

Delaware Cooperative Extension

Making a difference

Animals In The Garden

HYG - 63

The following wild animals frequent areas around homes. Because of the increase of residential development in Delaware, people are more likely to encounter these animals in their gardens and yards. Control methods are suggested for those times when animal populations reach the pest level.

BATS

Though not really associated with the garden, these little, furry, winged mammals are also quite beneficial, consuming great quantities of harmful insects. Yet many people regard them with disgust and fear. The danger of rabid bats is highly publicized and greatly exaggerated.

Control: When bats occasionally take up seasonal residence in a house, the only real solution is to "bat-proof" the building. This involves carefully sealing up all the openings through which the bats can enter. Naphthalene (moth flakes or crystals) is sometimes a temporary repellent. Poisons are not recommended.

BIRDS

Most urban dwellers like birds on or about their property. Some species, such as non-migratory geese, gulls, pigeons, grackles (and other blackbirds) or woodpeckers, may wear out their welcome. Most birds are protected or subject to hunting regulations (geese and mourning doves, for example). You must be careful how you minimize the nuisance.

Control: Modify the habitat. For pigeons and other roosting birds, use special Nixalite wire or thin tin wire fastened to or suspended over ledges and areas they use. Seal off and close up holes to exclude pigeons, starlings, sparrows or other birds that become a nuisance by nesting inside a house, barn or other structure. Most birds are visual, so scare tactics that involve movement, noise and bright colors are often effective in driving nuisance birds elsewhere. Change the negative scare stimulus frequently since birds become accustomed to such techniques. Recorded distress calls drive away birds such as crows, and models of birds of prey (hawks/owls) may also be effective if the position of the model is moved frequently. Try taking food away if that is the attraction to the nuisance species. Removing shelter and food may reduce nuisance birds but may also result in fewer of the desirable wildlife you hope to attract.

CATS AND DOGS

Not all cat/dog owners care for their pets as neighboring homeowners might want. Also, neighborhoods may have a population of feral cats or wild dogs.

Control: Problem cats/dogs may be best handled by local animal control agencies. This approach might help settle a problem of someone else's pet or a wild animal that uses your yard as a bathroom

or digs up your flower beds. Repellent sprays such as "Get Off My Garden" may be effective to keep digging or wandering animals away from shrubs, flowers or vegetables. Keep garbage lids on tight and put pepper sauce or other repellent on trash left at the curb. This will discourage "looting" by animals. Put bird feeders in the open to reduce cat predation.

CHIPMUNKS

Chipmunks are ground-dwelling relatives of squirrels. Chipmunks are easy to distinguish. They have short, pointy heads marked with two white stripes--one above and the other and below the eye--and five black lines with white striping down the back. Their bushy tails are darker in color on top and rust-colored below. They sit upright and hold food with their front feet. Their communication of high-pitched chirping is distinctive. Chipmunks favor areas with stone walls or rotting logs and heavy ground cover. They burrow but excavate the dirt, so tunnel entrances are well concealed. They are omnivores and eat insects, salamanders, acorns, seeds, yewberries, some grains and fruits. They hoard food for winter and carried in special cheek pouches.

A valuable forest inhabitant, chipmunks move seeds around for tree regeneration, and they are an important food source for birds and other mammals. They may dig up freshly planted seeds or eat the occasional flower but otherwise do little damage.

Control: Reduce the attractive cover or nesting sites to discourage their reproduction. Live-trapping may be necessary if they get inside homes or sheds or become too numerous. Use peanut butter, sunflower seeds, bacon or apple slices as bait.

DEER

Deer feed on farmers crops, grass, twigs, bark and evergreens in wooded sites. Attitudes toward deer vary greatly. Some neighbors encourage deer presence because of a fondness for nature while others go to great lengths to keep them out of the vegetable garden and from eating the shrubbery. If it is green, deer may eat it. New, tender garden plants or flowers and trees in the yard are high on their list of favorite foods.

Control: Fencing is one method to protect garden crops from deer. Since deer jump, you need an 8-foot fence for best results or stout chicken-wire fencing securely around smaller garden plots. Or, fence the area with a thorny shrub/tree--preferably something that will grow to 6 feet. Deer eat roses and some thorns but Russian olive, hawthorn, boxwood and holly will exclude them.

Deer are deterred by dogs, hanging aluminum foil, aluminum plates, mirrors, wood that hits objects in the wind and other noise-makers. Deer also switch food sources and habitat when confronted with repellent chemicals; some of these are contact repellents that taste bad while others merely smell terrible. These are marketed under a number of commercial brands, but they may not necessarily work for you. Some old-fashioned repellents are human hair, feather meal and blood, or meat meal. Hanging bars of fragrant deodorant soap from branches may work. Other well-known deer repellents are mothballs or moth flakes spread on the ground or put in mesh bags for hanging in a tree. No repellent is 100 percent effective, specially if deer population is high and deer are starving. Also deer, like most animals, adjust to the same stimulus, so heavy deer pressure requires using more than one technique.

FOX

Two fox species inhabit Delaware--the red fox and the gray fox. It is the red variety that you will most likely encounter. Resembling a small dog, the red fox weighs 8 to 12 pounds, and measures 22 to 25 inches in length, with an additional 14 to 16 inches for the tail. Its fur is typically a bright rusty-red or red-orange; the underside is white, and the bushy tail is tipped with white. Its legs and feet are blackish. The red fox can adapt to most habitats within its range, but prefers thinly

populated, rolling farm and suburban land, with wooded areas, streams and marshes. Foxes eat a variety of foods, including mice, rats, rabbits, groundhogs, opossums, birds, eggs, insects and fruits. Their keen hearing, vision and sense of smell aid in detecting prey. They sometimes bury stashes of food for later consumption. Occasionally, they feed on carrion (dead animals). Foxes hunt mainly at night and are most active during the early hours of darkness and very early morning hours. They do not hibernate, remaining active year-around.

Control: Even though they may snatch an occasional chicken, foxes should be considered beneficial. Not only do they help control rodent populations, thereby serving farmers and gardeners alike, foxes benefit all of us by enriching the natural world and helping to maintain ecological balance.

GROUNDHOGS

The groundhog, or woodchuck, is a large rodent, about two feet long, including its bushy tail. It has a compact, chunky body supported by short, strong legs. The forefeet, which have long, curved claws, are well adapted for digging. The coarse fur is gray on the upper body and yellowish-orange on the underside.

Groundhogs prefer to live in open fields, woodlands and hedgerows. They dig extensive burrows with two or more entrances. These burrows are commonly located in fields, pastures, along fence rows, stone walls, roadsides, and even at the bases of trees. Groundhogs feed on a variety of vegetables, grasses and legumes. Some favorite foods are peas, beans, carrot tops, alfalfa, clover and grasses. Early morning and evening hours are the groundhog's preferred feeding times.

Control: Needless to say, groundhogs living near vegetable gardens and other choice plantings can be real pests. Control measures are limited in residential and suburban areas. Wire fencing discourages them sometimes. Live-trapping may also be effective; bait the trap with apple slices or vegetables such as carrots or ears of corn. Another method is flushing the animals from their burrows, then filling the entrances with large rocks. Admittedly, none of these solutions will take care of the problem permanently, but they may reduce the damage groundhogs do.

MICE AND RATS

Mice and rats like to eat the same food people, and they delight in shredding the things we cherish to make their nests. They also leave droppings and can spread diseases to humans by way of their bites, their fleas/microbes and by partially eating the same foods we eat.

Mice may become bothersome. The white-footed mouse and deer mouse typically stay outside, but the house mouse prefers inside shelter. Whether outside or in, mice do not travel far, preferring cover to open spaces. Most mice are nocturnal. Although they see poorly, they have well-developed senses of smell, taste and hearing. In addition to eating stored food, they eat insects, fruit, nuts, seeds and mushrooms; few mice eat green vegetables.

Rats are bigger than mice with proportionally larger heads and hind feet. Several species live in or around humans, such as the Norway rat (also called barn, sewer, wharf rat), roof rat (also called black or ship rat) and pack rats (also called wood rats in the East and kangaroo rats in the western United States). Rats are good climbers, diggers and aerial highwire artists. They eat some strange things such as electric wires and water pipes, and they love garbage dumps. They are so taste-sensitive that it is difficult to get them to consume a toxic bait.

