

STORMWATER MANAGEMENT PLAN REVIEW COMMENTS

Project Name:
Developer/Owner:
Engineer/Applicant:

Review Date:
Review By:

THIS SUBMITTAL IS NOT ELIGIBLE FOR ONE STOP.

A HYDROLOGY STUDY WAS NOT INCLUDED WITH THIS SUBMITTAL.

For any questions / comments, or to make appointments call:

Cobb County Water System, Stormwater Management Division
680 South Cobb Drive
Marietta, Georgia 30060-3113
Phone: (770) 419-6435
Fax: (770) 419-6444

Review Comment errors or omissions do not relieve developer from compliance with applicable codes and specifications. All comments are subject to additional review and change.

Further understanding of the review comments can be obtained from:

- Cobb County Development Standards (Revised May 14, 2002)
- Georgia Stormwater Management Manual, Volume 2 – Technical Handbook

For all sequential plan reviews, please bring these comments, reviewed drawings and reviewed Hydrology Study. For One Stop bring two(2) copies of the final Hydrology Study.

GENERAL SITE (GS) COMMENTS

GS-1 Include address and legal description of site.

GS-2 Include vicinity map.

GS-3 Include zoning stipulations (if any). Additional comments pending.

GS-4 Include a copy of the approved preliminary plat in site plans.

GS-5 Show P.E.'s name, address, and phone number on plans.

GS-6 Sign all professional seals on plans.

GS-7 State acreage of total site area, disturbed site area and impervious site area.

GS-8 Describe the extent of proposed site work and land disturbance activity. Is grading necessary? Discuss with staff. If in the opinion of staff, proposed grading of site does not adhere closely to existing topography, additional Best Management Practices (BMP's) will be required per Cobb County Code and State Law.

- GS-9 Reduce impervious/paved area. The impervious percentage of the site exceeds the MAXIMUM allowable for the zoned land use.
- GS-10 Designate stormwater detention facilities on the plans.
- GS-11 Stormwater interception is inadequate. Gutter spread exceeds allowable or bypass is excessive.
- GS-12 Define downstream flood hazard potential. Define effect of project on existing downstream storm drainage infrastructure (if any).
- GS-13 A known downstream flood problem exists. This design may aggravate an existing problem. Seek alternative solutions.
- GS-14 Design and incorporate channel stabilization measures. Streambed grades are steep and on-site channels are unprotected. Development will increase volume of flow subjecting channels to greater scour potential.
- GS-15 Detention facilities must be placed on separate individual parcels of land with 20-ft wide access to them from the public right of way. The access around the impoundment should cover the entire 100-year impoundment area of the facility plus the dam and a 12-ft wide perimeter beyond the 100-year flood pool limits.
- GS-16 Provide a Buffer Variance from EPD or Director of Community Development Agency if in Tributary Protection Area or County Streambank Buffer.
- GS-17 Delineate wetlands on site and state total acreage. Provide documentation to verify that all required wetlands permits have been obtained from the U.S. Army Corps of Engineers.
- GS-18 Provide the following note on the drainage plan and on the final plat: 'The minimum floor elevation (MFE) for lots _____ shall be at least 1.0 feet above the adjacent streets top-of-curb. The builder shall provide an adequate swale between the houses to accommodate any overflows from the headwall/inlet at the rear of the lots or street overflow.'
- GS-19 Show topographic layout of the development at 2-foot contour intervals based on mean sea level datum.
- GS-20 Provide additional spot elevations to demonstrate drainage in parking lot/around building or at intersections.
- GS-21 Provide oil/grit separator vault and drain field for dumpster drainage. Show location and specify dimensions and materials on detail. Dumpster drain cannot tie to storm drainage system. Tie to sanitary sewer if possible.
- GS-22 Delineate the undisturbed natural vegetative buffer(s) of 25-feet measured from top of each stream bank. A 35-foot undisturbed buffer is required for areas inside of the ARC Chattahoochee River Corridor. Provide documentation to verify

that a variance from Georgia EPD has been obtained for buffer encroachment. A letter of concurrence from the County will be required.

GS-23 Provide access/drainage easement to and around detention pond per Development Standards.

GS-24 Add the following note to grading and drainage plan:

Water quality control device to be installed only after site is completely stabilized and temporary sediment filter and accumulated sediment is removed.

GS-25 Add the following note to grading and drainage plan:

Water quality control device to be installed only after site is completely stabilized and temporary sediment filter and accumulated sediment is removed.

