



NUMBER		NOT REQ'D	NOT DONE	SATISFIED	DRAINAGE REPORT	
					REVIEW #	
					BY	DATE
	ITEMS				Location in Engineering Design Standards & Policy Manual	

Preliminary Drainage Information

1	Preliminary Drainage Information Is Required With The Following Submittals: <ul style="list-style-type: none"> • General Plan Amendment • Rezone • PAD Application 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3.2.2.B.1</u> Preliminary Drainage Information Is Required For The GPA, Rezone, & PAD Application. If The Project Is Phased, A Master Drainage Report Is Required. If A Pre-Plat Is Being Submitted, A Preliminary Drainage Report Is Required.
2	Is The Project Phased? If <u>Yes</u> , A Master Drainage Report Is Required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3.2.2.B</u>
3	Format: Memorandum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Signed and sealed by AZ PE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.11.1.A.2
5	Project Description <ul style="list-style-type: none"> • Project Name • Report Type (Preliminary Drainage Information) • Project Location (Major Cross Streets, Section Township & Range) • Project Area (Acre) If residential - Number of Dwelling Units (DU)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6	Project Location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A Vicinity Map/Exhibit Should Be Provided To Show The Project Location.
7	Proposed Development Description	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8	Floodplain Designation <ul style="list-style-type: none"> • Identify floodplain within, adjacent to, and downstream of the site. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3.2.2.B.1</u>
9	Existing Drainage Ways <ul style="list-style-type: none"> • Identify location and sizes of existing and proposed natural and manmade drainage ways within, adjacent to, and downstream of the site. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3.2.2.B.1</u> Discuss Existing Drainage Ways That Impact The Site.
10	Storm Drain System <ul style="list-style-type: none"> • Identify Location & Sizes Of Existing And Proposed Storm Drain Systems Within, Adjacent To, And Downstream Of The Site. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3.2.2.B</u>

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11	Flow Management Discuss how both offsite flows impacting the site and flows generated onsite will be managed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.B.1
12	Drainage Exhibits Including: <ul style="list-style-type: none"> • Location Map • Floodplain Map • Existing/Proposed Improvements Map 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The Identified Maps Should Be Included With The Preliminary Drainage Information.

Master Drainage Report

1	A Master Drainage Report Is Required For Each Project Which Will Be Designed & Constructed In A Phased Succession.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C The Master Drainage Report is provided with a Rezone or PAD Application.
2	The Master Report shall follow the Outline provided at the end of Chapter 3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outline is at the end of Chapter 3 (Pages 44 to 45)
3	Title Page: <ul style="list-style-type: none"> • Project Name • Location • Type of Report (Master Wastewater Report) • Engineer's Seal & Signature • Date • Consulting Firm, Name, Address, and Phone Number 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 3 Outline
4	Table of Contents - Sealed and Signed by a P.E.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.11.1.A.2

INTRODUCTION

5	Project Name	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1
6	Project Location (Major Cross Streets, Section Township & Range)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1 Description Of The Location Of The Project & A Vicinity Map Shall Be Provided.
7	Report Type (Master Drainage Report)				3.2.2.C.1
8	Project Description (Size, Area, scope of project)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1


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9	Summarize referenced existing drainage studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1 Include any pertinent existing drainage studies. The existing studies should be described and the information that is being referenced should be summarized. Pertinent excerpts from these studies should be included in the Appendix of the drainage report.
10	Purpose and Objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1


ON-SITE DRAINAGE CONDITIONS

11	Drainage network, watershed, and floodplain boundaries within the project site and corresponding topographic map.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2 -Include location and sizes of all drainage ways and drainage systems within the project limits. -Topographic map depicting the existing conditions including all the aforementioned items, plus the 100-year floodplain for all washes with a capacity of 100 cfs or greater.
12	Site specific photographs and aerial photographs to support parameter selection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
13	Ground Cover Conditions – Description of the existing ground cover conditions and the identification of the hydrologic soils group(s) found on the property.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
14	Existing and proposed developments - Description of any existing development located on the property and how it affects drainage. Description of any existing and/or proposed developments on adjacent properties and how it affects drainage on the project area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
15	Provide justification for the selection of parameters used in the analysis of on-site conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2

