

# BROWARD COUNTY HIGHWAY CONSTRUCTION & ENGINEERING DIVISION

## PAVING AND DRAINAGE CHECKLIST

Project Name : \_\_\_\_\_  
 HC&ED Ref No. : \_\_\_\_\_ Plan Reviewed by : \_\_\_\_\_

### GENERAL REQUIREMENTS FOR PAVING, GRADING AND DRAINAGE PLANS

If No or N/A is selected for any of the items listed herein please indicate on a separate sheet the reasons for making said selection.

YES	NO	N/A	REQUIREMENT	REF
			Paving and Drainage plans signed and sealed by a Professional Engineer registered in the State of Florida, Landscape plans may be signed and sealed by a Professional Landscape Architect registered in the State of Florida.	B.C.M.S. 4-1.1
			A survey (which accurately reflects current field conditions), signed and sealed by a Professional Surveyor and Mapper, registered in the State of Florida	B.C.M.S. 4-1.1
			All existing facilities as well as all other proposed facilities, including bus stops and related facilities, shown adequately to permit assessment of compatibility of proposed work with existing facilities, etc.	B.C.M.S. 5-3.1
			Plan sheet size 24"x 36", Legal size sheets okay for small jobs provided scale requirements are met and only one (1) sheet is required.	B.C.M.S. 5-3.2
			Location sketch (general area layout) scale 300' or less to the inch.	B.C.M.S. 5-3.3
			Plan scale 1" = 20' minimum for Arterial & Collector Roads and for Subdivision Roads within the trafficway corridor.	B.C.M.S. 5-3.3
			Plan scale 1" = 40' minimum for Local Subdivision Roads outside of the trafficway corridor.	B.C.M.S. 5-3.3
			Design drawings for Arterial & Collector Roads shall include both plans and profiles. Profiles shall be to the same horizontal scale as the plan.	B.C.M.S. 5-3.3
			Design drawings for Local Roads need not include roadway profiles if sufficient elevations are provided.	B.C.M.S. 5-3.3
			Sufficient roadway geometry shown on plan to determine proper design/construction aspects of project.	B.C.M.S. 5-3.3
			Proposed pavement clearly indicated on plans and dimensionally located within the right of way.	B.C.M.S. 5-3.9
			Cross section(s) and/or typical section(s) of proposed road and drainage construction, shall show dimensions, materials and purposes of all existing (to remain) facilities as well as all proposed facilities within the right of way.	B.C.M.S. 5-3.11
			The title sheet shall bear the following note: The public roadway(s) indicated in these plans have been designed in accordance with the "Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets & Highways - State of Florida."	B.C.M.S. 5-3.12
			Are there water & sewer plans available and/or applicable to this project?	

### PLAN & PROFILE SHEETS FOR PAVING, GRADING AND DRAINAGE PLAN WORK WITHIN THE RIGHT OF WAY SHALL SHOW AND/OR ADDRESS THE FOLLOWING:

YES	NO	N/A	REQUIREMENT	REF
			1. Names and boundaries of abutting subdivision(s) shown including plat book/page. If unplatted labeled as acreage and shows Section, Township & Range.	B.C.M.S. 5-3.4 5-3.5
			2. Dimensions of all right of way widths & easements indicated on the plan.	B.C.M.S. 5-3.6
			3. Suitable legend on all sheets as applicable.	B.C.M.S. 5-3.7
			4. All streets identified.	B.C.M.S. 5-3.8
			5. Pavement A. Edges of permanent pavement adjacent to new pavement, etc. saw cut to straight line.	B.C.M.S. 3-6.5
			B. New pavement indicated by notes and/or light shading.	B.C.M.S. 5-3.9
			6. All existing and proposed utilities in public right-of-way shall be shown on the paving, grading and drainage plans. All utilities shall be identified and located by dimension, horizontally and by elevation, and their materials of construction shall be noted to the extent determinable without excavation. All existing utilities that have been abandoned, but are still in the ground, shall be shown on the plans and labeled "abandoned."	B.C.M.S. 5-3.10
			7. Control radii for turning movements shown on plan?	
			8. Entrance radii per plat requirements and/or Land Development Code requirements.	LDC