Control: It isn't easy getting rid of mice or rats; they like living with us and have such varied diets. Start by modifying their environment and take away their food supply--food intended for pets, for example--and hiding places. Neither mice nor rats have large territories. Exclude them from storage areas, but remember they can quickly gnaw small openings into larger ones. Use concrete, metal or hardware cloth to keep them out. Trapping mice and rats can be frustrating. Live-trapping works well

for field-type mice and rats, but are less effective for house mice or Norway rats. Glue boards and snap-type traps are more commonly used. Bait these with hot dogs, chocolate w/nuts, bacon, peanut butter or marshmallows. If you just want to drive them away, try using moth balls or sticky surfaces (paint cardboard with tanglefoot). Use poisons carefully and sparingly so no harm comes to non-target organisms. Always place poisons in a safety container and position them so that mice and rats have to enter to take the bait.

MOLES

Moles are seldom-seen little animals, but they can cause problems for some homeowners and gardeners. Burrowing mammals, moles have road, shovel-like front feet. Their diet consists almost entirely of insects, earthworms and other small soil life. In this way, moles can be beneficial, consuming large numbers of harmful insects, including beetle grubs, cutworms and wireworms. Their tunneling may help loosen and aerate the soil, allowing better penetration of water, lime and fertilizer. However, in their search for food, moles often tunnel near the soil surface, heaving the ground up in ridges. Extensive burrowing can cause the surface of the lawn to be lumpy, making walking and mowing more difficult. Moles also can damage plants by causing air pockets around the roots, and by dislodging shallow-rooted plants. Mole tunnels may also be used by field mice to reach and eat the roots, tubers and bulbs of garden plants.

Control: There are mole traps that are effective if used properly. You also can discourage moles by controlling the grub population in the lawn. (See HYG - 61, Moles, for more information.)

OPOSSUM

The opossum is a light gray, longhaired mammal about the size of a house cat. It has a long snout, dark beady eyes, large hairless ears and a long, rat-like tail. It is also the only North American marsupial--an animal that carries its young in a special abdominal pouch. Nocturnal animals, opossums live in a variety of habitats, but prefer wooded areas near streams or marshes. They seek shelter in the burrows of other animals, tree cavities, brush piles and similar cover. Occasionally, they take up residence under buildings. They eat practically anything, including small fish, birds and other animals, insects, berries and other fruits, grass, eggs and carrion. Opossums living near people may rummage through compost piles and get into garbage cans, bird feeders and pet foods.

Control: Opossums are seldom a serious pest problem. They can be caught easily in a live trap. Place the trap in a location frequented by opossums, and bait with fruit, cheese or slightly spoiled fish or meat. Release a captured opossum in a suitable area several miles away. Make your property less attractive to opossums by sealing off burrows and holes under buildings and by securing garbage cans and other outside food sources.

RABBITS

The common cottontail rabbit is easy to recognize. These long-eared, brownish-gray mammals with powder-puff tails and gentle dispositions thrive in both rural and suburban areas.

Rabbits prefer dense thickets or other areas of heavy vegetation. They thrive in open woodlands, in brushy fence rows and field borders, as well as in suburban and urban yards. Active year-round, rabbits feed in the spring and summer on succulent green plants. In fall and winter, they eat buds, twigs and the bark of trees and shrubs. Rabbits love what the gardener has to offer. Among their favorite vegetables are lettuce, peas, beans and beets. The tulip is one of their favorite flowers. Young fruit trees, brambles and evergreen seedlings are often damaged during the dormant season, because rabbits chew off tender bark, twigs and young stems.

Control: You can discourage rabbits by removing their cover. This may involve regular mowing, cutting and removing unwanted brush and undergrowth. Repellents are sometimes effective. Protect

vegetables and flowers with mothballs, dried blood or ground limestone. Wire barriers also provide excellent protection. Enclose small garden areas with 1-inch mesh chicken wire, two feet high. The trunks of young fruit trees and other susceptible woody plants can be protected with cylinders of 1/4-inch mesh hardware cloth (which will also ward off mice). Live-trapping is another control method. Purchase a live-trap from a garden center, hardware store or a mail-order firm. Put the trap in a place rabbits are known to frequent, and bait it with pieces of apple, carrot or cabbage. Promptly release trapped rabbits several miles away in a rural area.

RACCOON

The raccoon is a distinctively marked, stocky mammal related to the bear. It has a prominent black "mask" over the eyes, a heavily furred, ringed tail, and hand-like front feet. A mature animal is 2 to 3 feet long and weighs 12 to 25 pounds. Raccoons prefer deciduous woodlands near streams, lakes or marshes. They den in hollow trees or logs, rock crevices, animal burrows or brush piles. Sometimes, however, they will use a chimney, attic or space beneath a porch, outbuilding or vacation cabin for a den. A nocturnal animal, raccoons hunt for food at night and eat a varied diet. In spring and early summer, they live on small animals, such as insects, crayfish, clams and mussels, fish and frogs. In late summer and fall, they add berries and other fruits, nuts and grains to their carnivorous diets. They sometimes eat garden vegetables, especially sweet corn.

Control: Store garbage in durable hard-to-tip containers with tight-fitting lids. To keep raccoons out of the vegetable garden, a one- or two-wire electric fence is effective; activate the fence at dusk and turned it off at daybreak. Seal off burrows and openings under buildings to prevent raccoons from using the area as a den. A heavy metal grid fastened securely over the chimney top will prevent entry. When sealing off a building, make sure no animals are trapped inside. Raccoons can be captured in a live trap of suitable size and sturdiness. Bait the trap with canned fish. Take trapped animals to an isolated area several miles away to release.

SHREWS

Shrews are tiny mammals often mistaken for moles or voles. Shrews are generally smaller, however, and have long, slender snouts and needle-like front teeth; in contrast, mice have chisel-shaped teeth. Shrews also lack the greatly enlarged front feet characteristic of moles. The species common in our area is the northern short-tailed shrew. Like moles, shrews eat insects and worms. They also are fond of slugs, snails and millipedes. Shrews must eat continuously during the day to meet their high energy needs.

Control: Learn to recognize shrews and make them feel welcome in your garden. If you insist on discouraging them, however, keep the yard and garden neat and trimmed. Also, domestic cats are great predators of shrews, though they seldom eat them.

SKUNKS

With its jet black fur and prominent white stripes down the back, the skunk is recognizable to most of us. A member of the weasel family, the skunk has a stout body, a long, bushy tail, short, stocky legs, and feet with long claws, well adapted for digging. The striped skunk--the species most common in Delaware--is about the size of an ordinary house cat. Skunks are common throughout Delaware, where woodlands are interspersed with open fields or farmland. But they also inhabit many suburban and residential areas. In summer, skunks feed primarily on grasshoppers, crickets, yellow jackets and beetles. They also are fond of fruits. Mainly nocturnal, skunks search for food along the borders of woodlands, fence rows, creek or marsh edges, farmlands and lawns. They will dig small holes in gardens and tear up patches of turf looking for beetle grubs and other soil insects. Occasionally, skunks may set up housekeeping under a house, tool shed or other structure. If they tangle with dogs or are hit on the road, they release their characteristic odor.

Control: To discourage skunks from digging up the yard, apply a recommended chemical control to reduce the number of soil insects. To prevent skunks from making a den under a building, seal off all foundation openings with wire mesh. Do this when the animals are not at home. To live-trap a skunk, bait it with sardines or cat food. Use a box trap; then cover it with a cloth to move it.

SLUGS

Slugs, close relatives of snails, are unsightly pests in many gardens and greenhouses. Slugs damage plants with their feeding, often completely destroying seedlings. As they move, they leave an unsightly slime trail on plants and walkways. Crushed on walks and driveways, they can be an unsightly, malodorous mess. Instead of a shell, slugs have a smooth mantle, which is the raised area above the front part of the body. Slugs common to Delaware may vary in length from 1/4 inch to 3 or more inches. The mouthparts are hard and work like a rasp. Eyes are on tentacles above the mouthparts. All slugs need damp, humid conditions for development. In the day, they hide from sun and wind. During severely dry conditions, they can burrow several inches into the soil.