OFF-SITE WATERSHED CONDITIONS

NUMBER		NOT REQ'D	NOT DONE	SATISFIED		
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16	Watershed conditions and the drainage network entering and existing the project site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3 -Include a narrative describing the existing upstream and downstream drainage patterns, watershed boundaries, floodplain boundaries, natural and artificial channels, storm drains, storage basins, and any other drainage structures or improvements that are adjacent to or downstream of the project site. Include location and sizes of drainage ways and drainage systems that are adjacent to and downstream of the project.
17	Topographic map – Map should delineate watersheds from which stormwater enters or affects the project’s property and should show the locations and flow rates for the off-site flows impacting the property.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
18	Site specific photographs and aerial photographs to support parameter selection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
19	Ground cover conditions – Description of the ground cover conditions. Description of the hydrologic soil group(s) found in the off-site watersheds.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
20	Description of existing development in the watersheds and how this affects drainage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
21	Description of any proposed projects of developments, which have approved designs and that will affect this property.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
22	Description of any additional conditions which would significantly affect the runoff from the watershed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
23	Provide justification for the selection of parameters used in the analysis of off-site conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
FLOODPLAIN DESIGNATION					

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24	Floodplain Designation Identify Floodplain Within, Adjacent To, And Downstream Of The Site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.4 Provide A Description & Exhibit Identifying The Current FEMA Floodplain, Show The Floodplain Boundaries, Identify The FEMA Map Number, And List The Hazards Of The Floodzone. An Exhibit Showing The Floodplain Boundaries Shall Be Included.
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PROPOSED DRAINAGE PLAN


25	General description of proposed drainage system and components; including conveyance of off-site flows.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a
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26	Future Conditions including development of adjacent properties.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a
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27	Stormwater storage requirements – Provide a Table with Volume Provided, Volume Required, and Basin Locations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a
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28	Proposed drainage structures or special drainage facilities – Description of the design criteria and probable effect on the existing upstream and downstream drainage system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a
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29	Pre- and Post- runoff characteristics – <ul style="list-style-type: none"> • Compare and analyze the stormwater runoff exiting the project both prior to and after construction, for the 5, 10, 50, and 100-year storm events. • Describe the proposed facilities for collection, routing, and discharging off-site flows. • Description of the effects of the proposed facilities, such as retention or detention basins, on the downstream properties. • Verify that on-site and off-site flows will not combine. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.c
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30	Description of the lowest floor elevation and location.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5, 3.2.1.B.3 -Finished Floor Elevations shall be a minimum of 18 inches above the low lot outfall and a minimum of 12 inches above the high water elevation.
31	Project Phasing – Description of improvements to be constructed with each phase, the impact of each phase, and any required interim improvements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5 -Development requirements shall be met independently for each phase.

SPECIAL CONDITIONS

32	Project Stipulations, 401 and 404 Permits, and AZPDES.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.6
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DATA ANALYSIS METHODS

33	Hydrologic procedures, parameter selection and assumptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.7, Table 3.3-1
34	Hydraulic procedures, methods, parameter selection and assumptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.7, 3.3.3
35	Stormwater storage calculation methods and assumptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.7, 3.3.5

CONCLUSIONS


36	Provide a summary of findings and recommendations outline within the report based on the completion of the project in its entirety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.8
37	Description of project phasing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.8

REFERENCES

38	List all references cited in the report.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 3 Outline
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EXHIBITS

39	Location Map <ul style="list-style-type: none"> • Existing streets • Proposed streets • Existing parcels surrounding the project to a distance of at least one mile from the exterior boundaries of the project 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1
40	Floodplain Map	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.4

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41	Offsite Map: <ul style="list-style-type: none"> • Topography • Watershed boundaries • Floodplains • Flows Impacting the property 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2 C.3
42	On-site map: <ul style="list-style-type: none"> • Project Location • Topography (current 1-foot (minimum) contour mapping based on current topographic survey) • Drainage Ways with flows labeled (include natural and man-made channels) • Watershed Boundaries • Concentration Points • Floodplain for washes with a flow of 100-cfs or greater. • Flow entering the site • Flow exiting the site 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2

APPENDIX


43	Appendix- Hydrology <ul style="list-style-type: none"> • Soils Map • Sub-basin Data • Rainfall calculations • Model Output • Retention/detention basin inflow and outflow analysis and design calculations 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-An exhibit showing the SCS soils types used in the analysis -Sub-basin technical data including length, slope, area, etc. -Rainfall intensity data for the 5-yr; 10-yr; 50-yr; and 100-yr event -Include HEC-1 Model output or backup calculations used in the analysis. -Include HEC-RAS Model output or backup calculations used in the analysis. -Include backup calculations on the proposed retention basins.
44	Appendix- Supporting Data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If existing studies are being referenced in the report, pertinent excerpts from these studies should be included in the Appendix to provide back-up for the statements made in the report.

