Erosion Control Plan Narrative

FOR REZONING OF

Aydan Court
Chapel Hill, NC

Prepared for:
CAZCO, Inc.

Prepared By:

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January 21, 2009

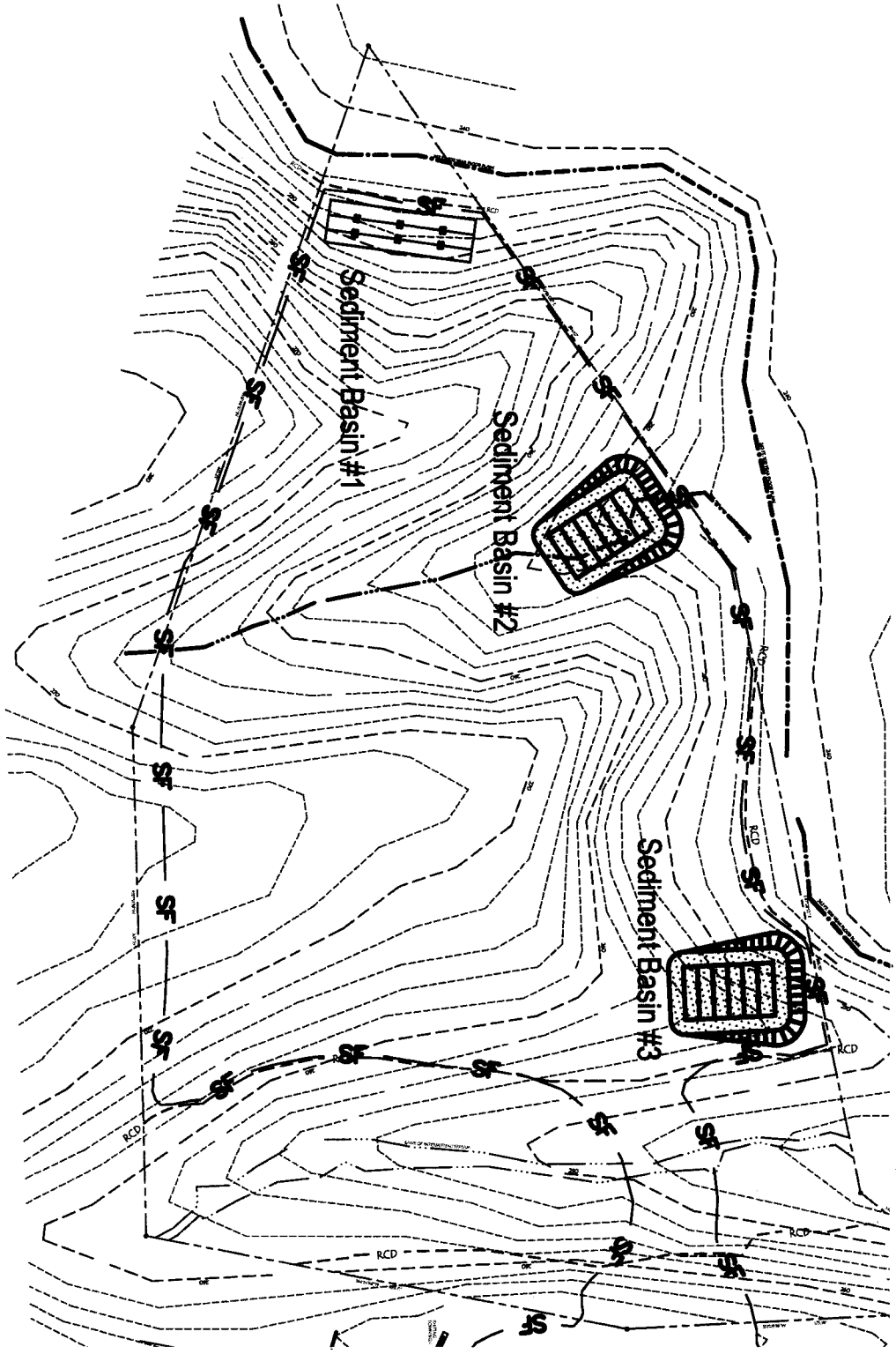
Narrative

Orange County has a comprehensive Soil Erosion and Sedimentation Control Ordinance which was just updated on October 23, 2007. The Erosion Control Department administers this ordinance, reviews plans, issues land disturbance permits, and inspects sediment control measures during construction.