HYDROLOGY STUDY (HY) COMMENTS

HY-1 Existing Conditions Hydrologic Analysis

- HY-1.1 Provide topographic map of existing site conditions with the drainage basin boundaries and areas indicated.
- HY-1.2 Identify soil types and land cover of areas for each sub-basin affected by the project.
- HY-1.3 Identify all perennial and intermittent streams and other surface water features.
- HY-1.4 Identify all existing stormwater conveyances and structural control facilities.
- HY-1.5 Show direction of flow and exits from the site.
- HY-1.6 Provide analysis of runoff provided by off-site areas upstream of the project site.
- HY-1.7 Provide methodologies, assumptions, site parameters and supporting design calculations used in analyzing the existing conditions site hydrology.

HY-2 Post-Development Hydrologic Analysis

- HY-2.1 Provide topographic map of developed site conditions with the post-development drainage basin boundaries and areas indicated.

- HY-2.2 Identify total area of post-development impervious surfaces and other land cover areas for each sub-basin affected by the project.
- HY-2.3 Provide calculations for determining the runoff volumes that need to be addressed for each sub-basin for the development project to meet the post-development stormwater management performance criteria [in Section 10-165](#).
- HY-2.4 Identify location and boundaries of proposed natural feature protection and conservation areas.
- HY-2.5 Provide documentation and calculations for any applicable site design credits that are being utilized.
- HY-2.6 Provide methodologies, assumptions, site parameters and supporting design calculations used in analyzing the existing conditions site hydrology.
- HY-3 Stormwater Management System
- HY-3.1 Provide a map and/or drawing or sketch of the stormwater management facilities, including the location of nonstructural site design features and the placement of existing and proposed structural stormwater controls, including design water surface elevations, storage volumes available from zero to maximum head, location of inlet and outlets, location of bypass and discharge systems, and all orifice/restrictor sizes.
- HY-3.2 Provide a narrative describing how the selected structural stormwater controls will be appropriate and effective.
- HY-3.3 Provide cross-section and profile drawings and design details for each of the structural stormwater controls in the system, including supporting calculations to show that the facility is designed according to the applicable design criteria.
- HY-3.4 Provide a hydrologic and hydraulic analysis of the stormwater management system for all applicable design storms (including stage-storage or outlet rating curves, and inflow and outflow hydrographs).
- HY-3.5 Provide documentation and supporting calculations to show that the stormwater management system adequately meets the post-development stormwater management performance criteria in [Section 10-165](#).
- HY-3.6 Include drawings, design calculations, elevations and hydraulic grade lines for all existing and proposed stormwater conveyance elements including stormwater drains, pipes, culverts, catch basins, channels, swales and areas of overland flow.

- HY-3.7 Where applicable, provide a narrative describing how the stormwater management system corresponds with any watershed protection plans and/or local greenspace protection plan.
- HY-4 Post-Development Downstream Analysis
- HY-4.1 Provide a downstream peak flow analysis which includes the assumptions, results and supporting calculations to show safe passage of post-development design flows downstream.
- HY-4.2 The analysis of downstream conditions in the report shall address each and every point or area along the project site's boundaries at which runoff will exit the property.
- HY-4.3 The analysis shall focus on the portion of the drainage channel or watercourse immediately downstream from the project and shall extend downstream from the project to a point in the drainage basin where the project area is 10 percent of the total basin area.
- HY-4.5 The downstream analysis shall be performed in accordance with the stormwater design manual.
- HY-5 Hydrology Study requires a signed professional engineer's seal.
- HY-6 Provide a narrative explaining design approach, rationale and methodology used in the design.
- HY-7 Include a detailed drainage area map showing all basins and sub-basins. Each basin must be labeled to correspond to basin identifiers in the study. Identify pre-development /post development conditions. Show the direction of flow and state acreage of drainage area for stormwater entering/exiting the site.
On all basin maps, show:
- 1) Label each basin to conform to hydrology report.
 - 2) Basin area in acres
 - 3) Basin limits
 - 4) "C" or CN factor for each basin
 - 5) Study point(s)
- HY-8 Provide a Summary Table to compare pre-development (allowable) flows to post-development (routed) flows for the 2-, 5-, 10-, 25-, 50- and 100 year storms.
- HY-9 In the report narrative, describe the downstream area to receive concentrated discharge from the site. Allowable discharge from the site shall consider downstream conditions. Identify a receiving downstream drainage feature.
- HY-10 On-site/off-site/bypass drainage areas defined in the study must be consistent with the drainage area map and the development plans.