Control: Sanitation improves slug control. A simple, effective trap for slugs is a group of stones, bricks, or boards 6 inches square or larger, placed around the garden or under greenhouse benches. Check the boards and destroy hiding slugs daily. Slugs avoid crawling over dry or dusty materials such as lime, road dust, cinders, gravel, or sand. The excessive secretion of mucus needed to free itself from these materials soon leads to exhaustion and death. Barriers also can be effective--a 4-inch wide strip of fly screen, placed on edge and partially embedded in the soil, keeps slugs out of gardens. There are some slug poison baits on the market; be careful not to poison dogs or other animals.

SNAKES

What common wild animal causes the most fear, frustration, and even frenzy? A snake! Almost all snakes in Delaware are non-poisonous. All snakes are predators. They eat a wide variety of foods, including insects, worms, small rodents, young birds and birds' eggs, frogs, toads, salamanders and other snakes. Snakes are especially valuable in the garden where they destroy many pests. Snakes live in a variety of habitats, from swamps to rocky, wooded slopes. In general, they like cool, damp, dark areas where they can hide and find food. The most effective control measure is to reduce the amount of habitat attractive to snakes. This might include a wood pile, rock pile, various accumulations of debris, an unmowed lawn, untended shrubbery and tangles of vegetation.

Control: To discourage snakes, keep your yard and garden neat and tidy. Occasionally, a snake may enter a house basement or attic. If this occurs, a pile of damp rags or burlap placed on the floor along a wall may tempt the snake to hide under it. Seal all holes, cracks or other means of entry into the house. Remove food, rodents or birds nesting in the home, and snakes will leave for better hunting territory. Do not kill snakes when you encounter them. Remember that snakes are a natural and beneficial part of the environment. Although you may not learn to like them, you can learn to appreciate them.

SQUIRRELS

Tree squirrels are among the most common and conspicuous of our wild animals. Of the three kinds of tree squirrels--gray, red and flying--the eastern gray squirrel is the most abundant in this area. From 16 to 24 inches long, including its bushy tail, the gray squirrel weighs from 3/4 to 1 2 pounds. Typically, it has gray fur on its back and whitish fur on its underside. Squirrels ordinarily inhabit wooded areas, often in close association with humans. They raise two litters of young each year--one in early spring, the other in summer. Tree cavities are preferred nesting sites, but they often nest of leaves, grass and other materials in the forks of trees. Squirrels will eat a great variety of foods, which is one reason they are pesky. Typically, they feed on fruits and nuts in fall and early winter.

Acorns, hickory nuts, walnuts and osage orange fruits are favorite fall foods. They often store nuts for later use. In late winter and early spring, they prefer tree buds. In summer they eat fruits, berries, corn, mushrooms and other succulent plant materials.

These rascally rodents seem constantly at odds with gardeners and homeowners. Squirrels will not hesitate to eat your favorite garden fruits, nuts and vegetables, especially sweet corn. They will nip the twigs from trees and chew the bark from various woody plants. They continually raid bird feeders, where they steal the feed and frighten off birds. On occasion, they even enter the attics of homes, where they set up housekeeping.

Control: Sad to say, there's very little that can be done to control squirrels. They can be trapped alive. Promptly remove them and release them at least 5 miles away. Use a live trap of suitable size and bait it with nutmeats or sunflower seeds. A repellent containing thiram can be applied to the bark of susceptible trees and shrubs to discourage gnawing. Special baffles on bird feeders may keep hungry squirrels from the feed. To reduce squirrels jumping onto feeders, cut back shrubbery from feeding areas. A heavy application of moth flakes may temporarily repel the animals from attics and other enclosed spaces; seal openings squirrels use to enter the house. If all else fails, sit back, relax and enjoy the squirrels' antics; at least they are interesting to watch.

VOLES

Voies, also called meadow mice and meadow voles, are small, stocky rodents, measuring about seven inches long at maturity. They have short legs, short tails, small eyes, partly hidden ears and chisel-like front teeth. Adults are chestnut brown in color, mixed with black on the back; their underparts are dark grey, and their feet are brown. Voies usually eat grasses and herbs, but will also feed upon seeds, bulbs and roots. They can damage trees and shrubs during winter when they gnaw off tender bark. If the gnawing girdles the tree, it may die. Voies make an extensive network of surface runways, especially in dense cover; they also tunnel underground.

Control: The best control is to keep the yard and garden neat and trimmed. Mow regularly to keep weeds and other unwanted vegetation down in areas around shrubs and trees. Avoid using heavy mulches, and don't allow drifts of wind-blown leaves and other litter to accumulate. Anticoagulant baits, like Warfarin, can be effective. Regular mouse snap traps may also be used. Set each trap at right angles to a visible runway, with the trigger in the runway. A pinch of oatmeal makes an effective bait. You can protect the trunks of young trees from vole damage with tree guard cylinders of 1/4-inch mesh hardware cloth. (See HYG - 62, Vole Identification and Control, for more information.)

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HYG - 63
8/22/97

Pesticides: Regulating Pesticides

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Inert Ingredients in Pesticide Products

Inert Ingredients in Pesticide Products; Policy Statement

OPP-36140; FRL-3190-1

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: This notice announces certain policies designed to reduce the potential for adverse effects from the use of pesticide products containing toxic inert ingredients. The Agency is encouraging the use of the least toxic inert ingredient available and requiring the development of data necessary to determine the conditions of safe use of products containing toxic inert ingredients. In support of these policies, the Agency has categorized inert ingredients according to toxicity. The Agency will (1) require data and labeling for inert ingredients which have been demonstrated to cause toxic effects; (2) in selected cases pursue hearings to determine whether such inert ingredients should continue to be permitted in pesticide products; (3) require data on inert ingredients which are similar in chemical structure to chemicals with demonstrated toxic properties or which have suggestive, but incomplete data on toxicity; and (4) subject all new inert ingredients, both for food and non-food uses, to a minimal data set and scientific review. The Agency is soliciting comments on these policies.

EFFECTIVE DATE: This policy is effective on April 22, 1987, subject to revision if comments received warrant such revision.

ADDRESSES: Three copies of written comments bearing the document control number [OPP-36140] should be submitted, by mail, to:

Information Services Section,
 Program Management and Support Division (TS-757C),
 Office of Pesticide Programs,
 Environmental Protection Agency,

401 M St. SW.,
Washington, DC 20460.

In person deliver comments to:
Rm. 236, CM #2,
1921 Jefferson Davis Highway,
Arlington, VA.

Information submitted as a comment in response to this notice may be claimed confidential by marking any part or all of that information as "Confidential Business Information" (CBI). Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR Part 2. A copy of the comment that does not contain CBI must be submitted for inclusion in the public docket. Information not marked confidential will be included in the public docket without prior notice. The public docket is available for public inspection in Room 236 at the address given above, from 8 a.m. to 4 p.m., Monday through Friday, except legal holidays.

FOR FURTHER INFORMATION CONTACT:

Tina Levine,
Hazard Evaluation Division
(TS769C),
Environmental Protection Agency,
401 M St. SW.,
Washington, DC 20460.
(703-557-9307).

Office location and telephone number:
Rm. 788E, CM #2,
1921 Jefferson Davis Highway,
Arlington, VA
(703-557-9307).

SUPPLEMENTARY INFORMATION: EPA is issuing this notice announcing certain policies regarding inert ingredients in pesticide products.

I. Definitions

1. *Active ingredient.* An ingredient which will prevent, destroy, repel, or mitigate any pest, or will alter the growth or maturation or other behavior of a plant, or cause the leaves or foliage to drop from a plant, or accelerate the drying of plant tissue.

2. *Inert ingredient.* For purposes of this policy, any intentionally added ingredient in a pesticide product which is not pesticidally active. This definition does not include impurities.
3. *Closely similar product.* A pesticide product that (1) contains the same active ingredient(s) in substantially the same percentage(s) as a product already registered, (2) is intended for the same use pattern as the already-registered product, and (3) contains no greater percentage of any List 1 or List 2 inert ingredient than the already-registered product.