The Aydan Court parcel is 5.8 acres. To construct Aydan Court, 3.8 acres of the site will be cleared. Silt fence will be installed to identify the clearing limit and control sediment runoff. There are 2 erosion control plans to address the sequence of construction of Aydan Court. The following applies to any project. When a project is cleared, the stormwater runoff follows natural drainage pattern to the lowest points and exits the site. On the phase 1 erosion control plan, we placed sediment basins at these lowest points of the site. There will always be small areas where a sediment basin is not appropriate such as where we cross the intermittent stream with the entry road. In these locations, we use silt fence but may add a second line of silt fence to further protect the intermittent stream from sediment. The three basins shown on the phase 1 plan will capture the stormwater runoff from the 3.8 acres of disturbance so the contractor can clear the site and start earthwork operations (cut and fill).

The phase 2 plan shows basin 2 being removed. As the site is brought to grade, the drainage patterns change. Stormwater runoff is redirected by the sitework operations and by adding storm pipes and inlets. Sediment Basin 2 will be removed when the stormwater is redirected to sediment basin 3. Sediment Basin 3 will be sized to handle the phase 2 drainage area.

The developer, contractor and design team has considered ways to control sediment on site and prevent sediment from leaving the site during construction. We are aware that Orange County has a progressive Soil Erosion and Sedimentation Control Ordinance but we wanted to provide measures that would go beyond the protection afforded by the ordinance. The Orange County Soil Erosion and Sedimentation Control Ordinance requires sediment basins to be sized to manage the 10-year storm event. The developer has decided to increase the size of the sediment basins and size them to manage the 50-year storm event. It will require the sediment basins to be oversized approximately 25-30% to contain the 50-year storm event. Most sediment removal on a construction site is done by the sediment basins. It is also widely know that the smaller suspended soil particles can only be removed by settling out of solution which is done in the sediment basin.



EROSION CONTROL PLAN PHASE 1 JANUARY 16, 2009

NORTH

EROSION

Developer: CAZCO, Inc.

