

FIRM NAME \_\_\_\_\_

FPID #: \_\_\_\_\_  
 DESCRIPTION: \_\_\_\_\_  
 COUNTY: \_\_\_\_\_

DESIGNER: \_\_\_\_\_  
 CHECKER: \_\_\_\_\_  
 DATE: \_\_\_\_\_

DRAINAGE DESIGN CHECKLIST	Provided		Designer's Initials	Checker's Initials
	YES	NO		
I. Drainage Report (see report outlines on FTE design website)				
A. Executive Summary - Brief Overview of Project Drainage Design				
B. Project Description				
1. Existing Conditions				
2. Proposed Project Conditions				
3. Project Justification Narrative - Basin Schematic and Description				
4. Location Maps, Floodplain Maps, USGS Maps, SCS Maps, Drainage Map, etc.				
5. Survey Datum Conversion				
6. Assessment of permanent and temporary environmental impacts				
C. Design Criteria and permits required				
1. List minimum criteria and determine which is controlling the drainage design				
2. List all permits required and determine which is controlling				
3. Document all contacts with agencies				
D. Drainage Maps (pre and post)				
1. Drainage Divides with topography (onsite and offsite)				
2. Drainage Basin Areas Delineated				
3. Overland Flowpaths Shown (Flow Arrows)				
4. Proposed Drainage Structures Plotted and Labeled with Structure Numbers				
5. Outfall and Cross Drain Structures Shown				
6. Required Information on Existing Structures included and Field Verified				
7. Section, Township, Range, City and County Lines, WMD and local WMD's boundaries where applicable				
8. Existing Ground Line and Proposed Grade Plotted in Profile, if profiles included				
9. Elevation Datum (Topography). Contours				
10. If profiles included, Storm Sewer Main plotted in Profile (including cross drains)				
11. High Water and Design High Water Information				
12. Adjacent and Receiving Water Bodies Labeled				
E. Drainage Calculations				
1. Open Channel Flow				
a. Supporting Documentation - Tc, CN or C calculations, drainage map with flow paths shown				
b. Hydrologic Analysis - Storm frequencies and duration				
c. Hydraulic Analysis - Hydraulic Worksheet for Roadside Ditches - Include channel lining requirements				
d. Outfall ditches sized for 25YR storm				
e. Check if any point source flows entering a ditch have been properly accounted for				
f. Confirm noise wall drainage has been properly designed (slot locations, no increase to water elevations offsite, etc.)				
2. Stormdrain Systems				
a. FDOT Stormdrain Tabulations				
1. Correct zone and frequency used?				
b. Supporting Documentation - Tc, CN or C calculations, drainage map with flow paths				
1. Starting tailwater documented?				
c. Areas of special inlet placement, SE transitions, intersections, side streets, lane tapers against grade, sags, flanking inlets				
d. Inlet Spacing/Spread Calculations/Bypass Flow/Debris Tolerance				
e. Check 50 year storm event for sag inlets with no other outlet (median drainage)				
f. Stormdrains which act as crossdrains should be checked using crossdrain criteria				
g. Minimum pipe slopes are sufficient to provide self-cleansing velocities (2.5 fps)				
h. Minimum required HGL clearance provided?				
i. Check if any systems have base flow entering them and confirm accounted for properly.				
j. Check velocities leaving systems, do any require energy dissipators/other erosion control measures?				

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3. Optional Pipe Analysis				
a. Include geotechnical results of soil chemistry				
b. Latest version of culvert service life estimator run				
c. CSLE results checked for availability, minimum and maximum cover				
d. CSLE pitting analysis run for jack and bore pipes				
4. Cross Drains				
a. Description of Drainage Area				
1. Natural Features				
2. Existing Facilities				
3. Existing Flooding				
4. Existing Drainage Problems				
5. Bridge/Bridge Culvert category				
b. Previous Studies				
1. Drainage Studies				
2. Water Management Permits/DERM				
3. FEMA - Define floodplain/floodway impacts				
c. Peak Design Flows				
1. All Design Storm Peaks				
2. FDOT Methodology				
d. Existing Conditions				
1. Flood Stages - Source				
2. Tailwater Elevation - Source				
3. Headwater Elevation - Source				
4. Scour - Source				
e. Culvert Design (Pre/Post)				
1. Supporting Documentation - Tc, CN or C calculations, drainage map with flow paths Tailwater Methodology and calculations				
2. FDOT Culvert Design Methodology (HDS-5)				
3. Headwater/Tailwater Comparison to Existing Conditions for Design Storms				
4. Design HW does not exceed Allowable HW				
5. 100 year HW not increased (if increased, provide evidence of no adverse impact to offsite)				
6. Erosion/Scour calculations and protection requirements				
7. Clear Zone Standards				
8. Flood Data Box Information				
f. Box Culvert Design (Pre/Post)				
1. Supporting Documentation - Tc, CN or C calculations, drainage map with flow paths Tailwater Methodology and calculations				
2. FDOT Culvert Design Methodology (HDS-5)				
3. Headwater/Tailwater Comparison to Existing Conditions for Design Storms				
4. Design HW does not exceed Allowable HW				
5. 100 year HW not increased (if increased, provide evidence of no adverse impact to offsite)				
6. Include low flows and HEC-3 runs or backwater curves for design flows				
7. Structural Design using FDOT "Reinforced Concrete Box Culvert and Wingwall Design"				