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YES	NO	N/A	REQUIREMENT	REF
			9. Drainage - Arterial, Collector & Subdivision Roadways A. Pipe size and material 1. Arterial & Collector Roadways a. Under or within 5 ft of existing or proposed paved areas (including curbs & sidewalk or bike paths) shall be Reinforced Concrete Pipe conforming to ASTM Specification C-76 or ASTM C-1450. Use of reinforced concrete pipe meeting ASTM C-1450 shall be approved on case by case basis. b. Minimum pipe size shall be fifteen (15) inches. 2. Subdivision Roadways a. Under or within 5 ft of existing or proposed paved areas (including curbs & sidewalk or bike paths) shall be Reinforced Concrete Pipe conforming to ASTM Specification C-76 or ASTM C-1450 or corrugated aluminum. b. Minimum pipe size shall be fifteen (15) inches. B. Slope Protection 1. At outfalls and culvert ends shall be concrete revetment mats having a minimum thickness of 4 inches. 2. Where embankment slopes are steeper than 1:3 approved concrete endwalls shall be installed. 3. Where embankment slopes are 1:3 or flatter, approved revetments shall be installed. This preferred type of revetment is the poured concrete-in-fabric form type, with a "quilted" appearance. C. Structure(s) 1. Type - Precast, reinforced concrete. 2. Must meet ASTM Standards C-478. 3. Minimum dimensions a. Wall thickness minimum of eight (8) inches. b. Top and Bottom Slabs minimum of eight (8) inches. c. Walls and floor slabs shall be fully doweled together. d. Top slabs shall have an approved anchorage to prevent displacement. e. Walls shall extend a minimum of six (6) inches above top of the highest pipe hole, three (3) inches minimum each side of each opening. f. Inlet walls shall extend a minimum of twelve (12) inches below the invert of the lowest pipe. g. Minimum compressive strength of 4000 p.s.i. at 28 days. h. All exposed brick shall be coated with ½ inch minimum thickness of cement mortar. i. Width not less than four (4) feet inside dimension between opposing walls. j. Conflict structures shall have not less than two (2) feet clearance between penetrating pipes & parallel concrete walls and shall measure not less than four (4) feet between other opposing walls. k. The minimum distance between a semi-cylindrical baffle and the opposing wall shall be two (2) feet. l. The minimum distance between a semi-cylindrical baffle and the adjacent wall shall be one (1) foot or three-fourths of the radius of the baffle, whichever is greater. 4. Top Frames, Grates & Covers a. All top frames, grates and covers shall be traffic bearing design and shall be cast of close-ground grey iron conforming to ASTM Standard A-48, Class 30 with a minimum lid weight of 165 lbs. and a minimum combined weight of 410 lbs. b. Frames placed on slabs shall be on a minimum of two courses and a maximum of four courses of brick. c. Inlet lids and grates shall be designed and placed to allow safe traversing by pedestrians and bicycles. 5. Rim (grate) elevation adequately shown on the plan. 6. Invert elevation adequately shown on the plan. 7. Concrete apron around frame for three (3) feet on three sides and extending to edge of pavement of the through travel lane. Aprons shall be a minimum of six (6) inches thick and shall have a minimum twenty-eight (28) day strength of 3000 p.s.i. D. Drainage pattern(s) 1. Existing grades 2. Proposed grades 3. Drainage arrows E. Cover Requirements - Minimum pipe cover per FDOT Index 205, but in no case less than twenty-four (24) inches. F. Overflow connections 1. Capacity of existing system provided. 2. Hydraulic Grade Line of system provided. 3. Proposed flow to system shown. 4. Generally maximum size of overflow connection is six (6) inches.	B.C.M.S. 6-1.13 & 7-2.5
			10. Vertical curves in conformity with FDOT "Greenbook" criteria for design speed.	FDOT Greenbook

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## PLAN & PROFILE SHEETS FOR PAVING, GRADING AND DRAINAGE PLAN WORK WITHIN THE RIGHT OF WAY SHALL SHOW AND/OR ADDRESS THE FOLLOWING:

