Unified Government - Storm Drainage Checklist

Name of Development: Master
Revision: 0 (Initial review = 0)
Review Date: 04/05/05

Reviewer: ____ Initials
Concur: _____ Bill Blackwell

Accept: _____ Reviewer
_____ Bill Blackwell

Reviewability of Plans				
1	Engineer's seal and signature is on cover sheet and report. *Comment:*	OK ___	Revise ___	NA ___
2	Topography shows discharge route to receiving stream, storm sewer, or improved channel. (Infill may discharge to existing storm sewer.) *Comment:*	OK ___	Revise ___	NA ___
3	Plat is included as part of construction drawing set. (Not required for DRC building permit.) *Comment:*	OK ___	Revise ___	NA ___
4	Overall layout is included, has readable font and line selection, limits of construction are clearly indicated, node and line numbers are unique, legible and correlate among layout, profile & data table. *Comment:*	OK ___	Revise ___	NA ___
5	Sub-basin map is included, is readable and basin identifiers correlate with data table. *Comment:*	OK ___	Revise ___	NA ___
6	Upstream tributary areas are identified and match ridgelines interpreted from the topography, or topographic evidence clearly shows they do not exist. Except upstream limits of a stream that flows though the site need not be shown. *Comment:*	OK ___	Revise ___	NA ___
7	Erosion control plan is included. *Comment:*	OK ___	Revise ___	NA ___
8	Regulatory flood plain is either 1) not present, 2) not impacted, or 3) submittal of a LOMR is documented. *Comment:*	OK ___	Revise ___	NA ___
9	Detention is shown or documented as exempt. *Comment:*	OK ___	Revise ___	NA ___
	If any element above is not acceptable, the review is terminated at this point.	**OK ___**	**Terminate Review ___**	
10	UG technical provisions established as controlling specifications. (For DRC building permit review, the note must include all work in public easements and Right-of-Way and all erosion control work.) *Comment:*	OK ___	Revise ___	NA ___
Hydrology				
11	Data Table and Layout show the same linkages. *Comment:*	OK ___	Revise ___	NA ___

12	Acreage of Tributary areas correlate between table and subbasin map *Comment:*	OK ___	Revise ___	NA ___
Detention Requirements – All ponds				
13	Actual release rate and required volume are acceptable. *Comment:*	OK ___	Revise ___	NA ___
14	Actual volume from plan contours exceeds required volume. *Comment:*	OK ___	Revise ___	NA ___
15	Controlled release consists of a circular pipe, or justification and additional construction details of alternate release are provided, and construction details show tamper proof construction. *Comment:*	OK ___	Revise ___	NA ___
16	Location, length and material of detention overflow are shown. *Comment:*	OK ___	Revise ___	NA ___
17	Overflow unit discharge appropriate for cover material. "NA" if offsite tributary area < 150% of onsite tributary area. *Comment:*	OK ___	Revise ___	NA ___
18	Elevation difference between overflow elevation and lowest openings in adjacent structures or lowest elevation at building setback on adjacent SF lot meets guidelines. *Comment:*	OK ___	Revise ___	NA ___
Tributary Area Less Than 20 Acres				
19	Controlled release is correctly sized. *Comment:*	OK ___	Revise ___	NA ___
Tributary Area Greater Than 20 Acres				
20	Stage storage curves identify the water surface elevation at 50 % of the required detention. *Comment:*	OK ___	Revise ___	NA ___
21	Low release pipe is correctly sized. *Comment:*	OK ___	Revise ___	NA ___
22	The invert elevation of the second stage controlled release (the 100% design point) is greater than the water surface elevation at 50 % of the required detention. *Comment:*	OK ___	Revise ___	NA ___
23	The second stage analysis recalculates the portion of the flow the low release discharges due to increased headwater depth. *Comment:*	OK ___	Revise ___	NA ___
24	The second stage release is correctly sized. *Comment:*	OK ___	Revise ___	NA ___
Maintenance Issues All Detention Ponds				

25	Detention area is on common tract and has access from ROW or appropriately graded, platted easement. (Exception for DRC building permit review.) *Comment:*	OK ___	Revise ___	NA ___
26	If wet pond detention is used, pond has settlement forebay (equal to 10 to 15% of total surface area), self-rescue slopes of 8:1 or flatter for 4 feet on either side of controlled water surface and clear water depths in center of main pool > 4'/ *Comment:*	OK ___	Revise ___	NA ___
Street and Lot Drainage System – Small Storm Sewers				
27	Inlet spacing adequate. *Comment:*	OK ___	Revise ___	NA ___
28	Pipe sizing is adequate. *Comment:*	OK ___	Revise ___	NA ___
29	Minimum pipe velocity is adequate. *Comment:*	OK ___	Revise ___	NA ___
Outlets for Small Sewers				
30	Discharge is to a stream, an engineered channel, or a level spreader. Or for infill development to an existing storm sewer. *Comment:*	OK ___	Revise ___	NA ___
31	If discharge in line with stream or engineered channel (pipe flow represents > 80% of downstream flow) length of riprap is 6 times the pipe diameter beyond the toe of embankment. *Comment:*	OK ___	Revise ___	NA ___
32	If discharge is lateral discharge to a stream or engineered channel 1) entry is not on the inside of a bend, 2) invert is 0 to 1 foot above the base flow elevation, 3) toe bank protection is provided and extends sufficiently upstream and is keyed in to prevent flanking by the stream. *Comment:*	OK ___	Revise ___	NA ___
33	If discharge is to level spreader 1) the unit discharge of flow does not exceed that allowable for the downstream ground cover, 2) depth of distribution channel is at least one half the diameter of the discharge pipe. *Comment:*	OK ___	Revise ___	NA ___
Large Storm Sewers				
34	100-year design flows are adequate. *Comment:*	OK ___	Revise ___	NA ___
35	Diameter and slope listed in table matches profile; and roughness coefficient 'n' meets guidelines. *Comment:*	OK ___	Revise ___	NA ___
36	Plotted results correlate with table values. *Comment:*	OK ___	Revise ___	NA ___
37	Inlet control considered at entrance loss. *Comment:*	OK ___	Revise ___	NA ___