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5. Underdrain, Vertical Column Recovery Structures or other drawdown systems				
a. Pollution abatement volume				
b. Design method				
c. Estimated length of underdrain for filtering pollution abatement volume				
d. Typical section with elevations				
e. Gravity flow in underdrain pipe(s)				
f. Estimated drawdown time to evacuate the pollution abatement volume				
g. Design addresses the drawdown of seasonal highwater table as applicable				
h. Design certified by geotechnical engineer				
i. Does system affect base clearance?				
6. Stormwater Management				
a. Pond Siting report - Wet, Dry, Detention, Retention, On-line, Off-line, Demonstrate all matrix factors fully evaluated.				
b. Stage storage calculations for proposed pond excluding compensation storage				
c. Supporting Documentation - Areas, Tc, CN or C calculations, drainage map w/flow paths				
d. Computed tailwater elevation of receiving facility for appropriate design frequency event				
e. Hydrologic Analysis				
1. Pre and Post Development Hydrographs				
f. Hydraulic Analysis				
1. Pond Routing Calculations				
2. Critical duration if required				
3. Pond Volume Calculations				
4. Skimmer Head Loss Calculations, including skimmer/box clearance				
5. Water Quality Volume Calculations Included. Correct criteria used				
6. Water Quality and Water Quantity Drawdown Times				
7. Littoral Area Calculations (wet pond), if applicable				
8. Permanent Pool Volume (wet pond). Use 21 days to avoid littoral zone requirements				
g. Computer Modeling Information				
1. Model Input Data				
2. Model Output Data				
7. Summary of Results in Table Form				
a. Pre vs. Post peak flows to receiving water				
b. Design high water in pond(s). Compare to min. required distance below roadway base				
c. 1 foot of freeboard above peak stage in pond(s) to the inside maintenance berm				
d. Floodplain compensation addressed				
e. NWL in ponds				
f. Control elevation, size, and provided recovery time versus required				
g. Required versus Provided water quality volumes				
h. Pre versus Post stages any where offsite HGL affected by project				
8. General				
a. Corrosiveness analysis has been performed on CMP installations and on RCP				
b. Description of offsite easements and/or flood rights, if required				
c. Check that existing drainage system will function under proposed conditions				
d. Verify that improvements do not result in adverse affects on adjacent property				
e. Temporary drainage addressed				
F. Correspondence and Supporting Documentation				

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II. Engineering Plans				
A. Drainage Maps				
1. All offsite area draining to project delineated and acreages labeled				
2. All offsite connections to project right of way shown				
3. Arrows showing flow direction both onsite and offsite				
4. Stormwater Management Facilities shown with outfall locations and easements				
5. Other items as identified in FDM Chapter 305				
6. Flood Data Table for cross drains included with notes				
B. Summary of Pay Items (or Estimated Quantities Report) includes all drainage items				
C. Summary of Drainage Structures (or Estimated Quantities Report)				
1. Separate columns for adjusted and modified structures				
2. Check sizes, lengths, inlet types, etc.				
3. Check for consistent structure labeling format				
4. Cross drains, side drains, ditch pavement, pond control structures, and any other miscellaneous drainage structures				
D. Optional Materials Sheet				
1. Check Drainage Manual/CSLE for availability, suitability, and max/min fill height for all materials				
2. Do not use materials that require a design review or approval by the State Engineer				
3. Gage for metal pipe noted				
4. RCP Class noted				
5. Verify jack and bore minimum pipe thicknesses are identified				
6. Verify allowable pipe materials follow Table 6-1 of the FDOT Drainage Manual				
E. Quantity Sheets (or Estimated Quantities Report)				
1. Erosion control items, side drains, and ditch pavement summarized				
F. Typical Sections				
1. Typical ditch sections shown with minimum bottom width and minimum berm elevation if needed				
2. Minimum depth of ditch shown				
3. Shoulder gutter shown where needed, such as pavement draining through guardrail				
4. Check number of lanes sloped in one direction vs.FDM Figure 211.2.1 and TDH 211.2.3 to determine need for hydroplaning calcs				
G. Plans				
1. Check Drainage and Outfall Structures, Underdrain/Cleanout Locations, and French Drain callouts				
2. Check Lengths of pipes and flow line information				
3. Check underground utility locations and Soil Boring locations				
4. Ponds labeled				
5. Check consistency of stationing with all sheets				
6. Check structure numbers for consistency				
7. Stations for locations of pond access are included				
8. Confirm construction is contained within the Right of Way				
9. Jurisdictional lines shown				
10. Are inlets required at super elevation transition, median lanes, sags, tapers, or intersections?				
11. If connecting to existing pipe, add corresponding note from the TDH Exhibit 311-1				
H. Profiles				
1. Check Existing Ground Elevations (Beginning and End of Sheet)				
2. Check Underground Utilities plotted (4 inches or greater)				
3. Show and label begin and end of special ditches (including median)				
4. For treatment swales, provide additional labeling as requested in the TDH 313.4				