YES	NO	N/A	REQUIREMENT	REF
			11. All existing and proposed utilities in the right of way are located on the plan dimensionally with elevations and material type as applicable. If unable to locate so note on plan(s).	B.C.M.S. 5-3.10
			12. Street names shown on all sheets.	B.C.M.S. 5-3.8
			13. North arrow shown on all sheets.	
			14. Sidewalks/bike path(s) etc. shown as applicable.	B.C.M.S. 6-1.13
			15. Do the plans as prepared address all applicable conditions of plat approval, etc.?	
			16. Sight Triangles	FDOT Index 546
			A. Arterial & Collector roadways consistent with FDOT/AASHTO criteria for design speed.	LDC
			B. Subdivision roadways consistent with the Land Development Code.	
			17. Adjacent Development	
			A. Adjacent driveways/streets are shown with tie dimensions to project.	
			B. Driveways opposite project are shown with ties either to project border or proposed project driveway(s)	

## TYPICAL SECTIONS FOR PAVING, GRADING AND DRAINAGE PLAN WORK WITHIN THE RIGHT OF WAY SHALL SHOW THE FOLLOWING:

YES	NO	N/A	REQUIREMENT	REF
			1. Design Speed	B.C.M.S. 6-1.3
			A. Arterial Roadway(s) minimum 45 mph. Ultimate right of way sufficient to construct a six (6) lane facility.	Drawings 1 - 6
			B. Collector Roadway(s) minimum 40 mph. Ultimate right of way sufficient to construct a four (4) or five (5) lane facility.	
			C. Subdivision Roadway(s) minimum 35 mph. Ultimate right of way sufficient to construct a two (2) or three (3) lane facility	
			2. Dimensions - Proposed pavement clearly indicated on the drawings and dimensionally located within public right-of-way	B.C.M.S. 5-3.9
			3. Materials and purposes of all existing facilities to remain.	
			4. Subgrade - Arterial, Collector & Subdivision Roadways	B.C.M.S. 6-1.6 & 7-2.1
			A. Entire right of way to be demucked. No material of FDOT Class A-5, A-7 or A-8 allowed.	
			B. LBR minimum of 40.	
			C. Top 12" of undisturbed soil shall be compacted to 100% max dry density per AASHTO T-99C.	
			5. Base	B.C.M.S. 6-1.7
			A. Arterial & Collector Roadways	
			1. Twelve (12) inch constructed in two (2) six (6) inch lifts.	
			2. Carbonates content minimum 70% and LBR minimum of 100.	
			3. Compacted to min 98% max dry density per AASHTO T-180.	
			4. Note: Base course construction shall not be started until all underground construction in the vicinity has been tested and accepted.	
			B. Subdivision Roadways	B.C.M.S. 7-2.2
			1. Eight (8) inch constructed in two (2) four (4) inch lifts.	
			2. Carbonates content minimum 60%	
			3. LBR minimum of 100	
			4. Compacted to min 98% max dry density per AASHTO T-180	
			5. Base primed per Florida D.O.T. Standards	
			6. Wearing (Surface) Courses	B.C.M.S. 6-1.8
			A. Arterial & Collector Roadways	
			1. Minimum total thickness of two (2) inches of asphaltic concrete in two (2) lifts as follows:	
			a. Structural course minimum thickness 1-1/4 inches. BCMS Drawing 6	
			b. Final lift (Friction Course) shall be Type S-III asphaltic concrete. BCMS Drawing 6	
			c. Tack Coat shall be used between paving courses.	
			d. Prime coat shall be used on the finished rock base.	
			e. Note: Wearing courses shall not be placed until:	B.C.M.S. 6-1.8.3
			1. A walk through has been conducted to determine if there is any remaining work that might cause damage to the final lift.	
			2. All landscape work that might cause damage to the final lift is complete.	
			3. All underground utilities are installed and accepted and a finished rock survey has been submitted to and accepted by the Highway Construction & Engineering Division.	
			f. For roads with a posted speed of 50 mph greater provide a minimum of 5/8 inch Type FC-2 friction course (1" maximum thickness).	

