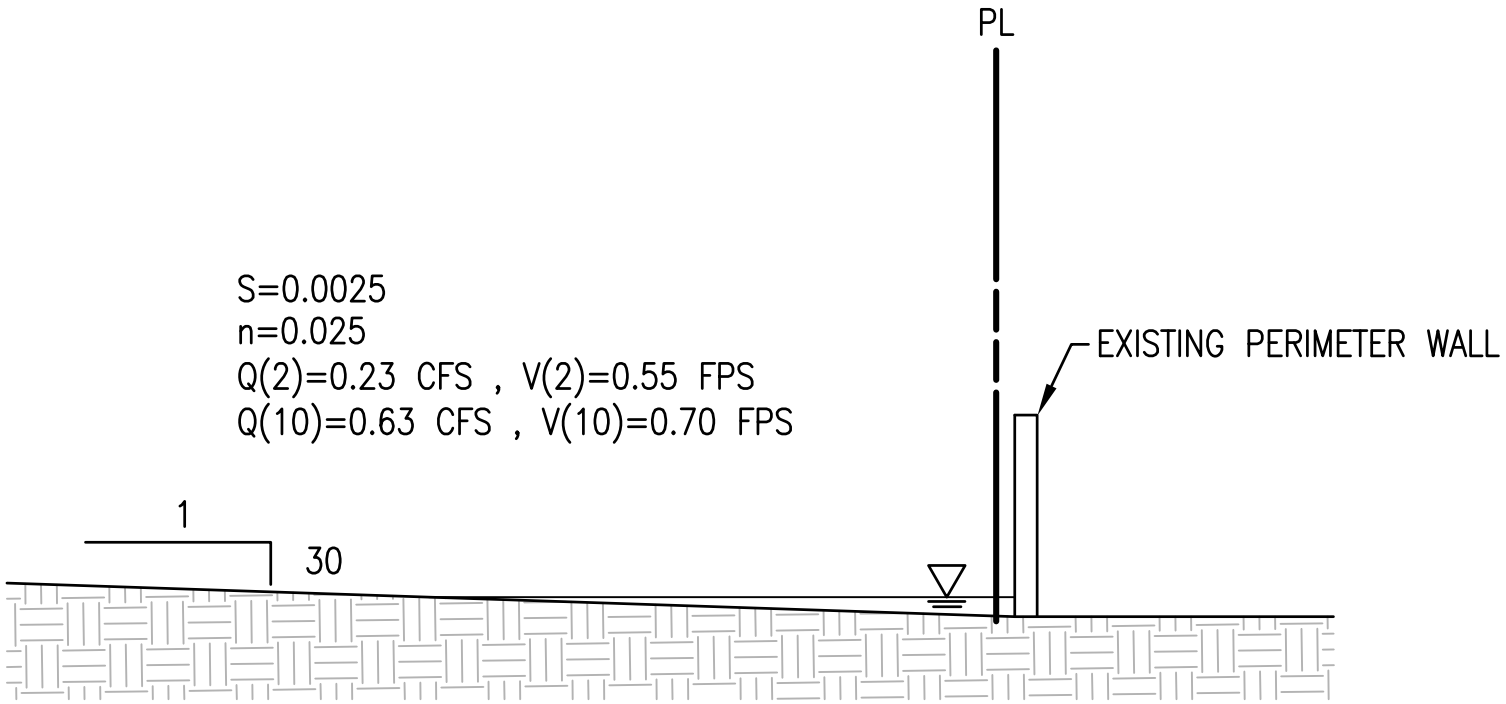
Initial area flow distance = 315.000(Ft.)
Top (of initial area) elevation = 329.000(Ft.)
Bottom (of initial area) elevation = 267.000(Ft.)
Difference in elevation = 62.000(Ft.)
Slope = 0.19683 s(percent)= 19.68
TC = k(0.450)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.219 min.
Rainfall intensity = 4.584(In/Hr) for a 10.0 year storm

USER INPUT of soil data for subarea
Runoff Coefficient = 0.530
Decimal fraction soil group A = 0.620
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.380
RI index for soil(AMC 1) = 0.00
Pervious area fraction = 0.700; Impervious fraction = 0.300
Initial subarea runoff = 2.988(CFS)
Total initial stream area = 1.230(Ac.)
Pervious area fraction = 0.700
End of computations, total study area = 1.23 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.700
Area averaged RI index number = 0.0

VI RUNOFF VELOCITY CALCULATIONS

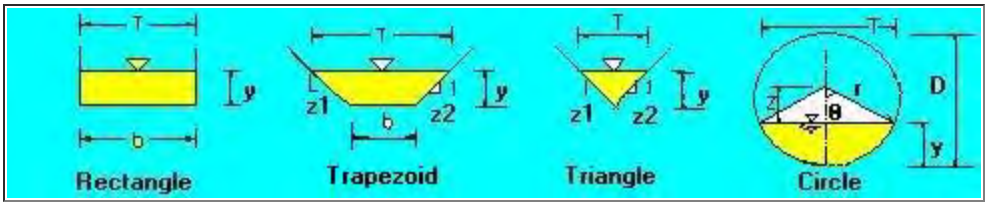
	2 YR DISCHARGE (Q) (CFS) LEAVING SITE	10 YR DISCHARGE (Q) (CFS) LEAVING SITE
SOUTH EXISTING	0.55	0.70
SOUTH PROPOSED	0	0
NORTH EXISTING	5.4	7.12
NORTH PROPOSED	0	7.01



EXISTING PARKING SOUTH OUTFLOW PATH SECTION

The open channel flow calculator

Select Channel Type: Triangle



Depth from Q

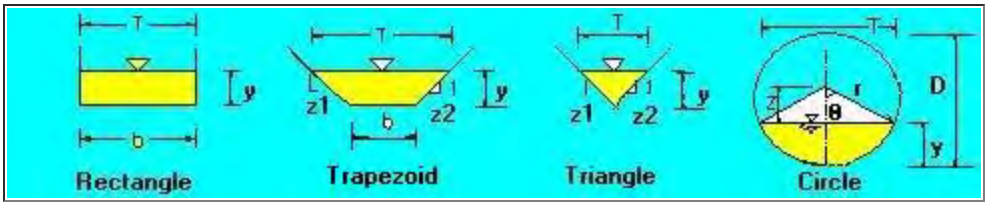
Select unit system: Feet(ft)

Channel slope: 0.0025 ft/ft	Water depth(y): 0.17 ft	Bottom W(b) 0 ft
Flow velocity 0.552442 ft/s	LeftSlope (z_1): 30 to 1 (H:V)	RightSlope (z_2): 0 to 1 (H:V)
Flow discharge 0.23 ft^3/s	Input n value 0.025 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 5.17 ft	Flow area 0.42 ft^2	Top width(T) 5 ft
Specific energy 0.17 ft	Froude number 0.34	Flow status Subcritical flow
Critical depth 0.11 ft	Critical slope 0.02 ft/ft	Velocity head 0 ft

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The open channel flow calculator

Select Channel Type: Triangle



Depth from Q

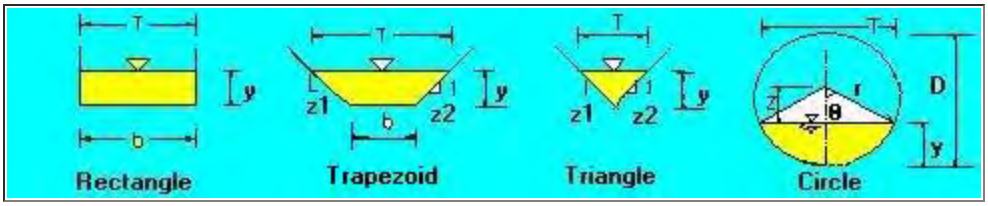
Select unit system: Feet(ft)

Channel slope: 0.0025 ft/ft	Water depth(y): 0.24 ft	Bottom W(b) 0 ft
Flow velocity 0.699708 ft/s	LeftSlope (z_1): 30 to 1 (H:V)	RightSlope (z_2): 0 to 1 (H:V)
Flow discharge 0.63 ft^3/s	Input n value 0.025 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 7.6 ft	Flow area 0.9 ft^2	Top width(T) 7.35 ft
Specific energy 0.25 ft	Froude number 0.35	Flow status Subcritical flow
Critical depth 0.16 ft	Critical slope 0.0218 ft/ft	Velocity head 0.01 ft

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The open channel flow calculator

Select Channel Type: Circle



Depth from Q

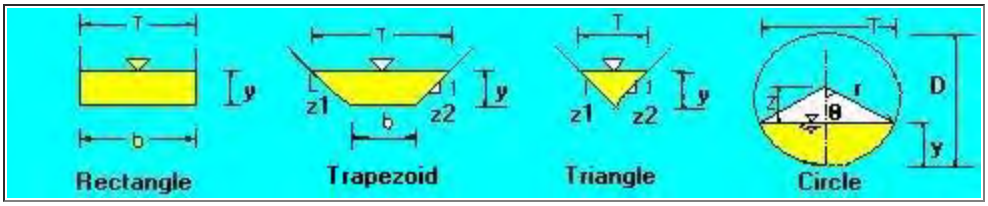
Select unit system: Feet(ft)

Channel slope: 0.01 ft/ft	Water depth(y): 0.56 ft	Radius (r) 1 ft
Flow velocity 5.398 ft/s	LeftSlope (z_1): to 1 (H:V)	RightSlope (z_2): to 1 (H:V)
Flow discharge 3.88 ft^3/s	Input n value 0.013 or select n	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 2.24 ft	Flow area 0.73 ft^2	Top width(T) 1.8 ft
Specific energy 1.02 ft	Froude number 1.5	Flow status Supercritical flow
Critical depth 0.69 ft	Critical slope 0.0045 ft/ft	Velocity head 0.45 ft

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The open channel flow calculator

Select Channel Type: Circle



Depth from Q

Select unit system: Feet(ft)

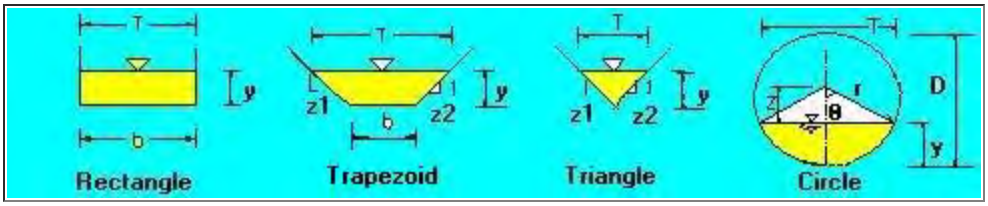
Channel slope: 0.01 ft/ft	Water depth(y): 0.97 ft	Radius (r) 1 ft
Flow velocity 7.108 ft/s	LeftSlope (z_1): to 1 (H:V)	RightSlope (z_2): to 1 (H:V)
Flow discharge 10.73 ft^3/s	Input n value 0.013 or select n clean,uncoated castiron:0.014	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 3.08 ft	Flow area 1.51 ft^2	Top width(T) 2 ft
Specific energy 1.75 ft	Froude number 1.44	Flow status Supercritical flow
Critical depth 1.18 ft	Critical slope 0.0053 ft/ft	Velocity head 0.78 ft

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DEVELOPED NORTH 10 YEAR FLOW

The open channel flow calculator

Select Channel Type: Circle



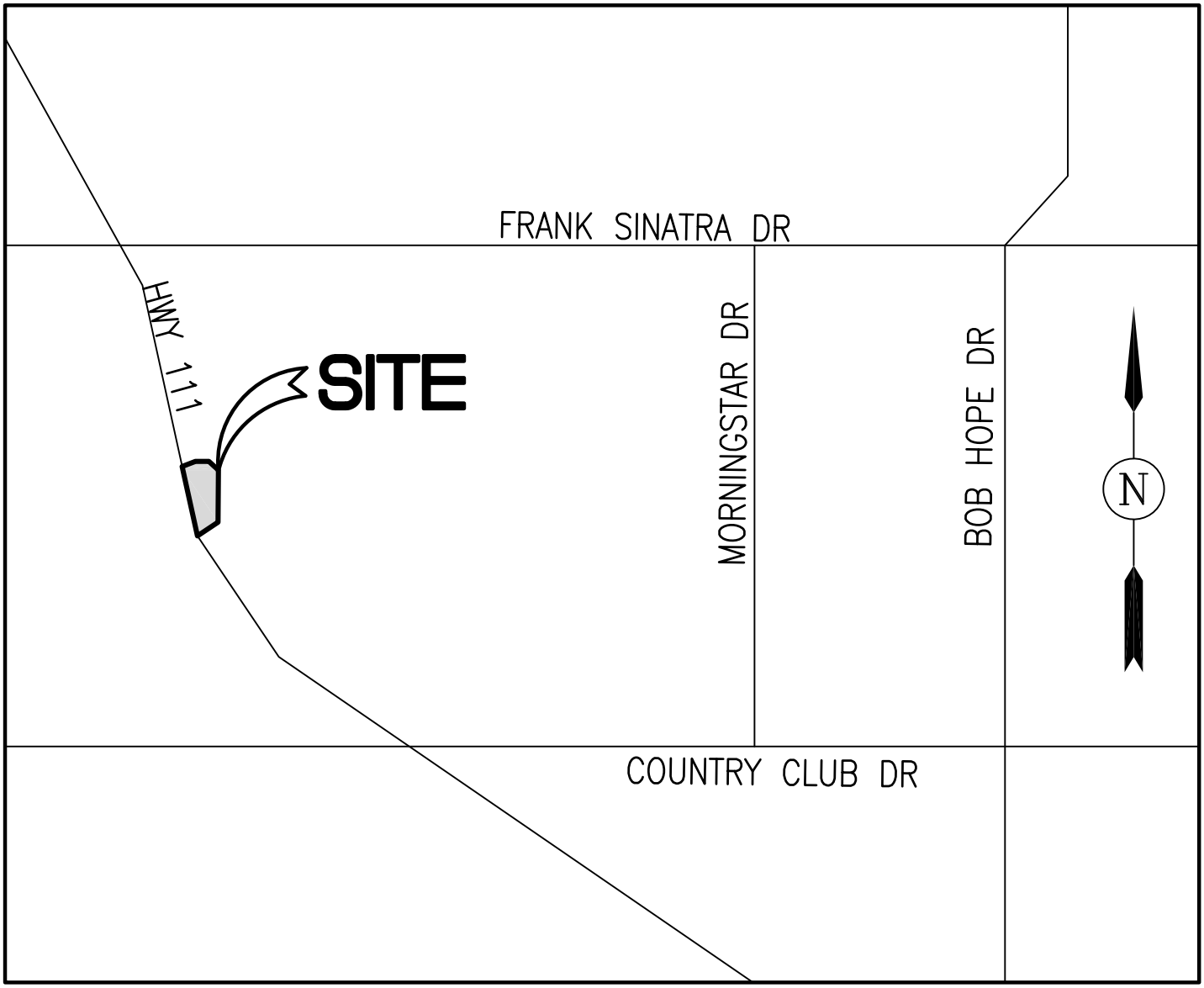
Depth from Q

Select unit system: Feet(ft)

Channel slope: 0.01 ft/ft	Water depth(y): 0.94 ft	Radius (r) 1 ft
Flow velocity 7.012 ft/s	LeftSlope (z_1): to 1 (H:V)	RightSlope (z_2): to 1 (H:V)
Flow discharge 10.13 ft^3/s	Input n value 0.013 or select n clean,uncoated castiron:0.014	
Calculate!	Status: Calculation finished	Reset
Wetted perimeter 3.02 ft	Flow area 1.45 ft^2	Top width(T) 2 ft
Specific energy 1.7 ft	Froude number 1.45	Flow status Supercritical flow
Critical depth 1.14 ft	Critical slope 0.0052 ft/ft	Velocity head 0.76 ft

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VII APPENDIX



VICINITY MAP

NOT TO SCALE

WORLD WILDLIFE MUSEUM

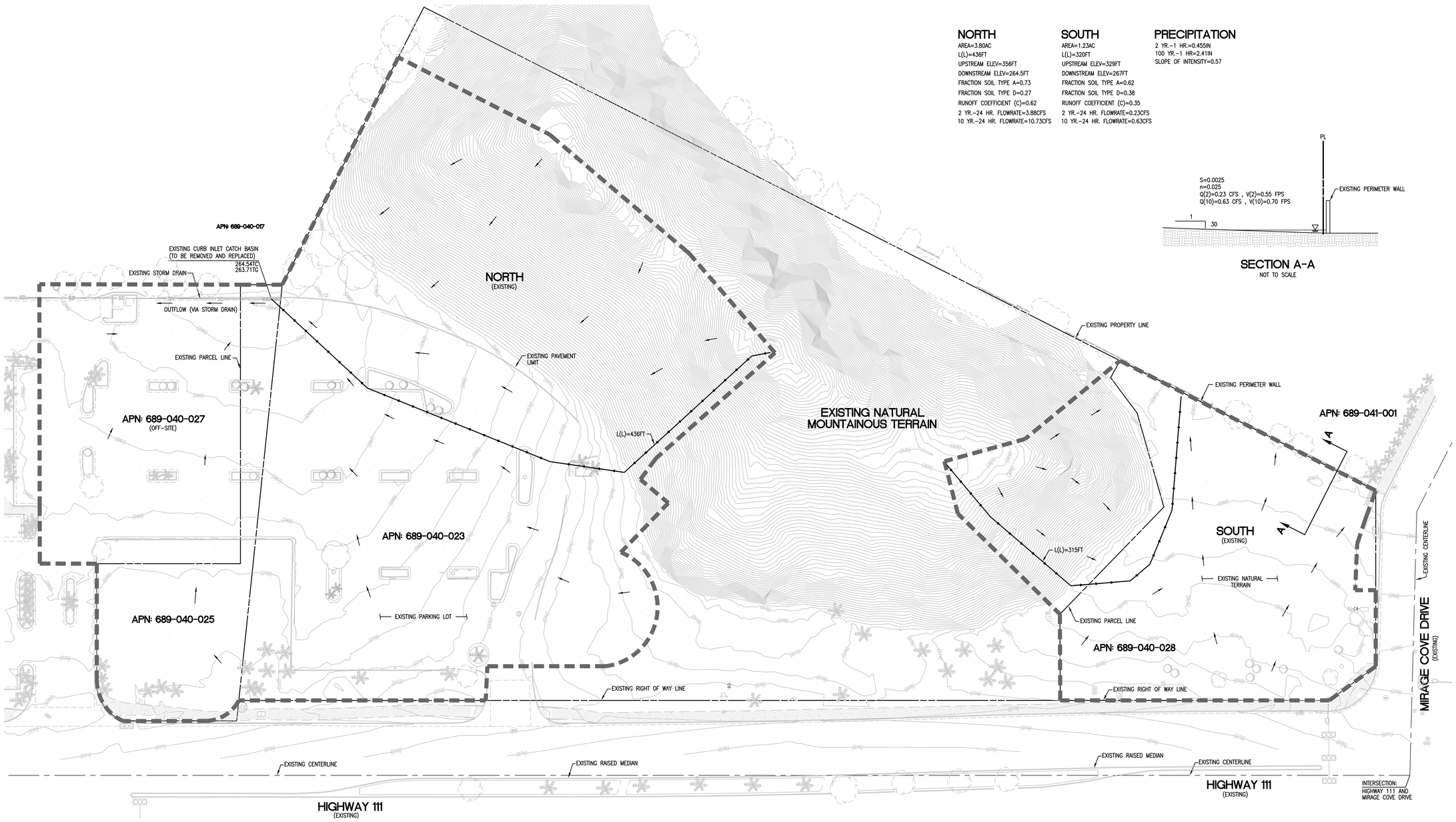
PRELIMINARY WQMP PLAN - EXISTING CONDITION

NORTH
AREA=3.80AC
L(L)=436FT
UPSTREAM ELEV=356FT
DOWNSTREAM ELEV=264.5FT
FRACTION SOIL TYPE A=0.73
FRACTION SOIL TYPE D=0.27
RUNOFF COEFFICIENT (C)=0.62
2 YR.-24 HR. FLOWRATE=3.88CFS
10 YR.-24 HR. FLOWRATE=10.73CFS

SOUTH
AREA=1.23AC
L(L)=320FT
UPSTREAM ELEV=329FT
DOWNSTREAM ELEV=267FT
FRACTION SOIL TYPE A=0.62
FRACTION SOIL TYPE D=0.38
RUNOFF COEFFICIENT (C)=0.35
2 YR.-24 HR. FLOWRATE=0.23CFS
10 YR.-24 HR. FLOWRATE=0.63CFS

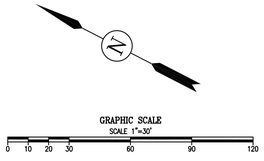
PRECIPITATION
2 YR.-1 HR.=0.455IN
100 YR.-1 HR=2.41IN
SLOPE OF INTENSITY=0.57

SECTION A-A
NOT TO SCALE



LEGEND

- SUBAREA BOUNDARY
- LONGEST LENGTH OF TRAVEL
- PROPOSED EARTHEN SWALE
- DIRECTIONAL FLOW ARROW



(NOT FOR CONSTRUCTION)

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TheAltumGroup.com

CITY OF PALM DESERT, CALIFORNIA

PRELIMINARY WQMP PLAN - EXISTING
WORLD WILDLIFE MUSEUM

FOR:

SHEET 1
OF 1

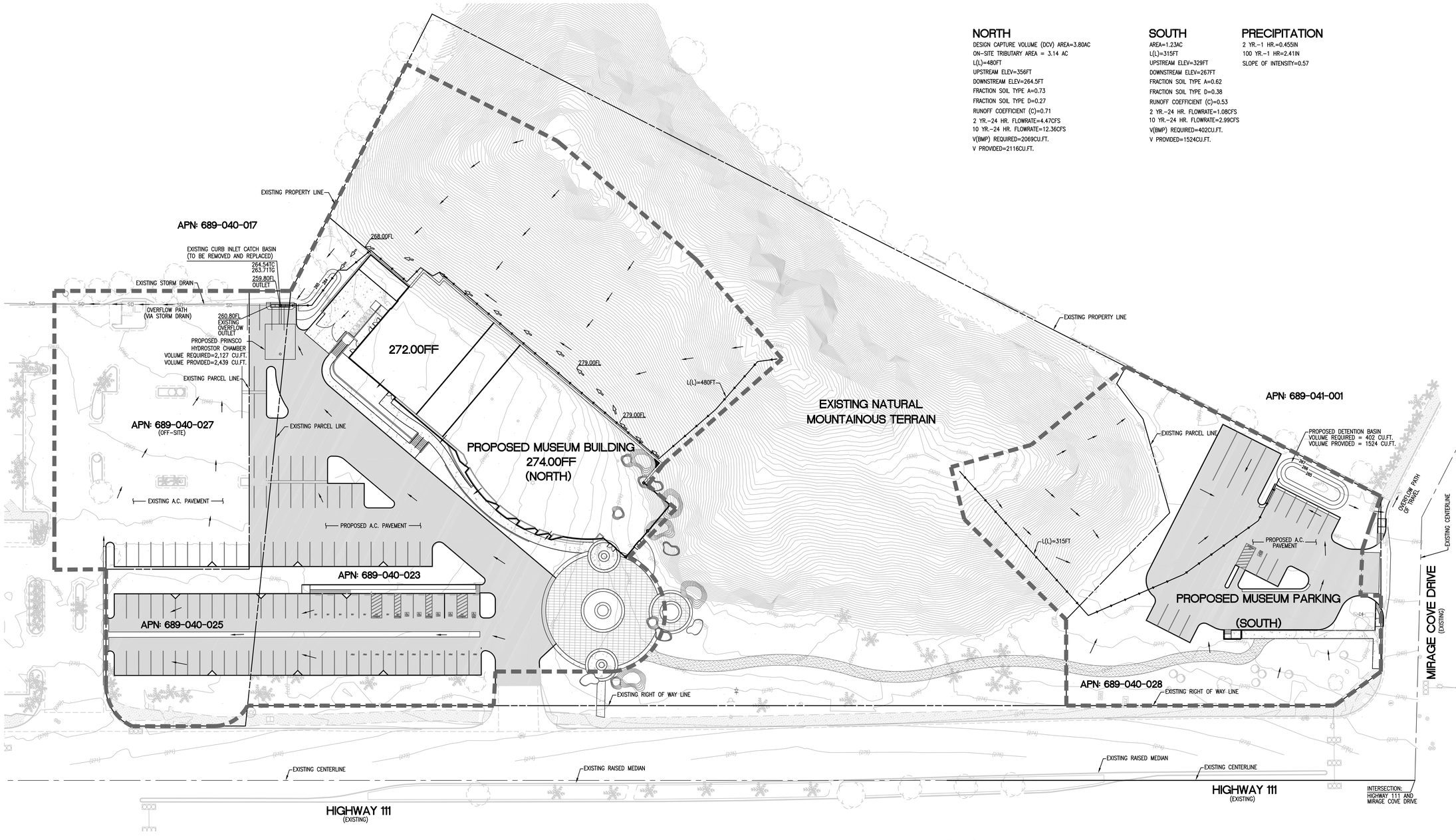
WORLD WILDLIFE MUSEUM

PRELIMINARY WQMP PLAN - DEVELOPED CONDITION

NORTH
DESIGN CAPTURE VOLUME (DCV) AREA=3.80AC
ON-SITE TRIBUTARY AREA = 3.14 AC
L(L)=480FT
UPSTREAM ELEV=356FT
DOWNSTREAM ELEV=264.5FT
FRACTION SOIL TYPE A=0.73
FRACTION SOIL TYPE D=0.27
RUNOFF COEFFICIENT (C)=0.71
2 YR.-24 HR. FLOWRATE=4.47CFS
10 YR.-24 HR. FLOWRATE=12.36CFS
V(BMP) REQUIRED=2069CU.FT.
V PROVIDED=2116CU.FT.

SOUTH
AREA=1.23AC
L(L)=315FT
UPSTREAM ELEV=329FT
DOWNSTREAM ELEV=267FT
FRACTION SOIL TYPE A=0.62
FRACTION SOIL TYPE D=0.38
RUNOFF COEFFICIENT (C)=0.53
2 YR.-24 HR. FLOWRATE=1.08CFS
10 YR.-24 HR. FLOWRATE=2.99CFS
V(BMP) REQUIRED=402CU.FT.
V PROVIDED=1524CU.FT.

PRECIPITATION
2 YR.-1 HR.=0.455IN
100 YR.-1 HR=2.41IN
SLOPE OF INTENSITY=0.57



LEGEND

- SUBAREA BOUNDARY
- LONGEST LENGTH OF TRAVEL
- PROPOSED EARTHEN SWALE
- PROPOSED A.C. PAVEMENT
- DIRECTIONAL FLOW ARROW

GRAPHIC SCALE
SCALE 1"=30'
0 10 20 30 60 90 120

(NOT FOR CONSTRUCTION)

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TheAltumGroup.com

CITY OF PALM DESERT, CALIFORNIA

PRELIMINARY WQMP PLAN - DEVELOPED
WORLD WILDLIFE MUSEUM

FOR:

SHEET 1
OF 1

NOAA Atlas 14, Volume 6, Version 2
Location name: Rancho Mirage, California, USA*
Latitude: 33.766°, Longitude: -116.443°
Elevation: 274 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	0.072 (0.060-0.087)	0.117 (0.097-0.142)	0.190 (0.157-0.231)	0.260 (0.214-0.319)	0.378 (0.301-0.479)	0.488 (0.380-0.632)	0.620 (0.471-0.824)	0.800 (0.590-1.09)	1.27 (0.901-1.82)	1.81 (1.24-2.68)
10-min	0.103 (0.086-0.124)	0.168 (0.140-0.203)	0.272 (0.226-0.330)	0.373 (0.307-0.458)	0.541 (0.431-0.687)	0.699 (0.544-0.906)	0.888 (0.675-1.18)	1.15 (0.846-1.57)	1.83 (1.29-2.61)	2.60 (1.78-3.84)
15-min	0.124 (0.104-0.150)	0.203 (0.169-0.246)	0.329 (0.273-0.400)	0.451 (0.372-0.553)	0.655 (0.521-0.831)	0.845 (0.658-1.10)	1.07 (0.816-1.43)	1.39 (1.02-1.90)	2.21 (1.56-3.15)	3.14 (2.15-4.65)
30-min	0.202 (0.169-0.245)	0.330 (0.275-0.400)	0.535 (0.444-0.650)	0.734 (0.605-0.900)	1.06 (0.848-1.35)	1.38 (1.07-1.78)	1.75 (1.33-2.32)	2.26 (1.66-3.09)	3.59 (2.54-5.13)	5.12 (3.49-7.56)
60-min	0.279 (0.233-0.338)	0.455 (0.379-0.552)	0.738 (0.613-0.898)	1.01 (0.835-1.24)	1.47 (1.17-1.87)	1.90 (1.48-2.46)	2.41 (1.83-3.21)	3.12 (2.30-4.26)	4.96 (3.51-7.08)	7.06 (4.83-10.4)
2-hr	0.374 (0.312-0.453)	0.611 (0.509-0.741)	0.969 (0.805-1.18)	1.30 (1.07-1.60)	1.82 (1.45-2.31)	2.28 (1.77-2.95)	2.80 (2.13-3.72)	3.40 (2.51-4.66)	5.01 (3.55-7.15)	7.14 (4.87-10.6)
3-hr	0.443 (0.369-0.536)	0.721 (0.601-0.875)	1.13 (0.940-1.38)	1.50 (1.24-1.84)	2.07 (1.65-2.62)	2.56 (1.99-3.31)	3.10 (2.36-4.12)	3.72 (2.75-5.09)	5.06 (3.58-7.22)	7.21 (4.92-10.7)
6-hr	0.593 (0.494-0.718)	0.953 (0.794-1.16)	1.47 (1.22-1.79)	1.93 (1.59-2.36)	2.60 (2.07-3.30)	3.17 (2.47-4.11)	3.79 (2.88-5.04)	4.48 (3.31-6.14)	5.51 (3.90-7.86)	7.28 (4.97-10.8)
12-hr	0.733 (0.611-0.888)	1.16 (0.969-1.41)	1.77 (1.47-2.15)	2.30 (1.90-2.82)	3.08 (2.45-3.91)	3.72 (2.90-4.83)	4.42 (3.36-5.88)	5.19 (3.83-7.10)	6.31 (4.46-9.00)	7.35 (5.02-10.9)
24-hr	0.867 (0.768-1.00)	1.36 (1.20-1.57)	2.06 (1.81-2.38)	2.66 (2.33-3.10)	3.54 (3.00-4.26)	4.27 (3.54-5.24)	5.05 (4.10-6.36)	5.91 (4.66-7.64)	7.16 (5.43-9.63)	8.20 (6.02-11.4)
2-day	0.996 (0.882-1.15)	1.54 (1.36-1.78)	2.32 (2.04-2.68)	2.99 (2.62-3.49)	3.98 (3.37-4.80)	4.80 (3.99-5.90)	5.69 (4.62-7.16)	6.67 (5.26-8.62)	8.09 (6.14-10.9)	9.28 (6.81-12.9)
3-day	1.06 (0.937-1.22)	1.63 (1.44-1.88)	2.44 (2.15-2.83)	3.16 (2.76-3.68)	4.21 (3.57-5.07)	5.09 (4.23-6.26)	6.05 (4.91-7.62)	7.11 (5.62-9.20)	8.67 (6.58-11.7)	9.99 (7.33-13.9)
4-day	1.09 (0.966-1.26)	1.67 (1.48-1.93)	2.51 (2.21-2.90)	3.24 (2.84-3.78)	4.33 (3.67-5.22)	5.24 (4.35-6.44)	6.24 (5.06-7.85)	7.34 (5.80-9.49)	8.97 (6.80-12.1)	10.4 (7.59-14.4)
7-day	1.19 (1.05-1.37)	1.82 (1.61-2.10)	2.73 (2.40-3.16)	3.52 (3.08-4.11)	4.71 (3.99-5.67)	5.70 (4.73-7.00)	6.78 (5.50-8.54)	7.98 (6.30-10.3)	9.76 (7.40-13.1)	11.3 (8.25-15.7)
10-day	1.26 (1.11-1.45)	1.93 (1.70-2.22)	2.89 (2.55-3.34)	3.74 (3.27-4.36)	5.00 (4.24-6.02)	6.06 (5.03-7.44)	7.21 (5.84-9.07)	8.48 (6.70-11.0)	10.4 (7.86-14.0)	12.0 (8.77-16.6)
20-day	1.38 (1.22-1.60)	2.14 (1.89-2.47)	3.23 (2.85-3.74)	4.20 (3.67-4.90)	5.65 (4.78-6.80)	6.86 (5.70-8.44)	8.20 (6.65-10.3)	9.68 (7.64-12.5)	11.9 (9.00-16.0)	13.7 (10.1-19.1)
30-day	1.55 (1.37-1.79)	2.42 (2.14-2.79)	3.68 (3.24-4.26)	4.80 (4.20-5.61)	6.49 (5.50-7.82)	7.92 (6.57-9.73)	9.48 (7.69-11.9)	11.2 (8.86-14.5)	13.8 (10.5-18.6)	16.0 (11.7-22.3)
45-day	1.70 (1.51-1.97)	2.69 (2.38-3.10)	4.12 (3.64-4.77)	5.41 (4.73-6.32)	7.36 (6.24-8.86)	9.02 (7.48-11.1)	10.8 (8.79-13.6)	12.9 (10.2-16.7)	15.9 (12.1-21.4)	18.5 (13.6-25.8)
60-day	1.83 (1.62-2.11)	2.91 (2.58-3.36)	4.50 (3.97-5.22)	5.94 (5.20-6.93)	8.12 (6.88-9.77)	9.98 (8.28-12.3)	12.0 (9.76-15.1)	14.3 (11.3-18.5)	17.8 (13.5-24.0)	20.8 (15.2-28.9)