II. Background and Legal Authority

A. *The Federal Insecticide, Fungicide, and Rodenticide Act*

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), requires that all pesticide products sold or distributed in commerce be registered by the Environmental Protection Agency (EPA or Agency). Prior to the establishment of EPA, the Department of Agriculture (USDA) registered pesticides under FIFRA. Most of the data requirements and regulatory activities under FIFRA have focused on the active ingredient. There are two exceptions to this general policy; (1) A battery of acute toxicity tests on the pesticide formulation, which generally includes both active and inert ingredients, is routinely required for registration of an end-use product; (2) The Agency has imposed certain labeling requirements for hazardous inert ingredients (49 FR 37980, September 26, 1984).

B. *Federal Food, Drug and Cosmetic Act*

In addition to its mandate under FIFRA, EPA has authority to regulate pesticide products under the Federal Food, Drug, and Cosmetic Act (FFDCA). Section 408 of FFDCA authorizes EPA to establish tolerances or safe levels of pesticide residues in raw agricultural commodities; section 409 similarly authorizes EPA to issue food additive regulations for pesticide residues in processed foods. Prior to the establishment of the EPA, the Food and Drug Administration (FDA) had the responsibility for establishing tolerances and food additive regulations for pesticide residues.

The FDA has issued several notices explaining its policy with regard to regulation of inert ingredients in pesticides under the FFDCA. In 1961, FDA published a notice in the **Federal Register** stating that USDA had determined that each component of registered pesticide products, including the inert ingredients, were pesticide chemicals and thus subject to the requirement of tolerances or exemption under FFDCA (26 FR 10640, November 14, 1961). In 1969, the FDA established a policy regarding data requirements and review procedures for clearance of inert ingredients (34 FR 6041, April 3, 1969). This notice set forth general toxicity data requirements and stated that residue data requirements would depend on the toxicity of the chemical. However, the policy allowed a less formal review process if FDA conclude that the inert ingredient was generally recognized as safe for the stated purpose. Exemptions from the requirement of a tolerance for inert

ingredients have generally occurred through the informal request procedure, rather than the formal petition process required for active ingredients. Inert ingredients exempt from the requirement of a tolerance are codified in 40 CFR 180.1001.

There are currently approximately 1,200 inert ingredients in pesticide formulations. About half of these have been cleared for food use under section 408 or 409 of FFDCA. Many of those chemicals had been approved by the FDA for non-pesticidal use as food additives, for example, as flavorings or in packaging, before they began being used in pesticide formulations. These chemicals were generally exempted from the requirement of a tolerance with little systematic review or screening by the EPA. Inert ingredients in products registered only for non-food uses also have received little scientific review.

III. Development of Regulatory Policy for Inert Ingredients

Because of concern that some inert ingredients in pesticide products might cause adverse effects to humans or the environment, the Agency developed a draft strategy for the regulation of inert ingredients, which was reviewed by the FIFRA Scientific Advisory Panel and was made available to the public in Spring 1986. This **Federal Register** notice announces the policy of the Agency regarding inert ingredients in pesticide products and is based on the strategy.

EPA has divided the approximately 1,200 intentionally-added inert ingredients currently contained in pesticide products into four toxicity categories:

1. Inerts of toxicological concern (List 1).
2. Potentially toxic inerts/high priority for testing (List 2).
3. Inerts of unknown toxicity (List 3).
4. Inerts of minimal concern (List 4).

EPA has identified about 50 inert ingredients as being of significant toxicological concern. This list was assembled on the basis of known toxicity of the chemical; no consideration was given to the potential for exposure. The criteria used to place chemicals on List 1 were carcinogenicity, adverse reproductive effects, neurotoxicity or other chronic effects, or developmental toxicity (birth defects). These effects must have been demonstrated in laboratory or human studies and the data subject to peer review. The criteria also included documented ecological effects and the potential for bioaccumulation. These criteria and the list, itself were reviewed by the Scientific Advisory Panel. List 1, inerts of toxicological concern, is as follows:

LIST 1. INERTS OF TOXICOLOGICAL CONCERN.

CAS No.	Chemical Name
62-53-3	Aniline
1332-21-4	Asbestos fiber
71-43-2	Benzene
1332-21-9	1,4-Benzenediol
3068-88-0	B-Butyrolactone
7440-43-0	Cadmium compounds
75-15-0	Carbon disulfide
56-23-5	Carbon tetrachloride
108-90-7	Chlorobenzene
67-66-3	Chloroform
62-73-7	DDVP
106-46-7	p-Dichlorobenzene
117-87-7	Di-ethylhexylphthalate (DEHP)
54-14-7	1,1-Dimethyl hydrazine
540-73-8	1,2-Dimethyl hydrazine
534-52-1	Dinitro-o-cresol
51-26-5	Dinitrophenol
123-91-1	Dioxane
106-89-8	Epichlorohydrin
110-80-5	Ethanol, 2-ethoxy (cellulosive)
111-15-9	Ethanol ethoxy acetate
96-45-7	Ethylene thiourea
107-06-2	Ethylene dichloride
109-86-4	Ethylene glycol monomethyl ether; methyl cellulosive
140-88-5	Ethyl acrylate
77-83-8	Ethyl methyl glycidate
50-00-0	Formaldehyde
70-30-4	Hexachlorophene
110-54-3	n-Hexane

302-01-2	Hydrazine
78-59-1	Isophorone
7439-92-1	Lead Compounds
568-64-2	Malachite Green
1191-80-6	Mercury oleate
591-78-6	Methyl n-butyl ketone
74-87-3	Methyl chloride
75-09-2	Methylene chloride
79-46-9	2-Nitropropane
25154-52-3	Nonylphenol
30525-89-4	Paraformaldehyde
87-86-5	Pentachlorophenol
127-18-4	Perfluoroethylene (PERC)
108-95-2	Phenol
90-43-7	o-Phenylphenol
78-87-5	Propylene dichloride (1,2-dichloropropane)
75-56-9	Propylene oxide
8003-34-5	Pyrethrins and pyrethroids
81-88-9	Rhodamine B
10588-01-9	Sodium dichromate
131-52-2	Sodium pentachloroheptate
62-56-6	Thiourea
26471-62-5	Toluene diisocyanate
79-00-5	1,1,2-Trichloroethane
56-35-9	Tributyl tin oxide
79-01-6	Trichloroethylene
1330-78-5	Tri-orthocresylphosphate (TOCP)
78-30-8	Tri-orthocresylphosphate (TOCP)

EPA has further identified about 60 inert ingredients which the Agency believes are potentially toxic and

should be assessed for effects of concern (List 2). Many of these inert ingredients are structurally similar to chemicals known to be toxic; some have data suggesting a basis for concern about the toxicity of chemical. Most of the chemicals on List 2 have been designated for testing through the National Toxicology Program (NTP), the EPA Office of Toxic Substances (OTS) or other regulatory or government bodies. The FIFRA Scientific Advisory Panel has also reviewed this list. Because testing is ongoing for most of chemicals on List 2, it is expected to change periodically. It is the Agency's policy to have all additions, deletions or changes to List 1 or 2 reviewed by the FIFRA Scientific Advisory Panel. List 2 potentially toxic inert/high priority for testing, is as follows:

LIST 2. POTENTIALLY TOXIC INERTS/HIGH PRIORITY FOR TESTING

CAS No.	Chemical Name
85-68-7	Butyl benzy phthalate
84-74-2	Dibutyl phthalate
84-66-2	Diethyl phthalate
131-11-3	Dimethyl phthalate
117-84-0	Dioctyl phthalate
95-49-6	2-Chlorotoluene
1319-77-3	Cresols
95-48-7	o-Cresol
106-44-5	p-Cresol
108-39-4	m-Cresol
108-94-1	Cyclohexanone
95-50-1	o-Dichlorobenzene
112-34-5	Diethylene glycol monobutyl ether (butyl carbitol)
111-90-0	Diethylene glycol mono ethyl ether (carbitol)
111-77-3	Diethylene glycol mono methyl ether (methyl carbitol)
34590-94-8	Dipropylene glycol monomethyl ether
111-76-2	2-Butoxy-1-ethanol (ethylene glycol mono butyl ether)
	1-Butoxy-2-propanol (1,2-propylene glycol mono

