ATTACHMENT A

A RESOLUTION ACCEPTING A REPORT ON THE STORMWATER ENGINEERING PROCESS, AUTHORIZING USE OF THE RESIDENTIAL CHECKLIST, AND DIRECTING STAFF TO PREPARE LAND USE ORDINANCE CHANGES TO IMPLEMENT USE OF THE COMMERCIAL CHECKLIST
Resolution No. 175/2009-10

WHEREAS, the Board of Aldermen requested a report on the stormwater engineering review process on September 1, 2009; and

WHEREAS, Town Staff has worked with the Town Engineer and members of the development community to prepare an item to address the request including the preparation of review checklists to assist in the review process; and

WHEREAS, Town Staff has found that it is necessary to amend the Land Use Ordinance in order to implement portions of the potential process changes.

NOW, THEREFORE BE IT RESOLVED that the Carrboro Board of Aldermen hereby accept the report on the stormwater engineering review process, authorize and support use of the residential stormwater review checklist, and direct staff to begin processing the Land Use Ordinance changes necessary to implement the commercial stormwater review checklist.

**APPOINTMENTS TO ROGERS ROAD WORK GROUP**

Mayor Chilton stated that a Rogers Road Work Group had been established at the last Assembly of Governments meeting and asked that the Board make its appointments to that work group.

MOTION WAS MADE BY DAN COLEMAN AND SECONDED BY RANDEE HAVEN-O'DONNELL TO APPOINT JACQUELYN GIST TO SERVE AS THE BOARD'S REPRESENTATIVE, AND THAT JOAL HALL BROUN SERVE AS THE ALTERNATE REPRESENTATIVE ON THIS WORK GROUP. VOTE: AFFIRMATIVE ALL

**********

**ENGINEERING REVIEW REQUIREMENTS FOR PERMITS**

MOTION WAS MADE BY DAN COLEMAN AND SECONDED BY LYDIA LAVELLE TO REQUEST A STAFF REPORT ON ENGINEERING ITEMS THAT MAY BE REVIEWED DURING THE CONSTRUCTION PHASE OF PROJECTS TO SPEED UP THE DEVELOPMENT REVIEW PROCESS. VOTE: AFFIRMATIVE ALL

**********

MOTION WAS MADE BY JACQUELYN GIST AND SECONDED BY JOAL HALL BROUN TO ADJOURN TO CLOSED SESSION TO DISCUSS A PERSONNEL MATTER AT 8:05 P.M. VOTE: AFFIRMATIVE ALL

MOTION WAS MADE BY DAN COLEMAN AND SECONDED BY JOAL HALL BROUN TO ADJOURN THE MEETING AT 8:45 P.M. VOTE: AFFIRMATIVE ALL

_____
Mayor

_____
Town Clerk

# DRAFT: 1-25-10 (Staff Review Revision)

## Carrboro Stormwater Drainage & Grading Submittal Requirements For the Review of

## SUP, CUP, ZP & Preliminary Subdivisions

Note: This checklist is specifically tailored to the particular stormwater design submittal requirements of the Town of Carrboro. The following items encompass stormwater related requirements represented in the Town's Land Use Ordinance (LUO), NPDES Phase II permit, Jordan Lake Watershed Rules, etc. Refer to appropriate sections of the LUO and the Town of Carrboro Storm Drainage Design Manual (LUO Appendix I) for a more detailed description of all requirements. Attendance at an independent pre-submittal meeting with Sungate Design Group to discuss stormwater drainage design and other issues surrounding the stormwater drainage review process and requirements specific to the Town of Carrboro is strongly encouraged.

**Required Information:**

| | |
|---|---|
| ☐ | 1. Stormwater Quality and Quantity Management Plan Narrative<br>a. Submit a narrative description of the project and the planned structural and non-structural BMP measures or techniques that will be used to control and mitigate the projects' stormwater quality and quantity impacts to the existing local hydrologic and hydraulic system.<br>b. The narrative should include a comparative pre- versus post-construction summary of the mitigation results at project points of interest or discharge. |
| ☐ | 2. Stormwater Quality and Quantity Management Plan, Details & Calculations<br>a. Provide an adequate number of plan sheets to fully demonstrate the grading, drainage and BMP systems proposed for the project. Show the proposed storm drainage, BMP's and grading on the same sheet(s) at 1"=50' scale, or less. Provide plan blowup details of BMP designs as necessary for accurate review of the proposed design.<br>b. Hydrologic methods and models used must be appropriate for the system conditions.<br>c. Show existing utility, street and drainage systems on or adjacent to the project boundaries.<br>d. For all BMP's that impound surface water, indicate the design water surface elevation, the 100-year water surface elevation and the amount of 100-year freeboard provided.<br>e. A note must appear on the plan stating that all installed BMP's (water quality and detention devices) must be certified by the Engineer of Record as constructed per the Approved Construction Plans prior to the issuance of the Certificate of Occupancy and that As-built Construction Plans will be submitted to the Town.<br>f. Basic Requirements:<br>1. Developments must install and maintain stormwater management systems that will control and treat runoff from the first 1-inch of rain as follows:<br>a. Draw down the treatment volume no faster than 48 hours, but no slower than 120 hours.<br>b. Achieve an 85% average annual removal rate for Total Suspended Solids.<br>2. Developments shall be constructed and maintained so that their stormwater |