- HY-11 Define bypass drainage areas (if any) and demonstrate how flows are managed to a pre-developed rate. Developed runoff must not increase where flows exit the property boundary.
- HY-12 Maximum allowable runoff coefficient for pre-development conditions is 0.30 (for rational method) and this value must be supported with appropriate documentation.
- HY-13 The runoff coefficient used is not reflective of the (wooded) predevelopment conditions present at this site. Use a lower 'CN' value (55 or less) for wooded areas. Using a higher CN here will result in an undersized detention pond. Revise Study and Resubmit.
- HY-14 Only those portions of an existing site which are unchanged may be 'grandfathered' as existing conditions. Areas that are razed and reformed must be considered in the undeveloped condition. Therefore the maximum allowable 'CN' value for existing conditions at this site must be 55 using the NRCS (SCS) curve number methodology
- HY-15 Hydraulic Rating for Control Structure is not well defined in the Hydrology Study and appears incomplete. Include a composite rating which includes each component of the control structure (i.e. weir flow, orifice flow and pipe flow).
- HY-16 Stormwater must be managed to not exceed pre-development rates.
- HY-17 Detention pond outlet structure must be located a minimum distance of 10 feet from the property boundary, or 6X diameter of outlet pipe, whichever is greater.
- HY-18 Minimum Tc for Pre-development Conditions is 10-minutes. Post-Development Tc must be same as Pre-Development Tc. Revise Design and Resubmit.
- HY-19 Include (or improve) detail of outflow control structure in hydrology study. Make sure this detail is consistent with site plans.
- HY-20 Provide a raised cover, or bee-hive grate for the outlet control structure.
- HY-21 This outlet control structure will be subject to frequent clogging. Include provisions in the design to keep it clear.
- HY-22 Use 'conic-method' for calculating storage volumes - not 'average end area method'.
- HY-23 Engineer's Runoff and Erosion Control Certificate omitted or unsigned. Include Engineer's Certificate signed by the same Georgia P.E. in Hydrology Study and on Site Plans.
- HY-24 Include routings through significant upstream/downstream impoundment(s) as well as through on-site detention pond.

- HY-25 Proposed orifice control just barely controls 2-year flows and will not restrict lesser (more frequent) floods. Use a proportional control device such as a V-notch weir, or alternate.
- HY-26 Verify the location of the existing detention pond, its condition and any maintenance required for it to properly function.
- HY-27 Demonstrate how this tract/lot/outparcel/site/unit/phase/rec area will be served by the existing stormwater detention pond. Provide a copy of the previous hydrology study and provide a letter from the current design engineer verifying compliance of current design with hydro. Show a note on plans to reference the previous hydrology study for _____. Demonstrate how the developed runoff coefficient for this site complies with the original hydrology study.
- HY-28 Any waiver of detention requirements is subject to review and approval by the Stormwater Management Division. Provide documentation to qualify for fee in lieu of detention.
- HY-29 Furnish Fee in Lieu of Detention Calculations and Fee.

STORM DRAINAGE (SD) COMMENTS

Pipe profile(s) required. Review and comment pending. Allow minimum one week after submittal of pipe profiles for review of drainage system. Please be advised that submittals without pipe profiles could be considered insufficient for review, and may be rejected for review in the future.

- SD-1 Check pipe flow capacities. Specify minimum design frequency as the 25-year event. Pressure flow not permitted for design storm (25 year).
Provide pipe chart, including inlet drainage area, "c" factor, inlet flow, accumulated flow, pipe material, pipe diameter, up and downstream inverts, up and downstream hydraulic grade line and velocity.
- SD-2 Provide 100 year Hydraulic Grade Line results on storm drainage profile plot.
- SD-3 Provide interior drop (in junction box) prior to pipe outfall.
- SD-4 Provide improved bedding detail.
- SD-5 Specify joint system.
- SD-6 Due to depth, diameter and choice of pipe materials, specify that pipe installation must be inspected, approved and certified in writing by a geotechnical engineer.
- SD-7 Provide pavement inlet design (HEC-12 analysis).
- SD-8 Provide DE equal in width to 4 times the depth plus the pipe diameter.