5131-86-8	butyl ether
124-16-3	1-Butoxyethoxy-2-propanol
107-98-2	1-Methoxy-2-propanol
29387-86-8	Propylene glycol monobutyl ether
25498-49-1	Tripropylene glycol monomethyl ether
577-11-7	Diethyl sodium sulfosuccinate
141-79-7	Mesityl oxide
106-10-1	Methyl isobutyl ketone
75-52-5	Nitromethane
108-88-3	Toluene
29395-43-1	Tolyl triazole
95-14-7	1,2,3-Benzotriazole
120-32-1	2-Benzyl-4-chlorophenol
7500-3	Chloroethane
88-04-0	p-Chloro-m-xylene
97-23-4	Dichlorophene
68-12-2	Dimethyl Formamide
100-41-4	Ethyl benzene
149-30-4	Mercaptobenzothiazole
74-83-9	Methyl bromide
75-43-4	Dichloromonofluoromethane
75-45-6	Chlorodifluoromethane
75-37-6	1,1-Difluoroethane
75-68-3	1-Chloro-1,1-difluoroethane
25168-06-3	Isopropyl phenols. Petroleum hydrocarbons
1330-20-7	Xylene
100-02-7	p-Nitrophenol
106-88-7	Butylene oxide
79-24-3	Nitroethane
75-05-8	Acetonitrile
96-48-0	gamma-Butyrolactone

71-55-6	1,1,1-Trichloroethane
102-71-6	Triethanolamine
111-42-2	Diethanolamine
97-88-1	Butyl methacrylate
80-62-6	Methyl methacrylate. Xylene-range aromatic solvents
95-82-9	Dichloroaniline
95-76-1	Dichloroaniline
626-43-7	Dichloroaniline
554-00-7	Dichloroaniline
608-27-5	Dichloroaniline
608-31-1	Dichloroaniline
101-84-8	Diphenyl ether
76-13-1	Trichlorotrifluoroethane
75-69-4	Trichlorofluoroethane
75-71-8	Dichlorotetrafluoromethane
79-14-2	Dichlorotetrafluoroethane

Inert ingredients were put on List 4 (minimal hazard or risk) if they were generally regarded as innocuous. These included inert ingredients such as cookie crumbs, corn cobs, and substances "generally recognized as safe (GRAS)" by the FDA (21 CFR Part 182). There are approximately 300 inert ingredients in this category.

An inert ingredient was placed on List 3 if there was no basis for listing it on any of the other three lists. There are approximately 800 inert ingredients in this category.

Lists 3 and 4 are not addressed further in this notice since the Agency will be taking no particular regulatory actions with respect to these inert ingredients at this time. Applications for exemptions from the requirement of tolerances for Lists 3 and 4 inert ingredients are discussed in unit VI.

These lists were developed to establish priorities for regulatory activities related to existing inert ingredients. The Agency intends to focus its initial regulatory efforts on the inerts of toxicological concern. For this reason, the current policy notice is most specific with regard to inert ingredients on List 1. As

resources permit, EPA will extend its activities to the other inert ingredients.

IV. Inerts of Toxicological Concern (List 1)

In order to reduce the potential for adverse effects to humans or the environment it is the policy of the Agency to encourage the use in pesticide products of the least toxic inert ingredients available and to require development of the information necessary to determine the conditions under which various chemicals may be used safely as inert ingredients in pesticide products. In line with this policy, EPA has developed procedures for dealing with new and existing pesticide registrations containing inerts of toxicological concern. It should be noted that the Agency is currently engaged in a comprehensive review of various chlorinated solvents, several of which are on List 1 or List 2. The data gathering described in Section A.3 below will support that effort. As conclusions are made in the Solvents Project, the inerts policy with respect to those substances will be reviewed to see whether adjustments in status would be appropriate. In the meantime, chemicals under review in the Solvents Project are subject to the requirements described below.

A. Existing Registrations

1. *Substitution.* Registrants are encouraged to substitute inert ingredients not included in List 1 or List 2 for inerts of toxicologic concern (List 1) now contained in their products. Registrants electing to substitute should submit a new Confidential Statement of Formula as a proposed amendment to the registration. The revised Confidential Statement of Formula should be sent to: Product Manager, Registration Division (TS-767C), Office of Pesticide Programs, Environmental Protection Agency, 401 M St. SW., Washington, DC 20460.

2. *Labeling.* As an immediate step to inform users and the general public of the presence of an inert of toxicological concern, EPA is directing registrants of each product containing an inert ingredient on List 1 to submit applications (to the product manager at the above address) to amend their registrations to add the following statement to the label:

This product contains the toxic inert ingredient (*name of inert*).

The wording should be placed in close proximity to the ingredients statement in a type size comparable to other front panel text.

Registrants are required to submit the application not later than October 20, 1987. (At the top of each application, please write in bold letters "INERTS".) No pesticide product containing a List 1 inert ingredient may be released for shipment after October 20, 1988 unless the product bears an amended label which complies with the provisions listed above. EPA may initiate cancellation proceedings under section 6(b)(1) of FIFRA for any product registrations containing a List 1 inert ingredient for which an amended label is not submitted in a timely fashion.

3. *Data Requirements.* In addition, any registrant who retains an inert of toxicologic concern in his or her product(s) will be subject to data call-in under section 3(c)(2)(B) of FIFRA. The data requirements will take into consideration the chemical's existing data base and the product's use pattern. Because of the demonstrated biological activity of chemicals on List 1, EPA may require as much data as would be required by 40 CFR Part 158 for an active ingredient. For many of these inert ingredients, adequate toxicity data exist but additional exposure data would be required. In addition, data on environmental fate, ecological effects and residue chemistry may be required. The Agency intends to issue data call-in letters for this data beginning in April 1987.

4. *Hearings.* For certain inert ingredients on List 1, EPA intends to issue Notices of Intent to Hold a Hearing under FIFRA section 6(b)(2). The purpose of these hearings will be to gather and present information on the risks and benefits of these inert ingredients. Based on the information presented during that hearing EPA will determine whether pesticide products containing a particular inert ingredient on List 1 should be cancelled, be subject to additional restrictions, or be allowed to continue their current registrations without change. Hearings conducted under FIFRA section 6(b)(2) are formal adjudicatory proceedings conducted according to the procedures in 40 CFR Part 164. Evidence is presented under oath by witnesses, who are subject to cross-examination. EPA has the burden of proceeding, but the ultimate burden of proof rests on registrants. Decisions are based only on evidence in the hearing record. The presiding Administration Law Judge makes an Initial Decision which may be appealed to the Administrator who makes the Final Decision.

EPA expects to issue the first Notice of Intent to Hold a Hearing concerning an inert ingredient on List 1 in 1987. Subsequent notices may cover several List 1 inert ingredients with similar functions in pesticide formulations, e.g. solvents.

5. *Reclassifying Inert Ingredients As Active Ingredients.* The Agency has also identified several inerts of toxicological concern which are present in pesticide formulations to act against some pest, although not necessarily the pest targeted by the formulation. For example, an ingredient may be added to a rodent bait to repel flies. Although these ingredients have traditionally been designated as inert ingredients, EPA believes that they are actually active ingredients. These inert ingredients are formaldehyde, paraformaldehyde, hexachlorophene, 2,2-dichloro vinyl dimethyl phosphate, and the pyrethins/pyrethroids. EPA recently indicated its intent to reclassify formaldehyde and paraformaldehyde as active ingredients when used in pesticide products to prevent microbial damage to such products (52 FR 321, January 5, 1987). EPA intends to similarly reclassify the other inert ingredients that prevent damage to pesticide formulations by pests as active ingredients in those formulations. This will simplify the process of obtaining data under FIFRA section 3(c)(2)(B).

6. *Revocation of Exemptions from Tolerance.* Any pesticide chemical used on food must have a tolerance or an exemption from the need for tolerance. If the Agency determines that an inert of toxicological concern

is no longer used in any food-use pesticide product, the exemption(s) from the need for a tolerance will be revoked for that inert ingredient. In addition, there may be circumstances in which EPA will replace existing exemptions with finite tolerances. Such action will be taken when the data gathered through the data call-in activities on inerts of toxicological concern enable the Agency to establish a finite tolerance.