| | |
|---|---|
| | management systems meet the following minimum standards:<br>a. The post-development discharge rates shall be less than or equal to the pre-development discharge rates for the 1-, 2-, 5-, 10-, and 25-year 24-hour design storms.<br>b. For upstream properties, the 100-year flood elevation may not be increased. |
| ☐ | 3. BMP water table data as required for minimum NCDWQ designs<br>a. Certain BMP's require minimum clearances to the groundwater table. If these BMP's are being proposed then also provide the water table test data from a suitably licensed testing professional. |
| ☐ | 4. BMP Designs that differ from NCDWQ Standards: It is the policy of the Town of Carrboro to require that all Stormwater Quality Measures required by Town codes be designed in accordance with the NCDENR-DWQ "Stormwater Best Management Practices Manual" (BMP Manual, latest version), subject to the following exceptions:<br>a. Bioretention overflow devices as shown on page 12-8 and depicted in Figure 12-3b of the BMP Manual shall not be allowed unless all stormwater entering the structure is via sheet flow (no stormwater discharge from pipe or ditch outlets allowed).<br>b. Lawn type turfgrass shall not be allowed as a final cover for Bioretention Area treatment zones.<br>c. Maximum ponding depth for Bioretention Areas shall be 12 inches for all regulated storms.<br>d. It is strongly encouraged that Bioretention Areas be designed and constructed with a minimum 3-foot depth of fill soil treatment media.<br>e. Stormwater quality measures, other than those described in the NCDWQ BMP Manual shall be allowed only where supporting technical documentation can be submitted which demonstrates that the proposed device provides an equal or greater level of water quality treatment to those in the BMP manual. The Town Engineer, after consultation with the Environmental Planner, will decide on the acceptability of the proposed device.<br>f. Provide data supporting the use of any BMP's not meeting all minimum NCDWQ Standards. Manufacturers test results, independent lab analysis, predictive modeling, or other documentation will be reviewed to determine if equal or better performance can be demonstrated by the use of such measures.<br>g. The use of proprietary BMP's not already approved by NCDWQ must meet the same standard of documentation and review. |
| ☐ | 5. Grading Plan with existing and proposed contours at 2' interval minimum<br>a. Show the existing and proposed contours on, and within 50-feet of the project site.<br>b. The existing contours should be shown at 2' intervals (minimum) and should be shown using a dashed (- - -) line.<br>c. The proposed contours should be shown at 2' intervals (minimum) and should be shown using a solid ( ___ ) line.<br>d. No grading or disturbance may take place within any tree protection area or within any stream buffer, unless specifically permitted in the ordinance and/or approved by the permit issuing authority.<br>e. No grading may take place on another property unless all necessary construction easements are secured and there is no disturbance to specimen trees, stream buffers, etc. on the adjacent property.<br>f. Topographic information that is based on non-surveyed data (GIS, LIDAR, etc.) is not of acceptable accuracy for a final, sealed plan submittal. Reliance on such data even for preliminary planning may result in inaccurate final designs and/or calculations which could result in substantial project delay. |
| ☐ | 6. On- and Off-site drainage area maps with existing and proposed boundaries and acreages<br>a. Provide a scaled map (or maps) showing the existing and proposed drainage areas |