- SD-9 Identify the 100-yr. limits/elevation/storage volume of the existing detention pond and show on plan.
- SD-10 Use L-back curbing only. Roll-back curbing is not permitted.
- SD-11 Subdivision drainage systems receiving offsite stormwater shall be designed to convey the 100-year storm event. With 100 year HGL at or below crown of pipe.
- SD-12 Specify type of pipe(s)/length of pipe(s) slopes on profiles. Certification of pipes shall be required before installation. Minimum allowable pipe slope is 1%. Maximum allowable pipe slope is 10%.
- SD-13 Use of underground/parking lot detention is inconsistent with the proposed Best Management Practices (BMP) to satisfy Federal clean water regulations. Discuss with staff.
- SD-14 Match crowns of storm drainage pipes at junction boxes. Otherwise, upstream crown must be higher than downstream crown within a junction box.
- SD-15 CMP cannot be used if depth, as measured to invert, is greater than 15 feet and diameter exceeds 36, without an inspection and certification by Geotechnical Engineer (Development Standards. 409.02.01). Recommend use of RCP or Cast-in-Place RCB or DIP.
- SD-16 Storm drainage pipes shall be minimum 18-inch diameter within County ROW public roads / dedicated easements.
- SD-17 Storm drainage pipe 30-inch diameter or smaller must extend at least 50 feet beyond the front building setback line.
- SD-18 Provide storm drainage profiles. Profiles (pipes and structures) must be labeled to correspond to storm drainage plan.
- SD-19 Specify minimum 12 gauge BCCMP or minimum 14 gauge Type 2 aluminized CMP.
- SD-20 CMP located on a live stream must have a paved invert. Provide note on site plans.
- SD-21 Concrete headwalls are required on inlet and outlet ends of pipe or specify use of concrete flared end section.
- SD-22 Note the 100-year headwater pool elevations at all sag inlets. Note on plans. Minimum finished floor elevation(s) shall be set at least 3 feet above the 100-year headwater pool elevation(s).
- SD-23 Maximum continuous length of pipe without a point of access (i.e. manhole or junction box) is 300 feet for pipes 48-inch or smaller.
- SD-24 Show typical ditch section. Open channel design must provide a non-erodible velocity. Specify type of channel lining.

SD-25 Provide grading design of ditch/swale/sag to demonstrate how stormwater will be directed to inlet(s) _____.

SD-26 Provide individual grading plans for lot(s) _____ to demonstrate how stormwater will be directed to street/inlet. Show note on plans and plat.

SD-27 Include BMP's to control non-point source pollution. Recommend review of ARC Stormwater Management Task Force, interim Stormwater Quality Management guidelines.

SD-28 Determine outlet velocity at discharging headwalls. Exit velocity of 5 fps or greater from headwall require energy dissipation devices in addition to the normal 6x diameter

SD-29 Include Standard Cobb County Pipe Notes on plans (below):

COBB COUNTY PIPE NOTES

1. THE DEPARTMENT OF TRANSPORTATION, STATE OF GEORGIA STANDARD "PIPE CULVERTS" NUMBER 1030D, LATEST EDITION SHALL BE USED IN DETERMINING THE CLASS OF REINFORCED CONCRETE PIPE OR GAGE OF CORRUGATED STEEL PIPE OR TYPE 2 CORRUGATED ALUMINUM PIPE UNDER FILL AND THE METHOD OF BACK-FILLING. THE MINIMUM GAGE FOR CORRUGATED STEEL PIPE ALLOWED UNDER COBB COUNTY STANDARDS IS 12 (0.109 INCHES). ALL CORRUGATED STEEL PIPES ARE TO BE FULLY COATED. THE MINIMUM GAGE FOR TYPE 2 CORRUGATED ALUMINUM PIPE UNDER COBB COUNTY STANDARDS IS 14 (0.075 INCHES).
2. FIELD JOINTS FOR CORRUGATED PIPE SHALL BE MADE WITH BANDS OF THE SAME BASE METAL AND COATING AS THE CORRUGATED PIPE. BANDS SHALL BE OF THE HUGGER TYPE DESIGNED TO FULLY ENGAGE AT LEAST ONE ANNULAR CORRUGATION AT THE END OF EACH CORRUGATED PIPE AROUND ITS ENTIRE CIRCUMFERENCE. MINIMUM BAND WIDTH SHALL EQUAL THE CENTERLINE LENGTH OF FOUR (4) ANNULAR CORRUGATIONS. BANDS SHALL CONFORM TO CURRENT ASTM/AASHTO INDUSTRY STANDARDS AS TO SECURING BOLTS, THEIR NUMBER AND PLACEMENT.
3. CONCRETE PIPE SECTIONS MAY BE JOINED WITH BITUMINOUS PLASTIC CEMENT JOINTS, RUBBER-TYPE GASKET JOINTS, O-RING GASKET JOINTS OR PRE-FORMED PLASTIC GASKET JOINTS. IN BITUMINOUS PLASTIC CEMENT JOINTS, THE ANNULAR SPACE SHALL BE FILLED WITH JOINT MATERIAL, AND THE INSIDE OF EACH JOINT WIPED SMOOTH. RUBBER-TYPE, O-RING, AND PRE-FORMED PLASTIC GASKET JOINTS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. ALL CATCH BASINS, DROP INLETS OR OTHER DRAINAGE STRUCTURES SHALL COMPLY WITH THE LATEST STANDARDS APPROVED AND

PROMULGATED BY THE GEORGIA DEPARTMENT OF TRANSPORTATION IN "STANDARDS SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES", LATEST EDITION.