B. New Registrations

In general, no new product that contains an inert of toxicological concern will be registered unless the product is closely similar to an existing product, as defined above. In limited circumstances, other products may be registered if review indicates that the risk of unreasonable adverse effects to humans or on the environment, will be decreased by such a registration. As specified above, the label of any product containing such an inert ingredient will be required to indicate the presence of the inert ingredient. In addition, the product will be registered conditionally, subject to any data requirements that the Agency imposes on registrants of similar products.

V. Potentially Toxic Inerts/High Priority for Testing

The Agency's goal is to collect enough information on each inert ingredient on List 2 to determine whether further actions such as those for inerts on List 1 are necessary. In order to make this determination, the Agency is monitoring ongoing testing and gathering existing information on the potential adverse effects of these substances and will require additional testing from industry if it is needed.

A. Existing Registrations

EPA does not plan to issue any specific requirements in the near future for inert ingredients on List 2. If an inert ingredient is moved from List 2 to List 1, as new data or information becomes available, it will become subject to the requirements outlined in Section IV of this notice.

B. New Registrations

Closely similar products containing List 2 inert ingredients will continue to be registered. Applications for registration of other products (e.g., new uses) containing inert ingredients that are on List 2 will be reviewed on a case-by-case basis. The Agency will consider the current weight-of-evidence with respect to the hazards posed as well as the potential for increased exposure when deciding whether the product meets the standard for registration.

VI. Inert Ingredients and New Food-Uses of Existing Inerts

Any inert ingredient proposed for use in a pesticide product is considered to be a "new" inert ingredient if it

is not currently identified as present in some approved pesticide formulation or has never been in a previously registered product. The minimal data generally required to evaluate the risks posed by the presence of a new inert ingredient in a pesticide product is a subset of the kinds of data typically required for active ingredients under 40 CFR Part 158. A description of the data required and guideline number as listed in 40 CFR Part 158 follows:

DATA REQUIRED TO EVALUATE RISKS POSED BY INERT INGREDIENTS IN PESTICIDE PRODUCTS

Guideline Ref.
Number 40 CFR Part
158

1. KIND OF DATA REQUIRED:

Residue Chemistry:

Description of the pesticide type of pesticide formulation (s) in which the inert will be used and the maximum percent by weight it can occupy in any formulation.

Description regarding the range of use patterns and range of concentrations of the inert material ¹

171-3

2. KIND OF DATA REQUIRED:

Product Chemistry:

Description of the chemical or chemical mixture including structural formula(e)

61-1

Chemical Abstracts Services (CAS) Registry Number and file

61-1

Any technical bulletins available on the inert:

Purpose of the inert in pesticide formulation (i.e., solvent, emulsifier, etc.)

61-1

Discussion of possible toxic contaminants such as

nitrosamines, polynuclear aromatics or dioxins 61-3
Batch analyses.² 62-1
Density/specific gravity 63-7
Solubility 63-8
Vapor Pressure 63-9
Dissociation Constant 63-10
Octanol/Water Partition Coefficient 63-11
pH 63-12

Toxicology:

90-day feeding study: rodent and dog³ 82-1
Subchronic Dermal toxicity⁴ 82-2, 82-3
Teratology study: rodent 83-3
Gene mutation test 84-2
Structural chromosomal aberration test 84-2
Other genotoxic effects 84-4

3. KIND OF DATA REQUIRED

Ecotoxicology:⁵

Acute 96-hr fish LC50 (preferably in rainbow trout or bluegill) 72-1
48-hr LC50 or EC50 in daphnia 72-2
Avian oral LD50 (preferable in mallard or bobwhite) 71-1
8-day avian dietary (preferable in mallard or bobwhite) 71-2

Environmental Fate:⁵

Hydrolysis	161-1
Aerobic soil metabolism	161-1
Photodegradation in water	161-2
Photodegradation in soil	161-3
Koc or Kd	163-1

¹ For use on food crops, include whether preharvest and/or post-harvest applications, or use on livestock, and use any restrictions.

² Batch analysis would be required only if there are possible contaminants of concern or if a mixture of variable composition is involved.

³ If the inert is used in a food-use product, two subchronic feeding studies will be required.

⁴ This study may be substituted for the 90-day feeding studies if only non-food use is proposed. The duration of the subchronic dermal study will depend on the potential duration and frequency of human exposure.

⁵ Ecotoxicology and environmental fate testing are required only for formulations used outdoors.

In certain circumstances, EPA may waive some or all of these data requirements, for example, if the applicant can show that the proposed new use pattern of the inert ingredient will result in little or virtually no exposure. Data or use information should address dietary, groundwater or applicator exposure, as appropriate. In gathering the data to be submitted to the Agency, the applicant should contact manufacturers trade associations, etc., who may be able to assist in identifying appropriate data. As a minimum, applicants whose formulations contain new food-use inert ingredients should contact the FDA to obtain data and information on inert ingredients that may have approved food additive uses.

In addition to new inert ingredients, the data requirements and review process described above will be used to evaluate requests for additional exemptions from tolerances and changes in exemptions from tolerances of inerts already cleared for food-use and for exemptions from tolerances for existing inert ingredients not presently used on foods. The requirements outlined constitute our "base set" of data needs. If these studies indicate potential human health concerns or ecotoxicity or potential groundwater contamination, further testing may be required to fully assess the risks and define acceptable uses.

VII. Proprietary Inert Ingredients or Mixtures

In the case of some products, the registrant is not aware of the identity of all of the inert ingredients. These products contain a substance (usually a combination of several inert ingredients) which is designed to

perform a particular function in pesticide products (e.g., to act as a solvent or emulsifier) but which is sold to pesticide registrants under a trade name without disclosure of the substance's constituents. The seller of such a substance typically will claim that the identity of the constituents is a trade secret. Many of these "proprietary inerts" are marketed in this manner today. EPA has allowed pesticide products containing such substances to be registered if the applicant for registration first arranged to have the supplier of the proprietary inert substance disclose its formula to EPA. This practice poses problems in administering the data call-in and labeling requirements contemplated by this Notice. For instance, EPA may know that a proprietary inert substance contains a List 1 inert ingredient, but may be unable to disclose that fact to the registrants of the products that contain the proprietary substance. EPA obviously cannot require these registrants to list the inert ingredient on their labels, or subject them to a data requirement, until the confidentiality problem is overcome. The approaches set forth below address this problem.

A. Existing Registration

If a product with an existing registration contains an inert of toxicological concern comprising part of a proprietary inert ingredient or mixture. The Agency will request the formulator of the ingredient or mixture to divulge the presence and identity of the inert of toxicological concern to the registrant so that the registrant can label the product properly. If the producer of the proprietary ingredient or mixture refuses to divulge this information, the Agency will require the formulator to justify the claim of confidential business information under 40 CFR Part 2. If EPA reviews the claim and determines that it is without merit, EPA will so inform the formulator of the ingredient or mixture. Thereafter, following the appropriate procedures in EPA regulations, EPA may inform registrants that the proprietary inert ingredient or mixture contains a specific ingredient. If EPA does not decide to disallow a CBI claim, EPA may none-the-less require, FIFRA under section 3(c)(2) (B), that the registrant provide EPA with information showing that the registrant knows the composition of the proprietary inert ingredient or mixture. In either case, once EPA has determined that a registrant is aware that his product contains an inert of toxicological concern which is present in a proprietary inert ingredient or mixture used to formulate the product, EPA will inform the registrant of the regulatory actions being initiated because of the presence of that inert ingredient.

B. Applications for New Registrations

If a registrant submits an application for a new use or identical or a substantially similar use containing an inert of toxicological concern as part of a proprietary inert ingredient or mixture, the Agency will notify the registrant that the product cannot be registered based on the inert ingredients which are contained in the formulation. It will be the responsibility of the registrant to contact the formulator/supplier of any proprietary ingredient or mixtures used in the pesticide formulation and determine the identity of the inert(s) of toxicological concern present in the pesticide formulation.

C. Registrant's Ongoing Responsibility for the Composition of the Pesticide Products

Units VII.A. and VII.B. discuss the procedures the Agency will employ to ensure that a registrant is aware that his product contains an inert of toxicological concern as part of a proprietary inert ingredient or mixture. With the exception of knowing about the presence of inerts of toxicological concern, the Agency does not at this time plan to require that an applicant know or find out the composition of a proprietary inert ingredient or mixture order to obtain registration. An applicant is, however, required to ensure that the Agency is informed of its composition by its producer.