Preliminary Drainage Report

1	A Preliminary Drainage Report is required for each project at the site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.D.1
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	plan or preliminary plat application.				
2	Preliminary Drainage Report shall be consistent with the approved Master Drainage Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.D.2 - If a Master Drainage Report was previously approved for the development the Preliminary Drainage Report shall follow the same development protocol as identified in the Master Drainage Report for the portion of the overall development being designed. However it will provide specific drainage information.
3	The Preliminary Drainage Report is not a conceptual view of drainage on the property, but rather a draft version of the Final Drainage Report.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.D.1
4	The Preliminary Report shall follow the Outline provided at the end of Chapter 3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outline is at the end of Chapter 3 (Pages 44 to 45)
5	<u>Title Page:</u> <ul style="list-style-type: none"> • Project Name • Location • Type of Report (Preliminary Drainage Report) • Engineer's Seal & Signature • Date • Consulting Firm, Name, Address, and Phone Number 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 3 Outline
6	Table of Contents - Sealed and Signed by a P.E.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.11.1.A.2
INTRODUCTION					
7	Project Name	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1
8	Project Location (Major Cross Streets, Section Township & Range)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1 Description Of The Location Of The Project & A Vicinity Map Shall Be Provided.
9	Report Type (Preliminary Drainage Report)				3.2.2.C.1
10	Project Description (Size, Area, scope of project)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1


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11	Summarize referenced existing drainage studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1 Include any pertinent existing drainage studies. The existing studies should be described and the information that is being referenced should be summarized. Pertinent excerpts from these studies should be included in the Appendix of the drainage report.
12	Purpose and Objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1


ON-SITE DRAINAGE CONDITIONS

13	Drainage network, watershed, and floodplain boundaries within the project site and corresponding topographic map.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2 -Include location and sizes of all drainage ways and drainage systems within the project limits. -Topographic map depicting the existing conditions including all the aforementioned items, plus the 100-year floodplain for all washes with a capacity of 100 cfs or greater.
14	Site specific photographs and aerial photographs to support parameter selection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
15	Ground Cover Conditions – Description of the existing ground cover conditions and the identification of the hydrologic soils group(s) found on the property.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
16	Existing and proposed developments - Description of any existing development located on the property and how it affects drainage. Description of any existing and/or proposed developments on adjacent properties and how it affects drainage on the project area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
17	Provide justification for the selection of parameters used in the analysis of on-site conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2

OFF-SITE WATERSHED CONDITIONS

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18	Watershed conditions and the drainage network entering and exiting the project site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3 -Include a narrative describing the existing upstream and downstream drainage patterns, watershed boundaries, floodplain boundaries, natural and artificial channels, storm drains, storage basins, and any other drainage structures or improvements that are adjacent to or downstream of the project site. Include location and sizes of drainage ways and drainage systems that are adjacent to and downstream of the project.
19	Topographic map – Map should delineate watersheds from which stormwater enters or affects the project’s property and should show the locations and flow rates for the off-site flows impacting the property.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
20	Site specific photographs and aerial photographs to support parameter selection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
21	Ground cover conditions – Description of the ground cover conditions. Description of the hydrologic soil group(s) found in the off-site watersheds.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
22	Description of existing development in the watersheds and how this affects drainage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
23	Description of any proposed projects of developments, which have approved designs and that will affect this property.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
24	Description of any additional conditions which would significantly affect the runoff from the watershed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
25	Provide justification for the selection of parameters used in the analysis of off-site conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
FLOODPLAIN DESIGNATION					

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26	Floodplain Designation Identify Floodplain Within, Adjacent To, And Downstream Of The Site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.4 Provide A Description & Exhibit Identifying The Current FEMA Floodplain, Show The Floodplain Boundaries, Identify The FEMA Map Number, And List The Hazards Of The Floodzone. An Exhibit Showing The Floodplain Boundaries Shall Be Included.
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PROPOSED DRAINAGE PLAN

27	General description of proposed drainage system and components; including conveyance of off-site flows.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a
28	Future Conditions including development of adjacent properties.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a
29	Stormwater storage requirements – Provide a Table with Volume Provided, Volume Required, and Basin Locations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a NOAA 14 is approved for actual rainfall data 3.3.5.A.1.a- Retention to be sized to retain 100% of the 100-yr 6-hr storm, unless the first flush waiver is granted. 3.3.5.C.8.a- Calculations showing that basins drain within 36 hours. Backup calculations should be provided to justify the results.
30	Proposed drainage structures or special drainage facilities – Description of the design criteria and probable effect on the existing upstream and downstream drainage system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a