5. USE OF HDPE REQUIRES THE FOLLOWING:

- Granular backfill to top of the pipe.
- Depths no greater than ten (10') feet as measured to invert of pipe.
- Installation must be outside County Right-of-Way.
- Watertight bell and spigot gasketed joints must be provided.
- 36-inch diameter or greater must be inspected and certified by a geotechnical engineer or a manufacturers representative.
- Smoothbore pipe only.

FLOODPLAIN (FP) COMMENTS

FP-1 Permit Procedures and Requirements

No owner or developer shall perform any development activities on a site where an Area of Special Flood Hazard is located without first meeting the requirements of the Cobb County Flood Damage Prevention Ordinance prior to commencing the proposed activity. Unless specifically excluded by this ordinance, any landowner or developer desiring a permit for a development activity shall submit to Cobb County a permit application on a form provided by the Cobb County Community Development Department for that purpose.

No permit will be approved for any development activities that do not meet the requirements, restrictions and criteria of this ordinance.

An application for a development project with any Area of Special Flood Hazard located on the site will be required to include a floodplain management / flood damage prevention plan. This plan shall include the following items:

- Site plan, drawn to scale, which includes but is not limited to:
 - Existing and proposed elevations of the area in question and the nature, location and dimensions of existing and/or proposed structures, earthen fill placement, amount and location of excavation material, and storage of materials or equipment;
 - For all proposed structures, spot ground elevations at building corners and 20-foot or smaller intervals along the foundation footprint, or one foot contour elevations throughout the building site;
 - Proposed locations of water supply, sanitary sewer, and utilities;
 - Proposed locations of drainage and stormwater management facilities;
 - Proposed grading plan;

Base flood elevations and future-conditions flood elevations;

Boundaries of the base flood floodplain and future-conditions floodplain;

If applicable, the location of the floodway; and

Certification of the above by a registered professional engineer or surveyor.

- Building and Foundation design detail, including but not limited to:
 - Elevation in relation to mean sea level (or highest adjacent grade) of the lowest floor, including basement, of all proposed structures;
 - Elevation in relation to mean sea level to which any non-residential structure will be floodproofed;
 - Certification that any proposed non-residential floodproofed structure meets the criteria in Section 5.2(2);
 - For enclosures below the base flood elevation, location and total net area of foundation openings as required in Section 5.1(5).
 - Design plans certified by a registered professional engineer or architect for all proposed structure(s).

- Description of the extent to which any watercourse will be altered or relocated as a result of the proposed development;

- Hard copies and digital files of computer models, if any, copies of work maps, comparison of pre-and post development conditions base flood elevations, future-conditions flood elevations, flood protection elevations, Special Flood Hazard Areas and regulatory floodway widths, flood profiles and all other computations and other information similar to that presented in the FIS;

- Copies of all applicable State and Federal permits necessary for proposed development; and

- Certification by the applicant that all development activities will be done according to the plan or previously approved revisions.

FP-2 Standards for Floodplain Development

General Standards

No development shall be allowed within the future-conditions floodplain that could result in any of the following:

Raising the base flood elevation or future-conditions flood elevation equal to or more than 0.01 foot;

Reducing the base flood or future-conditions flood storage capacity;

Changing the flow characteristics as to the depth and velocity of the waters of the base flood or future-conditions flood as they pass both the upstream and the downstream boundaries of the development area; or,

Creating hazardous or erosion-producing velocities, or resulting in excessive sedimentation.

Any development within the future-conditions floodplain allowed under (1) above shall also meet the following conditions:

Compensation for storage capacity shall occur between the average ground water table elevation and the base flood elevation for the base flood, and between the average ground water table elevation and the future-condition flood elevation for the future-conditions flood, and lie either within the boundaries of ownership of the property being developed and shall be within the immediate vicinity of the location of the encroachment. Acceptable means of providing required compensation include lowering of natural ground elevations within the floodplain, or lowering of adjoining land areas to create additional floodplain storage. In no case shall any required compensation be provided via bottom storage or by excavating below the elevation of the top of the natural (pre-development) stream channel unless such excavation results from the widening or relocation of the stream channel;

Cut areas shall be stabilized and graded to a slope of no less than 1.0 percent;

Effective transitions shall be provided such that flow velocities occurring on both upstream and downstream properties are not increased or decreased;

Verification of no-rise conditions (0.01 foot or less), flood storage volumes, and flow characteristics shall be provided via a step-backwater analysis meeting the requirements of Section 58;

Public utilities and facilities, such as water, sanitary sewer, gas, and electrical systems, shall be located and constructed to minimize or eliminate infiltration or contamination from flood waters; and

Any significant physical changes to the base flood floodplain shall be submitted as a Conditional Letter of Map Revision (CLOMR) or Conditional Letter of Map Amendment (CLOMA), whichever is applicable. The CLOMR submittal shall be subject to approval by Cobb County Stormwater Management Division using the

Community Consent forms before forwarding the submittal package to FEMA for final approval. The responsibility for forwarding the CLOMR to FEMA and for obtaining the CLOMR approval shall be the responsibility of the applicant. Within six months of the completion of construction, the applicant shall submit as-built surveys for a final Letter of Map Revision (LOMR).