In addition, the Agency does hold a registrant responsible for the certified limits of each inert ingredient in his product, including those that are present as part of a proprietary inert ingredient or mixture. An applicant who does not know the composition of an inert ingredient or mixture, and cannot persuade his supplier or producer to disclose it, may certify to an upper and lower limit of the ingredient or mixture as introduced into his product. In this case, the fact that the applicant uses a proprietary inert ingredient or mixture whose composition is not known to him does not remove his responsibility for maintaining the composition of each of those inert ingredients within its certified limits and assuring that the composition of the proprietary inert ingredient(s) or mixtures(s) he uses will not change over time. EPA believes that contractual agreement between formulator and supplier is the best way to ensure that the formulator can rely on the composition of the material received short of having direct knowledge of its composition.

Dated: April 13, 1987

J.A.Moore,

Assistant Administrator for Pesticides and Toxic Substances

(FR Doc. 87-8787 Filed 4-21-87; 8:45 am)

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Last updated on Thursday, January 9th, 2003
URL: <http://www.epa.gov/oppr001/inerts/fr52.htm>

V. Response to Staff Comment - Golf Course Design Safety

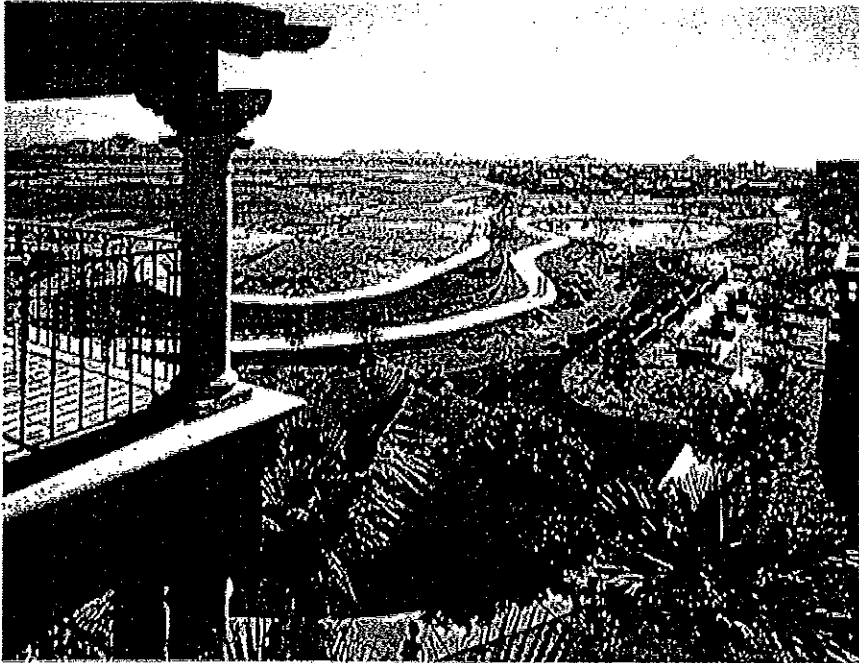
This response has been prepared by Arthur Hills and Chris Wilczynski of Arthur Hills/Steve Forest and Associates – Golf Course Architects.

A question was raised regarding the setback of housing at holes #3, #10, #18 and the driving range and if adequate distance was provided to ensure golf balls would not impact individual properties. The golf holes have been designed with consideration to this as well as public safety and welfare. While there is no hard and fast rule regarding this issue and setbacks/buffers vary based upon site conditions (topography, vegetation, predominant ball flight) there are industry recommendations which are followed. These recommendations are published within the book *Golf Course Development and Real Estate* by The Urban Land Institute - a leading organization in land planning and development. These same recommendations are employed by Arthur Hills/Steve Forest and Associates and were utilized as planning guidelines at The Preserve. Please review the attachment for a diagram illustrating these guidelines.

A specific example of 'poor' house siting along a golf hole was cited by town staff. The example used was Minnechaug Golf Course - a public 9 hole golf course in Glastonbury, CT. Formerly 18 holes, the course is now a pseudo golf/housing community. However, this comparison is poor in that the housing came after the planning of the golf course. The development was never planned in a cohesive manner thus, failing to abide by many of the recommendations currently employed in golf community design. For example, the housing along hole #1 at Minnechaug, a dogleg right (in the direction of the housing) has minimal setbacks to housing resulting in a conflict of uses. Planning at The Preserve has taken the proper measures into account to ensure this conflict will not occur.

Examples of hole planning and design at The Preserve:

At The Preserve hole #3 is a par three. The lots are approximately 35-40' (vertical) above the green. There is 200' from the center of the green to closest lot. It is very unlikely that a golf ball will ever trespass into the adjacent lots due to the elevation change and vegetation. Most golfers will be hitting an iron into the green. Hole #10 is a medium length, dogleg right par 4. The landing area is approximately 40' below the adjacent roadway and lots on the left side of the hole. There is 150' from the center of the fairway to the road along the left side of the hole. Due to the elevation change, vegetation and dogleg right nature of the hole it is unlikely that an errant golf ball would trespass into the lots. Hole #18 is a long, dogleg right par 4. A 10' +/- earthen berm with a heavy massing of conifer trees will be constructed along the left side of the hole. There is 160' from the center line of play to the roadway on the left side of the hole. It is unlikely that an errant golf ball would trespass into the adjacent road and lots due to the dogleg right nature of the hole and distance between the lots and center line of play. The driving range runs parallel to the proposed village town center near the clubhouse. There is approximately 250' from the center of the practice range target area to the road and lots running along the left side of the practice range. A 15' +/- berm with a massing of vegetation will also be constructed along the left side of the range. Due to the berm and vegetation and the spatial separation between the range and the lots it is unlikely that golf balls will trespass from the range area.



© RICK WALCZAK/ARTIST: PRINCESS HOTEL, SCOTTSDALE, ARIZONA

The view from the third floor of the Princess Hotel in Scottsdale, Arizona, illustrates the course's visual access.

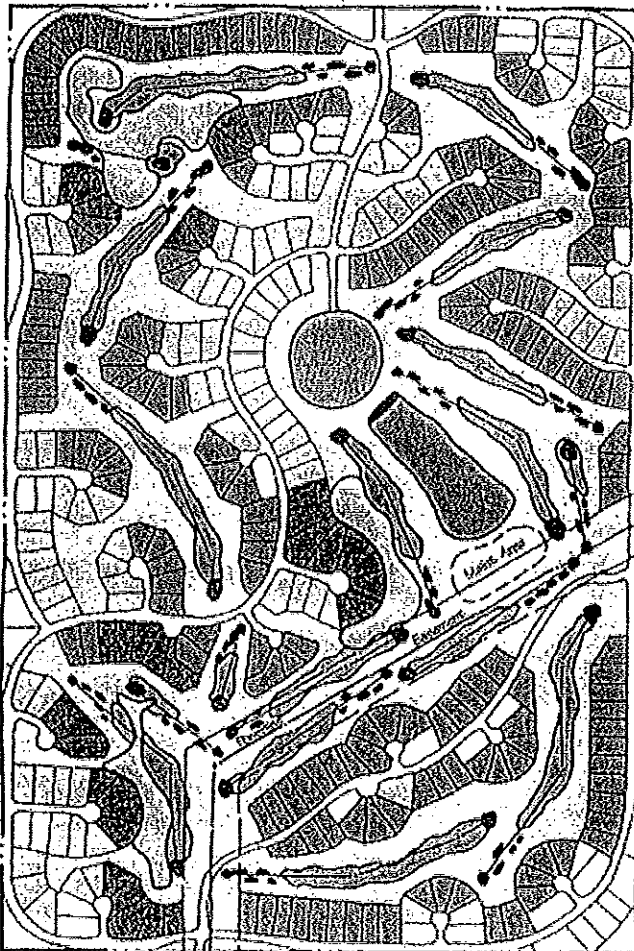
ferred. This combination provides the preferred length for the golf course with moderate flexibility in operations and maintenance and maximum golf frontage for real estate development.





