

Planning and Engineering
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Preliminary Drainage Report (PDR) Review Checklist

Checklist to be filled out by Licensed Civil Engineer in the State of Colorado. Checklist shall be uploaded separately with the drainage report and included in the appendix of the drainage report. Checklist shall be used as a guidance document only and shall not be considered comprehensive for submittal requirements. Please ensure reference of the most recent Storm Drainage and Technical Criteria Manual for full requirements.

*****Submittal shall be held if all applicable items are not included*****

Preliminary Drainage Report will be limited to three (3) reviews, additional review fees will apply to the fourth (4th) review.

Subdivision Name: _____

Applicant Company: _____ Phone: _____

Contact Name: _____ Email: _____

Owner Company: _____ Phone: _____

Contact Name: _____ Email: _____

	Please note that the following items are not to be included on the Preliminary Drainage submittal:		
	Sizing of orifices or restrictor plates for WQCV, EURV or 100 year flood events		
	Water surface profiles with RAS modeling		
	Storm drain sizing		
	Temporary erosion control measures (permanent only shown schematically)		
	Check HERE if a Master Drainage Plan has been reviewed and approved in the last twelve (12) months. Preliminary Drainage Plan shall be in conformance to Master Drainage Plan. Provide EDN # 222141		
		Included	N/A
	Drainage Planning Process		

1	Drainage kick-off meeting (to discuss general concepts and identify significant issues related to the drainage concepts and shall be limited to one (1) hour) scheduled and held with MHFD and City Drainage staff (and any other relevant municipalities) prior to submittal of Preliminary Drainage. Required for all sites with MEP facilities, stream management corridors (identified on MHFD website), regional ponds, major outfalls, basins > 130 acres prior to submittal of Preliminary Drainage Report and Plan. Applicant shall include meeting minutes, that have been reviewed by all attendees, from this meeting in the appendix. Please note, per Colorado Revised Statutes 32-11- 221(1), these improvements require MHFD approval.		
2	Drainage Plan matches Planning Site plan (site layout, easements, etc.).		
	Referrals		
3	Identify and confirm referrals to all relevant outside agencies have been made (CDOT, DEN/DIA (drainage and utilities), MHFD, CCBA, E-470, easement holders, etc.). Please include copy of transmittal(s) to required agencies. (implementation date TBD)		
	Format and General Items		
3	Drainage Plan matches Site Plan and plat (Site layout, easements, etc.).		
4	Drainage design for adjacent roadways included. <i>(Confirm with site plan what roads are being improved. Drainage Report should include drainage design for all roadways being improved even if roadway construction is deferred)</i>		
5	Project Phasing Shown <i>(If project is to be phased, then phasing must be described in PDR report text and shown on plan. Hydrologic analysis of different phases may be required and multiple plan sheets may be needed.)</i>		
6	All drainage design should conform to City of Aurora Storm Drainage Design & Technical Criteria (COA SDDTC).		
	Report		
7	COA approval block on report cover.		
8	Formal Subdivision name on report cover.		
9	Required report outline/Table Of Contents/content followed (SDDTC Sect 2.30).		
10	Advisory note that PDR approval is required prior to Civil Plan Approval.		
11	Variances - All requested variances must be numerically listed with justifications in section A.2.c of the Report. If no variances,		

	state "None." All variances require supervisor level approval and will require additional review time.		
12	Discuss effects of proposed development on adjacent, upstream and downstream sites under both existing and future buildout condition.		
	Preliminary Drainage Plan		
13	Drainage Plan uploaded as separate full-size dwg.		
14	COA approval block on drainage plan first sheet.		
15	No copyright notes on plan.		
16	Legend.		
17	Formal Subdivision name in title block of drainage plan.		
18	Minimum scale 1"=50' for single family. 1"=30' for multi-family and commercial. When drainage plan is on more than one sheet an <i>overview sheet showing entire site shall be provided</i> .		
19	General Notes required on plan (not comprehensive – see drainage specs): <ul style="list-style-type: none"> 1. City of Aurora review is only for general conformance (see Section SDDTC Section 2.22KJ). 2. Ref COA NAVD88 benchmark. 3. Design recurrence interval (minor or major) for storm pipe infrastructure. 4. State storm infrastructure is private or public. 		
20	Contours two feet (2') maximum, fifty feet (50') min beyond property line and shown for all off-site tributary areas. Offsite tributary areas may be shown on a separate 11x17 in report.		
21	Building FFE's shown (commercial and multi-family).		
22	Floodplain, floodway, FEMA panel #, effective date and BFE's shown.		
23	Retaining wall(s) locations (only) shown. Preliminary section with maximum height, any footer or geotechnical reinforcing shown and property line or ROW line shown.		
24	Drainage basin boundaries, flow arrows and design points shown. Offsite basins may be shown on separate plans in report.		
25	Emergency overflow arrow(s) shown with location and direction, for ponds, sump inlets etc. Unique flow direction arrow used for emergency overflow and noted in legend.		
26	Table of flows, C values and percent impervious for individual basins and design points shown on plans.		
26	Existing drainage facilities shown/labeled with size and COA Engineering Drawing Number (EDN).		
27	Proposed drainage facilities shown/labeled with asset type (no sizing of pipes/inlets).		