FP-3 Engineering Study Requirements for Floodplain Encroachments

An engineering study is required, as appropriate to the proposed development activities on the site, whenever a development proposes to disturb any land within the future-conditions floodplain, except for a residential single-lot development on streams without established base flood elevations and/or floodways for which the provisions of Sections 58-66 and 58-67 apply. This study shall be prepared by a currently registered Professional Engineer in the State of Georgia and made a part of the application for a permit. This information shall be submitted to and approved by the Cobb County Water System's Stormwater Management Division prior to the approval of any permit which would authorize the disturbance of land located within the future-conditions floodplain. Such study shall include:

Description of the extent to which any watercourse or floodplain will be altered or relocated as a result of the proposed development;

Step-backwater analysis, using a FEMA-approved methodology approved by the Cobb County Water System's Stormwater Management Division. Cross-sections (which may be supplemented by the applicant) and flow information will be obtained whenever available. Computations will be shown duplicating FIS results and will then be rerun with the proposed modifications to determine the new base flood profiles, and future-conditions flood profiles;

Floodplain storage calculations based on cross-sections (at least one every 100 feet) showing existing and proposed floodplain conditions to show that base flood floodplain and future-conditions floodplain storage capacity would not be diminished by the development;

The study shall include a preliminary plat, grading plan, or site plan, as appropriate, which shall clearly define all future-conditions floodplain encroachments.

FP-4 Floodway Encroachments

Located within Areas of Special Flood Hazard are areas designated as floodway. A floodway may be an extremely hazardous area due to velocity flood waters, debris or erosion potential. In addition, floodways

must remain free of encroachment in order to allow for the discharge of the base flood without increased flood heights. Therefore the following provisions shall apply:

Encroachments are prohibited, including earthen fill, new construction, substantial improvements or other development within the regulatory floodway, except for activities specifically allowed below;

Encroachments for bridges, culverts, roadways and utilities within the regulatory floodway may be permitted provided it is demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the encroachment shall not result in any increase to the pre-project base flood elevations, floodway elevations, or floodway widths during the base flood discharge. A registered professional engineer must provide supporting technical data and certification thereof; and,

If the applicant proposes to revise the floodway boundaries, no permit authorizing the encroachment into or an alteration of the floodway shall be issued by Cobb County until an affirmative Conditional Letter of Map Revision (CLOMR) is issued by FEMA and no-rise certification is approved by Cobb County's Stormwater Management Division Manager or his designee.

FP-5 Maintenance Requirements

The property owner shall be responsible for continuing maintenance as may be needed within an altered or relocated portion of a floodplain on his property so that the flood-carrying or flood storage capacity is not diminished. The Cobb County Community Development Director or his designee may direct the property owner (at no cost to the County) to restore the flood-carrying or flood storage capacity of the floodplain if the owner has not performed maintenance as required by the approved floodplain management plan on file with Cobb County Community Development.

FP-6 Submit a site plan for lots _____ which demonstrates that the lowest finished floor level (including basement) is above the downstream road grade or downstream top of dam elevation by at least 1.0 vertical foot.

FP-7 Demonstrate that the roadways are 3-feet above the base flood elevation (measured at the center line of the road) at or near creek crossing(s).

FP-8 All buildings located within or contiguous to a flood hazard area must be constructed so that the lowest floor elevation (including basement) is 3-feet above the base flood elevation.

FP-9 Site plans must be prepared subject to the requirements of the Cobb County Code § 58-68(3). Lowest floor elevations shall be no less than three (3) feet

above the 100-year flood hazard area. An elevation certification, prepared by a registered land surveyor, is required prior to pouring of footings and/or base slab of house.

FP-10 Reference the updated Flood Insurance Rate Map (FIRM) effective, August 18, 1992. State the appropriate community panel number.

FP-11 Place an asterisk on lot(s) _____, which are subject to flooding.