[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

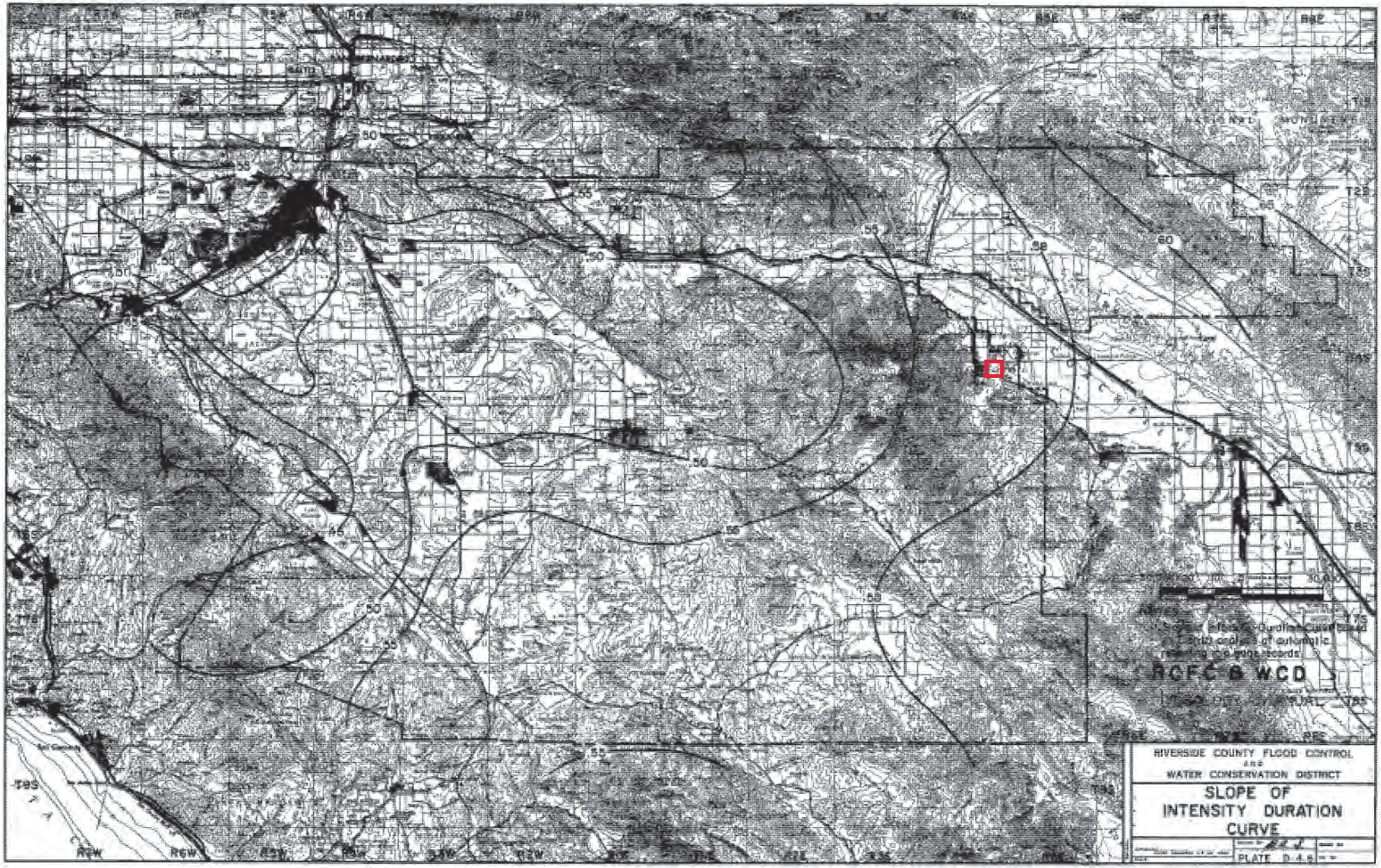
RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

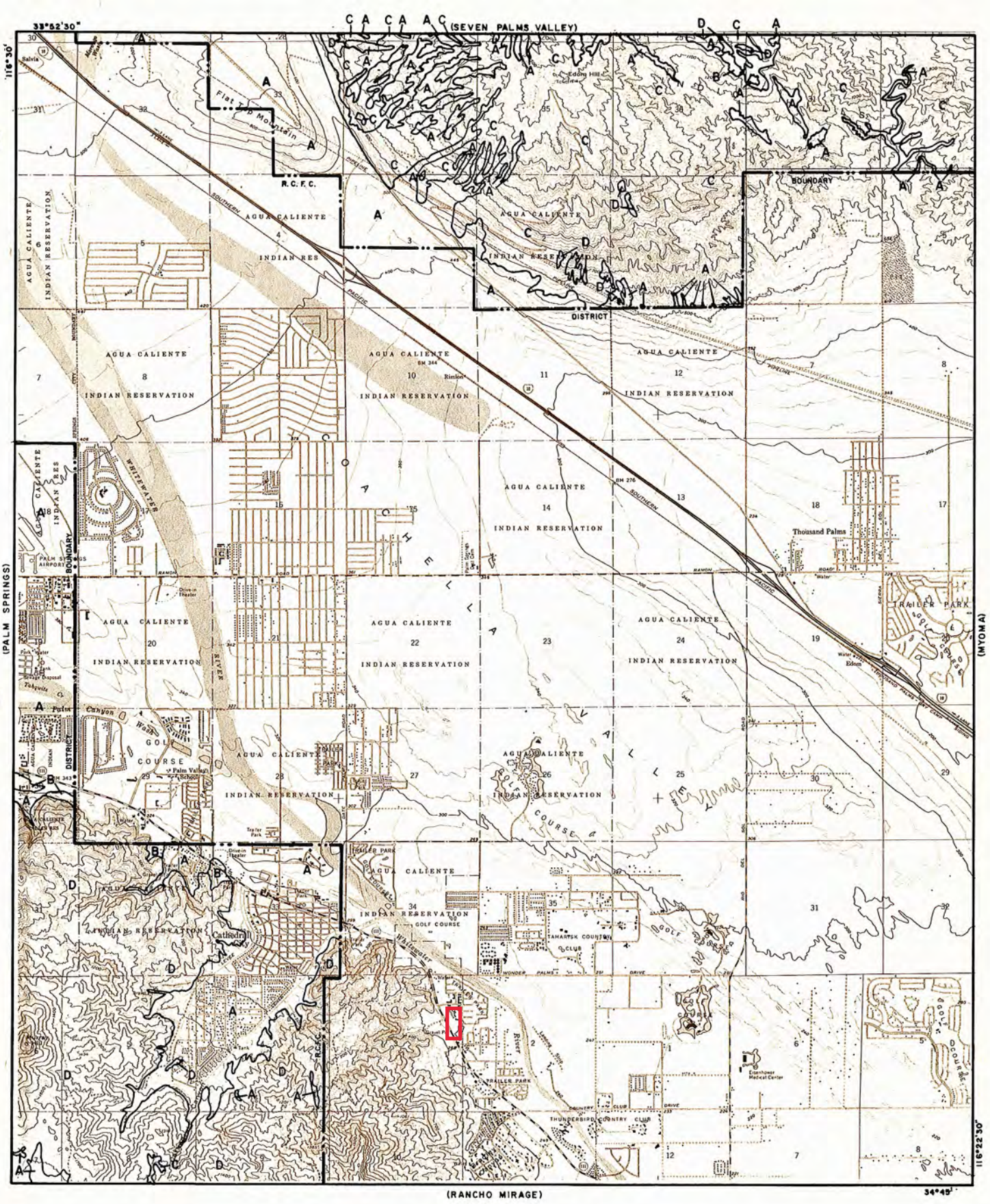
Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	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

PLATE D-5.5 (1 of 2)


RGFC & WCD
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
SLOPE OF
INTENSITY DURATION
CURVE
PLATE D-4.6



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR CATHEDRAL CITY

PLATE C-1.36

Appendix H

Noise and Vibration Analysis

HOWARD WORLD WILDLIFE MUSEUM

NOISE AND VIBRATION ANALYSIS

Prepared By:

Bill Lawson | blawson@urbanxroads.com

Reference Number
16391-02 NA

Agency
City of Rancho Mirage

Date
May 5, 2025

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LIST OF ABBREVIATED TERMS

(1)	Reference
ANSI	American National Standards Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
PPV	Peak Particle Velocity
Project	Howard World Wildlife Museum
RMMC	Rancho Mirage Municipal Code
RMS	Root-mean-square
VdB	Vibration Decibels

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EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Howard World Wildlife Museum (Project) in the City of Rancho Mirage. The Project consists of a 22,012-square-foot natural history museum. This noise study has been prepared to satisfy applicable City of Rancho Mirage noise standards and significance criteria based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1)

The results of this Noise and Vibration Analysis are summarized below based on the significance criteria in Section 4 of this report consistent with Appendix G of the CEQA Guidelines. (1) Table ES-1 shows the findings of significance for each potential noise and/or vibration impacts under CEQA before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Operational Noise	7	*Less Than Significant*	-
Project Construction Noise	8	*Less Than Significant*	-
Construction Vibration	8	*Less Than Significant*	-

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1 INTRODUCTION

This Noise and Vibration Analysis has been completed to determine the noise impacts associated with the development of the proposed Howard World Wildlife Museum, (Project). This noise and vibration analysis briefly describes the Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents the study methods and procedures for noise analysis, evaluates the future exterior noise environment, potential off-site traffic impacts, the Project-related long-term stationary-source operational noise, and Project-related short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The Project is located at the northeast corner of Highway 111 and Mirage Cove Drive in the City of Rancho Mirage as shown in Exhibit 1-1. The nearest existing noise-sensitive residential uses are located east of Project site within the Small Mountain Private Condominiums.

1.2 PROJECT DESCRIPTION

The Project proposes developing a 22,012-square-foot natural history museum. The museum's design will integrate with the existing hillside terrain, aligning the building with the natural landscape. The Project is expected to operate during typical daytime work hours. The preliminary site plan is provided in Exhibit 1-2.

EXHIBIT 1-1: PROJECT LOCATION

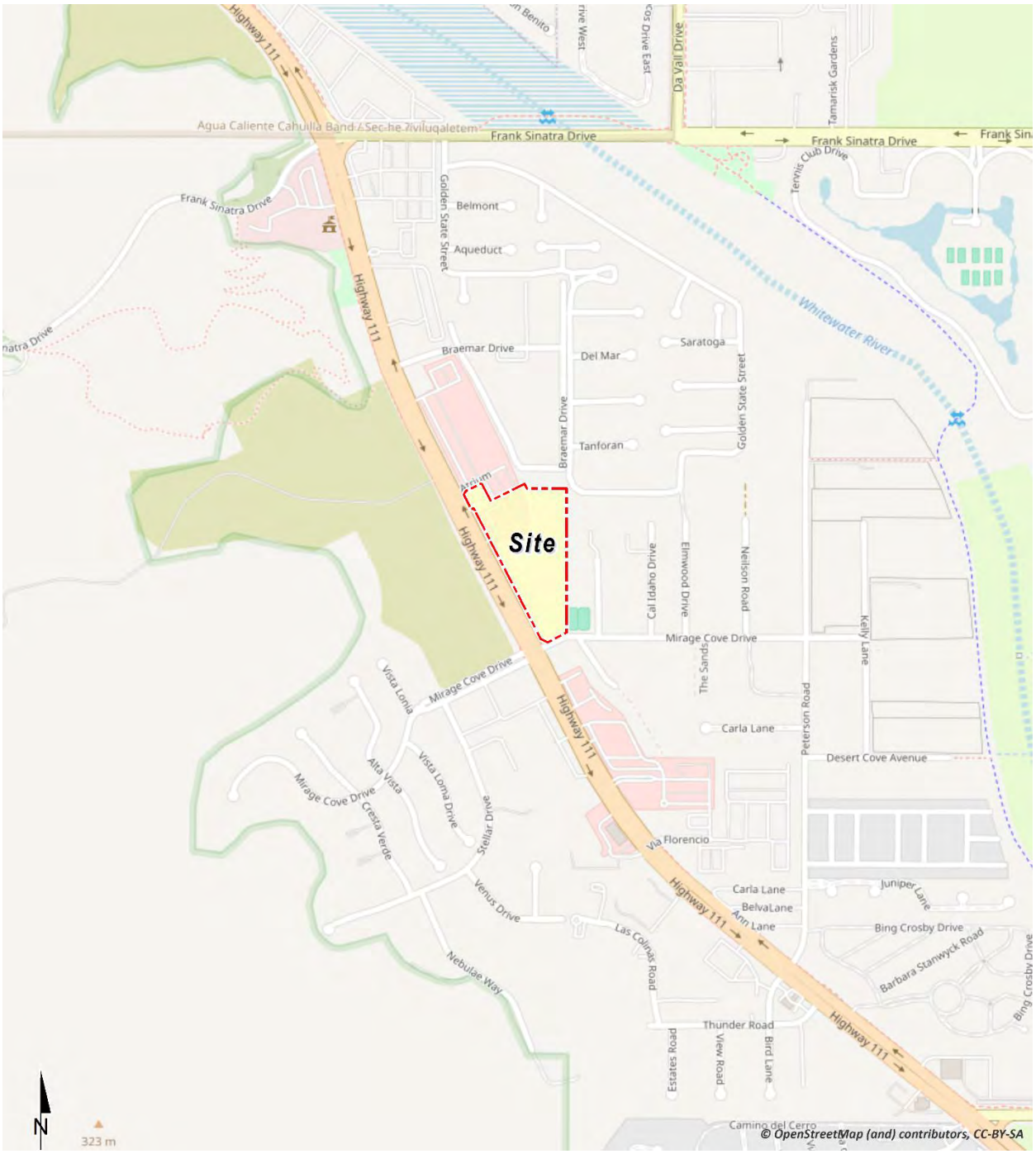
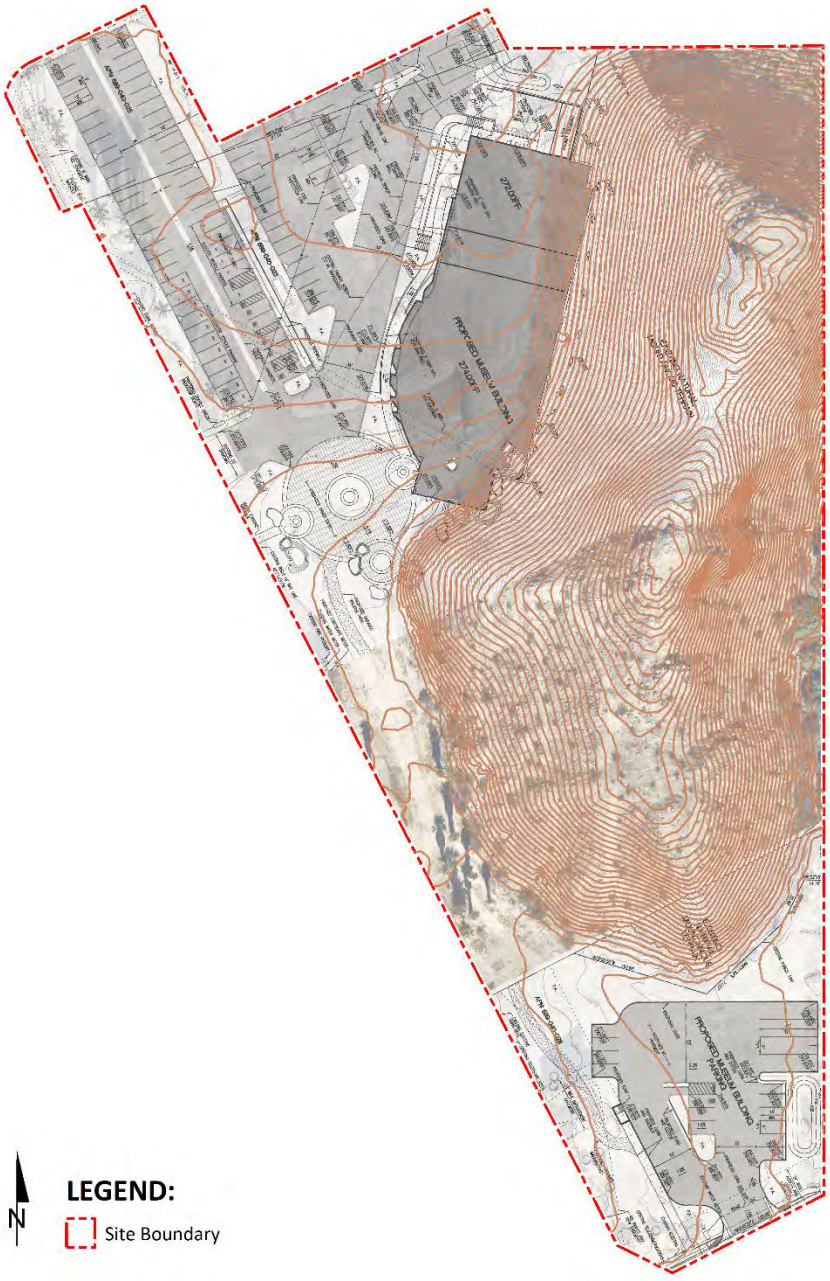


EXHIBIT 1-2: PRELIMINARY SITE PLAN



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2 FUNDAMENTALS

Noise is simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-1 presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-1: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (2) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA at approximately 1,000 feet, which can cause serious discomfort. (3) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most used metric is the equivalent level (Leq). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time-of-day corrections require the addition of 5 decibels to dBA Leq sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA Leq sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when noise can become more intrusive. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Rancho Mirage relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 Geometric Spreading

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (2)

2.3.2 Ground Absorption

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed.

When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (4)

2.3.3 Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (2)

2.3.4 Shielding

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an "out of sight, out of mind" effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby residents. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of-sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure. (5)

2.4 Noise Control

Noise control is the process of obtaining an acceptable noise environment for an observation point or receiver by controlling the noise source, transmission path, receiver, or all three. This concept is known as the source-path-receiver concept. In general, noise control measures can be applied to these three elements.

2.5 Noise Barrier Attenuation

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receiver. Noise barriers, however, do have limitations. For a noise barrier to work, it must block the line-of-sight path of sound from the noise source.

2.6 Land Use Compatibility With Noise

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being

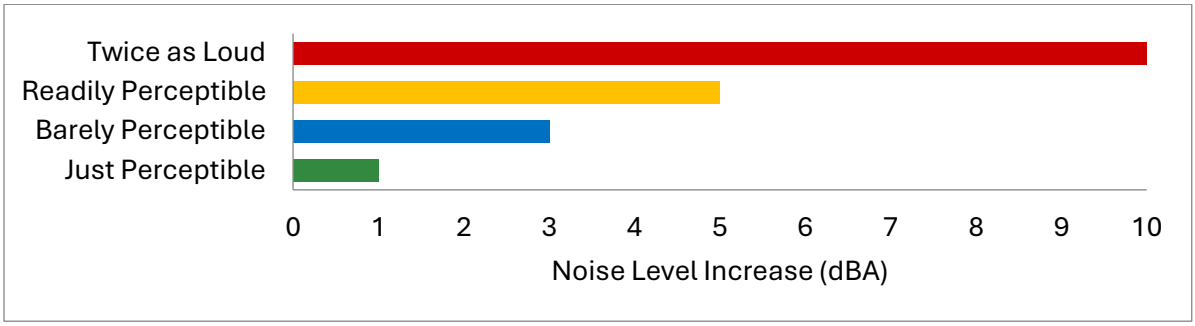
located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (6)

2.7 COMMUNITY RESPONSE TO NOISE

Approximately sixteen percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints may occur. Twenty to thirty percent of the population will not complain even in very severe noise environments. (7 pp. 8-6) Thus, a variety of reactions can be expected from people exposed to any given noise environment.

Surveys have shown that community response to noise varies from no reaction to vigorous action for newly introduced noises averaging from 10 dB below existing to 25 dB above existing. (8) According to research originally published in the Noise Effects Handbook (7), the percentage of high annoyance ranges from approximately 0 percent at 45 dB or less, 10 percent are highly annoyed around 60 dB, and increases rapidly to approximately 70 percent being highly annoyed at approximately 85 dB or greater. Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-2. A change of 3 dBA is considered barely perceptible, and changes of 5 dBA are considered readily perceptible. (4)

EXHIBIT 2-2: NOISE LEVEL INCREASE PERCEPTION



2.8 VIBRATION

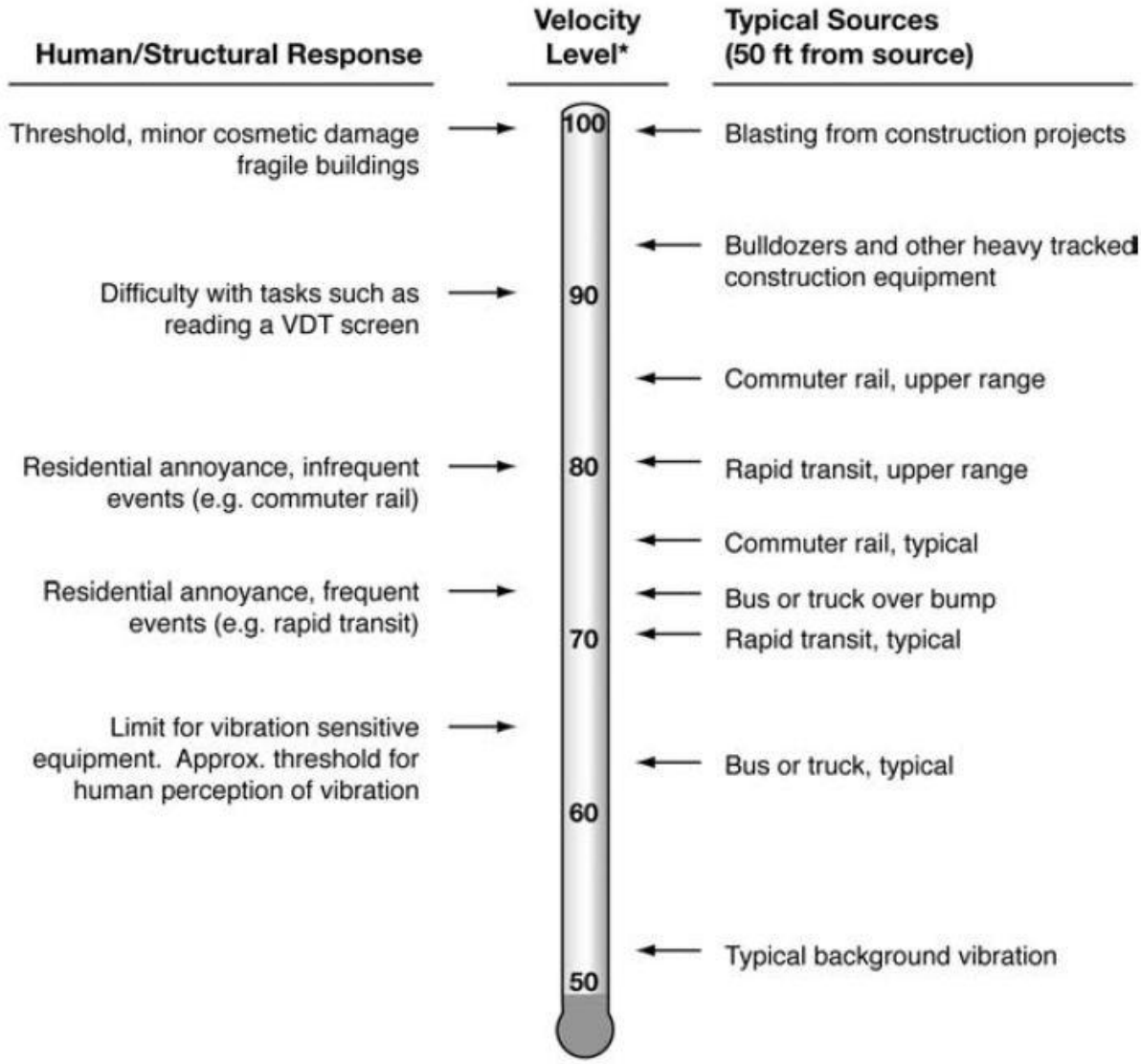
Per the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual, vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency. Additionally, in contrast to airborne noise, ground-borne vibration outdoors is not a common environmental problem and annoyance from ground-borne vibration is almost exclusively an indoor phenomenon)8(. Therefore, the effects of vibrations should only be evaluated at a structure and the effects of the building structure on the vibration should be considered. Wood-frame buildings, such as typical residential structures, are more easily excited by ground vibration than heavier buildings. In contrast, large masonry buildings with spread footings have a low response to ground vibration

(8). In general, the heavier a building is, the lower the response will be to the incident vibration energy. However, all structurers reduce vibration levels due to the coupling of the building to the soil.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal (8). The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body (8). However, the RMS amplitude and PPV are related mathematically, and the RMS amplitude of equipment is typically calculated from the PPV reference level. The RMS amplitude is approximately 70% of the PPV (9). Thus, either can be used in the description of vibration impacts.

While not universally accepted, vibration decibel notation (VdB) is another vibration notation developed and used by the FTA in their guidance manual to describe vibration levels and provide a background of common vibration levels and set vibration limits. (8) Decibel notation (VdB) serves to reduce the range of numbers used to describe vibration levels and is used in this report to describe vibration levels. As stated in the FTA guidance manual, the background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-3 illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-3: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (10) The purpose of the Noise Element is to limit the exposure of the community to excessive noise levels. In addition, CEQA requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 CITY OF RANCHO MIRAGE GENERAL PLAN NOISE ELEMENT

The City of Rancho Mirage has adopted a Noise Element of the General Plan (2017) to control and abate environmental noise, and to protect the citizens of and visitors to the City of Rancho Mirage from excessive exposure to noise. The Noise Element is intended to help align the community's various land uses with the existing and future noise environment and thus ensure that any negative effects of noise are minimized or completely avoided.

The noise criteria identified in the City of Rancho Mirage Noise Element are guidelines to evaluate the land use compatibility of transportation related noise. To assist the city in planning compatible uses, a range of exterior noise thresholds for various land uses have been developed. Particularly sensitive land uses include residences, schools, libraries, churches, hospitals and nursing homes, and destination resort areas. In addition, parks, golf courses, and other outdoor activity areas can be sensitive to noise disturbances. Less sensitive land uses include commercial uses, conventional hotels and motels, and playgrounds. Least sensitive to noise are heavy commercial uses, transportation, communication, and utility land uses. To protect noise sensitive land uses, and minimize the effects of excessive and nuisance noise, the City of Rancho Mirage General Plan Noise Element has outlined the following noise policies with the goal (Goal N 1) of a noise environment providing peace and quiet that complements and is consistent with Rancho Mirage's resort residential character:

Policy N 1.1: Land use patterns, associated traffic and its distribution, and individual developments shall be assessed for their potential to generate adverse and incompatible noise impacts. Noise exceeding normally acceptable levels shall be appropriately mitigated.

Policy N 1.2 Noise sensitive land uses, including residences, resorts, community open space, schools, libraries, churches, hospitals, and convalescent homes, shall be protected from high noise levels emitted by both existing and future noise sources.

Policy N 1.3 Project designs shall be required to include measures that assure that interior noise levels for residential development do not exceed 45 dBA CNEL.

Policy N 1.4 Land uses allowed adjacent to Rancho Mirage's major arterial roads and highways, or the Southern Pacific Railroad/I-10 corridor, should generally be limited to those that are compatible with higher noise levels to maximize noise-related land use compatibility.