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31	Pre- and Post- runoff characteristics – <ul style="list-style-type: none"> • Compare and analyze the stormwater runoff exiting the project both prior to and after construction, for the 5, 10, 50, and 100-year storm events. • Describe the proposed facilities for collection, routing, and discharging off-site flows. • Description of the effects of the proposed facilities, such as retention or detention basins, on the downstream properties. • Verify that on-site and off-site flows will not combine. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.c
32	Description of the lowest floor elevation and location.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5, 3.2.1.B.3 -Finished Floor Elevations shall be a minimum of 18 inches above the low lot outfall and a minimum of 12 inches above the high water elevation.
33	Project Phasing – Description of improvements to be constructed with each phase, the impact of each phase, and any required interim improvements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5 -Development requirements shall be met independently for each phase.
SPECIAL CONDITIONS					
34	Project Stipulations, 401 and 404 Permits, and AZPDES.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.6
DATA ANALYSIS METHODS					
35	Hydrologic procedures, parameter selection and assumptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.7, Table 3.3-1 -FCDMC- DDM Hydrology- Ch 3. Minimum Tc is 5min
36	Hydraulic procedures, methods, parameter selection and assumptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.7, 3.3.3
37	Stormwater storage calculation methods and assumptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.7, 3.3.5
CONCLUSIONS					

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38	Provide a summary of findings and recommendations outline within the report based on the completion of the project in its entirety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.8
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39	Description of project phasing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.8
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REFERENCES

40	List all references cited in the report.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 3 Outline
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EXHIBITS

41	Location Map <ul style="list-style-type: none"> • Existing streets • Proposed streets • Existing parcels surrounding the project to a distance of at least one mile from the exterior boundaries of the project 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1
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42	Floodplain Map	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.4
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43	Offsite Map: <ul style="list-style-type: none"> • Topography • Watershed boundaries • Floodplains • Flows Impacting the property 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2 C.3
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44	On-site map: <ul style="list-style-type: none"> • Project Location • Topography (current 1-foot (minimum) contour mapping based on current topographic survey) • Drainage Ways with flows labeled (include natural and man-made channels) • Watershed Boundaries • Concentration Points • Floodplain for washes with a flow of 100-cfs or greater. • Flow entering the site • Flow exiting the site 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
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APPENDIX			
45	Appendix- Hydrology <ul style="list-style-type: none"> • Soils Map • Sub-basin Data • Rainfall calculations • Model Output • Retention/detention basin inflow and outflow analysis and design calculations • Basis for setting finished floor elevations in relation of floodplains, adjacent washes, and/or natural or adjacent ground elevation if in a Special Flood Hazard Zone 	<input type="checkbox"/> <input style="border: 1px solid red;" type="checkbox"/> <input style="border: 1px solid green;" type="checkbox"/>	-An exhibit showing the SCS soils types used in the analysis -Sub-basin technical data including length, slope, area, etc. -Rainfall intensity data for the 5-yr; 10-yr; 50-yr; and 100-yr event -Include HEC-1 Model output or backup calculations used in the analysis. -Include HEC-RAS Model output or backup calculations used in the analysis. -Include backup calculations on the proposed retention basins.
46	Appendix- Hydraulics <ul style="list-style-type: none"> • Channel design calculations (including toe-down protection and drop structure design) • Culvert design calculations • Stormdrain calculations • Sediment and Scour Calculations • Erosion/Sediment Control Plan 	<input type="checkbox"/> <input style="border: 1px solid red;" type="checkbox"/> <input style="border: 1px solid green;" type="checkbox"/>	-Design requirements listed in Table 3.3-1. 3.3.3.C- Storm drain velocities to be between 3 fps & 9 fps. HGL for 10-yr 6-hr storm at least 1-ft below ground elevation.
47	Appendix- Supporting Data	<input type="checkbox"/> <input style="border: 1px solid red;" type="checkbox"/> <input style="border: 1px solid green;" type="checkbox"/>	Chapter 3 Outline If existing studies are being referenced in the report, pertinent excerpts from these studies should be included in the Appendix to provide back-up for the statements made in the report.