Design Pt info missing on plans

A table has been added on the first sheet of the plans summarizing the Design Point info.

There are currently two callouts located in plan view at the design points (sheet 3 and 6) detailing the same information presented in this table.

Revised

28	Existing and proposed easements and tracks for drainage functions only and as described in the City specifications and clearly shown.		
29	All detention ponds shown/labeled with ponding limits, volumes and elevations for WQCV, EURV (or 10 year) and 100 year as appropriate and allowable release rates.		
30	Cross sections for all swales, channels and critical emergency flow paths (show geometry, 100 year flow depth, Q100, freeboard).		
31	Prelim plan and profile for all channels. WS profile not required but do show utilities, culverts, grade controls, bank protection.		
32	Drafting standards – reference Sections 2.00 – 3.03 of Roadway Design Manual.		
	Previous Studies and Master Plans		
33	All sources for previous relevant drainage studies are reviewed and intent of each incorporated. <i>(Reports/studies can be found for regional drainage studies, previous site studies, and adjacent site development drainage plans on the MHFD website and City's document website.)</i> Include a label on plan with City EDN number where applicable.		
	Hydrologic Analysis		
	Basin Delineations		
35	Basin boundaries correspond to proposed topography.		
36	All off-site tributary areas delineated/evaluated <i>Properties must continue to accept historically tributary flows unless a variance approved by staff (may require additional review time).</i>		
37	Offsite emergency flows perpetuated through site.		
38	Water Quality and Detention are required for all on-site areas unless a variance approved by staff <i>(may require additional review time)</i> .		
39	Design points shown on plan.		
	Rainfall/Design Events		
40	Point Rainfall Depth per COA Criteria <i>Rational Method and CUHP rainfall per NOAA Atlas 14.</i>		
41	Urban Center or Transit Oriented District (TOD) 100 year design capacity is required of all storm conveyance systems, see COA SDDTC for limitations on street flow depth.		
42	City Center Zone (five (5) year minor event).		
	Rational Method (only for <= 90 acres)		

Tc equations have been revised to match COA criteria.

43	NRCS soils data map included with site boundaries delineated. Imperviousness and C values reflect correct hydrologic soil group per City Criteria.		
44	Imperviousness and C Values in compliance with Master Drainage Plan (if applicable) and reflect Planning Department site plan.		
45	Time of concentration (Tc) calcs utilize COA SDDTC methods (COA Tc methods consistent with MHFD).		
46	Confirm Weighted C and percent impervious, Tc, Intensity, peak flows.		
47	Confirm routed/accumulated flows at critical locations (ponds, storm inlets, etc.) including design points.		
	CUHP (See MHFD published criteria for items not yet published in COA SDDTC)		
48	Depression loss values correspond to COA Criteria.		
49	Infiltration method parameters correspond to COA Criteria.		
50	Impervious calculations reflect City percent impervious values.		
51	Confirm Directly Connected Impervious Area (DCIA) Level is accurate <i>0 unless distributed LID measures utilized throughout watershed. For example, providing ponds, rain gardens, or other approved water quality BMP's sized for the subdivision or large portions of it does not justify DCIA Level > 0.</i>		
52	Confirm basin areas, percent Impervious and WQCV portion of pond is 100% impervious.		
	SWMM		
53	Link-node diagram included, and DP's shown on plan.		
54	Pond storage rating curves match plan/calcs.		
55	Pond discharge rating curves match calcs.		
56	Confirm CUHP output hydrographs input to correct nodes and link node connectivity and continuity error not significant.		
	<u>Hydraulic Analysis</u>		
	Special Considerations		
57	If site is tributary to Norfolk or City Center Ponds, and utilizing these regional detention facilities for detention, additional fees are required (see published fee schedule). NOTE: Water quality still required on site.		
58	If site is tributary to Aurora Reservoir, special water quality conditions exist. Please refer to specification manual.		