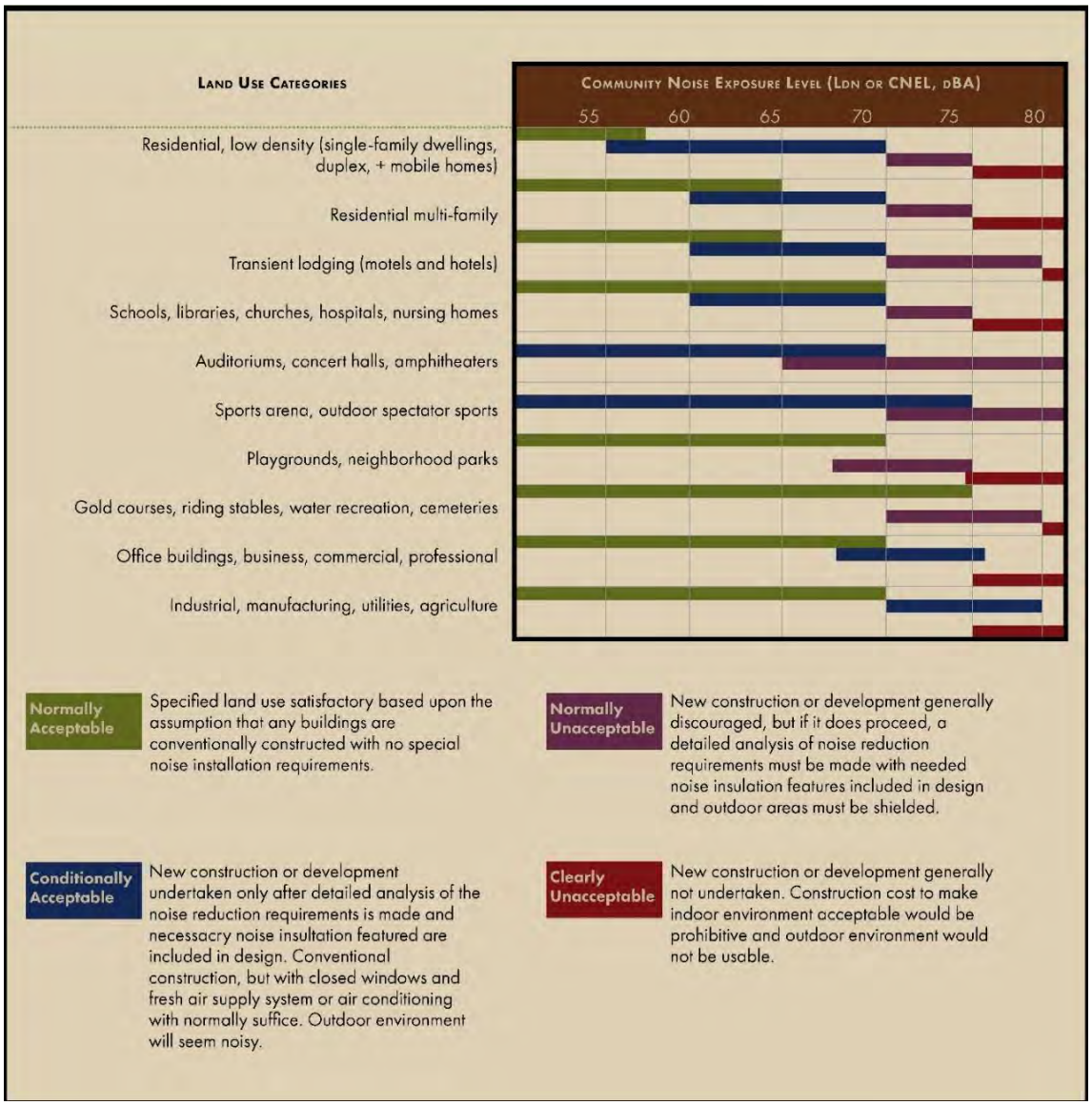
Policy N 1.5 Develop and maintain a circulation plan that is consistent with the resort residential character of Rancho Mirage, avoids impacts to existing and planned sensitive receptors/uses, and provides fixed routes for existing and future truck traffic.

The Noise Level and Land Use Compatibility matrix in the Noise Element shown on Exhibit 3-A provides guidelines to evaluate the acceptability of the transportation related noise level impacts. Single-family residential land uses are considered *normally acceptable* with exterior noise levels below 60 dBA CNEL and *conditionally acceptable* with noise levels below 70 dBA CNEL. Multi-family residential land uses are considered *normally acceptable* with exterior noise levels below 65 dBA CNEL and *conditionally acceptable* with noise levels below 70 dBA CNEL. For *conditionally acceptable* land use, *new construction or development undertaken only after a detailed analysis of the noise reduction requirements is made and necessary noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply system or air conditioning will normally suffice. Outdoor environment will seem noisy.*

3.3 Operational Noise Standards

To analyze noise impacts originating from a designated fixed location or private property such as the Howard World Wildlife Museum, stationary-source (operational) noise such as the loading dock activity, trash enclosure activity, roof-top air conditioning units, and parking lot vehicle movements are typically evaluated against standards established under a jurisdiction's Municipal Code. The City of Rancho Mirage Municipal Code (RMMC) noise standards are provided in Appendix 3.1. The RMMC Chapter 8.45 establishes the noise level standards for stationary noise sources. The Project's land use will potentially impact nearby noise-sensitive uses in the Project study area. For nearby noise-sensitive residential land uses in the Project study area, Section 8.45.030 identifies the base exterior noise level standard of 55 dBA L_{eq} during the daytime hours (7:00 a.m. to 6:00 p.m.), 50 dBA L_{eq} during the evening hours (6:00 p.m. to 10:00 p.m.) and 45 dBA L_{eq} during the nighttime hours (10:00 p.m. to 7:00 a.m.). (11) Further, Section 8.45.030[C] indicates that if the existing ambient noise level already exceeds any of the exterior noise level categories, then the standard shall be increased in five dBA increments to reflect the ambient conditions. Table 3-1 provides a summary of the City of Rancho Mirage operational exterior noise level standards for all land use types.

EXHIBIT 3-A: NOISE LEVEL AND LAND USE COMPATIBILITY



Source: City of Rancho Mirage General Plan Noise Element (2017) Exhibit 20

TABLE 3-1: OPERATIONAL NOISE STANDARDS

Land Use[1]	Zone[2]	Time Period	Exterior Noise Level Standards (dBA L_{eq})[3]
Residential (Low Density)	R-E, H-R, R-L-2, R-L-3	Daytime (7:00 a.m. to 6:00 p.m.)	55
		Evening (6:00 p.m. to 10:00 p.m.)	50
		Nighttime (10:00 p.m. to 7:00 a.m.)	45
Residential (Medium and High Density, Hospital, Open Space)	OS, R-M, R-H, MHP	Daytime (7:00 a.m. to 6:00 p.m.)	60
		Evening (6:00 p.m. to 10:00 p.m.)	55
		Nighttime (10:00 p.m. to 7:00 a.m.)	50
Commercial Office, Resort Commercial, Mixed Use, Institutional	O, P, Rs-H, M-U	Daytime (7:00 a.m. to 6:00 p.m.)	65
		Evening (6:00 p.m. to 10:00 p.m.)	60
		Nighttime (10:00 p.m. to 7:00 a.m.)	55
Commercial Neighborhood, General Commercial, Commercial Recreation, Light Industrial	C-N, C-G, I-L	Daytime (7:00 a.m. to 6:00 p.m.)	70
		Evening (6:00 p.m. to 10:00 p.m.)	65
		Nighttime (10:00 p.m. to 7:00 a.m.)	60

[1] City of Rancho Mirage Municipal Code, Section 8.45.030 Exterior noise level limits (Appendix 3.1).
[2] City of Rancho Mirage Land Use and Zoning Map
[3] L_{eq} represents a steady state sound level containing the same total energy as a time varying signal over a given sample period.

3.4 CONSTRUCTION NOISE STANDARDS

To analyze noise impacts originating from the construction of Howard World Wildlife Museum, noise from construction activities is typically evaluated against standards established under a City's Municipal Code. To control noise impacts associated with the construction of the proposed Project, the City has established limits to the hours of operation. RMMC Section 15.04.030[A][11] indicates that construction, shall be limited to the hours of 7:00 a.m. and 7:00 p.m. with no activity on Sundays and holidays (12). The city recognizes that construction noise is difficult to control and restricts allowable hours for this intrusion. Still, construction, even when restricted within these hours, presents a nuisance value when conducted in proximity to sensitive receptors (13). However, neither the City of Rancho Mirage General Plan nor Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* is used for analysis of daytime construction impacts, as discussed below.

According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that can be considered reasonable criteria for construction noise assessment. The FTA considers a daytime exterior construction noise level of 80 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use. (8 p. 179)

3.5 VIBRATION STANDARDS

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. (8)

To analyze vibration impacts associated with the Howard World Wildlife Museum, vibration-generating activities are appropriately evaluated against standards established under a City's Municipal Code if such standards exist. While Section 17.18.080 of the RMMC requires that *no vibration associated with any use shall be allowed which is discernable beyond the boundary line of the subject property,* the City of Rancho Mirage does not identify specific construction vibration level limits. Therefore, for analysis purposes, the Caltrans *Transportation and Construction Vibration Guidance Manual*, (9 p. 38) Table 19, vibration damage are used in this noise study to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise sensitive buildings adjacent to the Project site can best be described as "older residential structures" with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

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4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the CEQA Guidelines. (1) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

B. Generation of excessive ground-borne vibration or ground-borne noise levels?

C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

4.1 NOISE LEVEL INCREASES (THRESHOLD A)

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines. Under CEQA, consideration must be given to the magnitude of the increase, the existing baseline ambient noise levels, and the location of receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes that there is no single noise increase that renders the noise impact significant. (14) This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called ambient environment. In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will typically be judged.

4.1.1 Operational Noise (Substantial Permanent Noise Level Increase)

The Federal Interagency Committee on Noise (FICON) (15) developed guidance to be used for the assessment of project-generated increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (Leq).

As previously stated, the approach used in this noise study recognizes that there is no single noise increase that renders a noise impact significant, based on a 2008 California Court of Appeal ruling on Gray v. County of Madera. (14) For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur if the noise criteria may be exceeded. Therefore, for this analysis, a readily perceptible 5 dBA or greater project-related noise level increase is considered a significant impact when the without project noise levels are below 60 dBA. Per the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA barely perceptible noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure exceedance.

The FICON guidance provides an established source of criteria to assess the impacts of substantial temporary or permanent increase in baseline ambient noise levels. Based on the FICON criteria, the amount to which a given noise level increase is considered acceptable is reduced when the without Project (baseline) noise levels are already shown to exceed certain land-use specific exterior noise level criteria. The specific levels are based on typical responses to noise level increases of 5 dBA or readily perceptible, 3 dBA or barely perceptible, and 1.5 dBA depending on the underlying without Project noise levels for noise-sensitive uses. These levels of increases and their perceived acceptance are consistent with guidance provided by both the Federal Highway Administration (4 p. 9) and Caltrans (16 p. 2_48).

4.1.2 Construction Noise (Substantial Temporary Noise Increase)

To control the noise-generating construction activities, the temporary noise level increases over the existing ambient conditions must be considered under CEQA Significance Threshold A. Increases of up to 20 dBA L_{eq} are permitted according to Table B-1 of the RMMC. Although noise ordinances vary across jurisdictions, many cities and counties in California, including Los Angeles, San Diego, and San Francisco, set construction noise limits between 75 and 80 dBA L_{eq} and typically restrict construction activities to the daytime hours. In contrast, everyday noise regulations are more stringent because they apply to continuous, long-term noise sources that can significantly impact the quality of life. As a result, many jurisdictions establish daytime residential noise limits around 55 dBA L_{eq}. This suggests that a reasonable 20 dBA increase over the daytime noise limit can be tolerated without significant adverse effects. This is also illustrated in the adoption of many CEQA documents statewide that use an 80 dBA L_{eq} limit for assessing construction impacts while using everyday noise level limits of local noise ordinances in assessing on-site operational impacts.

Therefore, if the Project-related construction noise levels generate a temporary noise level increase over the existing daytime ambient noise levels more than 20 dBA L_{eq} consistent with Table B-1 of the RMMC, then the Project construction noise increases will be considered a *significant* impact.

4.2 VIBRATION (THRESHOLD B)

As described in Section 3.4, vibration impacts originating from the construction of the Howard World Wildlife Museum, vibration-generating activities are appropriately evaluated using standards established by the Caltrans *Transportation and Construction Vibration Guidance Manual*, Table 19. Caltrans' vibration thresholds for building damage are used in this noise study to assess potential operational and temporary construction-related impacts at adjacent building locations. A maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec) is used to describe the nearest residential buildings adjacent to the Project site.

4.3 CEQA GUIDELINES NOT FURTHER ANALYZED (THRESHOLD C)

CEQA Noise Threshold C applies when there are nearby public and private airports and/or airstrips and focuses on land use compatibility of the Project to nearby airports and airstrips. The Project site is not located within two miles of an airport or airstrip. The closest major airport is the Palm Springs International Airport (PSP), which is located over 4.5 miles north of the Project site As such, the Project site would not be exposed to excessive noise levels from airport operations, and therefore, impacts are considered less than significant, and no further noise analysis is conducted in relation to Appendix G to the CEQA Guidelines, Noise Threshold C.

4.4 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix that includes the allowable criteria used to identify potentially significant incremental noise level increases.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Receiving Land Use	Condition(s)	Significance Criteria	
			Daytime	Nighttime
Operational	Noise-Sensitive	Exterior Noise Levels[1]	See Table 3-1	
		If ambient is < 60 dBA L_{eq}[2]	≥ 5 dBA L_{eq} Project increase	
		If ambient is 60 - 65 dBA L_{eq}[2]	≥ 3 dBA L_{eq} Project increase	
		If ambient is > 65 dBA L_{eq}[2]	≥ 1.5 dBA L_{eq} Project increase	
Construction	Noise-Sensitive	Noise Level Threshold[3]	80 dBA L_{eq}	n/a
		Exterior Noise Level Increase[4]	20 dBA L_{eq}	
		Vibration Level Threshold[5]	0.3 PPV (in/sec)	

[1] City of Rancho Mirage Municipal Code, Section 8.45.030 Exterior Noise Level Limits (Appendix 3.1).
[2] FICON, 1992.
[3] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[4] City of Rancho Mirage Municipal Code, Table B-1 (Appendix 3.1).
[5] Caltrans Transportation and Construction Vibration Manual, April 2020 Table 19
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at six locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-1 provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, long-term noise level measurements were collected by Urban Crossroads, Inc. on Tuesday, April 29, 2025. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the equivalent daytime and nighttime hourly noise levels. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (17)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing equivalent hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources. (2) Further, FTA guidance states, that it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community. (8)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustic equivalence. (8) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts.

EXHIBIT 5-1: NOISE MEASUREMENT LOCATIONS



Collecting noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels and is necessary to assess potential noise increase due to the Project's contribution to the ambient noise levels. This approach is necessary to calculate the temporary or permanent increase in ambient noise levels as required by the CEQA Guidelines Environmental Checklist.

5.3 Noise Measurement Results

The noise measurements presented below focus on the equivalent or the hourly energy average sound levels (Leq) to describe the existing ambient conditions. Table 5-1 provides the (energy average) noise levels used to describe the hourly daytime (7:00 a.m. to 6:00 p.m.), evening (6:00 p.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. The daytime and nighttime equivalent noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number.

Table 5-1: Ambient Noise Level Measurements

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]			CNEL
		Daytime	Evening	Nighttime	
L1	Located north of the site within the Desert Braemar community near the residence at 69850 CA-111	61.3	59.6	48.1	63.5
L2	Located east of the site near the residence at 70100 Mirage Cove Drive.	54.0	48.4	43.2	53.6
L3	Located south of the site near the residence at 1 E the Palms St.	61.3	59.2	54.3	63.0
L4	Located southwest of the site near the residence at 8 Vista Loma Dr.	54.3	61.9	52.0	59.0
L5	Located within the site near the residence at 70100 Mirage Cove Dr.	63.1	61.2	54.0	64.0
L6	Located within the site east of CA-111.	61.6	61.0	57.8	65.4

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 6:00 p.m.; "Evening" = 6:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Table 5-1 provides the equivalent noise levels used to describe the daytime and nighttime ambient conditions for each of the measurements. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L1, L2, L5, L8, L25, L50, L90, L95, and L99 percentile noise levels observed during the daytime and nighttime periods.

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6 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following receiver locations, as shown on Exhibit 6-1, were identified as representative locations for analysis. The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA, as previously described in Section 5.2. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sounds could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

To describe the potential off-site Project noise levels, four receiver locations in the vicinity of the Project site were identified. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures. Distance is measured in a straight line from the Project boundary to each receiver location.

R1: Location R1 represents the existing high-density residence within the Desert Braemar community at 69850 CA-111, approximately 138 feet north of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receiver R1 is placed at the residential building façade. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

R2: Location R2 represents the existing high-density residence within the Small Mountain Private Condominiums community near the at 70100 Mirage Cove Drive, approximately 23 feet east of the Project site. Receiver R2 is placed in the private outdoor living area (backyard) facing the Project site. A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.

R3: Location R3 represents the existing residence at 1 E the Palms Street, approximately 94 feet south of the Project site. Receiver R3 is placed in the private outdoor living area (backyard) facing the Project site. A 24-hour noise measurement was taken near this location, L3, to describe the existing ambient noise environment.

R4: Location R4 represents the single-family residence at 8 Vista Loma Drive within the Mirage Cove low density residential community, approximately 703 feet west of the Project site. Receiver R4 is placed in the private outdoor living area (backyard) facing the Project site. A 24-hour noise measurement was taken near this location, L4, to describe the existing ambient noise environment.

EXHIBIT 6-1: RECEIVER LOCATIONS



7 OPERATIONAL NOISE ANALYSIS

This section analyzes the potential stationary-source operational noise impacts at the nearby receiver locations, identified in Section 6, resulting from the operation of the proposed Howard World Wildlife Museum Project. To conservatively describe the potential worst-case noise environment, Exhibit 7-1 presents the 22 individual noise sources used to assess the operational noise levels.

7.1 OPERATIONAL NOISE SOURCES

This operational noise analysis is intended to describe noise level impacts associated with the expected typical daytime and nighttime activities at the Project site. The on-site Project-related noise sources are expected to include: loading dock activity, trash enclosure activity, roof-top air conditioning units, and parking lot vehicle movements.

7.2 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a detailed description of the reference noise level measurements shown on Table 7-1 used to estimate the Project operational noise impacts. It is important to note that the following projected noise levels assume the worst-case noise environment with all noise source activity all operating at the same time. These sources of noise activity will likely vary throughout the day.

7.2.1 Measurement Procedures

The reference noise level measurements presented in this section were collected using a Larson Davis LxT Type 1 precisions sound level meter (serial number 01146). The LxT sound level meter was calibrated using a Larson-Davis calibrator, Model CAL 200, was programmed in "slow" mode to record noise levels in "A" weighted form and was located at approximately five feet above the ground elevation for each measurement. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (17)

EXHIBIT 7-1: OPERATIONAL NOISE SOURCE LOCATIONS

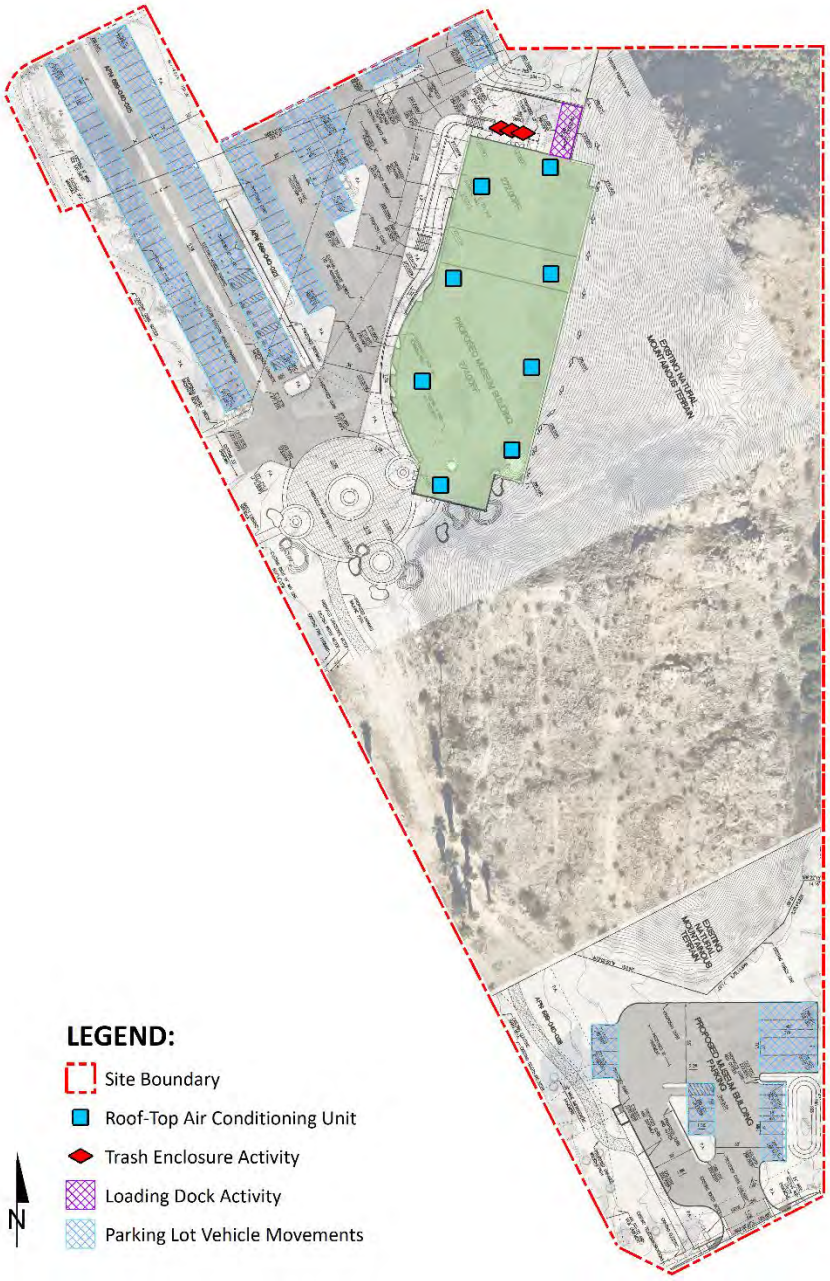


TABLE 7-1: REFERENCE NOISE LEVEL MEASUREMENTS

Reference Noise Source	Noise Source Height (Feet)	Min./ Hour[1]			Reference Noise Level (dBA L_{eq}) @ 50 Feet	Sound Power Level (dBA)[2]
		Day	Eve	Night		
Loading Dock Activity	8'	60	0	0	62.8	103.4
Trash Enclosure Activity	5'	60	60	0	57.3	89.0
Roof-Top Air Conditioning Units	5'	39	39	28	57.2	88.9
Parking Lot Vehicle Movements	5'	60	60	0	52.6	81.1

[1] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site. "Daytime" = 7:00 a.m. to 6:00 p.m.; "Evening" = 6:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

[2] Sound power level represents the total amount of acoustic energy (noise level) produced by a sound source independent of distance or surroundings. Sound power levels calculated using the CadnaA noise model at the reference distance to the noise source. Numbers may vary due to size differences between point and area noise sources.

7.2.2 Loading Dock Activity

To evaluate the noise levels associated with truck idling, backup alarms, trailer movements and loading activities, Urban Crossroads collected a reference noise level measurement to describe the potential operational noise levels associated with the Project loading dock activities. The measured reference noise level at 50 feet from the source of activity was measured at 62.8 dBA L_{eq}. Loading dock activities are limited to daytime hours.

7.2.3 Trash Enclosure Activity

To describe the noise levels associated with a trash enclosure activity, Urban Crossroads collected a reference noise level measurement at an existing trash enclosure containing two dumpster bins. The trash enclosure noise levels describe metal gates opening and closing, metal scraping against concrete floor sounds, dumpster movement on metal wheels, and trash dropping into the metal dumpster. The reference noise levels describe trash enclosure noise activities when trash is dropped into an empty metal dumpster, as would occur at the Project Site. The measured reference noise level at the uniform 50-foot reference distance is 57.3 dBA L_{eq} for the trash enclosure activity. The reference noise level describes the expected noise source activities associated with the trash enclosures for the Project's proposed building.

7.2.4 Roof-Top Air Conditioning Units

The reference noise level represents a Lennox SCA120 series 10-ton model packaged air conditioning unit. At the uniform reference distance of 50 feet, the reference noise level is 57.2 dBA L_{eq}. Based on the typical operating conditions observed over a four-day measurement period, the roof-top air conditioning units are estimated to operate for and average 39 minutes per hour during the daytime hours, and 28 minutes per hour during the nighttime hours. For this noise analysis, the air conditioning units are expected to be located on the roof of the Project buildings.

7.2.5 Parking Lot Vehicle Movements

To describe the on-site parking lot activity, a long-term noise level measurement was collected in the center of activity within a reference parking lot. At 50 feet from the center of activity, the parking lot produced a reference noise level of 52.6 dBA L_{eq}. Parking activities are expected to take place during the full hour (60 minutes) throughout the daytime and evening hours. The parking lot noise levels are mainly due to cars pulling in and out of parking spaces in combination with car doors opening and closing.

7.3 CadnaA Noise Prediction Model

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels. Using the ISO 9613-2 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source.

Consistent with the ISO 9613-2 protocol, the CadnaA noise prediction model relies on the reference sound power level (Lw) to describe individual noise sources. While sound pressure levels (e.g., Leq) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (Lw) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustic energy emitted by the sound source and is an absolute value that is not affected by the environment. The operational noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the noise analysis to account for mixed ground representing a combination of hard and soft surfaces. This approach ensures a reasonable approximation in environments where both hard and soft surfaces exist, aligning with typical real-world conditions. Appendix 7.1 includes the detailed noise dBA Leq model inputs used to estimate the Project operational noise levels presented in this section.

7.4 Project Operational Noise Levels

Using the reference noise levels to represent the Project operations that include loading dock activity, trash enclosure activity, roof-top air conditioning units, and parking lot vehicle movements, Urban Crossroads, Inc. calculated the operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Table 7-2 shows the Project operational noise levels during the daytime hours from 7:00 a.m. to 6:00 p.m. The daytime hourly noise levels at the off-site receiver locations are expected to range from 34.1 to 55.0 dBA L_{eq}.

TABLE 7-2: DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)			
	R1	R2	R3	R4
Loading Dock Activity	54.4	20.5	18.0	28.1
Trash Enclosure Activity	43.6	10.9	8.7	13.9
Roof-Top Air Conditioning Units	41.4	15.0	14.4	32.0
Parking Lot Vehicle Movements	38.3	46.9	38.4	25.0
Total (All Noise Sources)	55.0	46.9	38.5	34.1

[1] See Exhibit 7-1 for the noise source locations. CadnaA noise model calculations are included in Appendix 7.1.

Table 7-3 shows the Project operational noise levels during the evening hours from 6:00 p.m. to 10:00 a.m. The evening hourly noise levels at the existing off-site receiver locations are expected to range from 34.4 to 48.5 dBA L_{eq}.

TABLE 7-3: EVENING PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)			
	R1	R2	R3	R4
Loading Dock Activity	0.0	0.0	0.0	0.0
Trash Enclosure Activity	45.2	12.5	10.3	15.5
Roof-Top Air Conditioning Units	43.0	16.7	16.1	33.6
Parking Lot Vehicle Movements	39.9	48.5	40.0	26.6
Total (All Noise Sources)	48.0	48.5	40.0	34.4

[1] See Exhibit 7-1 for the noise source locations. CadnaA noise model calculations are included in Appendix 7.1.

Table 7-4 shows the Project operational noise levels during the nighttime hours from 10:00 p.m. to 7:00 a.m. The nighttime hourly noise levels at the existing off-site receiver locations are expected to range from 14.0 to 40.3 dBA L_{eq}.

TABLE 7-4: NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)			
	R1	R2	R3	R4
Loading Dock Activity	0.0	0.0	0.0	0.0
Trash Enclosure Activity	0.0	0.0	0.0	0.0
Roof-Top Air Conditioning Units	40.3	14.0	13.4	30.9
Parking Lot Vehicle Movements	0.0	0.0	0.0	0.0
Total (All Noise Sources)	40.3	14.5	14.0	30.9

[1] See Exhibit 7-1 for the noise source locations. CadnaA noise model calculations are included in Appendix 7.1.

The differences between the daytime and nighttime noise levels are largely related to the estimated duration of noise activity as outlined in Table 7-1. Appendix 7.1 includes the detailed noise model inputs.

7.5 PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds based on the City of Rancho Mirage exterior noise level standards by zoning type at the nearby receiver locations. Table 7-5 shows that the operational noise levels associated with Project will not exceed the City of Rancho Mirage daytime, evening and nighttime exterior noise level standards at the existing nearby noise-sensitive receiver locations. Therefore, the operational noise impacts are considered *less than significant* at the nearby noise-sensitive receiver locations.

TABLE 7-5: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Zoning	Project Operational Noise Levels (dBA Leq)[2]			Noise Level Standards (dBA Leq)[3]			Noise Level Standards Exceeded?[4]		
		Day	Eve.	Night	Day	Eve.	Night	Day	Eve.	Night
R1	R-H	55.0	48.0	40.3	60	55	50	No	No	No
R2	R-H	46.9	48.5	14.5	60	55	50	No	No	No
R3	C-G	38.5	40.0	14.0	70	65	60	No	No	No
R4	R-L-2	34.1	34.4	30.9	55	50	45	No	No	No

[1] See Exhibit 6-1 for the receiver locations.
[2] Proposed Project unmitigated operational noise levels as shown on Tables 7-2, 7-3 and 7-4.
[3] City of Rancho Mirage Municipal Code, Section 8.45.030 Exterior noise level limits (Appendix 3.1)
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
"Daytime" = 7:00 a.m. to 6:00 p.m.; "Evening" = 6:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

7.6 PROJECT OPERATIONAL NOISE LEVEL INCREASES

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearby receiver locations that may be potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (2) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describes the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime, evening and nighttime ambient conditions are presented in Tables 7-6, 7-7 and 7-8, respectively. As indicated on Table 7-6, the Project will generate daytime operational noise increases ranging from 0.0 to 0.9 dBA L_{eq} at the nearest receiver locations. Table 7-7 shows that the Project will generate evening operational noise increases ranging from 0.0 to 3.1 dBA L_{eq} at the nearest receiver locations. Table 7-8 shows that the Project will generate nighttime operational noise increases ranging from 0.0 to 0.7 dBA L_{eq} at the nearest receiver locations.

Project-related operational noise level increases would not exceed the operational noise level increase significance criteria presented in Table 4-1. Therefore, Project related operational noise level increases at the sensitive receiver locations will be *less than significant.*

TABLE 7-6: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	55.0	L1	61.3	62.2	0.9	5.0	No
R2	46.9	L2	54.0	54.8	0.8	5.0	No
R3	38.5	L3	61.3	61.3	0.0	5.0	No
R4	34.1	L4	54.3	54.3	0.0	5.0	No

[1] See Exhibit 6-1 for the receiver locations.
[2] Total Project daytime operational noise levels as shown on Table 7-2.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

TABLE 7-7: EVENING OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	48.0	L1	59.6	59.9	0.3	5.0	No
R2	48.5	L2	48.4	51.5	3.1	5.0	No
R3	40.0	L3	59.2	59.3	0.1	5.0	No
R4	34.4	L4	61.9	61.9	0.0	5.0	No

[1] See Exhibit 6-1 for the receiver locations.
[2] Total Project evening operational noise levels as shown on Table 7-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed evening ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

TABLE 7-8: NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	40.3	L1	48.1	48.8	0.7	5.0	No
R2	14.5	L2	43.2	43.2	0.0	5.0	No
R3	14.0	L3	54.3	54.3	0.0	5.0	No
R4	30.9	L4	52.0	52.0	0.0	5.0	No

[1] See Exhibit 6-1 for the receiver locations.
[2] Total Project nighttime operational noise levels as shown on Table 7-4.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed nighttime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

7.7 OFF-SITE TRAFFIC NOISE ANALYSIS

Traffic generated by the operation of the proposed Project will influence the traffic noise levels in surrounding off-site areas and at the Project site. However, the off-site Project-related traffic represents an incremental increase to the existing roadway volumes, which is not expected to generate a *barely perceptible* noise level increase of 3 dBA CNEL at nearby sensitive land uses adjacent to study area roadways, since a doubling of the existing traffic volumes would be required to generate a 3 dBA CNEL increase. The Project is anticipated to generate approximately of 150 trips per day. The incremental Project-related off-site traffic noise levels due to the Howard World Wildlife Museum project trips are estimated at less than 1 dBA CNEL. Therefore, due to the low traffic volumes generated by the Project, the off-site traffic noise levels generated by the Project are considered *less than significant* and no further analysis is required.