| | | |
|---|---|---|
| | | contributing flow to each existing and proposed cross pipe or BMP device. Include off-site areas that also contribute flow.<br>b. List the peak design flows contributed by each drainage area with the supporting data used for the flow determinations (surface cover percentages and averages, time of concentration, rainfall intensity, etc.). |
| ☐ | 7. | Stormwater Infrastructure Layout with existing pipes, inlets and culverts<br>a. Show all components of the proposed and existing drainage system:<br>1. Channels, swales, etc.<br>2. Pipe network.<br>3. Structures (catch basins, drop inlets, yard inlets, junction boxes, etc.).<br>4. Energy dissipaters.<br>5. Stormwater BMP's.<br>6. Easements and Maintenance Areas (for drainage and/or maintenance).<br>7. Detail drawings of all stormwater related components. |
| ☐ | 8. | Cross Pipe/Culvert Headwater Analysis, existing or proposed<br>a. Provide inlet control and outlet control calculations to determine design headwater depths at all road cross pipes, existing and proposed.<br>b. The design storm requirement to be used for cross pipe/culvert analysis shall be the 25-year storm with a maximum HW/D (headwater depth to pipe diameter) ratio of 1.2.<br>c. Effects of the 100-year storm shall be analyzed to ensure that no flooding will occur on upstream off-site properties due to culvert backwater effects, the stability of the roadway will not be compromised due to overtopping and no structures will be constructed on lots within the 100-year flood limits created by backwater from culverts and other stormwater structures. |
| ☐ | 9. | Impervious and other project surface conditions, existing and proposed with areas in square feet<br>a. Show the limits of impervious and other project surfaces (grassed, wooded, etc.) on the plans and indicate the existing and proposed project conditions in square feet. |
| ☐ | 10. | Disturbed area limits with area in square feet<br>a. Show the limits of disturbance on the plan and indicate the total in square feet.<br>b. "Disturbance" is defined as substantial alteration of the land surface, such as by grading, clearing, adding or enlarging a structure to cover an area not previously covered, or otherwise altering the land surface to make it less pervious. Adding new pavement to a previously unpaved surface, or the reconstruction of a previously paved area shall be considered disturbance, but repairing or resurfacing a previously paved surface shall not. |
| ☐ | 11. | Drainageways, streams, wetlands, buffers, 100-year floodplain and floodway delineations (FEMA and/or SFHA)<br>a. Show all regulated watercourses, wetlands and associated buffers and floodplains. Note the source of the delineation on the plans.<br>b. Provide documentation from the appropriate agency supporting the delineations shown.<br>c. Drainageways that are not mapped by FEMA but are determined by the Town to be Special Flood Hazard Areas (SFHA) shall be modeled by appropriate hydrologic and hydraulic methods to determine the limits of flooding from the 100-year storm event. SFHA determinations will be made at the project pre-submittal meeting with Sungate Design Group. |
| ☐ | 12. | Drainage, construction and maintenance areas/easements<br>a. Show all easements necessary for the installation, operation and maintenance of the existing and proposed stormwater system.<br>b. Private Drainage Easements are to be used for drainage systems crossing or encroaching on private parcels.<br>c. Private Drainage Maintenance Areas are to be used for drainage systems crossing or encroaching on common (HOA) property, commercial and other properties.<br>d. Public Drainage Easements are limited to locations where public drainage systems or |

Att C-4

| | | |
|---|---|---|
| | | pipes extend the inlet or outlet a minimal distance beyond the public right-of-way.<br>e. Temporary Construction, Permanent Maintenance, Permanent Access, Etc. type Easements are to be shown as necessary for project construction, operation and maintenance.<br>f. Provide legal documentation of all easements extending beyond the project boundaries. If easement closing documentation is delayed, consult with the Zoning Administrator to determine if appropriate plan approval conditions can be imposed in the interim. |
| ☐ | 13. | Utility plan showing potential conflicts with existing and proposed utilities<br>a. Provide utility plan and profile drawings showing the existing and proposed utilities and specifying the clearances required for crossing proposed storm drain pipes and other BMP features (basins inverts, outlet ditches, etc.). |
| ☐ | 14. | Regulatory permits<br>a. Submit copies of plans and appropriate models for impacts to floodways which would require a CLOMR or a "No Impact" certification.<br>b. Please consult the Town Engineer, Sungate Design Group, for additional information or to determine the type of permits that may be necessary.<br>c. If permitting is delayed, consult with the Zoning Administrator to determine if appropriate plan approval conditions can be imposed in the interim. Be aware that any significant modification to the plans created by the eventual agency permit conditions may result in further review, thus creating substantial project delays. |
| ☐ | 15. | Preliminary Erosion Control Plan<br>a. Provide a preliminary Erosion Control Plan of sufficient detail for Orange County Erosion Control to determine that an Erosion Control Permit can be issued for the planned development without significant modification to the plan. Significant modifications may require further review, thus creating substantial project delays. |
| ☐ | 16. | Retaining Walls<br>a. A schematic visual representation of any proposed retaining wall is required for approval. Plans must indicate the location, height and material of the proposed wall(s).<br>b. No structural review of retaining walls will be required for this stage of approval. |
| ☐ | 17. | Other Information Required for Engineering Review<br>a. Roadway alignment data (horizontal and vertical).<br>b. Sight distance calculations.<br>c. Street typical sections. |

**Information Not Required Until Construction Plan Stage:**

Att. C-5

Submit the following along with the above information, as approved for the SUP, CUP, ZP, or Preliminary Subdivision.