Minimum Tc for urbanized areas to be per COA eq 5.4

Routed/cumulative flows missing

Design Point information has been added to Rational Calculations presented within Appendix A.

R Flow routing/cumulation correlates to the two Design Points for the preliminary report. Routing and cumulation within pipes will be detailed during pipe sizing within the FDR.

	New (or Modified) Ponds		
59	Applicable detention and EURV/water quality requirements are met.		
60	Volumes per UD-Detention or CUHP/SWMM.		
61	Proposed ponds do not classify as a jurisdictional dam(s) designation. City will require the applicant to provide a letter of determination (from the State Engineers Office) when the proposed pond is within 0.5' of jurisdictional height as defined by State Engineers Office. Additional review time may be required.		
62	Elevation of top of embankment is a minimum of one foot (1') above the water surface elevation over the emergency weir when the weir is conveying the maximum design or emergency flow.		
63	Adjacent FFE's are a minimum of one foot (1') above pond emergency overflow water surface elevation.		
64	Total drainage area and percent impervious for each pond correctly computed. <i>(Reminder: check criteria manual for requirements for off-site tributary areas Water Quality is required for entire tributary area to the Water Quality Facility. Detention/EURV for offsite areas may be permitted to pass through, discuss with COA prior to submittal.)</i>		
65	Pond release rates, volumes and 100 year water surface elevation per COA criteria and clearly shown on Drainage Plan.		
66	All Ponds, underground detention and WQ devices are contained in "Drainage Easements" (easement shall include additional four feet (4") from the perimeter of underground detention and WQ devices). Access to these from ROW is to be shown as a City "Access Easement" (note this is not a public access easement).		
67	Access provided to forebays and outlet structure (top and bottom)in compliance with COA Specs.		
68	Pond berm slopes are maximum 4:1.		
69	<p>Pond emergency spillway flows and direction clearly shown on plan.</p> <ul style="list-style-type: none"> Existing historic flow patterns shall be maintained. If discharging to an adjacent developed property - demonstrate one foot (1') of freeboard to all existing structure Finish Floor Elevations. If emergency spillway flows are maintained on-site until reaching major watershed creek, ensure flows will not negatively impact properties along the flow path. All emergency spillway flow paths on site shall be in a drainage easement until reaching major watershed creek or ROW. All emergency overflows which discharge onto other undeveloped sites shall include a note on the plans indicating the owner shall perpetuate the flows. 		

70	If pond is within 10,000 feet of any airport and within five (5) miles of DIA/DEN, applicant to confirm drain time requirements and incorporate in pond design (i.e. Denver International Airport, forty (40) hour max drain time and no exposed micropool required).		
71	Permanent erosion control shown schematically on PDR Plan.		
	Use of Existing Ponds		
72	Provide the following callout note: <i>“Applicant understands re-certification may be required. If pond certificate, an executed I&M plan, or drainage easements do not exist, they will be required prior to Civil Plan approval.”</i>		
73	If pond is being expanded or changed due to tributary area change, percent impervious increase or some other aspect of the pond is being changed, then City will require that pond be brought up to current design standards (freeboard, EURV, access, easement dedications, etc.).		
	Specialty Water Quality Devices and Measures		
74	Subsurface, proprietary water quality devices only allowed with authorization from Aurora Water. Will not be allowed in greenfield development or to increase development density. If allowed, proprietary WQ device must achieve requirements set forth in the City criteria manual. Maintenance access that does not require traffic control must be provided.		
75	Water quality measures including rain gardens, grass swales, Etc. shall be designed per City criteria and design spreadsheets (MHFD) or equivalent included.		
	Streets/Alleys		
76	Included street capacity calcs for public and private streets, drives and alleys.		
77	Inlets shown upstream of curb returns where two (2) streets sloping down to an intersection per Aurora Roadway Manual.		
78	Cross Pans – refer to latest version of Roadway Design Manual. Cross Pans are not allowed across collector or arterial roadways, nor are they allowed on roadways with storm sewer systems.”		
79	When a street or alley with a steep grade ends at a T intersection, evaluate and mitigate flooding potential for properties at the end of that intersection including one foot (1') of freeboard for FFE and no inundation of garages for the 100 year event. See Drainage Criteria Manual for details.		
	Storm Drainage System		