8 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 8-1 shows the construction noise source locations in relation to the nearest sensitive receiver locations previously described in Section 6. To prevent high levels of construction noise from impacting noise-sensitive land uses, RMMC Section 15.04.030[A][11] indicates that construction, shall be limited to the hours of 7:00 a.m. and 7:00 p.m. with no activity on Sundays and holidays (12).

8.1 CONSTRUCTION NOISE LEVELS

The FTA *Transit Noise and Vibration Impact Assessment Manual* recognizes that construction projects are accomplished in several different stages and outlines the procedures for assessing noise impacts during construction. Each stage has a specific equipment mix, depending on the work to be completed during that stage. As a result of the equipment mix, each stage has its own noise characteristics; some stages have higher continuous noise levels than others, and some have higher impact noise levels than others. The Project construction activities are expected to occur in the following stages:

- Site Preparation
- Grading
- Building Construction
- Architectural Coating
- Paving

8.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe construction noise activities, this construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels. (18) The RCNM equipment database provides a comprehensive list of the noise-generating characteristics of specific types of construction equipment. In addition, the database provides an acoustic usage factor to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation. According to the EPA, FTA, and FHWA, the overall construction noise level is governed primarily by the noisiest pieces of equipment. The quieter pieces do not affect the overall level, but they do reduce the magnitude of the fluctuations in the noise level. Therefore, a rough estimate of the noise level needs only include the noisiest pieces of equipment expected at the site. (19) (8) (20) Consistent with FHWA and FTA guidance for detailed construction noise assessment, Table 8-1 presents the combined noise levels for the loudest construction activities expected for each stage, assuming all equipment operates simultaneously.

EXHIBIT 8-1: CONSTRUCTION NOISE SOURCE LOCATIONS



TABLE 8-1: CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Equipmnet[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Composite Reference Noise Level (dBA L_{eq})[2]	Reference Power Level (dBA L_w)[3]
Site Preparation	Tractor	80	84.0	115.6
	Backhoe	74		
	Grader	81		
Grading	Scraper	80	83.3	114.9
	Excavator	77		
	Dozer	78		
Building Construction	Crane	73	81.1	112.8
	Tractor	80		
	Welder/Torch	70		
Paving	Paver	74	77.8	109.5
	Dump Truck	72		
	Roller	73		
Architectural Coating	Man Lift	68	79.8	111.4
	Compressor (air)	74		
	Generator	78		

[1] FHWA Road Construction Noise Model.
[2] Represents the combined noise level for all equipment assuming they operate at the same time.
[3] The total amount of acoustical energy produced by a sound source independent of distance or surroundings.

8.3 CONSTRUCTION NOISE ANALYSIS

Construction projects involve various stages, and activities frequently shift from one location to another. For example, during site preparation and grading, noise-generating activities may concentrate in an area for a short period to remove an obstruction, while the majority of the grading involves the equipment moving back and forth in a predictable pattern throughout the site; building construction and foundation work generally concentrate near the building footprint, while paving generally involves a predictable pattern of movement throughout the site. Therefore, construction activities are best evaluated as multiple moving point sources within the construction area since the speed and power of the equipment vary, and the equipment constantly changes position in terms of its distance and direction relative to the receivers. (8) (21) Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts by phase at the nearby sensitive receiver locations were completed. To account for the dynamic nature of construction activities, the CadnaA construction noise analysis evaluates the noise source activities as multiple moving point sources, or construction crews, within the limits of construction.

Construction impacts are based on the loudest activity and the highest noise level calculated at each receiver location. As shown on Table 8-2, the construction noise levels are expected to range from 56.8 to 73.2 dBA L_{eq} at the nearby receiver locations. Appendix 8.1 includes the detailed CadnaA construction noise model inputs.

TABLE 8-2: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})					
	Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels[2]
R1	64.4	63.7	61.5	58.3	60.2	64.4
R2	73.2	72.5	70.3	67.1	69.0	73.2
R3	69.2	68.5	66.3	63.1	65.0	69.2
R4	56.8	56.1	53.9	50.7	52.6	56.8

[1] Construction noise source and receiver locations are shown on Exhibit 8-1.
[2] Construction noise level calculations based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations. CadnaA construction noise model inputs are included in Appendix 8.1.

8.4 PROJECT SITE CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, a construction-related daytime noise level threshold of 80 dBA L_{eq} is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the nearest receiver locations will satisfy the reasonable daytime 80 dBA L_{eq} significance threshold during Project construction activities as shown on Table 8-3. Therefore, the noise impacts due to Project construction noise are considered *less than significant* at all receiver locations.

TABLE 8-3: CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	64.4	80	No
R2	73.2	80	No
R3	69.2	80	No
R4	56.8	80	No

[1] Construction noise source and receiver locations are shown on Exhibit 8-1.
[2] Highest construction noise level calculations based on distance from the construction noise source activity to the nearest receiver locations as shown on Table 8-2.
[3] Construction noise level thresholds as shown on Table 4-1.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

8.5 TEMPORARY CONSTRUCTION NOISE LEVEL INCREASES

To describe the temporary Project construction noise level contributions to the existing ambient noise environment, the Project construction noise levels were combined with the existing ambient noise levels measurements at the nearest off-site receiver locations. The difference between the combined Project-construction and ambient noise levels is used to describe the construction noise level contributions. Temporary noise level increases that would be experienced at sensitive receiver locations when Project construction-source noise is added to the ambient daytime conditions are presented on Table 8-4.

Consistent with Table B-1 of the RMMC, a temporary noise level increase of 20 dBA is considered a *potentially significant* impact. As indicated in Table 8-4, the Project will contribute construction noise increases ranging from 4.4 to 19.3 dBA L_{eq} during the daytime hours at the nearest receiver locations. The unmitigated construction noise analysis shows that the nearest receiver locations will not exceed the temporary 20 dBA L_{eq} noise increase significance threshold during Project construction activities. Therefore, the temporary construction noise increase analysis shows that the noise impacts due to Project construction noise are considered *less than significant*.

TABLE 8-4: DAYTIME CONSTRUCTION NOISE LEVEL INCREASES

Receiver Location[1]	Typical Project Construction Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	64.4	L1	61.3	66.1	4.8	20	No
R2	73.2	L2	54.0	73.3	19.3	20	No
R3	69.2	L3	61.3	69.9	8.6	20	No
R4	56.8	L4	54.3	58.7	4.4	20	No

[1] Construction noise source and receiver locations are shown on Exhibit 8-1.
[2] Typical Project daytime construction noise levels as shown on Table 8-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project construction activities.
[6] The noise level increase expected with the addition of the proposed Project construction activities.
[7] City of Rancho Mirage Municipal Code, Table B-1 (Appendix 3.1).

8.6 CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Ground vibration levels associated with various types of construction equipment are summarized on Table 8-5. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential for building damage using the following vibration assessment methods defined by the FTA. To describe the vibration impacts the FTA provides the following equation:

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

TABLE 8-5: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089
Vibratory Roller	0.210

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Using the vibration source level of construction equipment provided on Table 8-5 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 8-6 presents the expected Project related vibration levels at the nearby receiver locations. At distances ranging from 28 to 750 feet from Project construction activities, construction vibration velocity levels are estimated to range from 0.001 to 0.177 PPV in/sec. Based on maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec), the typical Project construction vibration levels will fall below the damage thresholds at all the receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant* during typical construction activities at the Project site.

TABLE 8-6: PROJECT CONSTRUCTION VIBRATION LEVELS

Location[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]						Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Jack-hammer	Loaded Trucks	Large bulldozer	Vibratory Roller	Highest Vibration Level		
R1	137'	0.000	0.003	0.006	0.007	0.016	0.016	0.3	No
R2	28'	0.003	0.030	0.064	0.075	0.177	0.177	0.3	No
R3	99'	0.000	0.004	0.010	0.011	0.027	0.027	0.3	No
R4	750'	0.000	0.000	0.000	0.001	0.001	0.001	0.3	No

[1] Construction noise source and receiver locations are shown on Exhibit 8-1.
[2] Distance from receiver building facade to Project construction boundary (Project site boundary).
[3] Based on the Vibration Source Levels of Construction Equipment (Table 8-5).
[4] Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Table 19, p. 38.
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

9 REFERENCES

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12. —. *Municipal Code, Sections 15.04.030.*
13. —. *General Plan Update Draft Environmental Impact Report.* 2005.
14. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
15. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
16. **California Department of Transportation.** *Technical Noise Supplement.* November 2009.
17. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
18. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.
19. **U.S. Environmental Protection Agency.** *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances.* 1971. NTID300.1.
20. **U.S. Department of Transportation, Federal Highway Administration.** Special Report - Measurement, Prediction, and Mitigation. *Office of Planning, Environment, and Realty - Environment - Noise.* [Online] 2017. https://www.fhwa.dot.gov/environment/noise/construction_noise/special_report/hcn00.cfm.
21. —. *FHWA Highway Construction Noise Handbook.* Final Report August 2006.

10 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Howard World Wildlife Museum Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 584-3148.

Bill Lawson, P.E., INCE
Principal
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Newport Beach, CA 92658
(949) 581-3148
blawson@urbanxroads.com



Education

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993
Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

Professional Registrations

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

Professional Affiliations

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

Professional Certifications

Certified Acoustical Consultant – County of San Diego • March, 2018
Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

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APPENDIX 3.1:

CITY OF RANCHO MIRAGE MUNICIPAL CODE

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CHAPTER 8.45
NOISE

§ 8.45.010. Purpose.

The city has established a quality of life and environment in which peace and quiet is highly valued by its residents, visitors and businesses. The existence of excessive noise within the city is a condition which is detrimental to the health, safety, comfort, welfare and quality of life of the citizenry and shall be regulated in the public interest. This chapter has been created to implement the goals and policies of the noise element of the city's general plan and to prohibit undesirable noises in the community. This chapter shall be referred to and cited as the Rancho Mirage noise ordinance.
(Ord. 633 § 1(Exh. A), 1995)

§ 8.45.020. Definitions.

"Ambient noise level" means the all encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

"Cumulative period" means an additive period of time consisting of individual time segments which may be continuous or interrupted.

"Decibel (dBA)" means a unit of sound level measured on a sound level meter using the A-weighting network.

"Emergency" means any occurrence or set of circumstances involving actual or imminent physical danger, crisis, trauma or property damage which demands immediate action.

"Noise level" means the same as sound level the terms are interchangeable.

"Person" means any individual, association, partnership, corporation, organization, or public agency, including associated officer(s), employee(s) or department(s).

"Sound level" means the quantity of decibels measured using the frequency weighting of A of a sound level meter.

"Sound level meter" means an instrument meeting the American National Standards Institute's standard S1.4-1983 or later revision, for Type 1 or Type 2 specifications; or an instrument and the associated recording and analyzing equipment which will provide equivalent data.
(Ord. 633 § 1(Exh. A), 1995)

§ 8.45.030. Exterior noise level limits.

No person shall operate or cause to be operated any source of sound or allow the creation of sound or noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level, as measured on any other property, to exceed:

A. The noise level for the applicable zone specified in Table A-1 for a cumulative period of more than thirty minutes in any hour of the applicable time period.

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Table A-1		
Land Use/Zone	**Time of Day**	**Noise Level (dBA)**
Residential, Low Density (R-E, H-R, R-L-2, R-L-3)	7:00 a.m. to 6:00 p.m. 6:00 p.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	55 50 45
Residential, Medium and High Density, Hospital, Open Space (OS, R-M, R-H, MHP)	7:00 a.m. to 6:00 p.m. 6:00 p.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	60 55 50
Commercial Office, Resort Commercial, Mixed Use, Institutional (O, P, Rs-H, M-U)	7:00 a.m. to 6:00 p.m. 6:00 p.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	65 60 55
Commercial Neighborhood, General Commercial, Commercial Recreation, Light Industrial (C-N, C-G, I-L)	7:00 a.m. to 6:00 p.m. 6:00 p.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	70 65 60

B. For cumulative periods of time less than thirty minutes in an hour, all the noise standards in Table A-1 are increased according to Table B-1.

Table B-1	
Duration of Sound	**dBA Adjustment**
15—30 minutes per hour	+ 3
10—15 minutes per hour	+ 5
5—10 minutes per hour	+ 10
1—5 minutes per hour	+ 15
Any period of time less than 1 minute per hour	+ 20

C. If the measured ambient noise level exceeds the dBA limits in Table A-1, the noise limits and their adjustments for the first three categories in Table B-1 shall be increased in five dBA increments as needed to encompass or reflect said ambient noise level. The maximum noise level under the last two categories in Table B-1 shall be increased, if necessary, only to equal the ambient noise level.

(Ord. 633 § 1(Exh. A), 1995; Ord. 1015 § 2, 2011)

§ 8.45.040. Noise level measurement.

A. The location selected for measuring exterior noise levels shall be at the point of the property line of the affected property nearest the alleged offending noise source. If possible, the ambient noise shall be measured at the same location along the property line.

B. If the measurement location is on a boundary between two different locations, the noise level

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limit applicable to the lower noise zone shall apply.

C. Upon receipt of a complaint or a request to investigate, the code compliance officer, equipped with an American National Standards Institute Type 2 or better sound level meter, may investigate the complaint. The investigation shall consist of measurements and the gathering of data to adequately define the noise problem and shall include the following:

1. Type and measurement of noise source;

2. Location of noise source relative to complainant's or affected property;

3. Time period during which noise source is considered to be intrusive;

4. Total duration of noise levels measured;

5. Date(s) and time(s) of noise measurement survey.

(Ord. 633 § 1(Exh. A), 1995)

§ 8.45.050. Special provisions and exemptions.

The following activities and noise sources shall be exempted from the provisions of this chapter:

A. School bands, school athletic and other activities occurring on a school campus;

B. Outdoor gatherings, dance, shows, entertainment for events authorized through the city's special events process;

C. Activities conducted in public parks and public playgrounds that are dependent upon such facilities for their operation;

D. Any emission of sound for purposes of alerting persons to an emergency or the general emission of sound during performance of emergency work;

E. Construction, alteration, repair, grading or improvement of any building, structure, road or improvement to real property for which a permit has been issued by the city if said construction occurs within the allowable hours set forth in Section 15.04.030(A)(10);

F. The operation of any equipment and machinery at any time within any zone by the city, its employees, or any agent or franchisee of the city in the course of performing maintenance, construction or trash collection.

(Ord. 633 § 1(Exh. A), 1995)

§ 8.45.060. Additional prohibition.

It is unlawful and a nuisance for any person to keep, maintain or permit upon any lot or parcel of land within the city under his or her control any animal, including any fowl, which by any sound or cry shall habitually disturb the peace and comfort of any person in the reasonable and comfortable enjoyment of life or property.

(Ord. 633 § 1(Exh. A), 1995)

§ 8.45.065. Landscape maintenance.

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A. It is unlawful and a public nuisance for any person to permit or perform for-hire landscape and non-emergency exterior hardscape maintenance activities such as, but not limited to, tree trimming, re-seeding, lawn mowing, leaf blowing, dust and debris clearing and any other landscaping or nonemergency exterior hardscape maintenance activities which utilize any motorized saw, sander, drill, grinder, leaf-blower, lawnmower, hedge trimmer, edger, or any other similar tool or device any time on Saturday and Sunday and between the hours of six p.m. and seven a.m. the next day during weekdays, unless otherwise provided in this section.

B. The regular mowing or grooming of golf courses, grass tennis courts, grass croquet courts, and lawn bowling areas shall be exempt from the restrictions set forth in this section. The allowed work hours for mowing or green preparation for golf courses, grass tennis courts, grass croquet courts, and lawn bowling areas shall be between five thirty a.m. and seven p.m., seven days per week and during all seasons of the year.

C. Nothing set forth in this section shall permit any person from engaging in any activities that exceed the exterior noise level limits set forth in Section 8.45.030 or otherwise constitute a public nuisance as set forth in Section 14.60.325 of the Municipal Code.

(Ord. 936, § 3, 2006; Ord. 979, § 1, 2009)

§ 8.45.070. Administration.

The noise control program established by this chapter shall be administered by and is the responsibility of the code compliance division as directed by the director of the community development department.

(Ord. 633 § 1(Exh. A), 1995)

§ 8.45.080. Violations and enforcement procedures.

Violations of this chapter are declared to be a nuisance and subject to the procedures, remedies and penalties set forth in Title 14.

(Ord. 633 § 1(Exh. A), 1995; Ord. 916 § 4, 2006)

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APPENDIX 5.1:

STUDY AREA PHOTOS

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16391_L1_A 1.North
33, 46' 2.950000", 116, 26' 37.770000"



16391_L1_A 2.South
33, 46' 2.870000", 116, 26' 37.820000"



16391_L1_A 3.East
33, 46' 2.950000", 116, 26' 37.690000"



16391_L1_A 4.West
33, 46' 2.970000", 116, 26' 37.710000"



16391_L2_C 1.North
33, 45' 55.580000", 116, 26' 32.470000"



16391_L2_C 2.South
33, 45' 55.550000", 116, 26' 32.410000"



16391_L2_C 3.East
33, 45' 55.440000", 116, 26' 32.470000"



16391_L2_C 4.West
33, 45' 55.430000", 116, 26' 32.500000"



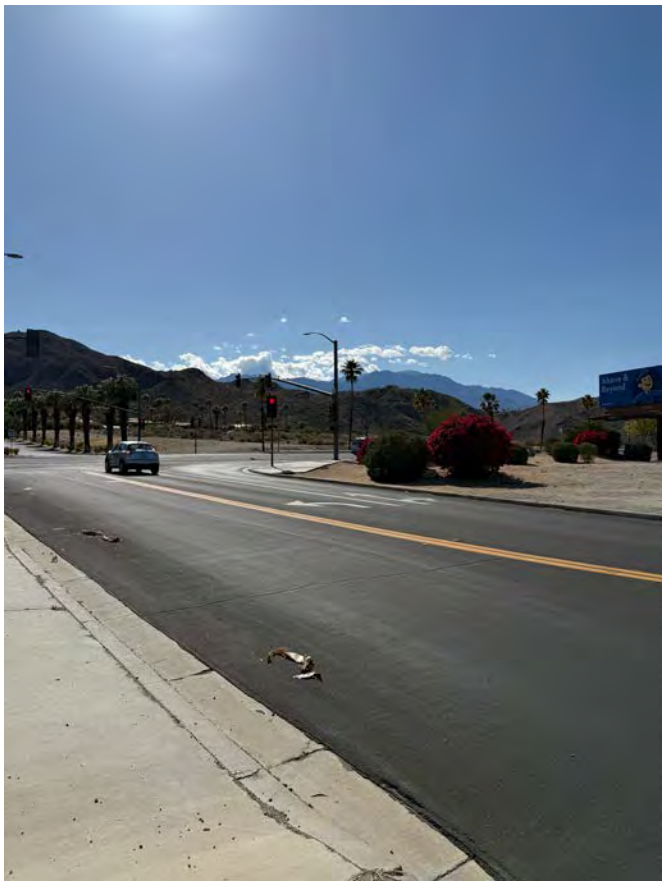
16391_L3_E 1.North
33, 45' 53.350000", 116, 26' 34.580000"



16391_L3_E 2.South
33, 45' 53.310000", 116, 26' 34.560000"



16391_L3_E 3.East
33, 45' 53.340000", 116, 26' 34.560000"



16391_L3_E 4.West
33, 45' 53.340000", 116, 26' 34.580000"



16391_L4_H 1.North
33, 45' 50.760000", 116, 26' 42.360000"



16391_L4_H 2.South
33, 45' 50.700000", 116, 26' 42.380000"



16391_L4_H 3.East
33, 45' 50.720000", 116, 26' 42.330000"



16391_L4_H 4.West
33, 45' 50.590000", 116, 26' 42.580000"



16391_L5_F 1.North
33, 45' 54.510000", 116, 26' 34.940000"



16391_L5_F 2.South
33, 45' 54.480000", 116, 26' 34.890000"



16391_L5_F 3.East
33, 45' 54.340000", 116, 26' 34.910000"



16391_L5_F 4.West
33, 45' 54.350000", 116, 26' 34.890000"



16391_L6_G 1.North
33, 45' 59.330000", 116, 26' 38.240000"



16391_L6_G 2.South
33, 45' 59.230000", 116, 26' 38.210000"



16391_L6_G 3.East
33, 45' 59.110000", 116, 26' 38.210000"



16391_L6_G 4.West
33, 45' 59.110000", 116, 26' 38.240000"

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

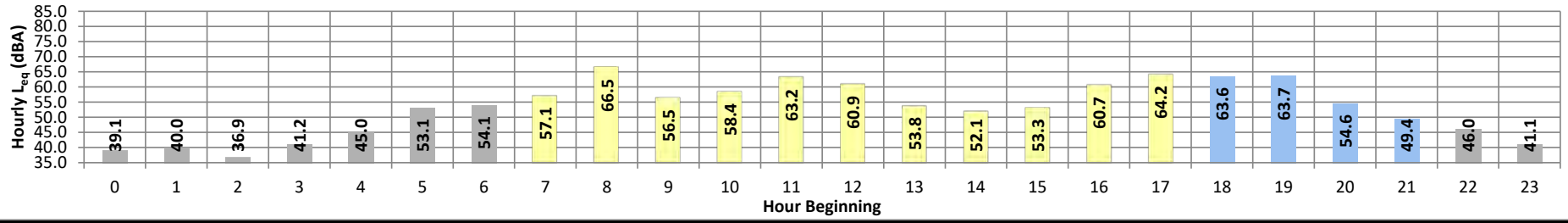
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24-Hour Noise Level Measurement Summary

Date: Tuesday, April 29, 2025 *Location:* L1 - Located north of the site within the Desert Braemar *Meter:* Piccolo II *JN:* 16391

Project: Howard Wildlife Museum *Source:* community near the residence at 69850 CA-111 *Analyst:* Z. Ibrahim

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	39.1	44.4	35.3	44.2	43.9	43.0	42.2	39.6	38.1	36.1	35.7	35.4	39.1	10.0	49.1
	1	40.0	46.7	36.2	46.5	46.1	44.6	43.3	40.3	38.6	36.7	36.5	36.3	40.0	10.0	50.0
	2	36.9	42.1	34.9	41.9	41.6	40.3	39.5	36.8	36.0	35.2	35.1	35.0	36.9	10.0	46.9
	3	41.2	47.5	37.5	47.2	46.9	45.3	44.6	41.7	39.5	38.1	37.8	37.6	41.2	10.0	51.2
	4	45.0	50.4	42.4	50.1	49.7	48.4	47.4	45.4	44.1	42.9	42.7	42.5	45.0	10.0	55.0
	5	53.1	60.8	44.5	60.2	59.8	58.8	58.2	54.6	48.9	45.3	44.9	44.6	53.1	10.0	63.1
	6	54.1	60.6	46.7	60.1	59.9	58.9	58.0	54.6	52.6	49.1	48.5	47.0	54.1	10.0	64.1
Day	7	57.1	65.2	48.7	63.9	63.1	61.8	61.0	57.9	55.5	51.3	50.3	49.2	57.1	0.0	57.1
	8	66.5	74.1	55.4	73.8	73.5	72.3	71.2	67.7	62.6	57.6	56.9	55.6	66.5	0.0	66.5
	9	56.5	63.5	49.3	62.4	61.7	60.4	59.7	57.4	55.4	51.9	51.0	49.9	56.5	0.0	56.5
	10	58.4	65.5	51.5	64.4	63.6	62.4	61.6	59.4	57.4	54.0	53.2	52.2	58.4	0.0	58.4
	11	63.2	73.3	52.2	71.6	70.5	68.6	67.5	63.9	60.6	55.4	54.3	52.8	63.2	0.0	63.2
	12	60.9	71.3	50.6	69.6	68.4	66.2	65.1	61.4	58.2	53.5	52.6	51.2	60.9	0.0	60.9
	13	53.8	63.8	47.2	63.2	62.4	59.9	58.2	52.7	50.3	48.2	47.8	47.3	53.8	0.0	53.8
	14	52.1	61.0	46.2	60.4	59.6	57.3	55.9	52.1	49.8	47.3	46.8	46.3	52.1	0.0	52.1
	15	53.3	63.1	46.8	62.0	60.7	58.6	57.1	53.5	50.7	48.0	47.5	47.0	53.3	0.0	53.3
	16	60.7	70.0	53.6	68.7	67.6	65.2	64.0	61.0	59.0	55.8	55.1	54.2	60.7	0.0	60.7
	17	64.2	72.9	56.2	71.3	70.2	68.5	67.6	64.9	62.7	59.0	58.1	56.9	64.2	0.0	64.2
Evening	18	63.6	72.6	55.6	70.9	69.7	67.9	67.0	64.3	62.1	58.3	57.5	56.3	63.6	0.0	63.6
	19	63.7	73.7	53.9	72.0	70.7	68.8	67.6	64.3	61.5	57.0	56.0	54.7	63.7	5.0	68.7
	20	54.6	64.2	46.5	62.6	61.5	59.8	58.8	55.3	52.1	48.2	47.5	46.8	54.6	5.0	59.6
	21	49.4	60.1	42.9	59.5	58.9	56.7	53.5	47.5	45.7	43.7	43.4	43.1	49.4	5.0	54.4
Night	22	46.0	55.8	38.4	55.5	55.1	53.5	51.0	44.7	41.8	39.0	38.7	38.4	46.0	10.0	56.0
	23	41.1	50.6	35.7	50.3	49.9	47.8	45.5	39.9	37.9	36.2	36.0	35.8	41.1	10.0	51.1

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	52.1	61.0	46.2	60.4	59.6	57.3	55.9	52.1	49.8	47.3	46.8	46.3
	Max	66.5	74.1	56.2	73.8	73.5	72.3	71.2	67.7	62.7	59.0	58.1	56.9
Energy Average		61.0	Average:		66.5	65.6	63.7	62.6	59.3	56.6	52.9	52.2	51.2
Evening	Min	49.4	60.1	42.9	59.5	58.9	56.7	53.5	47.5	45.7	43.7	43.4	43.1
	Max	63.7	73.7	55.6	72.0	70.7	68.8	67.6	64.3	62.1	58.3	57.5	56.3
Energy Average		61.0	Average:		66.3	65.2	63.3	61.7	57.8	55.3	51.8	51.1	50.2
Night	Min	36.9	42.1	34.9	41.9	41.6	40.3	39.5	36.8	36.0	35.2	35.1	35.0
	Max	54.1	60.8	46.7	60.2	59.9	58.9	58.2	54.6	52.6	49.1	48.5	47.0
Energy Average		48.1	Average:		50.7	50.3	49.0	47.7	44.2	42.0	39.9	39.6	39.2

Leq (dBA)		
Daytime (7am-7pm)	*Evening (7pm-10pm)*	*Nighttime (10pm-7am)*
61.0	**61.0**	**48.1**

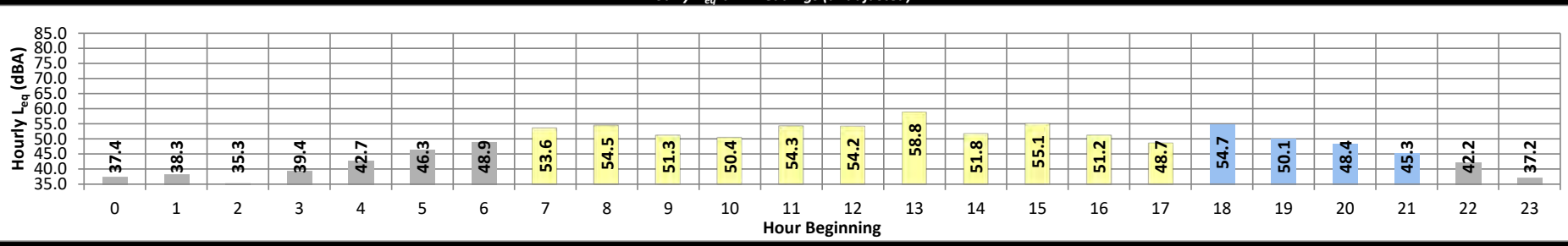
24-Hour
61.1

24-Hour Noise Level Measurement Summary

Date: Tuesday, April 29, 2025 *Location:* L2 - Located east of the site near the residence at 70100 *Meter:* Piccolo II *JN:* 16391

Project: Howard Wildlife Museum *Source:* Mirage Cove Drive. *Analyst:* Z. Ibrahim

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	37.4	42.7	33.4	42.4	42.1	41.3	40.4	38.2	36.5	34.2	33.8	33.5	37.4	10.0	47.4
	1	38.3	44.4	34.0	44.1	43.7	42.5	41.6	39.0	36.9	34.7	34.5	34.1	38.3	10.0	48.3
	2	35.3	40.2	33.1	39.9	39.5	38.4	37.5	35.6	34.6	33.5	33.4	33.1	35.3	10.0	45.3
	3	39.4	47.4	35.1	47.1	46.5	44.7	43.3	39.4	37.3	35.7	35.5	35.2	39.4	10.0	49.4
	4	42.7	47.7	39.7	47.3	46.8	45.5	44.9	43.3	42.1	40.4	40.1	39.8	42.7	10.0	52.7
	5	46.3	52.3	43.0	51.9	51.4	50.0	49.0	46.5	45.4	43.7	43.4	43.1	46.3	10.0	56.3
	6	48.9	55.1	44.8	54.5	53.9	52.7	51.9	49.5	48.0	45.7	45.3	44.9	48.9	10.0	58.9
Day	7	53.6	65.2	44.8	64.1	63.0	60.1	58.4	52.2	49.2	46.1	45.6	45.0	53.6	0.0	53.6
	8	54.5	60.2	51.2	59.3	58.4	57.1	56.6	55.2	54.0	52.0	51.7	51.4	54.5	0.0	54.5
	9	51.3	60.4	43.8	59.5	58.9	57.1	56.1	51.2	48.4	45.3	44.8	44.2	51.3	0.0	51.3
	10	50.4	59.7	45.0	58.7	58.0	55.4	53.4	50.3	48.7	46.4	45.9	45.3	50.4	0.0	50.4
	11	54.3	65.3	44.4	64.5	63.7	61.4	58.9	53.5	49.4	46.1	45.5	44.7	54.3	0.0	54.3
	12	54.2	58.6	49.7	58.2	57.8	57.2	56.8	55.3	53.8	50.7	50.3	49.8	54.2	0.0	54.2
	13	58.8	69.6	46.5	69.0	68.2	66.6	65.2	54.5	50.0	47.5	47.1	46.7	58.8	0.0	58.8
	14	51.8	61.2	44.5	60.4	59.7	57.5	55.9	51.9	48.9	45.8	45.3	44.7	51.8	0.0	51.8
	15	55.1	65.6	44.2	64.7	63.7	61.9	60.6	54.6	49.6	45.4	45.0	44.4	55.1	0.0	55.1
	16	51.2	58.7	46.4	57.7	56.9	55.1	54.3	51.8	50.1	47.7	47.3	46.7	51.2	0.0	51.2
	17	48.7	55.1	44.3	54.5	53.8	52.5	51.6	49.4	47.6	45.6	45.1	44.5	48.7	0.0	48.7
Evening	18	54.7	63.9	46.1	63.1	62.5	61.2	60.0	54.7	50.3	47.5	47.0	46.4	54.7	0.0	54.7
	19	50.1	57.7	46.2	56.9	56.2	54.0	52.8	50.3	49.0	47.2	46.9	46.4	50.1	5.0	55.1
	20	48.4	56.9	43.4	56.0	54.9	52.7	51.5	48.7	46.7	44.4	44.0	43.5	48.4	5.0	53.4
	21	45.3	51.8	41.5	51.4	50.9	49.4	48.0	45.6	44.3	42.4	41.9	41.6	45.3	5.0	50.3
Night	22	42.2	51.6	36.1	51.0	50.0	47.8	46.6	42.1	39.2	36.8	36.5	36.2	42.2	10.0	52.2
	23	37.2	46.6	32.0	46.1	45.2	42.9	40.9	36.8	34.6	32.6	32.3	32.1	37.2	10.0	47.2