| | | |
|---|---|---|
| ☐ | 1. | Detailed BMP Planting Plan<br>a. Detailed planting plans are required for BMP's that specify the use of plants to provide for part of the water quality treatment. Plants not specified in the NCDWQ BMP Manual may be proposed provided that they are generally accepted as being well adapted to the soil and moisture conditions expected to occur in the particular BMP proposed and are non-invasive. |
| ☐ | 2. | Soil analysis specification for Imported BMP cell material<br>a. Certain BMP's require the use of soils which meet specific minimum soil textural classifications. If these BMP's are being proposed then include a specification for the minimum soil texture to be accepted. |
| ☐ | 3. | BMP Construction Sequence<br>a. Certain BMP's and/or BMP components require precise scheduling of installation relative to the overall project construction sequence. A BMP Construction Sequence that is specific to the proposed project BMP's is required for Construction Plan approval. |
| ☐ | 4. | BMP Operation and Maintenance Plan/Manual/Agreements<br>a. Plans or separate manual type submittal documents and a draft maintenance agreement must be provided to specify the required maintenance schedules and procedures for each type of BMP proposed for the project.<br>b. The Maintenance Manual must identify the party responsible for post-construction BMP maintenance and provide legal documentation of that responsibility.<br>c. The proposed maintenance schedules and procedures must meet the minimum requirements of the BMP Manual and other standard maintenance and inspection requirement documents as developed by the Town of Carrboro. |
| ☐ | 5. | Stormwater Calculations for storm drainage system<br>a. Provide a scaled map (or maps) showing the existing and proposed drainage areas contributing flow to each existing and proposed storm drainage structure, inlet, pipe or device. Include off-site areas that also contribute flow.<br>b. Runoff calculations: Hydrologic calculations must be fully documented showing the basis of all existing and proposed findings (area and surface condition maps, breakdown of time of concentration/lag base data, etc.). Hydrologic methods and models used must be appropriate for the system conditions.<br>c. Capacity calculations: All street and local drainage systems must be designed to pass the 10-year storm runoff unless more stringent requirements apply.<br>d. HGL Calculations: All storm drainage systems must be analyzed to establish the hydraulic grade line. The HGL shall be at least 0.5-feet below the top of any inlet grate. Each storm drainage structure must also be checked for inlet control and exhibit a HW/D ratio of 1.5, or less. Pressure flow is not recommended.<br>e. Gutter spread calculations: Catch basins in streets must be designed for spread control using the 2-year storm runoff and 5-minute time of concentration. A 4-inch per hour intensity may be used in lieu of the 2-year storm, as allowed by NCDOT. Inlets shall be spaced to limit spread to one half of a lane width. Inlet capacity at sags shall allow for potential debris blockage by providing twice the required computed opening. |
| ☐ | 6. | Stormwater Infrastructure System Plan<br>a. Provide plans, profiles and construction detail drawings of all components of the project stormwater drainage system. Specify the elevations, lengths and slopes of all system components. Provide identifying numbers for inlets, junctions and pipes, etc. that are consistent with those provided in the storm drain system calculations.<br>b. Label all pipes in the stormwater system as to diameter and material of manufacture.<br>c. Minimum storm drain pipe size is 15". All storm drain pipes shall be RCP Class III, or |

Att. C-6

| | | |
|---|---|---|
| | | higher. Deviation from these standards is restricted to drainage comprised of roof runoff only. |
| ☐ | 7. | Retaining Wall Design and Calculations<br>a. Structural design drawings and supporting calculations sealed by a qualified NC professional engineer must be submitted for review and approval when planned walls exceed 3-feet in height and wall failure would affect the public right-of-way. This requirement is waived if the wall is subject to the NC Building Code and the wall design is reviewed and approved by the Building Inspector. |
| ☐ | 8. | Other Plan & Detail Information<br>a. Submit plan and detail information necessary to demonstrate the construction of all other required site improvements, including, but not limited to:<br>1. Street pavement section details.<br>2. Sidewalk and greenway pavement section details.<br>3. Other improvements specific to the project.<br>b. Specify planned measures for maximizing post-construction soil infiltration rates for areas to be graded or to experience heavy construction traffic. |
| ☐ | 9. | Submit copies of all necessary State and/or Federal permits (with conditions) for alteration or disturbance of wetlands, waters, streams, buffers, floodways and floodplains. Such permits may include, but are not limited to CLOMR's and LOMR's from FEMA, and wetland permits from the US Army Corps of Engineers and/or NCDEHNR. |

# DRAFT: 6/03/10 (DRM Staff Review Revision)

## Carrboro Stormwater Drainage & Grading Submittal Requirements For the Review of

## COMMERCIAL, OFFICE and INSTITUTIONAL DEVELOPMENT AND REDEVELOPMENT PROJECTS

Note: This checklist is specifically tailored to the particular stormwater design submittal requirements of the Town of Carrboro. The following items encompass stormwater related requirements represented in the Town's Land Use Ordinance (LUO), NPDES Phase II permit, Jordan Lake Watershed Rules, etc. Refer to appropriate sections of the LUO and the Town of Carrboro Storm Drainage Design Manual (LUO Appendix I) for a more detailed description of all requirements. Attendance at an independent pre-submittal meeting with Sungate Design Group to discuss stormwater drainage design and other issues surrounding the stormwater drainage review process and requirements specific to the Town of Carrboro is strongly encouraged.