Aydan Court Townhomes & Condominiums

N.C. Highway 54 - Chapel Hill, North Carolina

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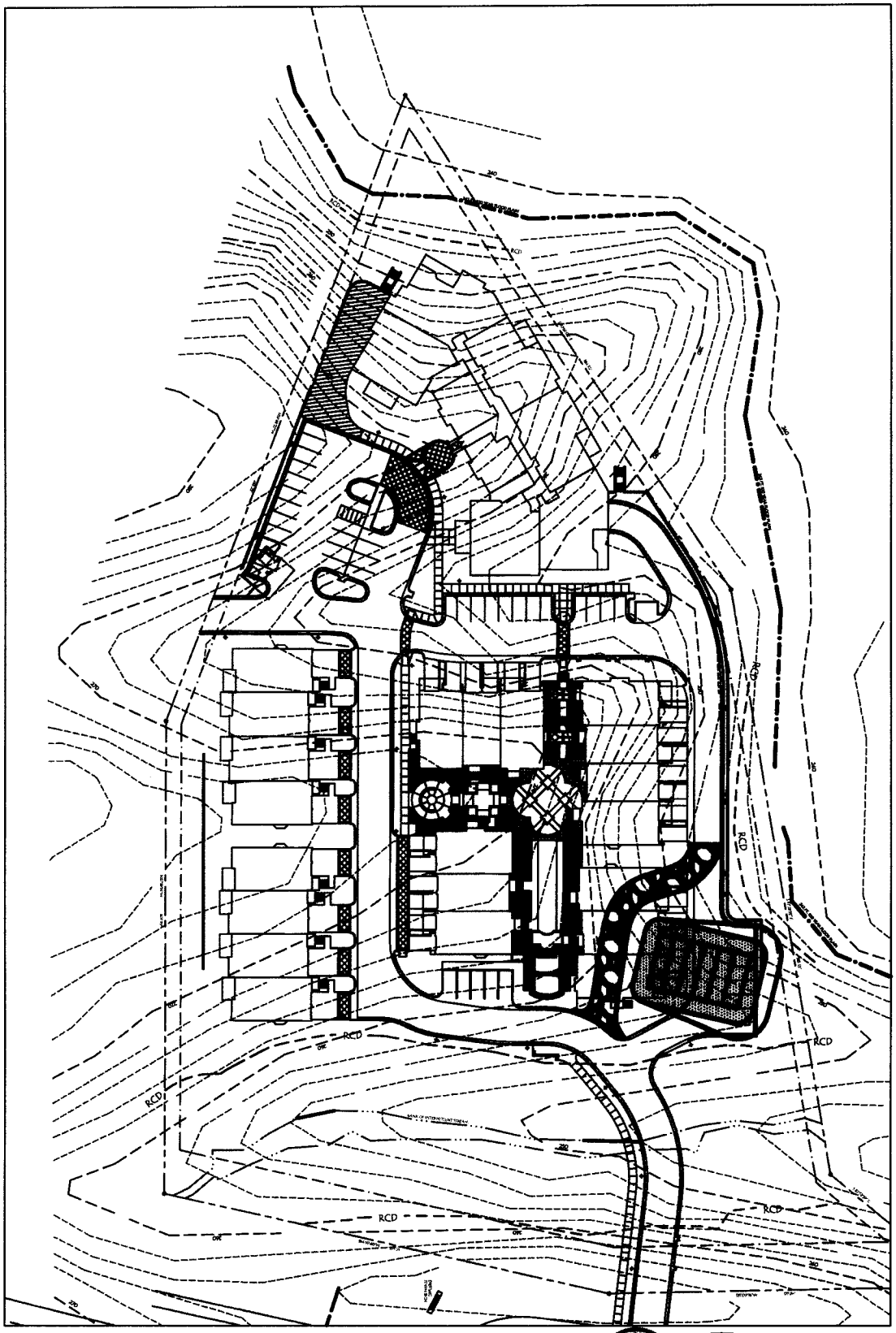
EROSION CONTROL PLAN PHASE 2 JANUARY 16, 2009



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February 16 2009

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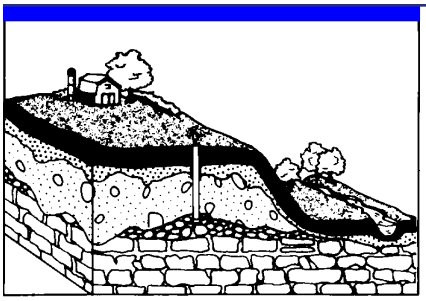
Re: Proposed Erosion Control for Aydan Court

Dear Warren,

This letter is confirmation of our earlier telephone conversations concerning your proposed erosion control plans for the Aydan Court project. Firstly, your Sediment trap design exceeds the design standards in the County Soil Erosion and Sediment Control Manual. Secondly you are planning to use the polymer polyacrylamide (PAM) as a flocculent in the trap(s) to reduce the turbidity and lastly you will also apply a granular type of PAM to the sites exposed soils to minimize soil erosion.
Please call with additional questions or comments.

Sincerely,

Reynolds J (Ren) Ivins
Erosion Control Supervisor



Soil Facts

Using Polyacrylamide (PAM) to Reduce Erosion on Construction Sites

Sediment and turbidity have the widest impact on water quality of any pollutants. Runoff from sites where bare soil is exposed, such as construction sites or tilled farm fields, often carries high sediment loads into receiving water bodies where some of the sediment settles, filling channels and lakes and causing habitat destruction. One approach to reducing this type of erosion is to use chemical treatments to augment seeding and mulching. The chemical polyacrylamide (PAM) is well suited for erosion control enhancement, and its use is described below.