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	48.7	55.1	43.8	54.5	53.8	52.5	51.6	49.4	47.6	45.3	44.8	44.2
	Max	58.8	69.6	51.2	69.0	68.2	66.6	65.2	55.3	54.0	52.0	51.7	51.4
Energy Average		53.9	Average:		61.0	60.2	58.3	57.1	52.7	50.0	47.2	46.7	46.1
Evening	Min	45.3	51.8	41.5	51.4	50.9	49.4	48.0	45.6	44.3	42.4	41.9	41.6
	Max	54.7	63.9	46.2	63.1	62.5	61.2	60.0	54.7	50.3	47.5	47.0	46.4
Energy Average		51.0	Average:		56.9	56.1	54.3	53.1	49.9	47.6	45.4	44.9	44.5
Night	Min	35.3	40.2	32.0	39.9	39.5	38.4	37.5	35.6	34.6	32.6	32.3	32.1
	Max	48.9	55.1	44.8	54.5	53.9	52.7	51.9	49.5	48.0	45.7	45.3	44.9
Energy Average		43.2	Average:		47.1	46.6	45.1	44.0	41.2	39.4	37.5	37.2	36.9

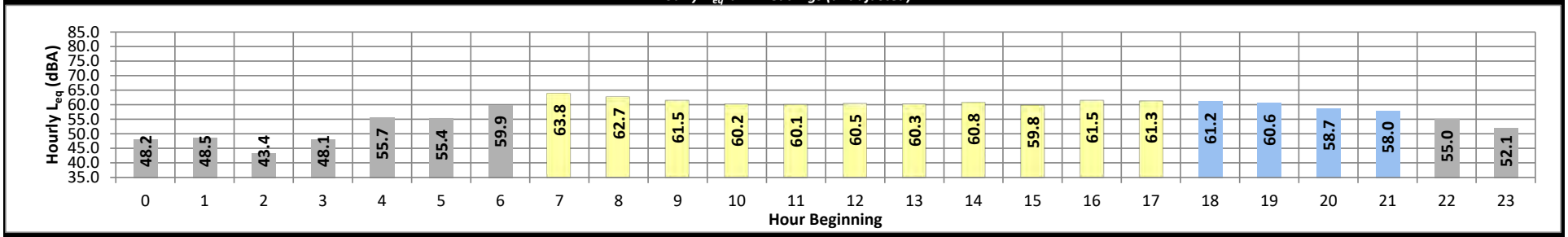
Leq (dBA)		
Daytime (7am-7pm)	*Evening (7pm-10pm)*	*Nighttime (10pm-7am)*
51.0	**53.9**	**43.2**
24-Hour		
53.6		

24-Hour Noise Level Measurement Summary

Date: Tuesday, April 29, 2025 *Location:* L3 - Located south of the site near the residence at 1 E the *Meter:* Piccolo II *JN:* 16391

Project: Howard Wildlife Museum *Source:* Palms St. *Analyst:* Z. Ibrahim

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	48.2	61.1	34.0	60.4	59.2	55.5	53.1	45.0	38.7	35.1	34.7	34.1	48.2	10.0	58.2
	1	48.5	61.9	35.7	61.2	60.0	56.1	52.8	43.7	39.1	36.6	36.3	35.9	48.5	10.0	58.5
	2	43.4	56.1	33.4	55.7	54.8	50.9	47.9	38.4	35.1	33.8	33.7	33.5	43.4	10.0	53.4
	3	48.1	59.8	37.1	59.3	58.5	55.4	52.7	45.8	42.2	37.9	37.6	37.2	48.1	10.0	58.1
	4	55.7	69.5	41.3	68.6	67.9	62.4	58.3	51.8	46.8	42.1	41.7	41.4	55.7	10.0	65.7
	5	55.4	65.2	45.5	64.8	64.3	62.3	60.2	55.1	51.0	47.0	46.3	45.7	55.4	10.0	65.4
	6	59.9	69.5	47.9	69.0	68.4	66.7	65.2	59.8	55.7	49.9	49.0	48.0	59.9	10.0	69.9
Day	7	63.8	73.3	54.1	72.6	71.9	69.9	67.9	63.8	61.1	56.7	55.6	54.4	63.8	0.0	63.8
	8	62.7	70.7	53.7	70.4	70.0	68.3	66.6	63.2	60.9	56.6	55.5	54.1	62.7	0.0	62.7
	9	61.5	73.0	50.7	72.2	70.9	67.4	65.2	61.0	57.9	53.1	52.2	51.1	61.5	0.0	61.5
	10	60.2	68.7	50.0	68.2	67.6	66.1	65.0	60.9	57.0	52.2	51.4	50.4	60.2	0.0	60.2
	11	60.1	69.7	49.2	69.2	68.5	66.6	64.7	60.1	56.6	51.5	50.5	49.5	60.1	0.0	60.1
	12	60.5	70.5	49.3	70.0	69.3	66.6	64.8	60.5	57.1	51.5	50.5	49.6	60.5	0.0	60.5
	13	60.3	69.2	49.4	68.8	68.0	65.7	64.2	61.0	58.0	52.2	51.1	49.8	60.3	0.0	60.3
	14	60.8	69.7	50.9	69.2	68.3	66.3	64.9	61.2	58.5	53.4	52.4	51.2	60.8	0.0	60.8
	15	59.8	67.1	49.1	66.7	66.2	64.7	63.8	61.1	58.0	52.0	50.7	49.4	59.8	0.0	59.8
	16	61.5	69.2	52.1	68.6	68.1	66.5	65.3	62.4	59.8	54.7	53.5	52.4	61.5	0.0	61.5
	17	61.3	69.5	52.6	68.9	68.0	65.9	64.7	62.1	59.8	55.4	54.2	53.0	61.3	0.0	61.3
Evening	18	61.2	68.1	52.4	67.6	67.0	65.7	65.0	62.3	59.7	55.0	54.0	52.9	61.2	0.0	61.2
	19	60.6	69.6	50.6	68.9	68.3	66.0	64.6	61.1	58.1	53.3	52.2	51.1	60.6	5.0	65.6
	20	58.7	67.9	46.7	67.5	67.0	64.9	63.2	59.3	55.4	49.0	47.8	47.0	58.7	5.0	63.7
	21	58.0	69.0	43.4	68.6	67.8	65.3	63.2	57.2	52.0	45.0	44.2	43.5	58.0	5.0	63.0
Night	22	55.0	65.5	38.7	65.0	64.2	62.2	60.8	54.5	47.8	40.0	39.3	38.8	55.0	10.0	65.0
	23	52.1	63.7	33.8	63.3	62.7	60.2	57.6	49.4	41.3	34.8	34.3	33.9	52.1	10.0	62.1

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	59.8	67.1	49.1	66.7	66.2	64.7	63.8	60.1	56.6	51.5	50.5	49.4
	Max	63.8	73.3	54.1	72.6	71.9	69.9	67.9	63.8	61.1	56.7	55.6	54.4
Energy Average		61.3	Average:		69.5	68.8	66.7	65.2	61.6	58.6	53.6	52.5	51.4
Evening	Min	58.0	67.9	43.4	67.5	67.0	64.9	63.2	57.2	52.0	45.0	44.2	43.5
	Max	61.2	69.6	52.4	68.9	68.3	66.0	65.0	62.3	59.7	55.0	54.0	52.9
Energy Average		59.8	Average:		68.1	67.5	65.5	64.0	60.0	56.3	50.6	49.6	48.6
Night	Min	43.4	56.1	33.4	55.7	54.8	50.9	47.9	38.4	35.1	33.8	33.7	33.5
	Max	59.9	69.5	47.9	69.0	68.4	66.7	65.2	59.8	55.7	49.9	49.0	48.0
Energy Average		54.3	Average:		63.0	62.2	59.1	56.5	49.3	44.2	39.7	39.2	38.7

Leq (dBA)

Daytime (7am-7pm)	*Evening (7pm-10pm)*	*Nighttime (10pm-7am)*
59.8	**61.3**	**54.3**

24-Hour

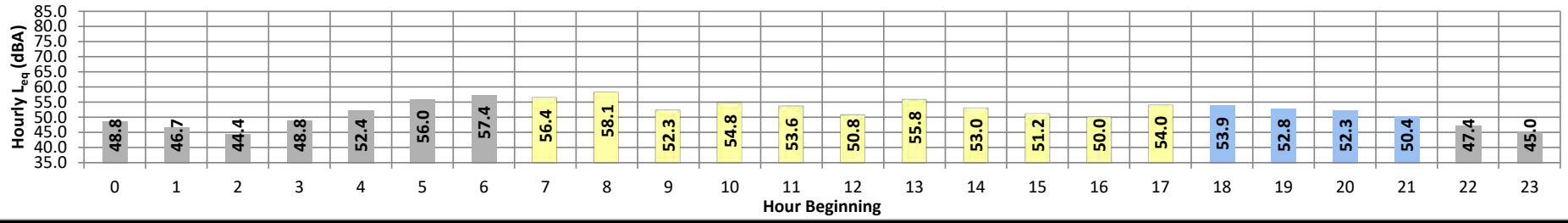
63.0

24-Hour Noise Level Measurement Summary

Date: Tuesday, April 29, 2025 *Location:* L4 - Located southwest of the site near the residence at 8 Vista *Meter:* Piccolo II *JN:* 16391

Project: Howard Wildlife Museum *Source:* Loma Dr. *Analyst:* Z. Ibrahim

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	48.8	57.1	38.3	56.7	56.2	54.5	53.3	49.8	46.0	39.6	38.9	38.4	48.8	10.0	58.8
	1	46.7	55.5	36.7	55.0	54.5	53.2	52.0	46.9	42.3	37.8	37.3	36.8	46.7	10.0	56.7
	2	44.4	53.5	35.2	53.0	52.5	50.4	49.2	44.8	40.7	36.0	35.6	35.3	44.4	10.0	54.4
	3	48.8	57.5	37.0	57.2	56.6	55.3	54.1	49.3	44.2	38.6	37.8	37.1	48.8	10.0	58.8
	4	52.4	60.3	42.6	59.9	59.4	58.1	57.1	53.3	49.5	44.7	43.9	42.9	52.4	10.0	62.4
	5	56.0	62.3	48.9	61.9	61.5	60.3	59.4	57.3	54.8	50.6	50.0	49.1	56.0	10.0	66.0
	6	57.4	61.9	51.6	61.6	61.3	60.8	60.3	58.7	56.7	53.0	52.4	51.7	57.4	10.0	67.4
Day	7	56.4	61.7	50.5	61.1	60.8	60.1	59.5	57.7	55.8	51.8	51.2	50.6	56.4	0.0	56.4
	8	58.1	63.7	53.3	63.3	62.9	61.7	61.2	58.9	57.5	54.8	54.2	53.6	58.1	0.0	58.1
	9	52.3	56.5	47.6	56.2	55.9	55.4	55.0	53.4	51.7	48.8	48.3	47.7	52.3	0.0	52.3
	10	54.8	65.4	48.5	64.6	63.4	59.3	57.2	54.3	52.8	50.0	49.4	48.7	54.8	0.0	54.8
	11	53.6	58.8	48.8	58.3	57.8	56.6	56.1	54.5	53.1	50.2	49.6	49.0	53.6	0.0	53.6
	12	50.8	57.5	45.7	57.0	56.6	55.3	54.4	51.5	49.4	46.8	46.3	45.9	50.8	0.0	50.8
	13	55.8	64.2	46.8	63.7	63.0	62.2	61.1	56.1	51.7	48.0	47.4	46.9	55.8	0.0	55.8
	14	53.0	60.6	46.0	59.7	58.9	57.6	56.9	53.9	51.3	47.2	46.7	46.2	53.0	0.0	53.0
	15	51.2	57.6	45.7	57.2	56.7	55.4	54.6	52.2	49.7	46.7	46.3	45.8	51.2	0.0	51.2
	16	50.0	55.2	44.9	54.8	54.5	53.7	53.0	51.1	49.3	45.9	45.6	45.1	50.0	0.0	50.0
	17	54.0	63.2	46.7	62.4	61.6	59.2	57.8	54.1	51.7	48.2	47.6	46.9	54.0	0.0	54.0
Evening	18	53.9	59.2	47.9	58.9	58.6	58.0	57.6	55.2	52.2	49.1	48.5	48.1	53.9	0.0	53.9
	19	52.8	59.0	47.7	58.4	57.8	56.4	55.5	53.7	52.0	49.1	48.4	47.8	52.8	5.0	57.8
	20	52.3	57.1	47.2	56.8	56.6	55.8	55.1	53.5	51.4	48.3	47.8	47.4	52.3	5.0	57.3
	21	50.4	55.2	45.0	54.8	54.5	53.9	53.4	51.6	49.6	46.2	45.7	45.2	50.4	5.0	55.4
Night	22	47.4	54.1	40.9	53.6	53.1	51.8	50.5	48.5	46.2	42.3	41.6	41.1	47.4	10.0	57.4
	23	45.0	50.6	38.8	50.1	49.6	48.7	48.2	46.3	43.9	40.2	39.5	39.0	45.0	10.0	55.0

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	50.0	55.2	44.9	54.8	54.5	53.7	53.0	51.1	49.3	45.9	45.6	45.1
	Max	58.1	65.4	53.3	64.6	63.4	62.2	61.2	58.9	57.5	54.8	54.2	53.6
Energy Average		54.3	Average:		59.8	59.3	57.9	57.0	54.3	52.2	48.9	48.4	47.9
Evening	Min	50.4	55.2	45.0	54.8	54.5	53.9	53.4	51.6	49.6	46.2	45.7	45.2
	Max	53.9	59.2	47.9	58.9	58.6	58.0	57.6	55.2	52.2	49.1	48.5	48.1
Energy Average		52.5	Average:		57.2	56.9	56.0	55.4	53.5	51.3	48.2	47.6	47.1
Night	Min	44.4	50.6	35.2	50.1	49.6	48.7	48.2	44.8	40.7	36.0	35.6	35.3
	Max	57.4	62.3	51.6	61.9	61.5	60.8	60.3	58.7	56.7	53.0	52.4	51.7
Energy Average		52.0	Average:		56.6	56.1	54.8	53.8	50.5	47.1	42.5	41.9	41.3

Leq (dBA)

Daytime (7am-7pm)	*Evening (7pm-10pm)*	*Nighttime (10pm-7am)*
52.5	**54.3**	**52.0**

24-Hour

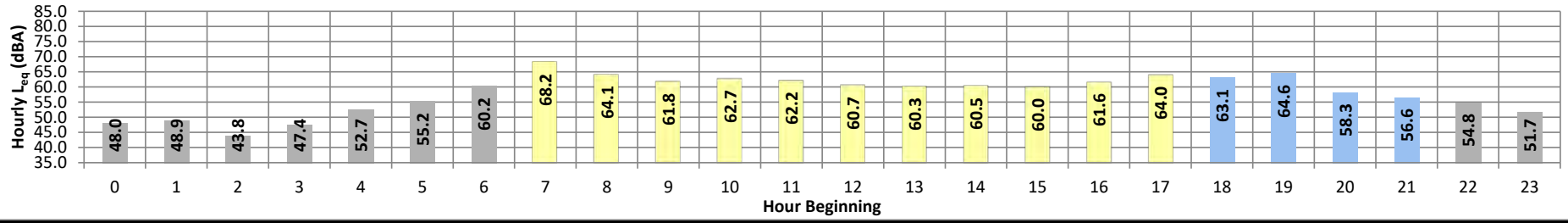
59.0

24-Hour Noise Level Measurement Summary

Date: Tuesday, April 29, 2025 *Location:* L5 - Located within the site near the residence at 70100 *Meter:* Piccolo II *JN:* 16391

Project: Howard Wildlife Museum *Source:* Mirage Cove Dr. *Analyst:* Z. Ibrahim

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	48.0	59.5	34.5	59.2	58.4	56.2	53.9	44.4	39.0	35.5	34.9	34.6	48.0	10.0	58.0
	1	48.9	61.3	35.5	60.8	59.9	57.0	54.1	44.6	39.3	36.5	36.1	35.6	48.9	10.0	58.9
	2	43.8	55.7	33.9	55.3	54.6	52.3	49.4	38.7	35.6	34.3	34.1	34.0	43.8	10.0	53.8
	3	47.4	58.2	37.1	57.8	56.9	54.7	52.9	45.4	41.3	38.2	37.8	37.3	47.4	10.0	57.4
	4	52.7	65.7	41.3	64.7	63.8	60.1	56.8	49.5	45.8	42.0	41.6	41.3	52.7	10.0	62.7
	5	55.2	64.7	46.3	64.3	63.8	62.1	60.2	54.9	51.0	47.4	47.0	46.5	55.2	10.0	65.2
	6	60.2	69.8	48.8	69.3	68.9	67.2	65.2	59.7	56.1	50.6	49.7	48.9	60.2	10.0	70.2
Day	7	68.2	79.0	56.3	78.7	78.5	76.7	73.1	65.3	63.1	59.1	58.2	56.9	68.2	0.0	68.2
	8	64.1	71.2	56.0	70.3	69.7	68.4	67.5	65.0	63.0	59.0	57.8	56.5	64.1	0.0	64.1
	9	61.8	70.2	53.8	69.4	68.5	66.6	65.4	62.4	60.3	56.5	55.5	54.3	61.8	0.0	61.8
	10	62.7	69.9	54.6	69.3	68.6	67.5	66.7	63.4	61.0	57.2	56.4	55.2	62.7	0.0	62.7
	11	62.2	71.9	51.8	71.3	70.9	69.2	66.2	61.7	58.8	54.3	53.3	52.2	62.2	0.0	62.2
	12	60.7	70.7	49.9	70.0	69.1	67.0	64.6	60.7	57.9	52.5	51.4	50.3	60.7	0.0	60.7
	13	60.3	68.8	49.9	68.3	67.6	65.8	64.2	61.0	58.3	52.5	51.5	50.2	60.3	0.0	60.3
	14	60.5	69.3	51.0	68.8	68.0	66.2	64.9	60.6	58.2	53.4	52.3	51.3	60.5	0.0	60.5
	15	60.0	67.6	50.2	67.2	66.5	65.1	63.9	61.1	58.3	52.7	51.6	50.5	60.0	0.0	60.0
	16	61.6	68.7	54.5	68.2	67.6	65.9	64.7	62.3	60.4	56.9	56.0	55.0	61.6	0.0	61.6
	17	64.0	71.7	57.0	70.9	70.0	67.9	66.9	64.7	63.0	59.6	58.7	57.6	64.0	0.0	64.0
Evening	18	63.1	70.3	56.3	69.2	68.4	66.9	66.1	64.1	62.2	58.6	57.8	56.9	63.1	0.0	63.1
	19	64.6	75.9	54.5	75.2	74.0	71.0	67.8	63.6	61.2	57.4	56.4	55.2	64.6	5.0	69.6
	20	58.3	66.2	48.3	65.9	65.4	64.1	62.6	59.2	55.9	50.5	49.6	48.6	58.3	5.0	63.3
	21	56.6	65.9	44.3	65.6	65.0	63.2	61.8	56.9	52.3	45.7	44.9	44.4	56.6	5.0	61.6
Night	22	54.8	65.6	38.7	65.0	64.0	62.0	60.3	54.6	48.2	40.0	39.3	38.8	54.8	10.0	64.8
	23	51.7	62.8	34.2	62.3	61.7	59.6	57.6	49.9	41.8	35.2	34.7	34.3	51.7	10.0	61.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	60.0	67.6	49.9	67.2	66.5	65.1	63.9	60.6	57.9	52.5	51.4	50.2
	Max	68.2	79.0	57.0	78.7	78.5	76.7	73.1	65.3	63.1	59.6	58.7	57.6
Energy Average		63.1	Average:		70.2	69.5	67.8	66.2	62.6	60.2	55.8	54.8	53.6
Evening	Min	56.6	65.9	44.3	65.6	65.0	63.2	61.8	56.9	52.3	45.7	44.9	44.4
	Max	64.6	75.9	56.3	75.2	74.0	71.0	67.8	64.1	62.2	58.6	57.8	56.9
Energy Average		61.8	Average:		69.0	68.2	66.3	64.6	60.9	57.9	53.1	52.2	51.2
Night	Min	43.8	55.7	33.9	55.3	54.6	52.3	49.4	38.7	35.6	34.3	34.1	34.0
	Max	60.2	69.8	48.8	69.3	68.9	67.2	65.2	59.7	56.1	50.6	49.7	48.9
Energy Average		54.0	Average:		62.1	61.3	59.0	56.7	49.1	44.2	40.0	39.5	39.0

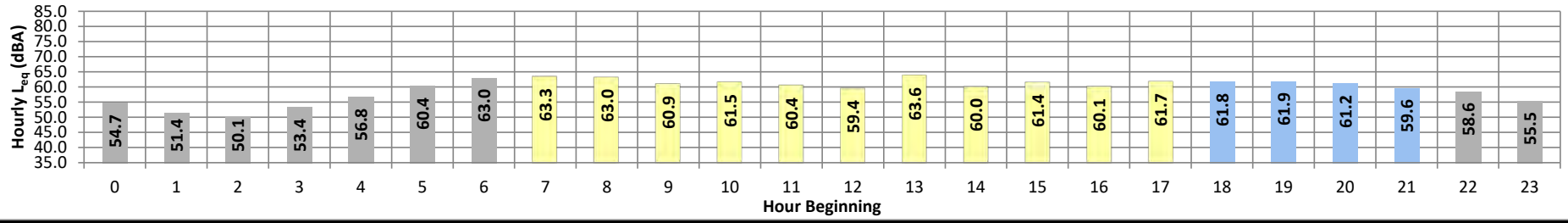
Leq (dBA)		
Daytime (7am-7pm)	*Evening (7pm-10pm)*	*Nighttime (10pm-7am)*
61.8	**63.1**	**54.0**
24-Hour		
64.0		

24-Hour Noise Level Measurement Summary

Date: Tuesday, April 29, 2025 *Location:* L6 - Located within the site. *Meter:* Piccolo II *JN:* 16391

Project: Howard Wildlife Museum *Source:* *Analyst:* Z. Ibrahim

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	54.7	63.6	42.2	63.1	62.3	60.5	59.4	55.6	51.6	44.0	42.9	42.4	54.7	10.0	64.7
	1	51.4	60.8	39.6	60.3	59.6	57.6	56.2	52.2	47.5	40.9	40.3	39.8	51.4	10.0	61.4
	2	50.1	59.7	38.1	59.3	58.5	56.3	54.9	50.7	46.1	39.4	38.8	38.2	50.1	10.0	60.1
	3	53.4	62.4	42.3	62.0	61.4	59.6	58.2	54.0	49.7	43.8	43.0	42.4	53.4	10.0	63.4
	4	56.8	64.1	47.1	63.8	63.2	61.8	61.0	58.1	54.7	49.3	48.2	47.2	56.8	10.0	66.8
	5	60.4	66.5	52.9	66.2	65.7	64.5	63.8	61.7	59.4	54.8	53.9	53.1	60.4	10.0	70.4
	6	63.0	68.6	55.7	68.3	67.8	66.9	66.2	64.3	62.0	57.6	56.7	55.9	63.0	10.0	73.0
Day	7	63.3	68.7	55.0	68.3	68.0	67.2	66.6	64.8	62.5	57.1	56.2	55.2	63.3	0.0	63.3
	8	63.0	69.7	54.4	69.4	69.1	67.9	67.0	64.2	61.7	56.3	55.3	54.6	63.0	0.0	63.0
	9	60.9	66.3	52.5	66.0	65.8	65.0	64.4	62.5	59.8	54.3	53.4	52.6	60.9	0.0	60.9
	10	61.5	69.8	53.0	69.3	68.7	66.7	65.1	62.2	59.7	54.9	54.0	53.2	61.5	0.0	61.5
	11	60.4	68.0	52.1	67.6	67.0	65.2	64.0	61.3	58.9	54.1	53.2	52.3	60.4	0.0	60.4
	12	59.4	66.8	51.2	66.4	66.0	63.9	62.7	60.5	58.0	53.3	52.3	51.4	59.4	0.0	59.4
	13	63.6	73.4	51.8	72.8	72.3	70.5	69.6	62.9	58.8	53.9	52.8	52.0	63.6	0.0	63.6
	14	60.0	66.8	51.9	66.4	65.7	64.1	63.4	61.2	58.8	53.8	52.7	52.1	60.0	0.0	60.0
	15	61.4	71.4	51.9	70.9	70.1	67.3	65.0	61.3	59.0	54.1	53.1	52.1	61.4	0.0	61.4
	16	60.1	65.7	51.7	65.4	65.0	63.9	63.3	61.5	59.3	53.6	52.7	51.8	60.1	0.0	60.1
	17	61.7	69.6	53.0	69.2	68.7	66.7	65.2	62.4	60.2	55.3	54.1	53.2	61.7	0.0	61.7
Evening	18	61.8	67.2	53.9	66.9	66.6	65.6	65.0	63.1	60.9	56.2	55.3	54.1	61.8	0.0	61.8
	19	61.9	69.8	53.5	69.3	68.6	66.6	65.3	62.8	60.4	55.5	54.6	53.7	61.9	5.0	66.9
	20	61.2	68.2	53.1	67.9	67.4	65.8	64.8	62.2	59.6	55.2	54.2	53.4	61.2	5.0	66.2
	21	59.6	67.7	50.6	67.4	66.8	64.9	63.4	60.6	57.5	52.7	51.5	50.8	59.6	5.0	64.6
Night	22	58.6	69.0	45.9	68.4	67.4	64.8	63.4	58.6	54.8	48.1	47.1	46.1	58.6	10.0	68.6
	23	55.5	64.5	43.2	64.0	63.4	61.6	60.3	56.3	51.9	45.4	44.3	43.4	55.5	10.0	65.5

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	59.4	65.7	51.2	65.4	65.0	63.9	62.7	60.5	58.0	53.3	52.3	51.4
	Max	63.6	73.4	55.0	72.8	72.3	70.5	69.6	64.8	62.5	57.1	56.2	55.2
Energy Average		61.6	Average:		68.4	67.8	66.2	65.1	62.3	59.7	54.6	53.6	52.8
Evening	Min	59.6	67.2	50.6	66.9	66.6	64.9	63.4	60.6	57.5	52.7	51.5	50.8
	Max	61.9	69.8	53.9	69.3	68.6	66.6	65.3	63.1	60.9	56.2	55.3	54.1
Energy Average		61.2	Average:		67.9	67.3	65.7	64.6	62.2	59.6	54.9	53.9	53.0
Night	Min	50.1	59.7	38.1	59.3	58.5	56.3	54.9	50.7	46.1	39.4	38.8	38.2
	Max	63.0	69.0	55.7	68.4	67.8	66.9	66.2	64.3	62.0	57.6	56.7	55.9
Energy Average		57.8	Average:		63.9	63.2	61.5	60.4	56.8	53.1	47.0	46.1	45.4

Leq (dBA)

Daytime (7am-7pm)	*Evening (7pm-10pm)*	*Nighttime (10pm-7am)*
61.2	**61.6**	**57.8**

24-Hour

65.4

APPENDIX 7.1:

CADNAA OPERATIONAL NOISE CALCULATIONS

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16391 - Howard World Wildlife Museum

CadnaA Noise Prediction Model: 16391-02 NA.cna
Date: 05.05.25
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (ft)	**10000.00**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (ft)	**3280.80**
Min. Length of Section (ft)	**3.30**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**1**
Search Radius Src	**328.08**
Search Radius Rcvr	**328.08**
Max. Distance Source - Rcvr	**3280.84 3280.84**
Min. Distance Rvcr - Reflector	**3.28 3.28**
Min. Distance Source - Reflector	**0.33**
Industrial (ISO 9613 (1996))	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (°F)	**50**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (mph)	**6.7**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr				Limit. Value				Land Use			Height		Coordinates		
			Day	Eve	Night	CNEL	Day	Eve	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	55.1	48.0	40.3	53.5	60.0	55.0	50.0	0.0				5.00	r	6502804.10	2222986.54	271.00
RECEIVERS		R2	46.9	48.5	14.0	47.2	60.0	55.0	50.0	0.0				5.00	r	6503057.48	2222171.49	270.82
RECEIVERS		R3	38.4	40.0	13.4	38.8	70.0	65.0	60.0	0.0				5.00	r	6503073.73	2221945.70	271.00
RECEIVERS		R4	34.1	34.5	30.9	38.5	55.0	50.0	45.0	0.0				5.00	r	6502254.18	2221700.19	307.28

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
POINTSOURCE		TRASH01	89.0	89.0	89.0	Lw	89		660.00	240.00	0.00	5.00	r	6502812.07	2222767.19	271.00
POINTSOURCE		TRASH02	89.0	89.0	89.0	Lw	89		660.00	240.00	0.00	5.00	r	6502819.57	2222765.54	271.41
POINTSOURCE		TRASH03	89.0	89.0	89.0	Lw	89		660.00	240.00	0.00	5.00	r	6502827.21	2222763.69	272.19
POINTSOURCE		AC01	88.9	88.9	88.9	Lw	88.9		429.00	156.00	252.00	5.00	g	6502819.79	2222545.07	296.00
POINTSOURCE		AC02	88.9	88.9	88.9	Lw	88.9		429.00	156.00	252.00	5.00	g	6502770.54	2222520.89	296.00
POINTSOURCE		AC03	88.9	88.9	88.9	Lw	88.9		429.00	156.00	252.00	5.00	g	6502758.00	2222592.54	296.00
POINTSOURCE		AC04	88.9	88.9	88.9	Lw	88.9		429.00	156.00	252.00	5.00	g	6502779.49	2222663.29	296.00
POINTSOURCE		AC05	88.9	88.9	88.9	Lw	88.9		429.00	156.00	252.00	5.00	g	6502798.75	2222726.87	296.00
POINTSOURCE		AC06	88.9	88.9	88.9	Lw	88.9		429.00	156.00	252.00	5.00	g	6502846.21	2222739.86	296.00
POINTSOURCE		AC07	88.9	88.9	88.9	Lw	88.9		429.00	156.00	252.00	5.00	g	6502846.66	2222666.42	296.00
POINTSOURCE		AC08	88.9	88.9	88.9	Lw	88.9		429.00	156.00	252.00	5.00	g	6502833.23	2222601.94	296.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
AREASOURCE		CAR01	81.1	81.1	81.1	62.0	62.0	62.0	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		CAR02	81.1	81.1	81.1	63.0	63.0	63.0	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		CAR03	81.1	81.1	81.1	63.1	63.1	63.1	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		CAR04	81.1	81.1	81.1	58.8	58.8	58.8	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		CAR05	81.1	81.1	81.1	54.3	54.3	54.3	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		CAR06	81.1	81.1	81.1	54.4	54.4	54.4	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		CAR07	81.1	81.1	81.1	57.6	57.6	57.6	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		CAR08	81.1	81.1	81.1	57.1	57.1	57.1	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		CAR09	81.1	81.1	81.1	64.6	64.6	64.6	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		CAR10	81.1	81.1	81.1	63.4	63.4	63.4	Lw	81.1		660.00	240.00	0.00	5	r
AREASOURCE		DOCK01	103.4	103.4	103.4	86.4	86.4	86.4	Lw	103.4		660.00	0.00	0.00	8	r