**Required Information:**

Submit the following for CUP, SUP or ZP review and approval of Commercial, Office & Institutional Development and Redevelopment projects. Since these required submittal items do not include the detailed design calculations and drawings that will be necessary for final construction plan approval, please be aware that any significant modification to the approved plans noted during the subsequent construction plan review may result in the requirement to obtain amended approval of the CUP, SUP or ZP, thus creating substantial project delays. Applicants that desire a more detailed review which may help to avoid amended approval of the CUP, SUP or ZP may provide more detailed plans and calculations as listed in construction plans at this stage of the permitting process.

| | |
|---|---|
| ☐ | 1. Stormwater Quality and Quantity Management Plan Narrative<br>a. Submit a narrative description of the project and the planned structural and non-structural BMP measures or techniques that will be used to control and mitigate the projects' stormwater quality and quantity impacts to the existing local hydrologic and hydraulic system. |
| ☐ | 2. Stormwater Quality and Quantity Management Plan, Details & Calculations<br>a. Basic Requirements (Detailed plans and calculations are to be provided at the Construction Plan review. If significant modifications in the project CUP, SUP or ZP approved plans are noted then further review may be required, resulting in substantial project delays.):<br>1. Provide an adequate number of plan sheets to fully demonstrate the grading, drainage and BMP systems proposed for the project. Show the proposed storm drainage, BMP's and grading on the same sheet(s) at 1"=50' scale, or less. Provide typical details of BMP designs as necessary for accurate review of the proposed design.<br>2. Show existing utility, street and drainage systems on or adjacent to the project boundaries. |

| | |
|---|---|
| | 3. A note must appear on the plan stating that all installed BMP's (water quality and detention devices) must be certified by the Engineer of Record as constructed per the Approved Construction Plans prior to the issuance of the Certificate of Occupancy and that As-built Construction Plans will be submitted to the Town. |

**Minimum Plan Requirements:**

| | |
|---|---|
| ☐ | 1. Grading Plan with existing and proposed contours at 2' interval minimum<br>a. Show the existing and proposed contours on, and within 50-feet of the project site.<br>b. The existing contours should be shown at 2' intervals (minimum) and should be shown using a dashed (- - -) line.<br>c. The proposed contours should be shown at 2' intervals (minimum) and should be shown using a solid ( ___ ) line.<br>d. No grading or disturbance may take place within any tree protection area or within any stream buffer, unless specifically permitted in the ordinance and/or approved by the permit issuing authority.<br>e. No grading may take place on another property unless all necessary construction easements are secured and there is no disturbance to specimen trees, stream buffers, etc. on the adjacent property.<br>a. Topographic information that is based on non-surveyed data (GIS, LIDAR, etc.) is not of acceptable accuracy for a final, sealed plan submittal. Reliance on such data even for preliminary planning may result in inaccurate final designs and/or calculations which could result in substantial project delay. |
| ☐ | 2. On- and Off-site drainage area maps with existing and proposed boundaries and acreages<br>a. Provide a scaled map (or maps) showing the existing and proposed drainage areas contributing flow to each existing and proposed cross pipe or BMP device. Include off-site areas that also contribute flow. |
| ☐ | 3. Stormwater Infrastructure Layout with existing pipes, inlets and culverts<br>a. Show all components of the proposed and existing drainage system:<br>1. Channels, swales, etc.<br>2. Pipe network.<br>3. Structures (catch basins, drop inlets, yard inlets, junction boxes, etc.).<br>4. Energy dissipaters.<br>5. Stormwater BMP's.<br>6. Easements and Maintenance Areas (for drainage and/or maintenance). |
| ☐ | 4. Impervious and other project surface conditions, existing and proposed with areas in square feet<br>a. Show the limits of impervious and other project surfaces (grassed, wooded, etc.) on the plans and indicate the existing and proposed project conditions in square feet. |
| ☐ | 5. Disturbed area limits with area in square feet<br>a. Show the limits of disturbance on the plan and indicate the total in square feet.<br>b. "Disturbance" is defined as substantial alteration of the land surface, such as by grading, clearing, adding or enlarging a structure to cover an area not previously covered, or otherwise altering the land surface to make it less pervious. Adding new pavement to a previously unpaved surface, or the reconstruction of a previously paved area shall be considered disturbance, but repairing or resurfacing a previously paved surface shall not. |