# PAVING AND DRAINAGE CHECKLIST

**TYPICAL SECTIONS FOR PAVING, GRADING AND DRAINAGE PLAN WORK WITHIN THE  
RIGHT OF WAY SHALL SHOW THE FOLLOWING:**

YES	NO	N/A	REQUIREMENT	REF
			6. Wearing (Surface) Courses - continued A. Arterial & Collector Roadways 2. Ultimate low edge of pavement to be consistent with 10 year flood criteria.	B.C.E.Q.C.B. 89-3
			B. Subdivision Roadways 1. Crown of road of pavement to be consistent with 10 year flood criteria.	
			2. One and one-half (1 1/2) inches of asphaltic concrete, FDOT Type S-III.	B.C.M.S. 7-2.3
			7. Shoulder A. Arterial & Collector Roadways 1. All shoulders to be stabilized to a minimum LBR of 40.	B.C.M.S. 6-1.9
			2. Minimum depth of stabilized shoulders to be Eight (8) inches.	
			3. Eight (8) foot width where conditions permit, but in any event, no less than six (6) feet.	
			4. Four (4) feet of shoulder paved as one way bike lane unless the area is needed for drainage, then the outside lane shall be designed and constructed two (2) feet wider than the interior lanes.	
			5. Shoulder pavement shall be 1" Type S-III over an 8" compacted and primed limerock base.	
			6. Limerock base compacted to minimum density of 98% AASHTO T-99C.	
			7. Cross slope between .03 ft./ft. and .06 ft./ft..	Greenbook
			B. Subdivision Roadways 1. LBR minimum of 40 for unpaved shoulder.	B.C.M.S. Drawing 6, Drawing 15 & 6-1.9
			2. Minimum depth of Eight (8) inches.	
			3. All shoulders shall be compacted to 95% maximum density AASHTO T-99C.	
			4. Eight (8) foot width where conditions permit, but in any event, no less than six (6) feet.	
			8. Swales - Arterial, Collector & Subdivision Roadways A. Bottom of swale shall be a minimum of six (6) inches below edge of adjoining pavement as measured to top of turf.	B.C.M.S. 6-1.12 & 7-2.4
			B. Compacted to 95% maximum density per AASHTO T-99C.	
			C. Shall be seeded, mulched & fertilized or sodded if not paved.	
			D. Slopes adjacent to shoulder 1:4 or flatter within the recoverable terrain within the clear zone. Within the non-recoverable terrain 1:4 but not steeper than 1:3 within the clear zone. Within the recoverable terrain 1:4 or flatter within the clear zone with a minimum width of 10 feet.	FDOT Index 700
			E. Back slopes maximum 1:4 where right of way permits or 1:3.	FDOT
			F. Ditch bottom should be four(4) feet wide and flat or gently rounded.	Greenbook
			9. Curb & Gutter A. Arterial & Collector Roadways 1. Limerock foundation or pad minimum LBR of 100.	B.C.M.S. 6-1.10
			2. Carbonates content minimum 70%.	
			3. Minimum four (4) inches thick and extends minimum of six (6) inches beyond edges of concrete.	
			4. Compacted to 98% max density per AASHTO T-180.	
			5. Minimum strength 3000 PSI.	
			6. Type F curb shall be placed one-quarter (1/4) inch higher than adjacent inlet frames and grates.	
			B. Subdivision Roadways 1. Limerock foundation or curb pad minimum LBR of 100.	B.C.M.S. 6-1.10 & 7-2.9
			2. Carbonates content minimum 60%.	
			3. Minimum four (4) inches thick and extends minimum of six (6) inches beyond edge of concrete.	
			4. Compacted to 98% max density per AASHTO T-180.	
			5. Minimum strength 3000 PSI.	
			6. Type F curb shall be placed one-quarter (1/4) inch higher than adjacent inlet frames and grates.	
			10. Traffic Separators - Arterial & Collector Roadways Less than four (4) feet in width between curbs, shall be paved with a six (6) inch minimum thickness of concrete.	B.C.M.S. 6-1.11
			11. Clear Zone Adjacent to non water body areas Consistent with Table 3-12 FDOT "Greenbook" criteria for design speed.	FDOT Greenbook