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
AREASOURCE	CAR01	5.00	r			6502992.40	2222109.10	273.47	268.47
						6503008.72	2222108.40	273.00	268.00
						6503008.37	2222054.23	272.54	267.54
						6502992.40	2222055.28	273.33	268.33
AREASOURCE	CAR02	5.00	r			6502940.32	2222109.10	274.91	269.91
						6502959.41	2222108.75	274.35	269.35
						6502960.11	2222072.64	274.45	269.45
						6502941.01	2222072.98	275.06	270.06
AREASOURCE	CAR03	5.00	r			6502874.00	2222148.33	275.80	270.80
						6502893.10	2222149.37	275.13	270.13
						6502892.75	2222111.53	275.96	270.96
						6502875.04	2222112.22	276.49	271.49
AREASOURCE	CAR04	5.00	r			6502990.66	2222163.61	273.46	268.46
						6503028.86	2222163.96	271.61	266.61
						6503030.60	2222116.73	271.41	266.41
						6502990.66	2222117.08	273.51	268.51
AREASOURCE	CAR05	5.00	r			6502496.91	2222810.83	275.00	270.00
						6502512.89	2222819.16	275.00	270.00
						6502639.97	2222580.97	276.67	271.67
						6502621.91	2222571.25	277.06	272.06
AREASOURCE	CAR06	5.00	r			6502552.82	2222838.61	274.31	269.31
						6502672.61	2222607.01	275.52	270.52
						6502655.94	2222598.68	275.86	270.86
						6502534.07	2222830.97	275.00	270.00
AREASOURCE	CAR07	5.00	r			6502618.36	2222757.93	274.44	269.44
						6502634.31	2222765.82	273.63	268.63
						6502694.92	2222646.75	274.16	269.16
						6502678.45	2222638.52	274.48	269.48
AREASOURCE	CAR08	5.00	r			6502656.16	2222776.63	272.70	267.70
						6502691.45	2222794.07	271.61	266.61
						6502717.66	2222742.61	271.67	266.67
						6502699.23	2222734.77	271.99	266.99
						6502711.78	2222710.46	272.41	267.41
						6502695.90	2222702.03	272.66	267.66
AREASOURCE	CAR09	5.00	r			6502716.83	2222806.62	271.00	266.00
						6502750.85	2222823.44	270.49	265.49
						6502757.06	2222812.20	271.00	266.00
						6502722.36	2222795.74	271.00	266.00
AREASOURCE	CAR10	5.00	r			6502793.53	2222844.54	271.00	266.00
						6502808.81	2222813.77	271.00	266.00
						6502793.13	2222806.32	271.00	266.00
						6502775.69	2222835.72	270.52	265.52
AREASOURCE	DOCK01	8.00	r			6502854.41	2222784.30	277.16	269.16
						6502868.14	2222781.15	281.92	273.92
						6502859.25	2222745.78	282.45	274.45
						6502845.93	2222748.94	277.51	269.51

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height		Coordinates			
							Begin		x	y	z	Ground
							(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING			BUILDING00001	x	0		25.00	r	6502789.79	2222762.24	291.00	266.00
									6502876.66	2222741.65	291.00	284.29
									6502871.74	2222726.87	291.00	282.80
									6502878.01	2222725.08	291.00	286.70
									6502826.96	2222521.34	291.00	293.89
									6502807.70	2222528.50	291.00	282.98
									6502801.44	2222503.88	291.00	291.58
									6502752.18	2222515.52	291.00	276.78
									6502755.76	2222532.53	291.00	275.66
									6502741.96	2222559.63	291.00	273.20

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates			
							Begin	x	y	z	Ground
							(ft)	(ft)	(ft)	(ft)	(ft)
								6502737.86	2222574.30	291.00	272.28
								6502735.61	2222604.63	291.00	270.60
								6502739.23	2222620.03	291.00	269.87
								6502753.52	2222648.15	291.00	268.85
								6502763.82	2222660.15	291.00	268.45

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APPENDIX 8.1:

CONSTRUCTION NOISE CALCULATIONS

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16391 - Howard World Wildlife Museum

CadnaA Noise Prediction Model: 16391-02 NA_Construction.cna
Date: 05.05.25
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (ft)	**10000.00**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (ft)	**3280.80**
Min. Length of Section (ft)	**3.30**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**1**
Search Radius Src	**328.08**
Search Radius Rcvr	**328.08**
Max. Distance Source - Rcvr	**3280.84 3280.84**
Min. Distance Rvcr - Reflector	**3.28 3.28**
Min. Distance Source - Reflector	**0.33**
Industrial (ISO 9613 (1996))	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (°F)	**50**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (mph)	**6.7**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr				Limit. Value				Land Use			Height		Coordinates		
			Day	Eve	Night	CNEL	Day	Eve	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	64.4	64.4	64.4	71.0	60.0	55.0	50.0	0.0				5.00	r	6502804.10	2222986.54	271.00
RECEIVERS		R2	73.2	73.2	73.2	79.9	60.0	55.0	50.0	0.0				5.00	r	6503057.48	2222171.49	270.82
RECEIVERS		R3	69.2	69.2	69.2	75.9	70.0	65.0	60.0	0.0				5.00	r	6503073.73	2221945.70	271.00
RECEIVERS		R4	56.8	56.8	56.8	63.4	55.0	50.0	45.0	0.0				5.00	r	6502254.18	2221700.19	307.28

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
CONSTRUCTION		0	115.6	115.6	115.6	76.3	76.3	76.3	Lw	115.6					8	r
CONSTRUCTION		0	115.6	115.6	115.6	83.7	83.7	83.7	Lw	115.6					8	r

Name	ID	Height			Coordinates			
		Begin		End	x	y	z	Ground
		(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
CONSTRUCTION	0	8.00	r		6502582.68	2222861.47	276.00	268.00
					6502632.37	2222768.19	276.66	268.66
					6502801.96	2222849.40	274.00	266.00
					6502816.54	2222822.32	274.00	266.00

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
						6502879.04	2222820.93	275.21	267.21
						6502860.29	2222745.58	283.03	275.03
						6502875.57	2222741.76	291.75	283.75
						6502872.09	2222727.87	290.93	282.93
						6502878.34	2222725.79	294.85	286.85
						6502826.61	2222521.97	301.48	293.48
						6502806.82	2222527.18	291.03	283.03
						6502801.61	2222502.87	299.93	291.93
						6502753.00	2222514.33	284.91	276.91
						6502747.97	2222491.81	286.03	278.03
						6502739.46	2222478.92	285.96	277.96
						6502743.75	2222471.99	287.79	279.79
						6502744.05	2222463.85	289.25	281.25
						6502735.94	2222453.30	285.94	277.94
						6502722.92	2222452.74	285.46	277.46
						6502715.20	2222459.60	285.12	277.12
						6502713.07	2222467.11	285.00	277.00
						6502685.85	2222473.74	283.82	275.82
						6502662.15	2222488.62	282.93	274.93
						6502659.24	2222495.60	282.73	274.73
						6502660.85	2222513.18	282.42	274.42
						6502668.62	2222532.04	281.99	273.99
						6502653.69	2222536.55	281.64	273.64
						6502630.08	2222523.36	282.00	274.00
						6502614.80	2222554.96	281.48	273.48
						6502621.17	2222561.73	280.69	272.69
						6502622.44	2222570.93	280.08	272.08
						6502493.62	2222816.76	278.00	270.00
CONSTRUCTION	0	8.00	r			6502933.11	2222164.22	278.00	270.00
						6503030.41	2222164.22	274.52	266.52
						6503030.41	2222115.68	274.46	266.46
						6502992.08	2222115.26	276.49	268.49
						6502990.48	2222112.83	276.53	268.53
						6502992.08	2222109.22	276.48	268.48
						6503008.74	2222109.22	276.00	268.00
						6503008.54	2222055.05	275.55	267.55
						6502991.63	2222053.19	276.33	268.33
						6502992.65	2222035.73	276.23	268.23
						6503002.39	2222022.02	276.00	268.00
						6503007.70	2222019.84	276.00	268.00
						6503017.38	2222021.62	275.67	267.67
						6502957.28	2221992.33	277.48	269.48
						6502965.30	2222003.46	277.29	269.29
						6502962.46	2222016.88	277.45	269.45
						6502953.38	2222023.25	277.85	269.85
						6502934.99	2222024.84	278.53	270.53
						6502928.65	2222029.02	278.78	270.78
						6502894.15	2222095.88	279.24	271.24
						6502893.11	2222108.59	279.03	271.03
						6502890.82	2222111.51	279.01	271.01
						6502874.57	2222112.14	279.50	271.50
						6502874.98	2222148.81	278.75	270.75
						6502891.40	2222148.73	278.20	270.20
						6502899.57	2222160.77	278.00	270.00
						6502910.19	2222164.01	278.00	270.00

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height			Coordinates			
				left	right		horz.	vert.	Begin		End	x	y	z	Ground
						(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
									6.00	r		6503034.82	2222157.78	272.17	266.17
												6503034.82	2222259.18	273.68	267.68

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates				
							Begin	x	y	z	Ground	
							(ft)	(ft)	(ft)	(ft)	(ft)	

Appendix I

Technical Memorandum
Focused Construction Noise Assessment

TECHNICAL MEMORANDUM

DATE: May 27, 2025
TO: John Criste, Terra Nova Planning & Research, Inc.
FROM: Bill Lawson, Urban Crossroads, Inc.
JOB NO: 16391-03 Noise Assessment.docx

SUBJECT: HOWARD WORLD WILDLIFE MUSEUM FOCUSED CONSTRUCTION NOISE ASSESSMENT

Urban Crossroads, Inc. has completed the following Noise Assessment for the Howard World Wildlife Museum (Project), which is located at the northeast corner of Highway 111 and Mirage Cove Drive in the City of Rancho Mirage.

PROJECT OVERVIEW

On May 5, 2025, Urban Crossroads, Inc. prepared a Noise and Vibration Analysis (2025 Noise Study) report for the Howard World Wildlife Museum Project. The 2025 Noise Study included a detailed evaluation of the proposed construction activities by stage for the overall Project development. However, the 2025 Noise Study did not fully assess the potential construction noise level impacts associated with the planned excavation of approximately 1,035 cubic yards including approximately 350 cubic yards of rock material. Exhibit 1 presents the limits of the planned hillside excavation.

NOISE PREDICTION MODEL

To fully describe the planned excavation construction noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels. Using the ISO 9613-2 protocol, CadnaA calculates the noise levels at each receiver based on the distance from each noise source to the noise receiver locations, the ground absorption, distance, and the effects of barrier/building attenuation and provides a summary of noise level at each receiver. A default ground attenuation factor of 0.5 was used in the CadnaA noise analysis to account for mixed ground representing a combination of hard and soft surfaces.

EXHIBIT 1: HILLSIDE EXCAVATION LIMITS OF CONSTRUCTION



RECEIVER LOCATIONS

To assess the potential for noise impacts, four receiver locations, as shown on Exhibit 1, were identified as representative locations for analysis. These are the same receiver locations presented in the 2025 Noise Study. Sensitive uses or receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land.

CONSTRUCTION NOISE

To prevent high levels of construction noise from impacting noise-sensitive land uses, City of Rancho Mirage Municipal Code 15.04.030[A][11] indicates that construction, shall be limited to the hours of 7:00 a.m. and 7:00 p.m. with no activity on Sundays and holidays (1). The city recognizes that construction noise is difficult to control and restricts allowable hours for this intrusion. Still, construction, even when restricted within these hours, presents a nuisance when conducted in proximity to sensitive receptors. (2)

CONSTRUCTION NOISE CRITERIA

Neither the City of Rancho Mirage General Plan nor Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers. According to the FTA *Transit Noise and Vibration Impact Assessment Manual,* local noise ordinances are typically not very useful in evaluating construction noise impacts. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. (3 p. 172) Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that "can be considered reasonable criteria for (construction noise) assessment". (3 p. 179) The FTA identifies two types of construction noise assessment criteria, general and detailed. For general construction noise assessments, the analysis is limited to the L_{max} of the two noisiest pieces of equipment with an hourly daytime exterior noise level threshold for residential land use of 90 dBA $L_{eq(1hr)}$. (3 p. 179)

For more detailed construction noise assessments, the analysis should include all anticipated equipment along with the typical usage factor for each piece of equipment. Detailed construction noise assessments should use an 8-hour daytime exterior noise level threshold for residential land uses of 80 dBA $L_{eq(8hr)}$. Based on the FTA guidance, an absolute daytime exterior construction noise level of 80 dBA L_{eq} is used as a reasonable threshold to assess construction noise impacts while using the FTA detailed analysis construction noise methodology. (3 p. 179)

Construction Reference Noise Levels

To describe construction noise activities, this construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published in the Roadway Construction Noise Model (RCNM). The RCNM includes a national database of construction equipment reference noise emission levels, including a comprehensive list of the noise-generating characteristics of specific types of construction equipment. (4 p. 3) In addition, the database provides a usage factor to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

According to the EPA, FTA, and FHWA, the overall construction noise level is governed primarily by the noisiest pieces of equipment. The quieter pieces do not affect the overall level, but they do reduce the magnitude of the fluctuations in the noise level. Therefore, a rough estimate of the noise level needs only to include the noisiest pieces of equipment expected at the site. (5) Consistent with FHWA and FTA guidance for detailed construction noise assessment, Table 1 presents the combined noise levels for the loudest construction activities expected from the hillside excavation activities, assuming all equipment operates simultaneously.

Table 1: Construction Reference Noise Levels

Construction Stage	Reference Construction Equipmnet[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Composite Reference Noise Level (dBA L_{eq})[2]	Reference Power Level (dBA L_w)[3]
Excavation	Backhoe	74	87.9	119.6
	Backhoe	74		
	Dump Truck	72		
	Front End Loader	75		
	Compressor (air)	74		
	Compressor (air)	74		
	Jack Hammer	82		
	Jack Hammer	82		
	Jack Hammer	82		

[1] FHWA Road Construction Noise Model.
[2] Represents the combined noise level for all equipment assuming they operate at the same time.
[3] The total amount of acoustical energy produced by a sound source independent of distance or surroundings.

Construction Noise Analysis

Construction projects involve various stages, and activities that frequently shift from one location to another. Typical construction activities are best evaluated as multiple moving point sources within the limits of construction (project site boundary) since the speed and power of the equipment vary, and the equipment constantly changes position in terms of its distance and direction relative to the receivers. (3) However, to present a conservative analysis of the construction noise levels when equipment is operating near the limits of construction, this analysis also describes the peak hour $L_{eq(1hr)}$ Project construction equipment noise levels. Using the reference noise levels of construction equipment in Table 1, the construction noise source activities shown in Exhibit 1, the CadnaA noise

prediction model, the typical $L_{eq(8hr)}$ and the peak hour equipment $L_{eq(1hr)}$ construction noise levels at nearby receiver locations were calculated. Table 2 shows that the typical and peak hour construction noise levels at the nearest noise sensitive receiver locations will not exceed the 80 dBA L_{eq} construction noise threshold. Therefore, construction noise impacts are considered *less than significant* at the nearby noise-sensitive receiver locations. Appendix 1 includes the typical construction equipment noise calculations and Appendix 2 includes the peak hour construction equipment noise calculations.

TABLE 2: HILLSIDE EXCAVATION CONSTRUCTION NOISE COMPLIANCE

Receiver Location[1]	Receiver Distance (Feet)	Unmitigated Construction Noise Levels (dBA L_{eq})			
		Typical Construction Noise Levels (8-Hour)[2]	Peak Construction Noise Levels (1-Hour)[3]	Threshold[4]	Threshold Exceeded?[5]
R1	244'	66.0	72.5	80	No
R2	413'	39.0	45.4	80	No
R3	614'	37.2	44.5	80	No
R4	948'	55.4	61.8	80	No

[1] Construction equipment noise source and receiver locations are shown on Exhibit 1.
[2] Typical construction equipment noise level calculations are included in Appendix 1.
[3] Peak Hour construction equipment noise level calculations are included in Appendix 2.
[4] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[5] Do the estimated Project construction noise levels exceed the construction noise level threshold?

REFERENCES

1. **City of Rancho Mirage.** *Municipal Code, Sections 15.04.030.*

2. —. *General Plan Update Draft Environmental Impact Report.* 2005.

3. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment Manual, FTA Report No. 0123.* September 2018.

4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.

5. **U.S. Department of Transportation, Federal Highway Administration.** Special Report - Measurement, Prediction, and Mitigation. *Office of Planning, Environment, and Realty - Environment - Noise.* [Online] 2017. https://www.fhwa.dot.gov/environment/noise/construction_noise/special_report/hcn00.cfm.

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APPENDIX 1:

TYPICAL CONSTRUCTION EQUIPMENT NOISE CALCULATIONS

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16391 - Howard World Wildlife Museum

CadnaA Noise Prediction Model: 16391-03 NA_HillsideTypical.cna
Date: 27.05.25
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (ft)	**10000.00**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (ft)	**3280.80**
Min. Length of Section (ft)	**3.30**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**1**
Search Radius Src	**328.08**
Search Radius Rcvr	**328.08**
Max. Distance Source - Rcvr	**3280.84 3280.84**
Min. Distance Rvcr - Reflector	**3.28 3.28**
Min. Distance Source - Reflector	**0.33**
Industrial (ISO 9613 (1996))	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (°F)	**50**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (mph)	**6.7**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr				Limit. Value				Land Use			Height		Coordinates		
			Day	Eve	Night	CNEL	Day	Eve	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	66.0	66.0	66.0	72.6	60.0	55.0	50.0	0.0				5.00	r	6502804.10	2222986.54	271.00
RECEIVERS		R2	39.0	39.0	39.0	45.6	60.0	55.0	50.0	0.0				5.00	r	6503057.48	2222171.49	270.82
RECEIVERS		R3	37.2	37.2	37.2	43.8	70.0	65.0	60.0	0.0				5.00	r	6503073.73	2221945.70	271.00
RECEIVERS		R4	55.4	55.4	55.4	62.0	55.0	50.0	45.0	0.0				5.00	r	6502254.18	2221700.19	307.28

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
HILLSIDE		0	119.6	119.6	119.6	88.1	88.1	88.1	Lw	119.6					8	r

Name	ID	Height				Coordinates			
		Begin		End		x	y	z	Ground
		(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
HILLSIDE	0	8.00	r			6502864.35	2222749.92	284.68	276.68
						6502881.91	2222745.73	294.34	286.33
						6502878.77	2222731.19	294.73	286.73
						6502883.84	2222730.02	297.69	289.69
						6502868.48	2222669.21	293.04	285.04
						6502864.18	2222652.15	292.00	284.00
						6502859.10	2222631.32	290.97	282.97
						6502855.72	2222618.43	289.32	281.32
						6502854.94	2222614.39	290.60	282.60
						6502851.81	2222603.85	290.90	282.90
						6502830.59	2222516.82	305.48	297.48

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
				6502810.80	2222521.34	295.01	287.01
				6502804.98	2222497.47	303.84	295.84
				6502744.74	2222511.44	284.68	276.68
				6502749.17	2222527.76	283.87	275.87
				6502741.14	2222541.09	282.48	274.48
				6502735.12	2222555.44	281.36	273.36
				6502731.22	2222570.50	280.42	272.42
				6502729.52	2222585.96	279.59	271.59
				6502730.07	2222601.51	278.77	270.77
				6502732.85	2222616.82	277.98	269.98
				6502735.32	2222616.32	277.99	269.99
				6502737.84	2222616.15	278.00	270.00
				6502740.36	2222616.32	277.99	269.99
				6502742.83	2222616.82	277.98	269.98
				6502747.52	2222617.26	277.96	269.96
				6502759.67	2222615.69	278.07	270.07
				6502766.44	2222617.34	278.01	270.01
				6502771.47	2222617.26	278.05	270.05
				6502775.47	2222618.21	278.02	270.02
				6502783.45	2222617.52	278.11	270.11
				6502787.36	2222618.91	278.05	270.05
				6502788.75	2222617.60	278.14	270.14
				6502801.16	2222619.60	278.15	270.15
				6502810.97	2222620.03	278.33	270.33
				6502826.51	2222619.95	279.27	271.27
				6502832.50	2222619.77	279.61	271.61
				6502835.88	2222624.90	280.55	272.55
				6502837.01	2222627.33	280.86	272.86
				6502841.70	2222629.41	282.57	274.57
				6502841.27	2222631.58	282.29	274.29
				6502844.39	2222633.75	283.35	275.35
				6502847.52	2222650.16	283.65	275.65
				6502848.73	2222652.41	283.94	275.94
				6502849.34	2222658.14	283.87	275.87
				6502852.81	2222682.80	283.82	275.82
				6502853.42	2222694.34	283.46	275.46
				6502856.89	2222715.87	283.57	275.57
				6502857.41	2222722.12	283.44	275.44
				6502858.37	2222723.85	283.67	275.67
				6502862.62	2222738.61	284.76	276.76

APPENDIX 2:

PEAK HOUR CONSTRUCTION EQUIPMENT NOISE CALCULATIONS

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16391 - Howard World Wildlife Museum

CadnaA Noise Prediction Model: 16391-03 NA_HillsidePeak.cna
Date: 27.05.25
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (ft)	**10000.00**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (ft)	**3280.80**
Min. Length of Section (ft)	**3.30**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**1**
Search Radius Src	**328.08**
Search Radius Rcvr	**328.08**
Max. Distance Source - Rcvr	**3280.84 3280.84**
Min. Distance Rvcr - Reflector	**3.28 3.28**
Min. Distance Source - Reflector	**0.33**
Industrial (ISO 9613 (1996))	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (°F)	**50**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (mph)	**6.7**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr				Limit. Value				Land Use			Height		Coordinates		
			Day	Eve	Night	CNEL	Day	Eve	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	72.5	72.5	72.5	79.2	60.0	55.0	50.0	0.0				5.00	r	6502804.10	2222986.54	271.00
RECEIVERS		R2	45.4	45.4	45.4	52.1	60.0	55.0	50.0	0.0				5.00	r	6503057.48	2222171.49	270.82
RECEIVERS		R3	44.5	44.5	44.5	51.2	70.0	65.0	60.0	0.0				5.00	r	6503073.73	2221945.70	271.00
RECEIVERS		R4	61.8	61.8	61.8	68.4	55.0	50.0	45.0	0.0				5.00	r	6502254.18	2221700.19	307.28

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)		(ft)	(ft)	(ft)
HILLSIDEPEAK		PEAK01	119.6	119.6	119.6	Lw	119.6					8.00	r	6502869.38	2222742.63	288.05
HILLSIDEPEAK		PEAK02	119.6	119.6	119.6	Lw	119.6					8.00	r	6502825.74	2222524.42	300.24
HILLSIDEPEAK		PEAK03	119.6	119.6	119.6	Lw	119.6					8.00	r	6502800.52	2222506.00	298.71
HILLSIDEPEAK		PEAK04	119.6	119.6	119.6	Lw	119.6					8.00	r	6502752.52	2222516.67	284.72

Global Wildlife Discovery Museum (PDP25-0003, EA25-0003)
Response to Comments

The City received one comment letter to the Initial Study/Mitigated Negative Declaration for the proposed Project. The following provides individual comments and responses. The complete comments are attached to this response in Appendix A.

California Department of Fish and Wildlife
Letter dated November 10, 2025

Comment 1:

The California Department of Fish and Wildlife (CDFW) received a Draft Mitigated Negative Declaration (MND) from the City of Rancho Mirage (City) for the Project pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE
CDFW is California's **Trustee Agency** for fish and wildlife resources and holds those resources in trust by statute for all the people of the State. (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a).) CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. (*Id.*, § 1802.) Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on Projects and related activities that have the potential to adversely affect fish and wildlife resources.

CDFW is also submitting comments as a **Responsible Agency** under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381.) CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority. (Fish & G. Code, § 1600 et seq.) Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), the Project proponent may seek related take authorization as provided by the Fish and Game Code.

PROJECT DESCRIPTION SUMMARY

Proponent: Prest Vuksic Greenwood Architects

Objective: The Project proposes to construct a new single-story 21,967 square foot museum. The Project contains three parcels that will be merged into one parcel totaling 6.78 acres, which includes a rock outcrop that rises to an elevation of 370 feet. The proposed building design incorporates the rock outcrop and requires removal of a small portion of the adjoining hillside.

The museum will include a lobby, a coffee shop, a gift shop, storage spaces, office spaces, restrooms, an outdoor plaza with a fountain, a main parking lot, and an overflow parking lot with separate access from Mirage Cove Drive. The museum includes a bus drop off in front of the building and an overflow parking lot for buses, special events, and groups. The Project will include landscaping including native and drought-tolerant species. The Project includes exterior lighting including security lighting.

Location: The Project site is located on the corner of Mirage Cove Drive and Highway 111 at 69934 Highway 111, Rancho Mirage, CA, 92270. The Project is located within Assessor's Parcel Numbers 689-040-023, 689-040-025, and 689-040-028. The Project is located within the boundaries of the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) and outside of a Conservation Area.

Timeframe: The Project anticipates grading and construction activities to begin in 2025.

Response 1:

The comment is noted. It provides a description of the Project and requires no further response.

Comment 2:

COMMENTS AND RECOMMENDATIONS

CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (i.e., biological resources). CDFW offers the comments and recommendations below to assist the City in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. The MND has not adequately identified and disclosed the Project's impacts (i.e., direct, indirect, and cumulative) on biological resources and whether those impacts are reduced to less than significant.

CDFW's comments and recommendations on the MND are explained in greater detail below and summarized here. CDFW is concerned that the MND does not adequately identify or mitigate the Project's significant, or potentially significant, impacts to biological resources. CDFW also concludes that the MND lacks sufficient information to facilitate a meaningful review by CDFW, including a complete and accurate assessment of biological resources on the Project site. CDFW requests that additional information and analyses be added to a revised MND, along with avoidance, minimization, and mitigation measures that avoid or reduce impacts to less than significant.

Existing Environmental Setting

Compliance with CEQA is predicated on a complete and accurate description of the environmental setting that may be affected by the proposed Project. CDFW is concerned that the assessment of the existing environmental setting has not been adequately analyzed in the MND. CDFW is concerned that without a complete and accurate description of the existing environmental setting, the MND may provide an incomplete analysis of Project-related environmental impacts.

The MND lacks a complete assessment of biological resources associated with burrowing owl within the Project site and surrounding area. A complete and accurate assessment of the environmental setting and Project-related impacts to biological resources is needed to both identify appropriate avoidance, minimization, and mitigation measures and demonstrate that these measures reduce Project impacts to less than significant.

Response 2:

The comment is noted. Individual responses to burrowing owl concerns are provided below.

Comment 3:

Mitigation Measures

CEQA requires that an MND include mitigation measures to avoid or reduce significant impacts. CDFW is concerned that the mitigation measures proposed in the MND are not adequate to avoid or reduce impacts to biological resources to below a level of significance. To support the City in ensuring that Project impacts to biological resources are reduced to less than significant, CDFW recommends adding mitigation measures for burrowing owls, avoidance of bats during tree removal, and artificial nighttime lighting, as well as revising the mitigation measures for nesting birds and surveys for bats.

1) Nesting Birds

It is the Project proponent's responsibility to comply with all applicable laws related to nesting birds and birds of prey. Fish and Game Code sections 3503, 3503.5, and 3513 afford protective measures as follows: section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by Fish and Game Code or any regulation made pursuant thereto. Fish and Game Code section 3503.5 makes it unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by Fish and Game Code or any regulation adopted pursuant thereto. Fish and Game Code section 3513 makes it unlawful to take or possess any migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. § 703 et seq.).

With regard to the CVMSHCP, per its associated Implementing Agreement (IA) and Permits from CDFW and the U.S. Fish and Wildlife Service (the Wildlife Agencies), Take associated with Covered Activities will not be in violation of the Migratory Bird Treaty Act and will be consistent

with Fish and Game Code sections 3503 and 3503.5; therefore, all Covered Activities within and outside Conservation Areas must undertake measures to avoid the take of individuals, nests, and eggs of nesting birds. The CVMSHCP includes a general conservation measure that applies to all bird species to avoid impacts to habitat for nesting birds during the nesting season (CVMSHCP Section 9.7). Per IA Section 13.8, City is obligated to comply with all terms and requirements of the CVMSHCP, the Wildlife Agencies' Permits that create the CVMSHCP, and the IA, including compliance with laws that protect nesting birds.

Page 114 of the MND indicates that the "vegetative scrub and mature fan palms on the Project site could also be potentially used by resident and migratory nesting birds." CDFW adds that the Project site contains suitable habitat for both ground-nesting birds and birds that nest in shrubs and trees.

The MND includes Mitigation Measure BIO-2 for nesting birds, which indicates "if construction occurs during the nesting season, February 1 through August 31, a qualified ornithologist or biologist must conduct a pre-construction nesting bird survey (NBS) immediately prior to scheduled construction activity." CDFW considers the mitigation measure for nesting birds in the MND to be inadequate in scope and timing to avoid or reduce impacts to nesting birds to a level less than significant. In alignment with the CVMSHCP's general conservation measure for nesting birds (CVMSHCP Section 9.7), CDFW recommends Project construction activities are conducted outside of the peak nesting bird season. CDFW also recommends the completion of nesting bird surveys *regardless* of the time of year to ensure that impacts to nesting birds and their nests and eggs are avoided. The timing of the nesting season varies greatly depending on several factors, such as bird species, weather conditions in any given year, and long-term climate changes (e.g., drought, warming, etc.). In response to warming, birds have been reported to breed earlier, thereby reducing temperatures that nests are exposed to during breeding and tracking shifts in availability of resources (Socolar et al., 2017).

CDFW staff have observed that climate change conditions may result in the nesting bird season occurring earlier and later in the year than historical nesting season dates.

CDFW recommends that disturbance of occupied nests of migratory birds and raptors within the Project site and surrounding area be avoided any time birds are nesting on-site. CDFW therefore recommends the completion of nesting bird surveys *regardless of the time of year* to ensure compliance with all applicable laws pertaining to nesting and migratory birds.