80	If connecting to an existing storm sewer pipe, at the point of connection, call out the offsite flow rate projected for the receiving storm sewer system and reference the name and date of the study. If no previous study exists, analysis showing adequate capacity must be performed by Applicant and provided with PDR.		
81	Sump inlets identified and emergency overflow shown on plan (with emergency flow arrows) and confirm one foot (1') minimum freeboard from 100 year WSEL to building FFE's (existing and new). Report shall include associated verbiage and calculations.		
82	Emergency overflows shall not discharge onto adjacent sites unless extreme condition exists (to be included in Variance list and approved by Engineering Services Manager). If allowed, applicant must include a note on the plans that clearly indicates that the adjacent property owner shall perpetuate the flows.		
83	Easements, tracts and/or license agreements identified on preliminary drainage plan. Note: All easements and license agreement shall be executed prior to civil plan approval.		
84	All storm lines and inlets labeled as public or private to identify maintenance obligations, subject to review by Aurora Water.		
	Culverts		
85	Sized (100 year capacity, twenty-four inch (24") minimum diameter or box minimum height six feet (6') if width > eight feet (8')), shown and labeled if under public roads.		
86	Emergency overflow provided per criteria (one foot (1') freeboard to FFEs) and labeled with WSEL.		
87	Maintenance access provided both u/s and d/s of culverts with twenty foot (20') minimum access around all riprap, headwalls and wingwalls at the outlet.		
88	Easements, tracts and/or license agreements identified on preliminary drainage plan. Note: All easements and license agreements shall be executed prior to civil plan approval.		
	Channels		
89	Regional Channels shall be designed for MEP (for maintenance eligibility) per MHFD.		
89	COA criteria for slope, velocity, Side slope freeboard one foot (1'), etc. are met.		
90	Preliminary plan, profiles, and typical section with normal depth calculations shown on plan along with drops, bank protection and utilities.		
91	Channels within DEN/DIA drain time zone may not be allowed to have any adverse slope sections and require special plant palette. DEN/DIA review required.		

92	Permanent erosion control shown schematically (note: FDR and civils shall provide design for permanent erosion control).		
	Outfalls		
93	Proposed outfall corresponds to any previously proposed/planned location (MDP for larger site, previous subdivision drainage reports, etc.) Include report reference label next to outfall.		
	Floodplains		
94	Floodplain limits, BFE's and FEMA map panel # and effective date shown on plan if within three hundred feet (300') limits of grading or construction.		
95	<p>"Best available information" 100 year floodplains (BAIF) including floodway and Base Flood Elevations must be clearly identified.</p> <ul style="list-style-type: none"> Sources to determine BAIF sources include COA website (effective FIRM's and LOMR's), MHFD website for recent FHADs, and FEMA Map Service Center (Preliminary status maps) Engineer is encouraged to contact City Floodplain Administrator to confirm source of BAIF. 		
96	Add this callout note to any work planned within the floodplain <i>"Applicant understands that construction or grading in 100 year Floodplain requires Floodplain Development Permit which must be obtained prior to grading or construction can commence."</i>		
97	For new development, no portion of residential lots can be shown within an existing floodplain. Minor portions of commercial/industrial lots may be allowed in existing floodplain if they meet the non-residential BFE requirements, Floodplain Administrator approval required and additional review times may apply.		
98	Residential Lowest Floor Elevation (LFE)'s are two feet (2') minimum above Base Flood Elevation (BFE).		
99	Non-residential LFE's are one foot (1') minimum above BFE.		
100	Setback requirement per latest version of the Storm Drainage Criteria manual. Consider any applicable fluvial hazard boundary studies and adjust corridor to account for potential stream corridor movement. Identify location and reference study name/date on plan.		
	Swales		
101	swales must be constructed per drainage criteria manual for minimum slopes, underdrain, and/or lining requirements.		
102	Easements, tracts and/or license agreements identified for public infrastructure per criteria. Note: all dedications and/or signed agreements required as part of the plat approval or prior to CD approval.		

103	Top of Swales for offsite drainage (not lot drainage) shall be a minimum of two feet (2') from the property line to avoid disturbance by fencing		
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I hereby certify that the information provided above is complete and accurate.

Printed Name & Title

Signature

Date