STRUCTURAL WALL DESIGN (SW) COMMENTS

SW-1 Provide stability analysis including the following:

- 1) The required safety factor is 3.0 for overturning and sliding. See attached memo for guidance on reducing safety factors to 2.0 for overturning and 1.5 for sliding.
- 2) A wall profile is required. Show the location of construction and expansion joints, which sections and where they are used.
- 3) For freestanding, water impounding walls, Cobb County Stormwater Management suggests applicant review the Army Corps of Engineers "Retaining and Flood Walls," publication number EM 1110-2-250 or ASCE's publication "Retaining and Flood Walls," ISBN #0-87262-968-6.
- 4) Compressive strength of concrete and yield strength of reinforcing steel must be specified.

SW-2 Provide structural design, per effective American Concrete Institute (ACI) Code, currently ACI 318-95 Chapter 10 (including: temperature steel, check shear at stem/footing interface).

SW-3 Provide joint details (construction / expansion).

SW-4 Provide turndowns into foundation soils below base slab.

SW-5 Provide guards at ends of wall to prevent pedestrian access (use fencing for example to prevent children from climbing onto wall).

SW-6 Incorporate measures to relieve uplift (i.e. under drainage).

SW-7 Provide waterstops at joints.

SW-8 Incorporate measures to prevent back-washing of wall.

SW-9 Provide specification for cast-in-place concrete, detailing concrete strength, re-bar strength, construction methodology, etc....using the CSI three-part section format or equal.

SW-10 Provide 'slump' and 'compressive strength' test results for this structure.

SW-11 Landscaping timber retaining wall(s) cannot exceed 30-inch height. Retaining walls are subject to inspection/certification (Development Standards. 413).

SW-12 Provide minimum 0.5-foot freeboard on any masonry or concrete wall detaining water for detention purposes.

Memo



Date: 4/4/2003

Re: Reduction of required safety factors and uplift for detention pond walls

Safety factors for detention pond walls can be reduced from 3.0 for overturning and sliding to 2.0 for overturning and 1.5 for sliding if all the following conditions are met:

1. A geotechnical engineer must provide a report for each wall location covering:
 - a) K_o (At-rest pressure coefficient)
 - b) K_p (Passive pressure coefficient)
 - c) Phi angle (Angle of internal friction)
 - d) Estimate of coefficient of friction
 - e) Dry unit weight of soil
 - f) Bearing capacity of soil

The above report must include a sketch of the boring locations, bore logs for each bore and date of field inspection. Bore locations must be within the footing area(s).

2. After the land disturbance permit is issued, the same geotechnical engineer that provided the report for Item #1 must inspect the footing excavations and certify in writing that:
 - a) The footing subgrade conforms to the data and assumptions as provided in the geotechnical report, or that any deficiencies were corrected before any concrete was poured. (Note: If it is not possible to correct the foundation conditions, construction must be suspended until the design can be modified by the design engineer to conform to conditions as found in the field and the modified design is approved by Cobb County Stormwater Management.)
 - b) He (or she) was present during the pouring of concrete for the key(s) and footing(s) and must state the date the concrete was poured.

- c) The outside dimensions of the excavations (and forms, if required) for the key(s) and footing(s) met or exceeded the dimensions as shown on the approved drawings.
3. The design engineer must inspect the rebar (for rebar size, spacing, development length and splices) and footings to confirm that the wall as constructed conforms to the section(s) and detail(s) as provided on the approved plans. Inspection must be performed before the concrete is poured and any deficiencies corrected before any concrete is poured. A report certifying that the wall as constructed conforms to the section(s) and detail(s) must be provided.
4. A minimum of one (1) concrete test cylinder must be made per pour, and 28 day compressive strength must meet or exceed the compressive strength specified on the approved structural drawings. Results of the test(s) must be provided.
5. A copy of the shop drawings of the reinforcing steel must be provided.

All documentation in Items 1, 2 and 3 must appear under the seal and signature of the appropriate professional engineer. Items 4 and 5 must be reviewed and approved in writing by the design engineer before submittal to Cobb County Stormwater Management. Item 1 must be provided to and approved by Cobb County Stormwater Management before a land disturbance permit will be issued. Items 2, 3, 4 and 5 must be provided to and approved by Cobb County Stormwater Management before Cobb County Stormwater Management will release the final plat for recording. Coordination of inspections and construction sequence is the sole responsibility of the applicant.

Any design for any wall impounding water must include full uplift under the footing, with hydrostatic pressure computed from the top of the wall to the bottom of the footing (or key, if used.) Uplift may be reduced up to 70% of the calculated value if under drains are provided. Under drains must drain by gravity and must be coordinated with the civil plans.