To support the City in avoiding or reducing impacts to nesting birds to a level less than significant, CDFW recommends Mitigation Measure BIO-2 is revised as follows, with additions in **bold** and removals in ~~strikethrough~~:

Mitigation Measure BIO-2: Nesting Birds
To the greatest extent feasible, the Project will avoid construction activities during the peak nesting season (January 15 through September 15). Regardless of the time of year, nesting bird surveys shall be performed by a qualified avian biologist no more than 3 days prior to vegetation removal or ground-disturbing activities. Pre-construction surveys shall focus on both direct and indirect evidence of nesting, including nest locations and nesting behavior. The qualified avian biologist will make every effort to

avoid potential nest predation as a result of survey and monitoring efforts. If active nests are found during the pre-construction nesting bird surveys, a qualified biologist shall establish an appropriate nest buffer to be marked on the ground. Nest buffers are species specific and shall be at least 300 feet for passerines and 500 feet for raptors. A smaller or larger buffer may be determined by the qualified biologist familiar with the nesting phenology of the nesting species and based on nest and buffer monitoring results. Construction activities may not occur inside the established buffers, which shall remain on-site until a qualified biologist determines the young have fledged or the nest is no longer active. Active nests and adequacy of the established buffer distance shall be monitored daily by the qualified biologist until the qualified biologist has determined the young have fledged or the Project has been completed. The qualified biologist has the authority to stop work if nesting pairs exhibit signs of disturbance. ~~To avoid impacts to resident and migratory nesting birds, all vegetation clearing, ground disturbance, and construction activity should be scheduled between September 1 and January 31 if possible. If construction occurs during the nesting season, February 1 through August 31, a qualified ornithologist or biologist must conduct a pre-construction nesting bird survey (NBS) immediately prior to scheduled construction activity. If active nests are identified, the biologist will demarcate a nowork buffer zone(s) around the active nest(s) and check the nest site(s) weekly until the young birds fledge and the nest(s) become inactive. The buffer zone size would be based on the nesting species, its sensitivity to disturbance, nesting stage and the expected intensity and duration of disturbance. No ground or vegetation disturbance shall occur within the nest site buffer zone(s) until the qualified biologist determines that the young have successfully fledged, and the nest is inactive.~~

~~Per CDFW recommendations, a buffer of 500 feet shall be set for listed species and birds of prey, and a buffer of 100 to 300 feet shall be set for unlisted songbirds.~~

Pursuant to the CEQA Guidelines, section 15097(f), CDFW has prepared a draft mitigation monitoring and reporting program (MMRP) in Attachment 1 for revised MM BIO-1 and MM BIO-2, as well as CDFW-recommended MM BIO-[A], MM BIO-[B], and MM BIO-[C].

Response 3:

The comment is noted. However, the commenter appears to imply that birds may nest on the site outside of the established nesting period, without providing substantial evidence. The City's responsibility is to assure that nesting birds are not disturbed, and that construction be avoided until the young have fledged. It is important to note that MBTA covered species include almost all bird species that could nest on the site, and that since a pre-construction survey will be required, all birds nesting on the site will be identified, regardless of MBTA status. The Initial Study mitigates impacts to nesting bird species to less than significant levels as written. The mitigation measure and the Initial Study correctly protect nesting birds, and do not require amendment.

Comment 4:

2) Burrowing Owl

On October 10, 2024, the Fish and Game Commission determined that western burrowing owl warrants protection as a candidate species under the California Endangered Species Act (Fish & G. Code, § 2050 et seq.). During the candidacy period, western burrowing owl will be afforded the same protection as threatened and endangered species under CESA. If Project activities, including relocation, could result in take, appropriate CESA authorization (i.e., Incidental Take Permit under Fish and Game Code section 2081) should be obtained prior to commencement of Project activities.

Take of individual burrowing owls and their nests or eggs is defined by Fish and Game Code section 86, and prohibited by sections 3503, 3503.5, and 3513. Take is defined in Fish and Game Code section 86 as "hunt, pursue, catch, capture or kill, or attempt to hunt, pursue, catch, capture or kill." Fish and Game Code sections 3503, 3503.5, and 3513 afford protective measures as follows: section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by Fish and Game Code or any regulation made pursuant thereto. Fish and Game Code section 3503.5 makes it unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by Fish and Game Code or any regulation adopted pursuant thereto. Fish and Game Code section 3513 makes it unlawful to take or possess any migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. § 703 et seq.).

With regard to the CVMSHCP, the CDFW Natural Community Conservation Plan (NCCP) Permit #2835-2008-001-06 does not provide Take Authorization for burrowing owl individuals, nests, or eggs. To the contrary, section 3.5.6 of the NCCP Permit states burrowing owl "pairs or individuals will not be Taken" and reiterates that the "HCP/NCCP does not authorize Take of [burrowing owl] nests [or] eggs[.]" Therefore, throughout the CVMSHCP area—both within and without Conservation Areas—Permittees must ensure that activities occurring within their jurisdictions do not result in the take, possession, or destruction of burrowing owl individuals, nests, or eggs. Any activity occurring within the CVMSHCP area that results in the take of burrowing owl individuals, nests, or eggs would be unlawful and would not be a Covered Activity under the CVMSHCP. Per IA Section 13.8, City is obligated to comply with all terms and requirements of the CVMSHCP, the Wildlife Agencies' Permits that create the CVMSHCP, and the IA, including compliance with laws that protect burrowing owls.

Page 30 of the Project's Biological Assessment states that "burrowing owl is considered absent from the project site. No burrowing owls, or sign thereof, were observed or detected on-site during the assessment. No California ground squirrel burrows of sufficient size to be suitable for burrowing were observed on-site. For these reasons, WSP considers there to be no potential for the occurrence of burrowing owl on-site." The MND and its supporting documents lack information on whether focused surveys for burrowing owl were conducted and the methods used to conduct any surveys for burrowing owl. Because the MND lacks the findings of recent focused surveys for burrowing owl following the guidelines in the *Staff Report on Burrowing Owl*

Mitigation, the number and locations of suitable and occupied burrows within the Project site are unknown. Given the lack of results from focused surveys for burrowing owl following recommended protocols and the lack of survey reports, CDFW is limited in its ability to provide biological expertise to support the City in reducing impacts to burrowing owl to a level less than significant. CDFW recommends that the MND is revised to include the results of four focused surveys for burrowing owl within the entire Project site and surrounding area, including survey reports, following the guidelines outlined in Appendix D of the *Staff Report on Burrowing Owl Mitigation* and to incorporate appropriate avoidance, minimization, and mitigation measures for burrowing owl.

Focused surveys are needed to inform appropriate avoidance, minimization, and mitigation measures and support the City in avoiding or reducing impacts to burrowing owl to a level less than significant. CDFW requests that if burrowing owls are detected during focused surveys, survey results are submitted to CDFW and the U.S. Fish and Wildlife Service (USFWS) and the City initiate consultation with CDFW and USFWS to identify a path forward regarding the protection of burrowing owls.

Page 7 of the MND states that the "7.20-acre project site currently consists of a combination of a parking lot, existing development, a rocky hillside with creosote bush scrub, and a largely barren area that has been graded/scraped and cleared of nearly all vegetation." CDFW notes that burrowing owls frequently move into disturbed areas prior to and during construction activities since they are adapted to highly modified habitats. CDFW also notes that there is also the potential for new burrows to be created by small mammals in between the time of surveys and the start of construction activities, and any new burrows or burrow surrogates have the potential to be occupied by burrowing owl. CDFW considers the Project site to contain suitable nesting and foraging habitat for burrowing owls. The MND lacks a mitigation measure for burrowing owl. CDFW recommends that the results of focused surveys for burrowing owl and appropriate avoidance, minimization, and mitigation measures are added to a revised MND to avoid or reduce impacts to burrowing owl to a level less than significant.

To support the City in avoiding or reducing impacts to burrowing owl to a level less than significant, CDFW recommends that the following Mitigation Measure is added to a revised MND:

Mitigation Measure BIO-[A]: Burrowing Owl Focused and Pre-Construction Surveys Suitable burrowing owl habitat has been confirmed on the site; therefore, focused burrowing owl surveys shall be conducted by a CDFW-approved qualified biologist prior to any Project activities, including vegetation- or ground-disturbing activities. CDFW strongly recommends that focused surveys are conducted in accordance with the Staff Report on Burrowing Owl Mitigation (2012 or most recent version)[7]. If burrowing owls are detected during the focused surveys, the qualified biologist and Project proponent shall begin coordination with CDFW and USFWS immediately, and shall submit the results of focused surveys to CDFW and USFWS as soon results become available and before commencement of any Project activities, including any vegetation- or ground-disturbing activities. CDFW recommends that the information included in the survey results be consistent with Appendix D of the Staff Report on Burrowing Owl Mitigation, including a detailed map showing locations of all burrowing owls, burrowing owl sign, potential

burrows, and occupied burrows (occupied means at least one burrowing owl or its sign has been observed within the last three years; may be indicated by owl sign including feathers, pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance or perch site); a description of the behavior of burrowing owls during surveys; a description of survey methods; and other items listed in Appendix D of the Staff Report on Burrowing Owl Mitigation under "Survey Reports." Consultation with CDFW and USFWS must be completed prior to commencement of any Project activities, including vegetation- or ground-disturbing activities. If impacts to occupied burrowing owl habitat or burrow(s) or burrowing owl individuals, nests, or eggs cannot be avoided, appropriate NCCP (Fish and Game Code section 2835) or CESA authorization (i.e., Incidental Take Permit under Fish and Game Code section 2081(b)) should be obtained from CDFW prior to commencement of Project activities, including vegetation- or ground-disturbing activities.

Preconstruction burrowing owl surveys shall be conducted no less than 14 days prior to the start of Project-related activities and within 24 hours prior to ground disturbance, in accordance with the Staff Report on Burrowing Owl Mitigation (2012 or most recent version). Preconstruction surveys should be repeated when there is a pause in construction of more than 30 days. Preconstruction surveys shall be performed by a CDFW-approved qualified biologist following the recommendations and guidelines provided in the Staff Report on Burrowing Owl Mitigation. If the preconstruction surveys confirm occupied burrowing owl habitat, Project activities shall be immediately halted and the qualified biologist shall coordinate with CDFW and USFWS. Project activities shall not recommence until consultation with CDFW and USFWS is completed.

Response 4:

The commenter provides no evidence to contradict the professional biologist's statement that no owl, sign, appropriate burrows or habitat are located on the site. As stated in both the Initial Study and the Biological Resources Study, the site is disturbed, isolated, has sparse vegetation and contains no habitat for the species. As a result of an on-site investigation, the biologist determined that they were not present on the site. The biologist correctly identified the lack of habitat, and correctly determined that no focused surveys were necessary. The IS correctly characterizes that there is no habitat for the species, and that impacts will be less than significant.

Comment 5:

3) *Bats*

Page 30 of the Project's Biological Resources Assessment and CVMSHCP Consistency Analysis Report (Biological Assessment), dated March 10, 2025, indicates that "although not detected during the assessment, the western yellow bat could potentially roost in the mature California palm aprons and trees on-site." CDFW concurs that the Project site contains suitable roosting habitat for western yellow bat (*Lasiurus xanthinus*; CVMSHCP Covered Species) in the untrimmed frond skirts of native and/or non-native fan palms (*Washingtonia* sp.). Additionally, page 34 of the Biological Assessment states that the "undeveloped rock outcrop could act as

potential roost sites for both pocketed free-tail and big free-tail bat." The MND indicates that pocketed free-tailed bat (*Nyctinomops femorosaccus*) is a California Species of Special Concern. CDFW adds that big free-tailed bat (*Nyctinomops macrotis*) is also a California Species of Special Concern.

The MND includes Mitigation Measure BIO-1 for western yellow bat and pocketed free-tailed bat, which indicates that "bat clearance surveys are recommended for the western yellow bat if the Project entails the removal of any palm trees from the site" and "a pre-construction bat clearance survey of the rock outcrop must be conducted prior to any disturbance to the rock outcrop." CDFW considers this measure to lack an appropriate level of detail on survey protocols and timing and methods of removing palm trees. Mitigation Measures BIO-1 also lacks avoidance, minimization, and mitigation measures for big free-tailed bat. CDFW considers Mitigation Measure BIO-1 to be inadequate in scope and timing to avoid or reduce impacts to western yellow bat, pocketed free-tailed bat, and big free-tailed bat to a level less than significant.

To support the City in avoiding or reducing impacts to western yellow bat, pocketed free-tailed bat, and big free-tailed bat to a level less than significant, CDFW recommends that Mitigation Measure BIO-1 is revised with the following additions in **bold** and removals in ~~strikethrough~~:

Mitigation Measure BIO-1: Surveys for Daytime, Nighttime, Wintering (Hibernacula), and Maternity Roosting Sites for Western Yellow Bat, Pocketed Free-Tailed Bat, and Big Free-Tailed Bat

Prior to commencing Project activities, a CDFW-approved qualified bat biologist shall perform bat habitat/roosting surveys to determine presence of daytime, nighttime, wintering (hibernacula), and maternity roost sites. Surveys shall be conducted during favorable weather conditions only. Each survey shall consist of one dusk emergence survey (start one hour before sunset and last for three hours), followed by one pre-dawn re-entry survey (start one hour before sunrise and last for two hours), and one daytime visual inspection of all potential roosting habitat on the Project site. Surveys shall be conducted within one 24-hour period. Visual inspections shall focus on the identification of bat sign (i.e., individuals, guano, urine staining, corpses, feeding remains, scratch marks and bats squeaking and chattering). Bat detectors, bat call analysis, and visual observation shall be used during all dusk emergence and pre-dawn re-entry surveys. If active maternity roosts are identified in the work area or 500 feet extending from the work area, Project construction will only occur between October 1 and February 28, outside of the maternity roosting season when young bats are present but are not yet ready to fly out of the roost. Maternity roosts shall not be evicted, excluded, removed, or disturbed. If active hibernacula are identified in the work area or 500 feet extending from the work area, a minimum 500-foot no-work buffer shall be provided around hibernacula. Buffers shall be left in place until the end of Project construction and activities or until a qualified bat biologist determines that the hibernacula are no longer active. Project-related construction and activities shall not occur between 30 minutes before sunset and 30 minutes after sunrise. Hibernacula roosts shall not be evicted, excluded, removed, or disturbed. ~~Bat Clearance Surveys: Western yellow bats roost on the undersides of California and Mexican fan palm fronds, particularly the dead fronds where they can blend in more easily. If there are no dead fronds, they may choose to roost in the live fronds. Bat clearance surveys~~

~~are recommended for the Western yellow bat if the Project entails the removal of any palm trees from the site. Each palm that is scheduled to be removed must be inspected by a qualified biologist for the presence of roosting western yellow bats. Pocketed free-tailed bats roost in rock crevices of hillsides, therefore, to avoid significant impacts, a pre-construction bat clearance survey of the rock outcrop must be conducted prior to any disturbance to the rock outcrop. The appropriate level and extent of the survey.~~

Regarding the removal of any fan palms (*Washingtonia* sp.) within the Project site, CDFW recommends the following mitigation measure is added to a revised MND:

Mitigation Measure BIO-[B]: Avoidance of Bats during Tree Removal

Tree removal work with the potential to house roosting bats shall be performed between September 15 and October 31 to minimize direct impacts to roosting bats. This time period is after young are volant (flying) but before expected onset of torpor (wintering inactivity). Tree removal work may also be conducted between February 15 and March 31, following winter torpor and prior to the start of the maternity season. No tree removals shall occur during the hibernation season, which typically begins in November or December (depending on weather conditions) and continues through mid-February, due to the high potential for mortality of hibernating bats. Depending on weather conditions and the best professional judgement of a qualified bat biologist approved by CDFW, tree removal work may be performed in November if the forecasted nighttime low temperatures on the evening of removal and the subsequent four evenings do not drop below 45˚F. In November, if weather is cold (i.e., forecasted nighttime low temperatures reach 45˚F or less for that evening and the next four evenings), then no tree removals shall be performed. All palm removals shall require a two-step removal process and the involvement of a CDFW-approved qualified bat biologist to ensure that no roosting bats are killed during this activity. The following two-step tree removal process shall be implemented over two consecutive days: on Day 1, live palm fronds located above the frond skirt, and as identified by a qualified bat biologist, will be removed. On Day 2, the remainder of the tree may be removed without supervision by a qualified bat biologist.

Response 5:

It is important to note that the landscape plan shows that most, if not all of the palms are proposed to remain on the site and be incorporated into the Project landscape. It is noted that the commenter provides an incomplete version of Mitigation Measure BIO-1. The last two sentences actually read: “The appropriate level and extent of the survey shall be commensurate with the level of disturbance to the rock outcrop. If roosting bats are identified, the biologist shall provide guidance as to the appropriate avoidance measures that should be taken.” Therefore, BIO-1 defines that the responsibility for determination actions to be taken to protect bats, including nesting young if they occur on the site will lie with a professional biologist based on the actual conditions at the time of the survey. The biologist will also be able to determine whether removal of the palms, if required, should be delayed, based on their findings during the survey.

As it relates to big free-tailed bats, the commenter is incorrect. The biological report states that the species has no special status in California (page 25), and as a result, it is not listed in the mitigation measure. That said, since pre-construction surveys are required, and since the biologist will be providing protection measures based on their findings during that survey, the species will be identified and protected if it occurs.

The IS is correctly written, and no change in the mitigation measure is required.

Comment 6:

4) Artificial Nighttime Lighting

Page 23 of the MND indicates that "pursuant to the City's Ordinance Codes, §17.18.050 and § 17.26.120, exterior lighting, including security lighting, must be energy efficient and either recessed or shielded such that light, glare and reflection are directed downward and away from neighboring properties. All light fixtures should appropriately serve the immediate purpose and not emit light, glare, or reflection beyond the project's boundaries. Exterior lighting for the Proposed Project is subject to approval by the City prior to construction. Should the Museum require operation during the evening hours, light emanating from the interior would be largely shielded by the decorative wall positioned along the front side of the building. Light emanating from the back windows would be shielded by the rock outcrop directly behind the building. Adherence to the City's lighting ordinance codes would ensure that potential impacts resulting from lighting or glare would be less than significant." The MND lacks an analysis of direct, indirect, and cumulative impacts of artificial nighttime lighting, including impacts associated with long-term operations, on biological resources including migratory birds that fly at night, burrowing owls, bats, and other nocturnal and crepuscular wildlife. The Project's museum will be located adjacent to vacant, vegetated areas to the southeast—areas that provide suitable nesting, roosting, foraging, and refugia habitat for birds, migratory birds that fly at night, burrowing owls, bats, and other nocturnal and crepuscular wildlife. The Project's proposed artificial nighttime lighting has the potential to significantly and adversely affect wildlife in these vacant areas adjacent to the Project site. Artificial lighting alters ecological processes including, but not limited to, the temporal niches of species; the repair and recovery of physiological function; the measurement of time through interference with the detection of circadian and lunar and seasonal cycles; the detection of resources and natural enemies; and navigation.[8] Many species use photoperiod cues for communication (e.g., bird song[9]), determining when to begin foraging,[10] behavioral thermoregulation,[11] and migration.[12] Phototaxis, a phenomenon that results in attraction and movement towards light, can disorient, entrap, and temporarily blind wildlife species that experience it.[10]

CDFW recommends that the MND is revised to include an analysis of the direct, indirect, and cumulative impacts of artificial nighttime lighting associated with the Project's long-term operations on biological resources, and appropriate avoidance, minimization, and mitigation measures that will reduce impacts to less than significant.

To support the City in avoiding, minimizing, and mitigating for the Project's direct and indirect impacts of artificial nighttime lighting on biological resources, CDFW recommends that the City include in a revised MND the following mitigation measure:

Mitigation Measure BIO-[C]: Artificial Nighttime Lighting

Throughout construction and the lifetime operations of the Project, the City and Project proponent shall eliminate all nonessential lighting throughout the Project area and avoid or limit the use of artificial light at night during the hours of dawn and dusk when many wildlife species are most active. The City and Project proponent shall ensure that all lighting for the Project is fully shielded, cast downward and directed away from surrounding open-space and agricultural areas, reduced in intensity to the greatest extent possible, and does not result in lighting trespass including glare into surrounding areas or upward into the night sky (see the International Dark-Sky Association standards at http://darksky.org/). The City and Project proponent shall ensure use of LED lighting with a correlated color temperature of 3,000 Kelvins or less, proper disposal of hazardous waste, and recycling of lighting that contains toxic compounds with a qualified recycler.

Response 6:

The commenter's opinion is noted, but provides no substantial evidence that the Project will result in substantial lighting, or that the lighting proposed for the Project will impact biological resources. The site is isolated, is surrounded by development, and is required to comply with the City's ordinances which strictly limit lighting. The City's construction hour restrictions make it unlikely that construction will occur at night. There is no evidence that lighting on the property would be significant, and no change to the IS is required.

Comment 7:

5) Landscaping

Page 22 of the MND states that the "proposed landscape plan will introduce a variety of native and drought tolerant landscape material." The preliminary landscaping plan in Exhibit 7 of the MND has very low resolution and therefore provides limited information. The MND lacks additional information on landscaping plans. CDFW recommends that the MND include recommendations regarding landscaping from Section 4.0 of the CVMSHCP "Table 4-112: Coachella Valley Native Plants Recommended for Landscaping" (pp. 4-180 to 4-182; https://cvmshcp.org/plan-documents/). CDFW also recommends incorporation of water-wise concepts in any Project landscape design plans. In particular, CDFW recommends xeriscaping with locally native California species and installing water-efficient and targeted irrigation systems (such as drip irrigation). Native plants support butterflies, birds, reptiles, amphibians, small mammals, bees, and other pollinators that evolved with those plants. More information on native plants suitable for the Project location and nearby nurseries is available at Calscape: https://calscape.org/. Local water agencies/cities and resource conservation cities in your area may be able to provide information on plant nurseries that carry locally native species, and some facilities display drought-tolerant locally native species demonstration gardens. Information on drought-tolerant landscaping and water-efficient irrigation systems is available on California's Save our Water website: https://saveourwater.com/.

Response 7:

The comment is noted. The Project is required to comply with both the City's water efficient landscaping standards and CVWD's water conservation requirements in landscaping, which include water budgeting for landscaped areas. The Project will therefore be regulated to assure low water use in landscaping, as clearly stated in the Initial Study.

Comment 8:

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations. (Pub. Resources Code, § 21003, subd. (e).) Accordingly, please report any special-status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be filled out and submitted online at the following link: https://wildlife.ca.gov/Data/CNDDB/Submitting-Data. The types of information reported to CNDDB can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

ENVIRONMENTAL DOCUMENT FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of environmental document filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the environmental document filing fee is required in order for the underlying Project approval to be operative, vested, and final. (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089.)

CONCLUSION

CDFW appreciates the opportunity to comment on the MND to assist City in identifying and mitigating Project impacts to biological resources. CDFW concludes that the MND does not adequately identify or mitigate the Project's significant, or potentially significant, impacts to biological resources. CDFW recommends that revised and additional mitigation measures and analysis as described in this letter be added to a revised MND.
CDFW personnel are available for consultation regarding biological resources and strategies to avoid and minimize impacts. Questions regarding this letter or further coordination should be directed to Jacob Skaggs, Senior Environmental Scientist Specialist, at jacob.skaggs@wildlife.ca.gov.

Response 8:

The City will continue to assure that biologists report their findings when studies are prepared, and that CDFW fees are paid when necessary.

The commenter's opinions are noted, but as described above, the City has prepared an IS which complies with CEQA and which will mitigate the impacts of the Project to less than significant levels. No changes to the document are necessary.

APPENDIX A

COMMENT LETTER

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Inland Deserts Region
3602 Inland Empire Boulevard, Suite C-220
Ontario, CA 91764
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

November 10, 2025
Sent via email

Lezlee Perez
Assistant Planner
City of Rancho Mirage
69-825 Highway 111
Rancho Mirage, CA 92270
lezleep@ranchomirageca.gov

Global Wildlife Discovery Museum Project (PROJECT)
Mitigated Negative Declaration (MND)
SCH# 2025100436

Dear Lezlee Perez:

The California Department of Fish and Wildlife (CDFW) received a Draft Mitigated Negative Declaration (MND) from the City of Rancho Mirage (City) for the Project pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources and holds those resources in trust by statute for all the people of the State. (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a).) CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. (*Id.*, § 1802.) Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on Projects and related activities that have the potential to adversely affect fish and wildlife resources.

[1]CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

CDFW is also submitting comments as a **Responsible Agency** under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381.) CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority. (Fish & G. Code, § 1600 et seq.) Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), the Project proponent may seek related take authorization as provided by the Fish and Game Code.

PROJECT DESCRIPTION SUMMARY

Proponent: Prest Vuksic Greenwood Architects

Objective: The Project proposes to construct a new single-story 21,967 square foot museum. The Project contains three parcels that will be merged into one parcel totaling 6.78 acres, which includes a rock outcrop that rises to an elevation of 370 feet. The proposed building design incorporates the rock outcrop and requires removal of a small portion of the adjoining hillside.

The museum will include a lobby, a coffee shop, a gift shop, storage spaces, office spaces, restrooms, an outdoor plaza with a fountain, a main parking lot, and an overflow parking lot with separate access from Mirage Cove Drive. The museum includes a bus drop off in front of the building and an overflow parking lot for buses, special events, and groups. The Project will include landscaping including native and drought-tolerant species. The Project includes exterior lighting including security lighting.

Location: The Project site is located on the corner of Mirage Cove Drive and Highway 111 at 69934 Highway 111, Rancho Mirage, CA, 92270. The Project is located within Assessor's Parcel Numbers 689-040-023, 689-040-025, and 689-040-028. The Project is located within the boundaries of the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) and outside of a Conservation Area.

Timeframe: The Project anticipates grading and construction activities to begin in 2025.

COMMENTS AND RECOMMENDATIONS

CDFW has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (i.e., biological resources). CDFW offers the comments and recommendations below to assist the City in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. The MND has not adequately identified and disclosed the Project's impacts (i.e., direct, indirect, and cumulative) on biological resources and whether those impacts are reduced to less than significant.

CDFW's comments and recommendations on the MND are explained in greater detail below and summarized here. CDFW is concerned that the MND does not adequately identify or mitigate the Project's significant, or potentially significant, impacts to biological resources. CDFW also concludes that the MND lacks sufficient information to facilitate a meaningful review by CDFW, including a complete and accurate assessment of biological resources on the Project site. CDFW requests that additional information and analyses be added to a revised MND, along with avoidance, minimization, and mitigation measures that avoid or reduce impacts to less than significant.

Existing Environmental Setting

Compliance with CEQA is predicated on a complete and accurate description of the environmental setting that may be affected by the proposed Project. CDFW is concerned that the assessment of the existing environmental setting has not been adequately analyzed in the MND. CDFW is concerned that without a complete and accurate description of the existing environmental setting, the MND may provide an incomplete analysis of Project-related environmental impacts.

The MND lacks a complete assessment of biological resources associated with burrowing owl within the Project site and surrounding area. A complete and accurate assessment of the environmental setting and Project-related impacts to biological resources is needed to both identify appropriate avoidance, minimization, and mitigation measures and demonstrate that these measures reduce Project impacts to less than significant.

Mitigation Measures

CEQA requires that an MND include mitigation measures to avoid or reduce significant impacts. CDFW is concerned that the mitigation measures proposed in the MND are not adequate to avoid or reduce impacts to biological resources to below a level of significance. To support the City in ensuring that Project impacts to biological resources are reduced to less than significant, CDFW recommends adding mitigation measures for burrowing owls, avoidance of bats during tree removal, and artificial nighttime lighting, as well as revising the mitigation measures for nesting birds and surveys for bats.

1) Nesting Birds

It is the Project proponent's responsibility to comply with all applicable laws related to nesting birds and birds of prey. Fish and Game Code sections 3503, 3503.5, and 3513 afford protective measures as follows: section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by Fish and Game Code or any regulation made pursuant thereto. Fish and Game Code section 3503.5 makes it unlawful to take, possess, or destroy any birds in

the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by Fish and Game Code or any regulation adopted pursuant thereto. Fish and Game Code section 3513 makes it unlawful to take or possess any migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. § 703 et seq.).

With regard to the CVMSHCP, per its associated Implementing Agreement (IA) and Permits from CDFW and the U.S. Fish and Wildlife Service (the Wildlife Agencies), Take associated with Covered Activities will not be in violation of the Migratory Bird Treaty Act and will be consistent with Fish and Game Code sections 3503 and 3503.5; therefore, all Covered Activities within and outside Conservation Areas must undertake measures to avoid the take of individuals, nests, and eggs of nesting birds. The CVMSHCP includes a general conservation measure that applies to all bird species to avoid impacts to habitat for nesting birds during the nesting season (CVMSHCP Section 9.7). Per IA Section 13.8, City is obligated to comply with all terms and requirements of the CVMSHCP, the Wildlife Agencies' Permits that create the CVMSHCP, and the IA, including compliance with laws that protect nesting birds.

Page 114 of the MND indicates that the "vegetative scrub and mature fan palms on the Project site could also be potentially used by resident and migratory nesting birds." CDFW adds that the Project site contains suitable habitat for both ground-nesting birds and birds that nest in shrubs and trees.

The MND includes Mitigation Measure BIO-2 for nesting birds, which indicates "if construction occurs during the nesting season, February 1 through August 31, a qualified ornithologist or biologist must conduct a pre-construction nesting bird survey (NBS) immediately prior to scheduled construction activity." CDFW considers the mitigation measure for nesting birds in the MND to be inadequate in scope and timing to avoid or reduce impacts to nesting birds to a level less than significant. In alignment with the CVMSHCP's general conservation measure for nesting birds (CVMSHCP Section 9.7), CDFW recommends Project construction activities are conducted outside of the peak nesting bird season. CDFW also recommends the completion of nesting bird surveys *regardless* of the time of year to ensure that impacts to nesting birds and their nests and eggs are avoided. The timing of the nesting season varies greatly depending on several factors, such as bird species, weather conditions in any given year, and long-term climate changes (e.g., drought, warming, etc.). In response to warming, birds have been reported to breed earlier, thereby reducing temperatures that nests are exposed to during breeding and tracking shifts in availability of resources (Socolar et al., 2017[2]).

[2] Socolar JB, Epanchin PN, Beissinger SR and Tingley MW (2017). Phenological shifts conserve thermal niches. Proceedings of the National Academy of Sciences 114(49): 12976-12981.

CDFW staff have observed that climate change conditions may result in the nesting bird season occurring earlier and later in the year than historical nesting season dates. CDFW recommends that disturbance of occupied nests of migratory birds and raptors within the Project site and surrounding area be avoided any time birds are nesting on-site. CDFW therefore recommends the completion of nesting bird surveys *regardless of the time of year* to ensure compliance with all applicable laws pertaining to nesting and migratory birds.