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<b>I. Drainage Structures Sheets</b>				
1. Check plotting of drainage structures (offset as indicated in Standard Plans, verify all gutter elevations are also correct)				
2. Existing structures requiring work are noted and given a proposed structure number				
3. Drainage structure notes include structure number, flow lines with direction, Standard Plan numbers				
4. Structure number and stationing shown along right border of sheet				
5. Underground utilities are shown (gas mains running through conflict boxes not allowed)				
6. Existing Ground Line and Proposed Grade Plotted				
7. All utility conflicts have been identified				
8. Design fill heights for box culverts are shown (includes top slab thickness)				
9. Check for adequate cover over pipe for all optional materials allowed				
10. Check for adequate cover over pipes in a horizontal curve				
11. Check for adequate cover between ditch and pipe				
12. Riprap/energy dissipators shown if required				
13. Minimum depth of pipe flowlines adhere to FDOT Drainage Design Guide				
14. Wall Zones Delineated				
<b>J. Drainage Details (Control Structures and Pond Details)</b>				
1. Check that Pond radii points and access driveway have a station offset				
2. Minimum maintenance berm and littoral shelf provided				
3. Pond parameters given and verified (i.e. control, DHW, SHW, Weir elevation, pond bottom, berm, slopes)				
4. Check to see if a fence, gate, or sediment sump is required				
5. Geotech borings for pond shown on plans				
6. Actual Pond cross sections provided with soil borings shown				
7. Skimmer details required if not using Standard Plan 425-070				
8. Drainage easement or flood rights required?				
9. Confirmed control structures shown in tables/details are constructible in the locations proposed				
10. Stations for locations of pond access are included, if included within the sheet clip				
11. Show and label pond tie up/down contours tying to existing ground contours				
<b>K. Cross Sections</b>				
1. Check tie ins are appropriate at the beginning and ending of all ditches				
2. Special ditch grade elevations shown				
3. Soil borings shown w/ SHWT				
4. Underground utilities (4 inch or greater) shown				
5. Check low points in ditches with locations of DBI's				
6. Check that proposed limits of construction stay within Right of Way				
7. Check that project does not cause offsite ponding				
8. Does project eliminate any existing conveyance ditches?				
9. Shoulder gutter requirements met				
10. Check number of lanes sloped in one direction vs.FDM Figure 211.2.1 and TDH 211.2.3 to determine need for hydroplaning calcs				
<b>III. Geotechnical Report</b>				
<b>A. Boring Location and Logs</b>				
<b>B. Estimated Seasonal High Groundwater Elevations for Ponds and Roadway</b>				
<b>C. Certification of Underdrain Designs</b>				
<b>D. Geotech certification for embankment stability</b>				

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IV. Other Miscellaneous Drainage Items				
A. Status of Design Variances or Exceptions				
B. Liability Concerns				
1. Documentation that proposed drainage design meets clear zone requirements				
2. Documentation that proposed drainage design will not affect historic stormwater discharge location, rate and quantity (as applicable), and stages				
C. Right of Way				
1. Easement or Right of Way acquisitions are required for any construction activity proposed beyond the right of way lines shown on the plans				
2. Are flood rights required?				
D. Clearances/Conflicts				
1. Evidence of stormsewer and utility clearance check				
2. Seasonal highwater clearance checked against: bottom of base; pond bottom of storage elevation; and ditch bottom elevation				
3. Freeboard, A.H.W. and D.H.W. meet local, state, and FDOT requirements				
E. Maintenance of Traffic Plans have been checked for temporary drainage items				
F. TSPs for drainage items completed by Ph III				

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