Characteristics of PAM

PAM is a term describing a wide variety of chemicals based on the acrylamide and acrylate units. When linked in long chains, these units can be modified to result in a net positive, neutral, or negative charge on the PAM molecule. The positively charged, or cationic, PAMs, are not used for erosion control because they can be toxic to fish and other aquatic organisms if they spill into water bodies in sufficient concentrations. The negatively charged, or anionic, PAMs, are much less toxic to aquatic organisms and are widely used in furrow irrigation agriculture. This type of PAM is the focus of this discussion, and all references to "PAM" are to the anionic forms.

PAM is available as a crystalline powder (Figure 1), an emulsion, or a solid block or "log." It is nontoxic to humans and to other species in the environment. One of the ingredients used to make PAM is acryamide, which is a suspected carcinogen, and as a result the PAMs available for our uses are required to have less than 0.05 percent free acryamide. This quality control allows them to be used in food processing, drinking water treatment, and other uses where human exposure is likely.

PAM is water soluble, but dissolves very slowly and requires rapid agitation and extended mixing time. Water with more than 0.1 percent dissolved PAM is often noticeably viscous, and most PAMs have a maximum concentration of 0.5 to 1 percent in water. A good rule of thumb is to mix 1 pound of PAM per 100 gallons of water. When dry PAM becomes wet, it is very slippery and sticky and can create a slipping hazard.

Erosion Control

The erosion process is initiated when a rain droplet impacts the soil surface and dislodges soil particles. Once overland flow begins during a heavy or prolonged rain, these soil particles are then washed downslope. It has long been known that protecting the soil by maintaining plant cover or by mulching reduces potential erosion significantly. Therefore, erosion control should always begin with protecting the soil from rain droplets and slowing overland flow by using mulch and vegetation. PAM does not directly protect soil from rain droplet impacts, but it

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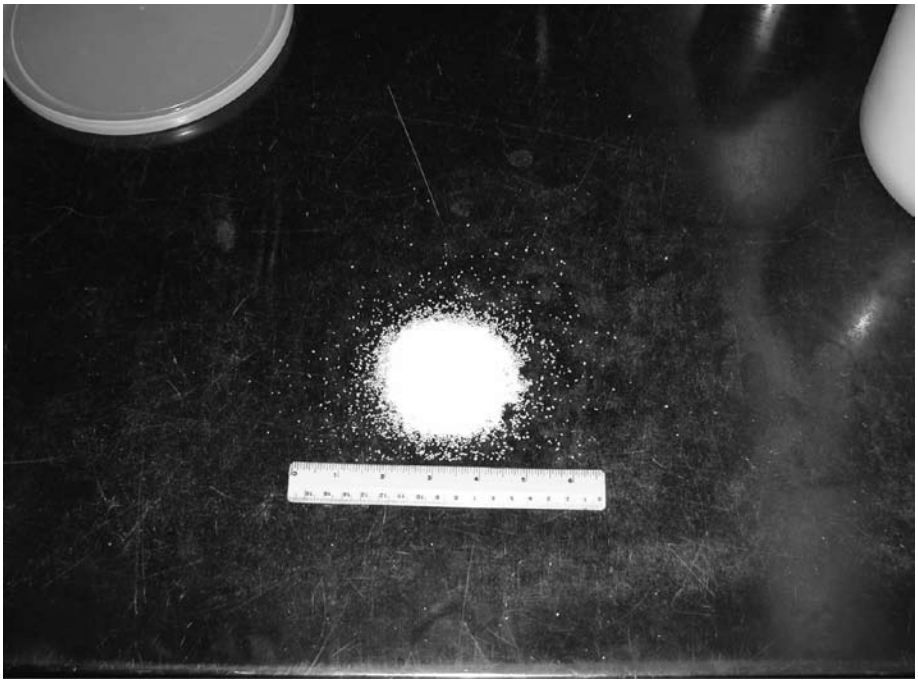

Figure 1. Granular or powdered PAM formulation is used primarily in hydroseeding.