| | | |
|---|---|---|
| ☐ | 6. | Drainageways, streams, wetlands, buffers, 100-year floodplain and floodway delineations (FEMA and/or SFHA)<br>a. Show all regulated watercourses, wetlands and associated buffers and floodplains. Note the source of the delineation on the plans.<br>b. Provide documentation from the appropriate agency supporting the delineations shown.<br>c. Some drainageways not mapped by FEMA are determined by the Town to be Special Flood Hazard Areas (SFHA). SFHA determinations will be made at the project pre-submittal meeting with Sungate Design Group. |
| ☐ | 7. | Drainage, construction and maintenance areas/easements<br>a. Show all easements necessary for the installation, operation and maintenance of the existing and proposed stormwater system.<br>b. Private Drainage Easements are to be used for drainage systems crossing or encroaching on private parcels.<br>c. Private Drainage Maintenance Areas are to be used for drainage systems crossing or encroaching on common (HOA) property, commercial and other properties.<br>d. Public Drainage Easements are limited to locations where public drainage systems or pipes extend the inlet or outlet a minimal distance beyond the public right-of-way.<br>e. Temporary Construction, Permanent Maintenance, Permanent Access, Etc. type Easements are to be shown as necessary for project construction, operation and maintenance. |
| ☐ | 8. | Preliminary Erosion Control Plan<br>a. Provide a preliminary Erosion Control Plan of sufficient detail for Orange County Erosion Control to determine that an Erosion Control Permit can be issued for the planned development without significant modification to the plan. Significant modifications may require further review, thus creating substantial project delays. |
| ☐ | 9. | Retaining Walls<br>a. A schematic visual representation of any proposed retaining wall is required for approval. Plans must indicate the location, height and material of the proposed wall(s).<br>b. No structural review of retaining walls will be required for this stage of approval. |
| ☐ | 10. | Other Information Required for Engineering Review<br>a. Street typical sections. |

## Information Not Required Until Construction Plan Review Stage:

Submit the following along with the above information, shown as approved for the CUP, SUP or ZP. Be aware that any significant modification to the approved CUP, SUP or ZP plans noted during the subsequent construction plan review may result in the requirement to obtain amended approval of the CUP, SUP or ZP, thus creating substantial project delays.

| | | |
|---|---|---|
| ☐ | 1. | Stormwater Quality and Quantity Management Plan Narrative<br>a. The narrative should include a comparative pre- versus post-construction summary of the mitigation results at project points of interest or discharge. |
| ☐ | 2. | Stormwater Quality and Quantity Management Plan, Details & Calculations<br>a. Provide BMP plans, details and calculations sufficient to demonstrate compliance with the following Basic Requirements:<br>1. Developments must install and maintain stormwater management systems that will control and treat runoff from the first 1-inch of rain as follows: |