Final Drainage Report			
1	A Final Drainage Report is required for each project at the time of construction plan submittal.	<input type="checkbox"/> <input style="border: 1px solid red;" type="checkbox"/> <input style="border: 1px solid green;" type="checkbox"/>	3.2.2.E.1
2	Final Drainage Report shall be consistent with the approved Master Drainage Report and Preliminary Drainage Report.	<input type="checkbox"/> <input style="border: 1px solid red;" type="checkbox"/> <input style="border: 1px solid green;" type="checkbox"/>	3.2.2.E.1- The Final Drainage Report shall follow the same development protocol as identified in the Master Drainage Report and Preliminary Drainage Report for the portion of the overall development being designed. However it will provide more specific drainage information.

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3	The Final Report shall follow the Outline provided at the end of Chapter 3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outline is at the end of Chapter 3 (Pages 44 to 45)
4	<u>Title Page:</u> <ul style="list-style-type: none"> • Project Name • Location • Type of Report (Final Drainage Report) • Engineer's Seal & Signature • Date • Consulting Firm, Name, Address, and Phone Number 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 3 Outline
5	Table of Contents - Sealed and Signed by a P.E.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.11.1.A.2

INTRODUCTION

6	Project Name	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1
7	Project Location (Major Cross Streets, Section Township & Range)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1 Description Of The Location Of The Project & A Vicinity Map Shall Be Provided.
8	Report Type (Final Drainage Report)				3.2.2.C.1
9	Project Description (Size, Area, scope of project)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1
10	Summarize referenced existing drainage studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1 Include any pertinent existing drainage studies. The existing studies should be described and the information that is being referenced should be summarized. Pertinent excerpts from these studies should be included in the Appendix of the drainage report.
11	Purpose and Objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1

ON-SITE DRAINAGE CONDITIONS


12	Drainage network, watershed, and floodplain boundaries within the project site and corresponding topographic map.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2 -Include location and sizes of all drainage ways and drainage systems within the project limits. -Topographic map depicting the existing conditions including all the aforementioned items, plus the 100-year floodplain for all washes with a capacity of 100 cfs or greater.
13	Site specific photographs and aerial photographs to support parameter selection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2

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14	Ground Cover Conditions – Description of the existing ground cover conditions and the identification of the hydrologic soils group(s) found on the property.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
15	Existing and proposed developments - Description of any existing development located on the property and how it affects drainage. Description of any existing and/or proposed developments on adjacent properties and how it affects drainage on the project area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
16	Provide justification for the selection of parameters used in the analysis of on-site conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2

OFF-SITE WATERSHED CONDITIONS

17	Watershed conditions and the drainage network entering and existing the project site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3 -Include a narrative describing the existing upstream and downstream drainage patterns, watershed boundaries, floodplain boundaries, natural and artificial channels, storm drains, storage basins, and any other drainage structures or improvements that are adjacent to or downstream of the project site. Include location and sizes of drainage ways and drainage systems that are adjacent to and downstream of the project.
18	Topographic map – Map should delineate watersheds from which stormwater enters or affects the project’s property and should show the locations and flow rates for the off-site flows impacting the property.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
19	Site specific photographs and aerial photographs to support parameter selection.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3

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20	Ground cover conditions – Description of the ground cover conditions. Description of the hydrologic soil group(s) found in the off-site watersheds.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
21	Description of existing development in the watersheds and how this affects drainage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
22	Description of any proposed projects of developments, which have approved designs and that will affect this property.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
23	Description of any additional conditions which would significantly affect the runoff from the watershed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3
24	Provide justification for the selection of parameters used in the analysis of off-site conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.3

FLOODPLAIN DESIGNATION

25	Floodplain Designation Identify Floodplain Within, Adjacent To, And Downstream Of The Site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.4 Provide A Description & Exhibit Identifying The Current FEMA Floodplain, Show The Floodplain Boundaries, Identify The FEMA Map Number, And List The Hazards Of The Floodzone. An Exhibit Showing The Floodplain Boundaries Shall Be Included.
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PROPOSED DRAINAGE PLAN

26	General description of proposed drainage system and components; including conveyance of off-site flows.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a
27	Future Conditions including development of adjacent properties.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a