DAM DESIGN (DM) COMMENTS

- DM-1 Arrange a Pre-Design Meeting with Stormwater Management per Development Standards.
- DM-2 Arrange to have site field inspected by the Safe Dams Division (EPD) to determine whether the proposed/existing dam will be subject to regulation by the State. Obtain a letter from them to that effect.
- DM-3 Any residential pond, dam and outlet control structure must be located on a separate lot outside the boundaries of any permitted building lots.
- DM-4 No CMP allowed in water impoundment dams. Use DIP or RCP pressure pipe.
- DM-5 Provide section through dam. Section through dam must specify minimum crest width of 12 feet for permanent impoundments (8 feet for dry detention). Use no

- steeper than 2.5H:1V side slopes on dams. 3H:1V are preferred for dry detention ponds and are required for permanent impoundments.
- DM-6 Include seepage collars and cutoff walls and/or concrete cradle to protect against piping failure.
- DM-7 Provide a lake draining system.
- DM-8 Provide a toe drain, install animal guards on outlet pipes.
- DM-9 Dedicated roadways across permanent impoundment structures (i.e. dams) will not be permitted.
- DM-10 Provide fencing around ponds 6 feet deep or more (Development Standards. 409.03.02).
- DM-11 Provide Earthwork Specification, using Construction Specification Institute's (CSI's) three-part section format, for fill placement.
- DM-12 This is a Category 1 Structure regulated by State of Georgia EPD Safe Dams Program. It will be necessary to have plans approved by them. Owner must obtain an Operating Permit from Safe Dams Program.
- DM-13 Provide a Dam-Break analysis. Show the inundation limits/elevations of the dam breach zone.
- DM-14 Siphons must be properly anchored down. A concrete cradle is preferred.
- DM-15 Provide a debris deflector (for standpipe).
- DM-16 Provide a riprap blanket on upstream slope of dam that extends 3 vertical feet above and below the Normal Pool Elevation (wave action protection).
- DM-17 Provide buoyancy calculations for riser structure.
- DM-18 Principal spillway must either handle floods up to and including the 50 year flood or the emergency spillway must be paved.
- DM-19 Incorporate energy dissipation at outfall.
- DM-20 Armor emergency spillway (gabions, concrete, other).
- DM-21 Minimum freeboard for permanent (wet) impoundments is 3 vertical feet above the 100 year flood pool elevation. For temporary (dry) detention facilities, the minimum freeboard allowance is 2 vertical feet above the 100-year flood pool.
- DM-22 Submittal of Compaction Reports, performed by geotechnical Engineer, to document construction practices will be required for this structure.
- DM-23 Submit asbuilt drawings of dam.

Provide the following note on the grading plan:

- **All organics and top soil shall be removed from the entire footprint of the dam.**
 - **Earthen fill shall be CL or ML material approved for use by Geotechnical Engineer (PE) and placed in 6” lifts and compacted to not less than 95% Standard Proctor under said Engineer’s direction.**
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Operations and Maintenance (OM) Plan

- OM-1 Identify the parts or components of a stormwater management facility or practice that need to be regularly or periodically inspected and maintained, and the equipment and skills or training necessary.
- OM-2 Include an inspection and maintenance schedule, maintenance tasks, responsible parties for maintenance, funding, access and safety issues.
- OM-3 Include provisions in the O&M Plan for the periodic review and evaluation of the effectiveness of the maintenance program and the need for revisions or additional maintenance procedures.

Maintenance Access Easements (AE)

- AE-1 The applicant must ensure access from public right-of-way to stormwater management facilities and practices requiring regular maintenance at the site for the purpose of inspection and repair by securing all the maintenance access easements needed on a permanent basis. Such access shall be sufficient for all necessary equipment for maintenance activities. Upon final inspection and approval, a plat or document indicating that such easements exist shall be recorded and shall remain in effect even with the transfer of title of the property.

Inspection and Maintenance Agreements (IM)

- IM-1 Unless an on-site stormwater management facility or practice is dedicated to and accepted by Cobb County, the applicant must execute an easement and an inspection and maintenance agreement binding on all subsequent owners of land served by an on-site stormwater management facility or practice.

Evidence of Other Applicable Permits

- OP-1 The applicant shall certify and provide documentation to Cobb County that all other applicable environmental permits have been acquired for the site prior to approval of the stormwater management plan.

Erosion and Sedimentation (ES) Plan (Community Development Review)

- ES-1 An erosion and sedimentation control plan in accordance with Cobb County's Erosion and Sedimentation Ordinance or NPDES Permit for Construction Activities.
- ES-2 The plan shall also include information on the sequence/phasing of construction and temporary stabilization measures and temporary structures that will be converted into permanent stormwater controls.

Landscaping and Open Space (LS) Plan (Community Development Review)

- LS-1 A detailed landscaping and vegetation plan prepared in accordance with the Cobb County Tree Preservation and Replacement Ordinance (Section 50-216).