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**TYPICAL SECTIONS FOR PAVING, GRADING AND DRAINAGE PLAN WORK WITHIN THE RIGHT OF WAY SHALL SHOW THE FOLLOWING :**

YES	NO	N/A	REQUIREMENT	REF
			12. Guardrail	B.C.M.S.
			A. Arterial & Collector Roadways	6-1.5
			1. Is guardrail required or necessary as a result of the clear zone requirements of 11 above?	
			2. If required is location consistent with FDOT criteria	
			3. When guardrail is required for canal protection the following criteria apply:	
			a. Guardrail should be placed at or near the edge of the clear recovery area.	
			b. The distance from the outside edge of shoulder to the face of guardrail should, in all cases, be greater than twelve (12) feet when guardrail is not constructed at the edge of the shoulder.	
			c. The roadway front slope back of the guardrail may be steepened to 2:1.	
			4. A continuous strip of asphalt four (4) inches thick and three (3) feet minimum width, centered on the guardrail, shall be placed at all new guardrail installations in unpaved areas.	
			5. End anchorages consistent with FDOT criteria and labeled as to type.	
			6. Adjacent to water bodies as measured from the outside edge of the ultimate through travel lane to the top of the lake/canal ultimate side slope (top of bank) nearest the road will be:	
			a. Design speed 50 mph or greater sixty (60) feet minimum.	
			b. Design speed less than 50 mph	
			1) Rural highways fifty (50) feet.	
			2) Urban (curb & gutter) highways forty (40) feet.	
			c. New lake/canal or roadway alignment required, distances greater than those above should be provided to accommodate possible future improvements to roadway (widening, etc.)	
			7. At all existing bus stop locations, where guardrail is proposed to be installed, openings must be provided in the guardrail at appropriate points for passenger access. If so doing would create a hazardous condition, bus stops should be relocated instead.	
			B. Guardrail - Subdivision Roadways	B.C.M.S.
			Same Criteria as arterial and collector roads except that the minimum distance from the outside edge of the ultimate through travel lane to the top of the side slope (top of bank) of any lake or canal shall be 40 feet. Reduction of this distance to 28 feet shall be considered on a case by case basis.	7-1.5
			13. Median(s)	FDOT
			A. Width - Consistent with Table 3-11 FDOT "Greenbook" criteria for design speed.	Greenbook
			Note: Median widths consistent with urban section require curb & gutter.	
			B. Cross Slope - Maximum 1:6, preferably not steeper than 1:10	
			14. Bike Path, Bike Lanes or Recreational Trails and Multi-Purpose Paths	B.C.M.S.
			A. Four (4) foot paved shoulder(s); or	6-1.9
			B. Outside through travel lane(s) two (2) feet wider than other lanes.	6-3.1 6-4
			15. Sidewalk(s) - Arterial, Collector & Subdivision Roadway	B.C.M.S.
			A. Minimum width six (6) feet, clear of all obstructions.	6-1.14
			B. Narrow grass strips (one (1) to three (3) feet) between sidewalk and curb and gutter not permitted.	&
			C. Minimum thickness six (6) inches.	7-2.7
			D. Wire mesh (not permitted).	
			E. Minimum Transverse slope .01 ft./ft. and Maximum Transverse slope .02 ft./ft. toward swale or gutter.	
			F. Transverse hair broom finish.	
			G. Longitudinal slope conforms with ADA "Greenbook".	
			H. Handicap ramps are provided at intersections?	
			I. Sufficient elevations shown to determine relationship with PGL and any adjacent projects?	
			J. Minimum Strength 3000 PSI.	
			16. Grassing/Seeding/Mulching/Sodding/Fertilizing	B.C.M.S.
			Addressed in typical section by appropriate notes and/or comments.	6-1.16
			All grass placed in county right of way shall be Argentine Bahia.	