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28	Stormwater storage requirements – Provide a Table with Volume Provided, Volume Required, and Basin Locations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a NOAA 14 is approved for actual rainfall data 3.3.5.A.1.a- Retention to be sized to retain 100% of the 100-yr 6-hr storm, unless the first flush waiver is granted. 3.3.5.C.8.a- Calculations showing that basins drain within 36 hours. Backup calculations should be provided to justify the results.
29	Proposed drainage structures or special drainage facilities – Description of the design criteria and probable effect on the existing upstream and downstream drainage system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.a
30	Pre- and Post- runoff characteristics – <ul style="list-style-type: none"> • Compare and analyze the stormwater runoff exiting the project both prior to and after construction, for the 5, 10, 50, and 100-year storm events. • Describe the proposed facilities for collection, routing, and discharging off-site flows. • Description of the effects of the proposed facilities, such as retention or detention basins, on the downstream properties. • Verify that on-site and off-site flows will not combine. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5.c
31	Description of the lowest floor elevation and location.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5, 3.2.1.B.3 -Finished Floor Elevations shall be a minimum of 18 inches above the low lot outfall and a minimum of 12 inches above the high water elevation.
32	Project Phasing – Description of improvements to be constructed with each phase, the impact of each phase, and any required interim improvements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.5 -Development requirements shall be met independently for each phase.

SPECIAL CONDITIONS

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33	Project Stipulations, 401 and 404 Permits, and AZPDES.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.6
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DATA ANALYSIS METHODS

34	Hydrologic procedures, parameter selection and assumptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.7, Table 3.3-1 -FCDMC- DDM Hydrology- Ch 3. Minimum Tc is 5min
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35	Hydraulic procedures, methods, parameter selection and assumptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.7, 3.3.3
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36	Stormwater storage calculation methods and assumptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.7, 3.3.5
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CONCLUSIONS

37	Provide a summary of findings and recommendations outline within the report based on the completion of the project in its entirety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.8
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38	Description of project phasing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.8
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REFERENCES

39	List all references cited in the report.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chapter 3 Outline
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EXHIBITS

40	Location Map <ul style="list-style-type: none"> • Existing streets • Proposed streets • Existing parcels surrounding the project to a distance of at least one mile from the exterior boundaries of the project 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.1
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41	Floodplain Map	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.4
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42	Offsite Map: <ul style="list-style-type: none"> • Topography • Watershed boundaries • Floodplains • Flows Impacting the property 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2 C.3
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43	On-site map: <ul style="list-style-type: none"> • Project Location • Topography (current 1-foot 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.C.2
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	(minimum) contour mapping based on current topographic survey) <ul style="list-style-type: none"> • Drainage Ways with flows labeled (include natural and man-made channels) • Watershed Boundaries • Concentration Points • Floodplain for washes with a flow of 100-cfs or greater. • Flow entering the site • Flow exiting the site 				
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APPENDIX

44	Appendix- Hydrology <ul style="list-style-type: none"> • Soils Map • Soils and or Geologic Analysis • Sub-basin Data • Rainfall calculations • Model Output • Floodplain calculations • Storage volume calculations • Retention/detention basin inflow and outflow analysis and design calculations • Basis for setting finished floor elevations in relation of floodplains, adjacent washes, and/or natural or adjacent ground elevation if in a Special Flood Hazard Zone 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			-An exhibit showing the SCS soils types used in the analysis -Sub-basin technical data including length, slope, area, etc. -Rainfall intensity data for the 5-yr; 10-yr; 50-yr; and 100-yr event -Include HEC-1 Model output or backup calculations used in the analysis. -Include HEC-RAS Model output or backup calculations used in the analysis. -Include backup calculations on the proposed retention basins.
45	Appendix- Hydraulics <ul style="list-style-type: none"> • Street Capacity calculations • Catch basin calculations • Inlet Calculations • Scupper Calculations • Channel design calculations (including toe-down protection and drop structure design) • Culvert design calculations 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			-Design requirements listed in Table 3.3-1. 3.3.4.C.3- Scour calculations shall be provided to show that the channel will not exceed the scour velocity of the channel material. 3.3.3.C- Storm drain velocities to be between 3 fps and 9 fps. HGL for 10-yr 6-hr storm at least 1-ft below ground elevation.

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	<ul style="list-style-type: none"> • Storm Drain Calculations • Sediment and Scour Calculations • Erosion/Sediment Control Plan 				
46	Appendix- Percolation Tests and Results	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.3.5.D.2 - Percolation tests and results to be included with drainage report.
47	Appendix- Supporting Data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If existing studies are being referenced in the report, pertinent excerpts from these studies should be included in the Appendix to provide back-up for the statements made in the report.
48	A SWPPP and NOI should be submitted if construction disturbs more than 1 acre.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.2.2.D