VILLAGE OF CARO
ENGINEERING DESIGN STANDARDS

APRIL 2004

SECTION 5 – STORM WATER BASINS

VILLAGE OF CARO

ENGINEERING DESIGN STANDARDS

A. Plans and Specifications - Submittal Procedure

1. All plans, specifications and calculations for detention basins and storm water storage shall be submitted, in accordance with Section 1 - General Requirements & Submittals.
2. Detention or Retention Basin plans are required to be submitted along with all new storm drainage system plans.

B. Design Criteria:

1. Detention basins shall be designed to detain the volume of runoff from the entire site, resulting from a twenty-five (25) year frequency storm. Detention is not required for flows originating offsite that flow through the site, unless the receiving storm facilities cannot handle the offsite flow
2. Detention basins shall drain by gravity. Pumped basins shall be considered, in extreme cases, and approved by the Village.
3. Detention basins shall discharge to a natural watercourse, established drainage system, or drainage area where a dedicated easement exists for the purpose of drainage. In no case shall a basin or system discharge onto adjacent property without an easement or the property owner's permission.
4. In general, the Oakland County "A Simple Method of Detention Basin Design" method shall be used for detention. Basin sizing discharge of detention basins shall be limited to 0.4 cfs per acre of the site, but in no case shall exceed the capacity of the receiving stream or body of water. In the event that the receiving stream cannot properly convey the 0.4 cfs per acre design discharge, the discharge shall be limited to the existing capacity of the receiving system and must have the outlet pipe invert above the normal water level. Hydraulic calculations may be required by the Village showing the existing capacity of the receiving stream for their review.
5. All basins must have a minimum of twelve (12) inches of freeboard above the design high water elevation.
6. All basins must be designed with an overflow to control flooding. The overflow shall discharge to an existing drainage system or storm drain. If a weir overflow is used, sufficient erosion protection must be incorporated into the design. Calculations for the overflow design must accompany the plans.
7. Where orifice restrictors are used, the diameter of the restrictor shall be a minimum of four (4) inches to prevent clogging. Outlet shall be a pipe rounded to nearest full pipe size.

8. Erosion control protection such as riprap, placed on filter fabric, shall be used at all entrances and exists to the basin. Riprap may be natural stone or clean broken concrete, a minimum of four (4) inches in diameter.

9. Exterior side slopes of basins shall not be steeper than four (4) horizontal to one (1) vertical or 4:1. Interior side slopes shall not exceed six (6) horizontal to one (1) vertical or 6:1, unless approved by the Village. All basins must be fenced, if the maximum side slopes specified herein are exceeded. The Village may waive fencing when the design is an integral part of the landscaping and the variance from these Design Standards does not present a potential hazard. Fences shall be a minimum of six (6) feet high, vinyl clad chain link, with a locking access gate, eight (8) feet wide. Alternate types of fencing may be permitted for aesthetic purposes, subject to approval by the Village.

10. The bottom of the basin shall have a minimum grade of one percent (1.0%) from the perimeter toward the flow line. The slope of the flow line to the outlet shall have a minimum grade of one-half percent (0.5%). All inlet and outlet pipes twelve (12) inches in diameter and larger shall have a bar screen, a flared end section and riprap.

11. The entire detention basin area must be seeded (MDOT Class A seed) or sodded (MDOT Class B sod) and the turf shall be fully established before the Village approves the detention basin for operation and maintenance. Straw mats or mulch blankets may be required for steeper banks or when storm water enters basin via sheet flow.

12. Retention basins (basins with no outlet) must be sized to accommodate two (2) consecutive one hundred (100) year storms (as calculated by the Oakland County method for retention). Documentation by a licensed Professional Engineer must be submitted to support that the basin will percolate into the soils naturally, with an estimate of the time to accomplish this, based on hydraulic calculations. The Village will determine the acceptance of the design.

13. Parking lot storage is not allowed, unless there is no other feasible alternative. Maximum depth of storage is six (6) inches. No storage is allowed near the entry and exit ways of the building or designated handicapped parking spaces.

14. In commercial areas, such as gas stations, where the entire site is paved and the site area is extremely limited, detention may be accomplished via underground storage tanks or oversized storm pipes. Large diameter HDPE piping with a minimum of six (6) inches of stone above pipe are acceptable to the Village. The maximum void space within backfill stone allowed to be included in the storage volume and below the top of the storage pipe shall be forty percent (40%). The system shall have provisions for cleaning.

15. Minimum isolation (setback from property lines) of all basins shall be no less than twenty (20) feet.

C. Maintenance Agreement

1. An agreement for operation and/or maintenance of the detention basin system must be executed by the developer and submitted to and accepted by the Village. The agreement, both as to form and content, shall be subject to the approval of the Village's legal counsel.

D. Easements and Access

1. For all new residential development, the property in which the detention basin is located upon must be contained in an easement deeded for detention purposes only.
2. A minimum twenty (20) foot wide access easement shall be provided.
3. At a minimum, a twelve (12) foot wide gravel access drive shall be located within the above easement for maintenance purposes.