| | |
|---|---|
| | a. Draw down the treatment volume no faster than 48 hours, but no slower than 120 hours.<br>b. Achieve an 85% average annual removal rate for Total Suspended Solids.<br>2. Developments shall be constructed and maintained so that their stormwater management systems meet the following minimum standards:<br>a. The post-development discharge rates shall be less than or equal to the pre-development discharge rates for the 1-, 2-, 5-, 10-, and 25-year 24-hour design storms.<br>b. For upstream properties, the 100-year flood elevation may not be increased. Provide plan blowup details of BMP designs as necessary for accurate review of the proposed design.<br>b. For all BMP's that impound surface water, indicate the design water surface elevation, the 100-year water surface elevation and the amount of 100-year freeboard provided.<br>c. Certain BMP's require minimum clearances to the groundwater table. If these BMP's are being proposed then also provide the water table test data from a suitably licensed testing professional.<br>d. Detailed planting plans are required for BMP's that specify the use of plants to provide for part of the water quality treatment. Plants not specified in the NCDWQ BMP Manual may be proposed provided that they are generally accepted as being well adapted to the soil and moisture conditions expected to occur in the particular BMP proposed, and are non-invasive.<br>e. Certain BMP's require the use of soils which meet specific minimum soil textural classifications. If these BMP's are being proposed then include a specification for the minimum soil texture to be accepted.<br>f. Certain BMP's and/or BMP components require precise scheduling of installation relative to the overall project construction sequence. A BMP Construction Sequence that is specific to the proposed project BMP's is required for Construction Plan approval. |
| ☐ | 3. BMP Operation and Maintenance Plan/Manual/Agreements<br>a. Plans or separate manual type submittal documents and a draft maintenance agreement must be provided to specify the required maintenance schedules and procedures for each type of BMP proposed for the project.<br>b. The Maintenance Manual must identify the party responsible for post-construction BMP maintenance and provide legal documentation of that responsibility.<br>c. The proposed maintenance schedules and procedures must meet the minimum requirements of the BMP Manual and other standard maintenance and inspection requirement documents as developed by the Town of Carrboro. |
| ☐ | 4. Grading Plan with existing and proposed contours at 2' interval minimum<br>a. Topographic information that is based on non-surveyed data (GIS, LIDAR, etc.) is not of acceptable accuracy for a final, sealed plan submittal. If such data was relied upon for the CUP, SUP or ZP plan approval the field surveyed data must be substituted for this submittal. If significant project modifications are shown, then further review may be necessary which could result in substantial project delay. |
| ☐ | 5. On- and Off-site drainage area maps with existing and proposed boundaries and acreages<br>a. List the peak design flows contributed by each drainage area with the supporting data used for the flow determinations (surface cover percentages and averages, time of concentration, rainfall intensity, etc.). |
| ☐ | 6. Cross Pipe/Culvert Headwater Analysis, existing or proposed<br>a. Provide inlet control and outlet control calculations to determine design headwater depths at all road cross pipes, existing and proposed.<br>b. The design storm requirement to be used for cross pipe/culvert analysis shall be the 25-year storm with a maximum HW/D (headwater depth to pipe diameter) ratio of 1.2.<br>c. Effects of the 100-year storm shall be analyzed to ensure that no flooding will occur on |

| | | |
|---|---|---|
| | | upstream off-site properties due to culvert backwater effects, the stability of the roadway will not be compromised due to overtopping and no structures will be constructed on lots within the 100-year flood limits created by backwater from culverts and other stormwater structures. |
| ☐ | 7. | Drainageways, streams, wetlands, buffers, 100-year floodplain and floodway delineations (FEMA and/or SFHA)<br>a. Drainageways that are not mapped by FEMA but are determined by the Town to be Special Flood Hazard Areas (SFHA) shall be modeled by appropriate hydrologic and hydraulic methods to determine the limits of flooding from the 100-year storm event. SFHA determinations will be made at the project pre-submittal meeting with Sungate Design Group. |
| ☐ | 8. | Stormwater Calculations for storm drainage system<br>a. Provide a scaled map (or maps) showing the existing and proposed drainage areas contributing flow to each existing and proposed storm drainage structure, inlet, pipe or device. Include off-site areas that also contribute flow.<br>b. Runoff calculations: Hydrologic calculations must be fully documented showing the basis of all existing and proposed findings (area and surface condition maps, breakdown of time of concentration/lag base data, etc.). Hydrologic methods and models used must be appropriate for the system conditions.<br>c. Capacity calculations: All street and local drainage systems must be designed to pass the 10-year storm runoff unless more stringent requirements apply.<br>d. HGL Calculations: All storm drainage systems must be analyzed to establish the hydraulic grade line. The HGL shall be at least 0.5-feet below the top of any inlet grate. Each storm drainage structure must also be checked for inlet control and exhibit a HW/D ratio of 1.5, or less. Pressure flow is <u>not recommended</u>.<br>e. Gutter spread calculations: Catch basins in streets must be designed for spread control using the 2-year storm runoff and 5-minute time of concentration. A 4-inch per hour intensity may be used in lieu of the 2-year storm, as allowed by NCDOT. Inlets shall be spaced to limit spread to one half of a lane width. Inlet capacity at sags shall allow for potential debris blockage by providing twice the required computed opening. |
| ☐ | 9. | Stormwater Infrastructure System Plan<br>a. Provide plans, profiles and construction detail drawings of all components of the project stormwater drainage system. Specify the elevations, lengths and slopes of all system components. Provide identifying numbers for inlets, junctions and pipes, etc. that are consistent with those provided in the storm drain system calculations.<br>b. Label all pipes in the stormwater system as to diameter and material of manufacture.<br>c. Minimum storm drain pipe size is 15". All storm drain pipes shall be RCP with a minimum slope of 0.5%. Deviation from these standards is restricted to drainage comprised of roof runoff only.<br>d. All storm drainage design and construction shall meet NCDOT minimum standards. |
| ☐ | 10. | Drainage, construction and maintenance areas/easements<br>a. Provide legal documentation of all easements extending beyond the project boundaries. If easement closing documentation is delayed, consult with the Zoning Administrator to determine if appropriate plan approval conditions can be imposed in the interim. |
| ☐ | 11. | Utility plan showing potential conflicts with existing and proposed utilities<br>a. Provide utility plan and profile drawings showing the existing and proposed utilities and specifying the clearances required for crossing proposed storm drain pipes and other BMP features (basins inverts, outlet ditches, etc.). |
| ☐ | 12. | Regulatory permits<br>a. Submit copies of all necessary State and/or Federal permits (with conditions) for alteration or disturbance of wetlands, waters, streams, buffers, floodways and floodplains. Such permits may include, but are not limited to CLOMR's and LOMR's from FEMA, and |