To support the City in avoiding or reducing impacts to nesting birds to a level less than significant, CDFW recommends Mitigation Measure BIO-2 is revised as follows, with additions in **bold** and removals in ~~strikethrough~~:

Mitigation Measure BIO-2: Nesting Birds

To the greatest extent feasible, the Project will avoid construction activities during the peak nesting season (January 15 through September 15). Regardless of the time of year, nesting bird surveys shall be performed by a qualified avian biologist no more than 3 days prior to vegetation removal or ground-disturbing activities. Pre-construction surveys shall focus on both direct and indirect evidence of nesting, including nest locations and nesting behavior. The qualified avian biologist will make every effort to avoid potential nest predation as a result of survey and monitoring efforts. If active nests are found during the pre-construction nesting bird surveys, a qualified biologist shall establish an appropriate nest buffer to be marked on the ground. Nest buffers are species specific and shall be at least 300 feet for passerines and 500 feet for raptors. A smaller or larger buffer may be determined by the qualified biologist familiar with the nesting phenology of the nesting species and based on nest and buffer monitoring results. Construction activities may not occur inside the established buffers, which shall remain on-site until a qualified biologist determines the young have fledged or the nest is no longer active. Active nests and adequacy of the established buffer distance shall be monitored daily by the qualified biologist until the qualified biologist has determined the young have fledged or the Project has been completed. The qualified biologist has the authority to stop work if nesting pairs exhibit signs of disturbance. ~~To avoid impacts to resident and migratory nesting birds, all vegetation clearing, ground disturbance, and construction activity should be scheduled between September 1 and January 31 if possible. If construction occurs during the nesting season, February 1 through August 31, a qualified ornithologist or biologist must conduct a pre-construction nesting bird survey (NBS) immediately prior to scheduled construction activity. If active nests are identified, the biologist will demarcate a nowork buffer zone(s) around the active nest(s) and check the nest site(s) weekly until the young birds fledge and the nest(s) become inactive. The buffer zone size would be based on the nesting species, its sensitivity to disturbance, nesting stage and the expected intensity and duration of disturbance. No ground or vegetation disturbance shall occur within the nest site buffer zone(s) until the qualified biologist determines that the young have successfully fledged, and the nest is inactive.~~

~~Per CDFW recommendations, a buffer of 500 feet shall be set for listed species and birds of prey, and a buffer of 100 to 300 feet shall be set for unlisted songbirds.~~

Pursuant to the CEQA Guidelines, section 15097(f), CDFW has prepared a draft mitigation monitoring and reporting program (MMRP) in Attachment 1 for revised MM BIO-1 and MM BIO-2, as well as CDFW-recommended MM BIO-[A], MM BIO-[B], and MM BIO-[C].

2) Burrowing Owl

On October 10, 2024, the Fish and Game Commission determined that western burrowing owl warrants protection as a candidate species under the California Endangered Species Act (Fish & G. Code, § 2050 et seq.). During the candidacy period, western burrowing owl will be afforded the same protection as threatened and endangered species under CESA. If Project activities, including relocation, could result in take, appropriate CESA authorization (i.e., Incidental Take Permit under Fish and Game Code section 2081) should be obtained prior to commencement of Project activities.

Take of individual burrowing owls and their nests or eggs is defined by Fish and Game Code section 86, and prohibited by sections 3503, 3503.5, and 3513. Take is defined in Fish and Game Code section 86 as “hunt, pursue, catch, capture or kill, or attempt to hunt, pursue, catch, capture or kill.” Fish and Game Code sections 3503, 3503.5, and 3513 afford protective measures as follows: section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by Fish and Game Code or any regulation made pursuant thereto. Fish and Game Code section 3503.5 makes it unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by Fish and Game Code or any regulation adopted pursuant thereto. Fish and Game Code section 3513 makes it unlawful to take or possess any migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. § 703 et seq.).

With regard to the CVMSHCP, the CDFW Natural Community Conservation Plan (NCCP) Permit #2835-2008-001-06 does not provide Take Authorization for burrowing owl individuals, nests, or eggs. To the contrary, section 3.5.6 of the NCCP Permit states burrowing owl “pairs or individuals will not be Taken” and reiterates that the “HCP/NCCP does not authorize Take of [burrowing owl] nests [or] eggs[.]” Therefore, throughout the CVMSHCP area—both within and without Conservation Areas—Permittees must ensure that activities occurring within their jurisdictions do not result in the take, possession, or destruction of burrowing owl individuals, nests, or eggs. Any activity occurring within the CVMSHCP area that results in the take of burrowing owl individuals, nests, or eggs would be unlawful and would not be a Covered Activity under the CVMSHCP. Per IA Section 13.8, City is obligated to comply with all terms and

requirements of the CVMSHCP, the Wildlife Agencies' Permits that create the CVMSHCP, and the IA, including compliance with laws that protect burrowing owls.

Page 30 of the Project's Biological Assessment states that "burrowing owl is considered absent from the project site. No burrowing owls, or sign thereof, were observed or detected on-site during the assessment. No California ground squirrel burrows of sufficient size to be suitable for burrowing were observed on-site. For these reasons, WSP considers there to be no potential for the occurrence of burrowing owl on-site." The MND and its supporting documents lack information on whether focused surveys for burrowing owl were conducted and the methods used to conduct any surveys for burrowing owl. Because the MND lacks the findings of recent focused surveys for burrowing owl following the guidelines in the *Staff Report on Burrowing Owl Mitigation*,[3] the number and locations of suitable and occupied burrows within the Project site are unknown. Given the lack of results from focused surveys for burrowing owl following recommended protocols and the lack of survey reports, CDFW is limited in its ability to provide biological expertise to support the City in reducing impacts to burrowing owl to a level less than significant. CDFW recommends that the MND is revised to include the results of four focused surveys for burrowing owl within the entire Project site and surrounding area, including survey reports,[4] following the guidelines outlined in Appendix D of the *Staff Report on Burrowing Owl Mitigation* and to incorporate appropriate avoidance, minimization, and mitigation measures for burrowing owl. Focused surveys are needed to inform appropriate avoidance, minimization, and mitigation measures and support the City in avoiding or reducing impacts to burrowing owl to a level less than significant. CDFW requests that if burrowing owls are detected during focused surveys, survey results are submitted to CDFW and the U.S. Fish and Wildlife Service (USFWS) and the City initiate consultation with CDFW and USFWS to identify a path forward regarding the protection of burrowing owls.

Page 7 of the MND states that the "7.20-acre project site currently consists of a combination of a parking lot, existing development, a rocky hillside with creosote bush scrub, and a largely barren area that has been graded/scraped and cleared of nearly all vegetation." CDFW notes that burrowing owls frequently move into disturbed areas prior to and during construction activities since they are adapted to highly modified

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[3] California Department of Fish and Game (CDFG). 2012. Staff report on burrowing owl mitigation. State of California, Natural Resources Agency. Available for download at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843&inline

[4] Survey reports should include details on survey methods and results, including, but not limited to, the names and qualifications of surveyor(s); a description of survey methods; a description of the conditions of the project site and recent photos; map(s) showing the locations of all suitable burrows, occupied burrows, burrowing owls, and burrowing owl sign; descriptions of burrowing owl behavior observed; California Natural Diversity Database (CNDDB) field survey forms, etc. For more information, see Appendix D, Survey Reports, of the CDFW 2012 Staff Report on Burrowing Owl Mitigation.

habitats.[5,6] CDFW also notes that there is also the potential for new burrows to be created by small mammals in between the time of surveys and the start of construction activities, and any new burrows or burrow surrogates have the potential to be occupied by burrowing owl. CDFW considers the Project site to contain suitable nesting and foraging habitat for burrowing owls. The MND lacks a mitigation measure for burrowing owl. CDFW recommends that the results of focused surveys for burrowing owl and appropriate avoidance, minimization, and mitigation measures are added to a revised MND to avoid or reduce impacts to burrowing owl to a level less than significant.

To support the City in avoiding or reducing impacts to burrowing owl to a level less than significant, CDFW recommends that the following Mitigation Measure is added to a revised MND:

Mitigation Measure BIO-[A]: Burrowing Owl Focused and Pre-Construction Surveys

Suitable burrowing owl habitat has been confirmed on the site; therefore, focused burrowing owl surveys shall be conducted by a CDFW-approved qualified biologist prior to any Project activities, including vegetation- or ground-disturbing activities. CDFW strongly recommends that focused surveys are conducted in accordance with the *Staff Report on Burrowing Owl Mitigation* (2012 or most recent version)[7]. If burrowing owls are detected during the focused surveys, the qualified biologist and Project proponent shall begin coordination with CDFW and USFWS immediately, and shall submit the results of focused surveys to CDFW and USFWS as soon results become available and before commencement of any Project activities, including any vegetation- or ground-disturbing activities. CDFW recommends that the information included in the survey results be consistent with Appendix D of the *Staff Report on Burrowing Owl Mitigation*, including a detailed map showing locations of all burrowing owls, burrowing owl sign, potential burrows, and occupied burrows (occupied means at least one burrowing owl or its sign has been observed within the last three years; may be indicated by owl sign including feathers, pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance or perch site); a description of the behavior of burrowing owls during surveys; a description of survey methods; and other items listed in Appendix D of the *Staff Report on Burrowing*

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[5] Chipman, E. D., N. E. McIntyre, R. E. Strauss, M. C. Wallace, J. D. Ray, and C. W. Boal. 2008. Effects of human land use on western burrowing owl foraging and activity budgets. Journal of Raptor Research 42(2): 87-98.
[6] Coulombe, H. N. 1971. Behavior and population ecology of the Burrowing Owl, *Speotyto cunicularia*, in the Imperial Valley of California. Condor 73:162–176.
[7] California Department of Fish and Wildlife (CDFW). 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency. Available for download at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843.

Owl Mitigation **under "Survey Reports." Consultation with CDFW and USFWS must be completed prior to commencement of any Project activities, including vegetation- or ground-disturbing activities. If impacts to occupied burrowing owl habitat or burrow(s) or burrowing owl individuals, nests, or eggs cannot be avoided, appropriate NCCP (Fish and Game Code section 2835) or CESA authorization (i.e., Incidental Take Permit under Fish and Game Code section 2081(b)) should be obtained from CDFW prior to commencement of Project activities, including vegetation- or ground-disturbing activities.**

Preconstruction burrowing owl surveys shall be conducted no less than 14 days prior to the start of Project-related activities and within 24 hours prior to ground disturbance, in accordance with the *Staff Report on Burrowing Owl Mitigation* (2012 or most recent version). Preconstruction surveys should be repeated when there is a pause in construction of more than 30 days. Preconstruction surveys shall be performed by a CDFW-approved qualified biologist following the recommendations and guidelines provided in the *Staff Report on Burrowing Owl Mitigation*. If the preconstruction surveys confirm occupied burrowing owl habitat, Project activities shall be immediately halted and the qualified biologist shall coordinate with CDFW and USFWS. Project activities shall not recommence until consultation with CDFW and USFWS is completed.

3) Bats

Page 30 of the Project's Biological Resources Assessment and CVMSHCP Consistency Analysis Report (Biological Assessment), dated March 10, 2025, indicates that "although not detected during the assessment, the western yellow bat could potentially roost in the mature California palm aprons and trees on-site." CDFW concurs that the Project site contains suitable roosting habitat for western yellow bat (*Lasiurus xanthinus*; CVMSHCP Covered Species) in the untrimmed frond skirts of native and/or non-native fan palms (*Washingtonia* sp.). Additionally, page 34 of the Biological Assessment states that the "undeveloped rock outcrop could act as potential roost sites for both pocketed free-tail and big free-tail bat." The MND indicates that pocketed free-tailed bat (*Nyctinomops femorosaccus*) is a California Species of Special Concern. CDFW adds that big free-tailed bat (*Nyctinomops macrotis*) is also a California Species of Special Concern.

The MND includes Mitigation Measure BIO-1 for western yellow bat and pocketed free-tailed bat, which indicates that "bat clearance surveys are recommended for the western yellow bat if the Project entails the removal of any palm trees from the site" and "a pre-construction bat clearance survey of the rock outcrop must be conducted prior to any disturbance to the rock outcrop." CDFW considers this measure to lack an appropriate level of detail on survey protocols and timing and methods of removing palm trees. Mitigation Measures BIO-1 also lacks avoidance, minimization, and mitigation measures for big free-tailed bat. CDFW considers Mitigation Measure BIO-1 to be inadequate in scope and timing to avoid or reduce impacts to western yellow bat, pocketed free-tailed

bat, and big free-tailed bat to a level less than significant.

To support the City in avoiding or reducing impacts to western yellow bat, pocketed free-tailed bat, and big free-tailed bat to a level less than significant, CDFW recommends that Mitigation Measure BIO-1 is revised with the following additions in **bold** and removals in ~~strikethrough~~:

Mitigation Measure BIO-1: Surveys for Daytime, Nighttime, Wintering (Hibernacula), and Maternity Roosting Sites for Western Yellow Bat, Pocketed Free-Tailed Bat, and Big Free-Tailed Bat

Prior to commencing Project activities, a CDFW-approved qualified bat biologist shall perform bat habitat/roosting surveys to determine presence of daytime, nighttime, wintering (hibernacula), and maternity roost sites. Surveys shall be conducted during favorable weather conditions only. Each survey shall consist of one dusk emergence survey (start one hour before sunset and last for three hours), followed by one pre-dawn re-entry survey (start one hour before sunrise and last for two hours), and one daytime visual inspection of all potential roosting habitat on the Project site. Surveys shall be conducted within one 24-hour period. Visual inspections shall focus on the identification of bat sign (i.e., individuals, guano, urine staining, corpses, feeding remains, scratch marks and bats squeaking and chattering). Bat detectors, bat call analysis, and visual observation shall be used during all dusk emergence and pre-dawn re-entry surveys. If active maternity roosts are identified in the work area or 500 feet extending from the work area, Project construction will only occur between October 1 and February 28, outside of the maternity roosting season when young bats are present but are not yet ready to fly out of the roost. Maternity roosts shall not be evicted, excluded, removed, or disturbed. If active hibernacula are identified in the work area or 500 feet extending from the work area, a minimum 500-foot no-work buffer shall be provided around hibernacula. Buffers shall be left in place until the end of Project construction and activities or until a qualified bat biologist determines that the hibernacula are no longer active. Project-related construction and activities shall not occur between 30 minutes before sunset and 30 minutes after sunrise. Hibernacula roosts shall not be evicted, excluded, removed, or disturbed. ~~Bat Clearance Surveys: Western yellow bats roost on the undersides of California and Mexican fan palm fronds, particularly the dead fronds where they can blend in more easily. If there are no dead fronds, they may choose to roost in the live fronds. Bat clearance surveys are recommended for the Western yellow bat if the Project entails the removal of any palm trees from the site. Each palm that is scheduled to be removed must be inspected by a qualified biologist for the presence of roosting western yellow bats. Pocketed free-tailed bats roost in rock crevices of hillsides, therefore, to avoid significant impacts, a pre-construction bat clearance survey of the rock outcrop must be conducted prior to any disturbance to the rock outcrop. The appropriate level and extent of the survey.~~

Regarding the removal of any fan palms (*Washingtonia* sp.) within the Project site, CDFW recommends the following mitigation measure is added to a revised MND:

Mitigation Measure BIO-[B]: Avoidance of Bats during Tree Removal

Tree removal work with the potential to house roosting bats shall be performed between September 15 and October 31 to minimize direct impacts to roosting bats. This time period is after young are volant (flying) but before expected onset of torpor (wintering inactivity). Tree removal work may also be conducted between February 15 and March 31, following winter torpor and prior to the start of the maternity season. No tree removals shall occur during the hibernation season, which typically begins in November or December (depending on weather conditions) and continues through mid-February, due to the high potential for mortality of hibernating bats. Depending on weather conditions and the best professional judgement of a qualified bat biologist approved by CDFW, tree removal work may be performed in November if the forecasted nighttime low temperatures on the evening of removal and the subsequent four evenings do not drop below 45˚F. In November, if weather is cold (i.e., forecasted nighttime low temperatures reach 45˚F or less for that evening and the next four evenings), then no tree removals shall be performed. All palm removals shall require a two-step removal process and the involvement of a CDFW-approved qualified bat biologist to ensure that no roosting bats are killed during this activity. The following two-step tree removal process shall be implemented over two consecutive days: on Day 1, live palm fronds located above the frond skirt, and as identified by a qualified bat biologist, will be removed. On Day 2, the remainder of the tree may be removed without supervision by a qualified bat biologist.

4) Artificial Nighttime Lighting

Page 23 of the MND indicates that "pursuant to the City's Ordinance Codes, §17.18.050 and § 17.26.120, exterior lighting, including security lighting, must be energy efficient and either recessed or shielded such that light, glare and reflection are directed downward and away from neighboring properties. All light fixtures should appropriately serve the immediate purpose and not emit light, glare, or reflection beyond the project's boundaries. Exterior lighting for the Proposed Project is subject to approval by the City prior to construction. Should the Museum require operation during the evening hours, light emanating from the interior would be largely shielded by the decorative wall positioned along the front side of the building. Light emanating from the back windows would be shielded by the rock outcrop directly behind the building. Adherence to the City's lighting ordinance codes would ensure that potential impacts resulting from lighting or glare would be less than significant." The MND lacks an analysis of direct, indirect, and cumulative impacts of artificial nighttime lighting, including impacts associated with long-term operations, on biological resources including migratory birds that fly at night, burrowing owls, bats, and other nocturnal and crepuscular wildlife. The Project's museum will be located adjacent to vacant, vegetated areas to the

southeast—areas that provide suitable nesting, roosting, foraging, and refugia habitat for birds, migratory birds that fly at night, burrowing owls, bats, and other nocturnal and crepuscular wildlife. The Project's proposed artificial nighttime lighting has the potential to significantly and adversely affect wildlife in these vacant areas adjacent to the Project site. Artificial lighting alters ecological processes including, but not limited to, the temporal niches of species; the repair and recovery of physiological function; the measurement of time through interference with the detection of circadian and lunar and seasonal cycles; the detection of resources and natural enemies; and navigation.[8] Many species use photoperiod cues for communication (e.g., bird song[9]), determining when to begin foraging,[10] behavioral thermoregulation,[11] and migration.[12] Phototaxis, a phenomenon that results in attraction and movement towards light, can disorient, entrap, and temporarily blind wildlife species that experience it.[10]

CDFW recommends that the MND is revised to include an analysis of the direct, indirect, and cumulative impacts of artificial nighttime lighting associated with the Project's long-term operations on biological resources, and appropriate avoidance, minimization, and mitigation measures that will reduce impacts to less than significant.

To support the City in avoiding, minimizing, and mitigating for the Project's direct and indirect impacts of artificial nighttime lighting on biological resources, CDFW recommends that the City include in a revised MND the following mitigation measure:

Mitigation Measure BIO-[C]: Artificial Nighttime Lighting

Throughout construction and the lifetime operations of the Project, the City and Project proponent shall eliminate all nonessential lighting throughout the Project area and avoid or limit the use of artificial light at night during the hours of dawn and dusk when many wildlife species are most active. The City and Project proponent shall ensure that all lighting for the Project is fully shielded, cast downward and directed away from surrounding open-space and agricultural areas, reduced in intensity to the greatest extent possible, and does not result in lighting trespass including glare into surrounding areas or upward into the night sky (see the International Dark-Sky Association standards at http://darksky.org/). The City and Project proponent shall ensure use of LED lighting with a correlated

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[8] Gatson, K. J., Bennie, J., Davies, T., Hopkins, J. 2013. The ecological impacts of nighttime light pollution: a mechanistic appraisal. Biological Reviews, 88.4: 912-927.
[9] Miller, M. W. 2006. Apparent effects of light pollution on singing behavior of American robins. The Condor 108:130–139.
[10] Stone, E. L., G. Jones, and S. Harris. 2009. Street lighting disturbs commuting bats. Current Biology 19:1123–1127.
[11] Beiswenger, R. E. 1977. Diet patterns of aggregative behavior in tadpoles of *Bufo americanus*, in relation to light and temperature. Ecology 58:98–108.
[12] Longcore, T., and C. Rich. 2004. Ecological light pollution - Review. Frontiers in Ecology and the Environment 2:191–198.

color temperature of 3,000 Kelvins or less, proper disposal of hazardous waste, and recycling of lighting that contains toxic compounds with a qualified recycler.

5) Landscaping

Page 22 of the MND states that the "proposed landscape plan will introduce a variety of native and drought tolerant landscape material." The preliminary landscaping plan in Exhibit 7 of the MND has very low resolution and therefore provides limited information. The MND lacks additional information on landscaping plans. CDFW recommends that the MND include recommendations regarding landscaping from Section 4.0 of the CVMSHCP "Table 4-112: Coachella Valley Native Plants Recommended for Landscaping" (pp. 4-180 to 4-182; https://cvmshcp.org/plan-documents/). CDFW also recommends incorporation of water-wise concepts in any Project landscape design plans. In particular, CDFW recommends xeriscaping with locally native California species and installing water-efficient and targeted irrigation systems (such as drip irrigation). Native plants support butterflies, birds, reptiles, amphibians, small mammals, bees, and other pollinators that evolved with those plants. More information on native plants suitable for the Project location and nearby nurseries is available at Calscape: https://calscape.org/. Local water agencies/cities and resource conservation cities in your area may be able to provide information on plant nurseries that carry locally native species, and some facilities display drought-tolerant locally native species demonstration gardens. Information on drought-tolerant landscaping and water-efficient irrigation systems is available on California's Save our Water website: https://saveourwater.com/.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations. (Pub. Resources Code, § 21003, subd. (e).) Accordingly, please report any special-status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be filled out and submitted online at the following link: https://wildlife.ca.gov/Data/CNDDB/Submitting-Data. The types of information reported to CNDDB can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

ENVIRONMENTAL DOCUMENT FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of environmental document filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the environmental document filing fee is required in order for the underlying Project approval to be operative, vested, and final.

(Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089.)

CONCLUSION

CDFW appreciates the opportunity to comment on the MND to assist City in identifying and mitigating Project impacts to biological resources. CDFW concludes that the MND does not adequately identify or mitigate the Project's significant, or potentially significant, impacts to biological resources. CDFW recommends that revised and additional mitigation measures and analysis as described in this letter be added to a revised MND.

CDFW personnel are available for consultation regarding biological resources and strategies to avoid and minimize impacts. Questions regarding this letter or further coordination should be directed to Jacob Skaggs, Senior Environmental Scientist Specialist, at jacob.skaggs@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Kim Freeburn
84F92FFEEFD24C8...
Kim Freeburn
Environmental Program Manager

Attachment 1: MMRP for CDFW-Proposed Mitigation Measures

ec:

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ATTACHMENT 1: MITIGATION MONITORING AND REPORTING PROGRAM (MMRP)

Mitigation Measures	Timing and Methods	Responsible Parties
Mitigation Measure BIO-2: Nesting Birds **To the greatest extent feasible, the Project will avoid construction activities during the peak nesting season (January 15 through September 15). Regardless of the time of year, nesting bird surveys shall be performed by a qualified avian biologist no more than 3 days prior to vegetation removal or ground-disturbing activities. Pre-construction surveys shall focus on both direct and indirect evidence of nesting, including nest locations and nesting behavior. The qualified avian biologist will make every effort to avoid potential nest predation as a result of survey and monitoring efforts. If active nests are found during the pre-construction nesting bird surveys, a qualified biologist shall establish an appropriate nest buffer to be marked on the ground. Nest buffers are species specific and shall be at least 300 feet for passerines and 500 feet for raptors. A smaller or larger buffer may be determined by the qualified biologist familiar with the nesting phenology of the nesting species and based on nest and buffer monitoring results. Construction activities may not occur inside the established buffers, which shall remain on-site until a qualified biologist determines the young have fledged or the nest is no longer active. Active nests and adequacy of the established buffer distance shall be monitored daily by the qualified biologist until the qualified biologist has determined the young have fledged or the Project has been completed. The qualified biologist has**	**Timing:** No more than 3 days prior to all vegetation removal or ground-disturbing activities throughout all phases of the Project. **Methods:** See Mitigation Measure	**Implementation**: Project Proponent and City of Rancho Mirage **Monitoring and Reporting**: City of Rancho Mirage

the authority to stop work if nesting pairs exhibit signs of disturbance.		
Mitigation Measure BIO-[A]: Burrowing Owl Focused and Pre-Construction Surveys **Suitable burrowing owl habitat has been confirmed on the site; therefore, focused burrowing owl surveys shall be conducted by a CDFW-approved qualified biologist prior to any Project activities, including vegetation- or ground-disturbing activities. CDFW strongly recommends that focused surveys are conducted in accordance with the *Staff Report on Burrowing Owl Mitigation* (2012 or most recent version)[13]. If burrowing owls are detected during the focused surveys, the qualified biologist and Project proponent shall begin coordination with CDFW and USFWS immediately, and shall submit the results of focused surveys to CDFW and USFWS as soon results become available and before commencement of any Project activities, including any vegetation- or ground-disturbing activities. CDFW recommends that the information included in the survey results be consistent with Appendix D of the *Staff Report on Burrowing Owl Mitigation*, including a detailed map showing locations of all burrowing owls, burrowing owl sign, potential burrows, and occupied burrows (occupied means at least one burrowing owl or its sign has been observed within the last three years; may be indicated by owl sign including feathers, pellets, prey remains, eggshell fragments, or excrement at or near**	**Timing: Focused surveys:** Consistent with timing in Appendix D of the Staff Report on Burrowing Owl Mitigation and prior to commencement of any Project activities, including vegetation- or ground-disturbing activities for all phases of the Project. **Pre-construction surveys:** No less than 14 days prior to start of Project-related activities and within 24 hours prior to ground disturbance for all phases of the Project and when there is a pause in construction of more than 30 days. **Methods:** See Mitigation Measure	**Implementation**: Project Proponent and City of Rancho Mirage **Monitoring and Reporting**: City of Rancho Mirage

[13] California Department of Fish and Wildlife (CDFW). 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency. Available for download at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843.

a burrow entrance or perch site); a description of the behavior of burrowing owls during surveys; a description of survey methods; and other items listed in Appendix D of the *Staff Report on Burrowing Owl Mitigation* under "Survey Reports." Consultation with CDFW and USFWS must be completed prior to commencement of any Project activities, including vegetation- or ground-disturbing activities. If impacts to occupied burrowing owl habitat or burrow(s) or burrowing owl individuals, nests, or eggs cannot be avoided, appropriate NCCP (Fish and Game Code section 2835) or CESA authorization (i.e., Incidental Take Permit under Fish and Game Code section 2081(b)) should be obtained from CDFW prior to commencement of Project activities, including vegetation- or ground-disturbing activities. **Preconstruction burrowing owl surveys shall be conducted no less than 14 days prior to the start of Project-related activities and within 24 hours prior to ground disturbance, in accordance with the *Staff Report on Burrowing Owl Mitigation* (2012 or most recent version). Preconstruction surveys should be repeated when there is a pause in construction of more than 30 days. Preconstruction surveys shall be performed by a CDFW-approved qualified biologist following the recommendations and guidelines provided in the *Staff Report on Burrowing Owl Mitigation*. If the preconstruction surveys confirm occupied burrowing owl habitat, Project activities shall be immediately halted and the qualified biologist shall coordinate with CDFW and USFWS. Project activities shall not recommence until consultation with CDFW and USFWS is completed.**		

Mitigation Measure BIO-1: Surveys for Daytime, Nighttime, Wintering (Hibernacula), and Maternity Roosting Sites for Western Yellow Bat, Pocketed Free-Tailed Bat, and Big Free-Tailed Bat **Prior to commencing Project activities, a CDFW-approved qualified bat biologist shall perform bat habitat/roosting surveys to determine presence of daytime, nighttime, wintering (hibernacula), and maternity roost sites. Surveys shall be conducted during favorable weather conditions only. Each survey shall consist of one dusk emergence survey (start one hour before sunset and last for three hours), followed by one pre-dawn re-entry survey (start one hour before sunrise and last for two hours), and one daytime visual inspection of all potential roosting habitat on the Project site. Surveys shall be conducted within one 24-hour period. Visual inspections shall focus on the identification of bat sign (i.e., individuals, guano, urine staining, corpses, feeding remains, scratch marks and bats squeaking and chattering). Bat detectors, bat call analysis, and visual observation shall be used during all dusk emergence and pre-dawn re-entry surveys. If active maternity roosts are identified in the work area or 500 feet extending from the work area, Project construction will only occur between October 1 and February 28, outside of the maternity roosting season when young bats are present but are not yet ready to fly out of the roost. Maternity roosts shall not be evicted, excluded, removed, or disturbed. If active hibernacula are identified in the work area or 500 feet extending from the work area, a minimum 500-foot no-work buffer shall be provided around hibernacula. Buffers shall be left in place until the end of Project construction and activities or until a**	**Timing:** Prior to commencement of Project Activities. **Methods:** See Mitigation Measure	**Implementation**: Project Proponent and City of Rancho Mirage **Monitoring and Reporting**: City of Rancho Mirage

qualified bat biologist determines that the hibernacula are no longer active. Project-related construction and activities shall not occur between 30 minutes before sunset and 30 minutes after sunrise. Hibernacula roosts shall not be evicted, excluded, removed, or disturbed.		
Mitigation Measure BIO-[B]: Avoidance of Bats during Tree Removal **Tree removal work with the potential to house roosting bats shall be performed between September 15 and October 31 to minimize direct impacts to roosting bats. This time period is after young are volant (flying) but before expected onset of torpor (wintering inactivity). Tree removal work may also be conducted between February 15 and March 31, following winter torpor and prior to the start of the maternity season. No tree removals shall occur during the hibernation season, which typically begins in November or December (depending on weather conditions) and continues through mid-February, due to the high potential for mortality of hibernating bats. Depending on weather conditions and the best professional judgement of a qualified bat biologist approved by CDFW, tree removal work may be performed in November if the forecasted nighttime low temperatures on the evening of removal and the subsequent four evenings do not drop below 45˚F. In November, if weather is cold (i.e., forecasted nighttime low temperatures reach 45˚F or less for that evening and the next four evenings), then no tree removals shall be performed. All palm removals shall require a two-step removal process and the involvement of a CDFW-approved qualified bat biologist to ensure that no roosting bats are killed during this activity. The following**	**Timing:** See Mitigation Measure. **Methods:** See Mitigation Measure	**Implementation**: Project Proponent and City of Rancho Mirage **Monitoring and Reporting**: City of Rancho Mirage

two-step tree removal process shall be implemented over two consecutive days: on Day 1, live palm fronds located above the frond skirt, and as identified by a qualified bat biologist, will be removed. On Day 2, the remainder of the tree may be removed without supervision by a qualified bat biologist.		
Mitigation Measure BIO-[C]: Artificial Nighttime Lighting **Throughout construction and the lifetime operations of the Project, the City and Project proponent shall eliminate all nonessential lighting throughout the Project area and avoid or limit the use of artificial light at night during the hours of dawn and dusk when many wildlife species are most active. The City and Project proponent shall ensure that all lighting for the Project is fully shielded, cast downward and directed away from surrounding open-space and agricultural areas, reduced in intensity to the greatest extent possible, and does not result in lighting trespass including glare into surrounding areas or upward into the night sky (see the International Dark-Sky Association standards at http://darksky.org/). The City and Project proponent shall ensure use of LED lighting with a correlated color temperature of 3,000 Kelvins or less, proper disposal of hazardous waste, and recycling of lighting that contains toxic compounds with a qualified recycler.**	**Timing:** Throughout construction and the lifetime operations of the Project **Methods:** See Mitigation Measure	**Implementation**: Project Proponent and City of Rancho Mirage **Monitoring and Reporting**: City of Rancho Mirage