38	Entry and exit loss calculations adequate. *Comment:*	OK ___	Revise ___	NA ___
39	Energy slope calculation adequate. *Comment:*	OK ___	Revise ___	NA ___
40	Energy grade line does not exceed ground surface. *Comment:*	OK ___	Revise ___	NA ___
Outlets for Large Sewers				
41	Energy dissipation is provided by either a rigid energy dissipating structure or by a plunge pool. *Comment:*	OK ___	Revise ___	NA ___
42	If energy-dissipating structure is used, 1) Design method is submitted in the report and is based on calibrated research models, 2) Dimensions calculated correctly from the methodology. *Comment:*	OK ___	Revise ___	NA ___
43	If plunge pool is used, 1) the length and width are adequate, 2) location and size of easement for plunge pool is adequate, and 3) riprap is shown for upslope protection and shaped to downstream channel. *Comment:*	OK ___	Revise ___	NA ___
Maintenance Issues – All Storm Sewer Systems				
44	Flared end section or headwall used at outlets. *Comment:*	OK ___	Revise ___	NA ___
45	If connecting to existing public storm sewer, existing nodes are identified by UG node numbers. *Comment:*	OK ___	Revise ___	NA ___
46	a) Easements are provided and satisfy width requirements. (Exception for DRC building permit review) b) The centerlines of storm sewer and sanitary sewer are horizontally separated by a distance not less than the difference in invert elevations plus the sum of the diameters. c) For construction period offsite work (such as clearing or erosion control), a notarized right of entry is required. For offsite work that remains after construction has been completed (such as grading and temporary cul-de-sacs) recorded easements are required. *Comment:*	OK ___	Revise ___	NA ___
47	Pipe diameter does not decrease in the direction of flow through a node in a continuous system. Exception at detention controlled release. *Comment:*	OK ___	Revise ___	NA ___
48	Curb inlets openings are between 5 and 8 feet. Area inlets use UG detail. *Comment:*	OK ___	Revise ___	NA ___

49	Profiles shows appropriate material and construction detail 1) Embankment fill conditions do not exist or are mitigated, 2) Pipe is RCP under roads and RCP or HDPE elsewhere, 3) A minimum of 2 foot cover is provide at roads or load analysis is provided, 4) Pipe does not end mid-lot on a SF residential lot, except lots > 1 acre, 5) Slope anchors are provided or not required, 6) No reach exceeds 500 feet between access points, 7) Utility lines that cross storm sewers are shown; minimum vertical separation between pipe exteriors is provided – two feet for sanitary sewers and one foot for other utilities. (Exemptions for DCR building permit reviews) *Comment:*	OK ___	Revise ___	NA ___
Engineered Channels				
50	Depth, cross section, and slope correlate between tabulated values and construction plans. *Comment:*	OK ___	Revise ___	NA ___
51	Minimum velocity and channel lining erosion resistance are adequate. *Comment:*	OK ___	Revise ___	NA ___
52	The difference in elevation from the water surface to the lowest structural opening exceeds 1.0'. *Comment:*	OK ___	Revise ___	NA ___
Stream Crossings – Roadway Crossings Greater Than 50 SF Opening				
53	Corps of Engineers NOI filed. *Comment:*	OK ___	Revise ___	NA ___
54	Located in a tangent or toe bank protection provided sufficiently upstream. *Comment:*	OK ___	Revise ___	NA ___
55	Design flows match regression curve. *Comment:*	OK ___	Revise ___	NA ___
56	Backwater does not cross property line *Comment:*	OK ___	Revise ___	NA ___
57	Backwater does not enter street. *Comment:*	OK ___	Revise ___	NA ___
58	Cross section includes a low flow channel and a flood terrace. *Comment:*	OK ___	Revise ___	NA ___
59	Outlet erosion control provided. *Comment:*	OK ___	Revise ___	NA ___
Stream Crossing – Utility Crossings				
60	Located in a tangent or toe bank protection provided sufficiently upstream. *Comment:*	OK ___	Revise ___	NA ___
61	Located in pool or at top of riffle. *Comment:*	OK ___	Revise ___	NA ___
62	Grade protection in next riffle downstream. *Comment:*	OK ___	Revise ___	NA ___