| | |
|---|---|
| | wetland permits from the US Army Corps of Engineers and/or NCDEHNR.<br>b. Please consult the Town Engineer, Sungate Design Group, for additional information or to determine the type of permits that may be necessary.<br>c. If permitting is delayed, consult with the Zoning Administrator to determine if appropriate plan approval conditions can be imposed in the interim. Be aware that any significant modification to the plans created by the eventual agency permit conditions may result in further review, thus creating substantial project delays. |
| ☐ | 13. Retaining Wall Design and Calculations<br>a. Structural design drawings and supporting calculations sealed by a qualified NC professional engineer must be submitted for review and approval when planned walls exceed 3-feet in height and wall failure would affect the public right-of-way. This requirement is waived if the wall is subject to the NC Building Code and the wall design is reviewed and approved by the Building Inspector. |
| | |
| ☐ | 14. Other Plan & Detail Information<br>a. Submit plan and detail information necessary to demonstrate the construction of all other required site improvements, including, but not limited to:<br>1. Roadway alignment data (horizontal and vertical).<br>2. Sight distance calculations.<br>3. Street pavement section details.<br>4. Sidewalk and greenway pavement section details.<br>5. Other improvements specific to the project.<br>b. Specify planned measures for maximizing post-construction soil infiltration rates for areas to be graded or experience heavy construction traffic. |

Attachment E

May 10, 2010

Mr. Marty Roupe
Zoning Division
Town of Carrboro
301 West Main Street
Carrboro, NC 27510

Re: Stormwater Checklist for Commercial Development

Dear Marty,

In January, 2010 we prepared a draft checklist to assist engineers and designers in the preparation of engineering information required for CUP plans for commercial development. The checklist was prepared at the request of the Board of Aldermen in reaction to a study prepared by RTS which recommended modifying the process for developments to delay certain current requirements for plan preparation until the Construction Plan Phase. A good deal of the required information that was moved to the Construction Plan Phase as outlined in the checklist is related to the Stormwater Section of the LUO, Section 15-263 and Appendix I.

As explained in the agenda item and in conjunction with the recently adopted Jordan Lake Rules, responsibility for removal of nutrients and other contaminants from stormwater on developments has been delegated by the State to the Town. This has resulted in the necessary BMP's, which are required for removal of nutrients and total suspended solids, being designed and sited much earlier in the design process due to the size and positioning of the devices. Each development site now has to be designed to direct all stormwater from disturbed areas to BMP's and detention devices to meet the requirements of the Jordan Rules and the LUO. The size and location of the stormwater BMP's generally dictate that the site design be governed by the location of these devices much the same as by flood zones, stream buffers, significant trees, steep slopes and other LUO site constraints. Unlike stream buffers, significant trees, steep slopes and other constraints, BMP's must be designed and are added to the site, typically on land that is generally developable. Improper sizing and location of these devices during the early design phases can result in significant changes to the site plan as the design becomes more detailed, hence in our opinion, the need for detailed design at the CUP stage in order to avoid subsequent CUP modifications.

Based on the Board's recommendation for easing the requirements at the CUP level, the checklist has been created such that the detailed calculations necessary to accurately size these BMP's and detention facilities are no longer required at the CUP level but are deferred to the Construction Plan level. Likewise, other detailed engineering requirements for storm drainage system design, roadway design, culvert analysis and environmental agency permitting have been moved to the Construction Plan Phase as outlined in the checklist. It should be understood by the Board of Aldermen that as a result of easing the submittal requirements for the CUP level, the Town Engineer may not be able to offer detailed responses to questions relating to the performance of the proposed stormwater system and/or the potential for increased flooding on up or downstream

properties; however, prior to construction, the project will still have to meet the same high stormwater quality and quantity standards and review process that the Board and the citizens of Carrboro have come to expect. It will simply occur later in the process, at the Construction Plan phase. The size and location of these devices and other engineered systems at the CUP stage will be the sole responsibility of the applicant and the associated engineer/design professional. Based on reviews of past CUP plans, the site design could vary significantly at the construction plan phase and therefore require CUP modification.

If you have any questions or need further information, please contact me.

Sincerely,

W. Henry Wells, Jr., PE
Town Engineer