Figure 2. Granular PAM is slowly added to a hydroseeder tank under full agitation.

reduces soil detachment, maintains the soil's structure, and increases infiltration rates early in the rain event.

PAM is applied as a liquid using typical erosion control equipment such as hydroseeders or hydromulchers. In the mixing tank, the powder is slowly introduced into the water under constant, heavy agitation (Figure 2). It is critical that it be introduced slowly to ensure that the granules do not stick together and form large globules, which are difficult to dissolve.

Once dissolved, usually after 30 minutes or more of agitating at least half a tank of clean water, the seed and mulch can be added, along with the rest of the water, as is typically done. An example of the calculations for a hydromulching application is given in Table 1. PAM is also reported to extend the achievable spray distance of the hydromulcher because of the added lubrication it provides.

PAM can reduce the amount of water running off a site by increasing infiltration, at least initially. This effect is the result of maintaining soil structure, as opposed to improving it. PAM also may reduce the turbidity of the runoff water beyond the reductions provided by the ground cover. In either case, the steeper the slope, the less benefit PAM will provide and the more critical it is that a good ground cover be used prevent erosion. Higher PAM rates will also be needed on steeper slopes (Figure 3). Dry granules have been applied directly with limited success, but dissolved PAM is more reliable because of better distribution and soil contact.

Overall considerations for using PAM to augment erosion control include:

- PAM should not be applied alone for erosion control, but in combination with mulch and seeding. This is especially important on steeper slopes.
- There are many types of PAMs, each with slightly different properties and ability to react with a specific soil. Be sure to use the PAM that works best on the soil at your site. Some suppliers and manufacturers will test your soil

Table 1. Example calculations for the addition of PAM to a hydromulching application. Amounts are for each 1,000 gallons applied.

Hydromulch Type	A. Typical Maximum Rate (lb/acre)	B. Typical Maximum Amount in Tank (lb/1,000 gal)	C. Liquid Applied Per Acre (gal) = (A/B)*1,000	D. PAM Added to Achieve 20 lb/acre (lb/1,000 gal) = (20 lb/C)*1,000
Wood Fiber	2,500	500	5,000	4
Mechanically Bonded Fiber	4,000	500	8,000	2.5

at no charge to determine the best PAM for your site.

- Seed germination and survival may be enhanced by PAM by increasing soil moisture through greater infiltration.
- PAM does not improve soil structure, but it will help maintain the existing structure for a period of time after application.
- Sandy soils with little clay will not benefit from PAM applications.
- Published research suggests that 20 pounds per acre are the minimum required for significant benefits in reducing erosion. At $6 per pound, this is an additional $120 per acre, which is a small fraction (less than 5 percent) of the usual hydromulching operation costs. The additional time for mixing will also need to be considered, however.
- Do not apply PAM to streams, lakes, or wetlands.

Figure 3. Seed, PAM, and a fiber mulch are applied to a steep slope with a hydroseeder.

- When applying PAM to slopes immediately adjacent to bodies of water, be sure all runoff passes through a sediment control feature, such as a silt fence or check dam.
- Wet PAM is very slippery and therefore a hazard for slipping. Be sure to sweep up any dry PAM spilled onto surfaces used for walking or driving.

Additional resources

Erosion Control: Land Application of Anionic Polyacrylamide, Code 1050. Wisconsin Dept. Nat. Res. http://efotg.nrcs.usda.gov/references/public/AL/tg450.pdf

Sojka, R. E. *PAM Research Project.* USDA-ARS NW Irrig. & Soils Res. Lab, Kimberly, Idaho, USA. http://kimberly.ars.usda.gov/pampage.shtml.

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