Land use plans that are designed merely to maximize golf frontage do not necessarily maximize overall real estate values. A number of other factors must be considered when integrating golf and real estate. The single-fairway, returning nines configuration for an 18-hole golf course is ideal for maximizing golf frontage and therefore maximizing the opportunity to enhance real estate values. In some cases—a hotel resort or high-density development, for example—where real estate values are enhanced by views of the golf course from a high-rise building rather than actual frontage, a core course might provide greater advantages.

Whatever strategy is used to place a value on golf-oriented real estate, valuation must consider local market factors. Comparative marketability studies can aid in determining real estate values and which pricing strategies yield the best results in a particular location.

Safety in the Golf Corridor

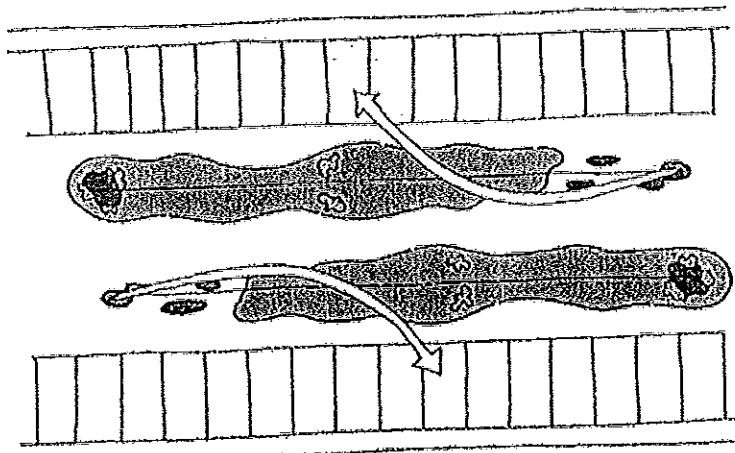
One of the most significant factors to consider in delineating the golf corridor is safety. Like many sports, golf is not inherently safe. A well-hit golf ball can reach an initial velocity of 250 feet per second or over 170 miles per hour, and a range of 250 yards or more. The golf ball thus has the potential for greater speed and range than a bullet from a shotgun, and the potential for injury can be considerable. This factor is augmented by the wide range of physical and psychological variables inherent in any golf course and the range of players' abilities. Golf is not easily mastered, and even the most accomplished players can hit a ball poorly. People have been seriously, even fatally, injured by errant golf balls, golf clubs, and golf cars. Being on a golf course during an electrical storm has resulted in many players' being struck by lightning. And the threats are not confined to golfers; pedestri-



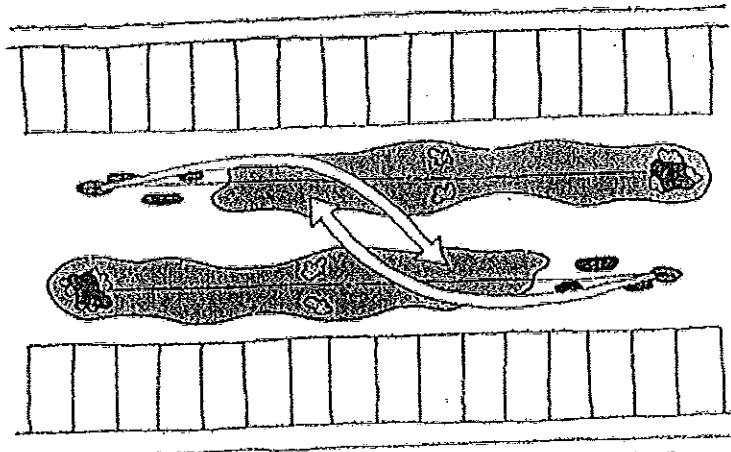
-  Prime Golf and Water Frontage
-  Golf Fairway Frontage
-  Open Space Golf Access
-  Interior Lot



A typical diagram used for analyzing real estate premiums.
Source: Desmond Mulchand, Inc.



This relationship between fairway and lot should be avoided, because most golfers are right-handed and tend to slice the ball to the right.
Source: Desmond Muirhead, Inc.



The preferred relationship between fairway and lot allows holes to "slice" into each other rather than into houses.
Source: Desmond Muirhead, Inc.

ans and motorists walking or driving by a course have been struck by errant golf balls. Golf, like life, is a challenge with risks. Thus, safety is a critical concern to anyone involved in the design, development, construction, maintenance, and operation of a golf course, or to anyone charged with responsibility for the safety of people on or near the course, or to anyone who could be injured or suffer damages from golf.

To design a totally risk-free, "safe" golf course is impossible, because numerous factors simply are beyond the control of the designer: the climate, the weather, the ability and skill of individual players. Even if a list of safety criteria could be determined for the design of a totally "safe" golf course, the cost of building such a course would be prohibitive. It is possible, however, to anticipate a few factors

that can present an undue hazard. And it is possible to find economically feasible ways to mitigate the danger.

No hard and fast rules can be associated with safety in golf course design simply because the range of variables from course to course, hole to hole, and even player to player is so vast. The increasing integration of golf courses with adjacent real estate results in conflicts in land use, and safety becomes a greater concern. Today, all areas of the golf course industry, including owners, developers, design professionals, operations and maintenance personnel, managers, material suppliers, equipment manufacturers, and individual players, must address it. Further, technical advances in the design of golf balls and golf clubs have translated into greater speed and distances, with the atten-

dant greater potential for danger from poorly hit balls or slices, hooks, and shanks. All of these factors have influenced the way golf courses are designed today, and a prudent developer would keep the following points in mind:

- Recognize and understand that land planning and the design of golf courses are intricately related to each other. The potential impact of one on the other can significantly enhance or diminish the value of a golf-oriented real estate development.
- The developer or its agent is involved as a key member in planning and design. The integration of various disciplines is ultimately the developer's responsibility.
- Regular safety reviews are part of the planning process. Additional reviews are required after any major change. Safety reviews should be made part of standard operating procedures, and they should involve all members of the design team.
- Recognize that safety is ongoing. Include allowances for fine-tuning play of the course in the budget to address any unanticipated issues after the course is put into play.

"Golf course safety" is a relative term, requiring judgment based on some mutually agreed criteria. The following brief overview summarizes a few basic, common-sense criteria for safety in designing golf courses.¹ The design standards developed from these criteria or from the consensus of experienced designers and developers serve only as *guidelines* and must be weighed case by case for specific sites.

- Golfers must use *reasonable care* commensurate with the known hazards inherent in the game.²
- Golfers assume *reasonable risk*.³
- The design of the golf course should reflect standards that do not expose golfers to undue risk.⁴
- The public has a right to free and unmolested use of the highways. Golf balls landing on or across a highway render the owner liable for maintaining a public nuisance that resulted in injuries from the hazardous condition.⁵
- A golf ball in flight beyond the perimeter of the golf course is the same as

an object falling from a structure, and the liability is comparable.⁶

- A pivotal standard cited in many court cases renders a liability if the possibility of an accident was clear to the ordinarily prudent eye.⁷
- Golf-related restrictions on adjacent private property are justifiable for reasons of safety. It is therefore reasonable to restrict the use of private property (building setback lines and so on) adjacent to a golf course.
- Owners of houses and other real estate fronting a golf course assume more risk than the public on a highway but less risk than golfers. The homeowner's uninformed and unsuspecting guests are not included, however.
- Spectators at a golf tournament assume more risk than homeowners but less risk than golfers.

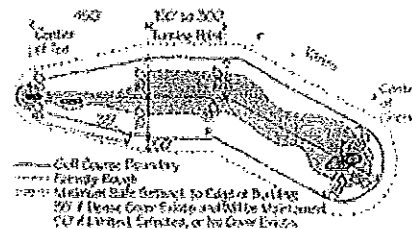
Legal terms like "reasonable care," "reasonable" or "undue" risk, "foreseeable" hazards, and "ordinarily prudent eye" provide criteria for defining and judging safety and for allocating liability. Beyond these legal concepts, however, no measurable design standards can be applied in a blanket formula that satisfies legally defined criteria for safety.

The standard 300-foot through-the-green width that became a rule of thumb in design of a single-fairway layout during the 1960s and 1970s is seriously outdated in terms of current safety concerns. It was rationalized by two concepts:

- The average golfer who hit a ball poorly (did not follow the ideal path as reflected by the centerline) did not hit the ball as forcefully as possible; therefore, the ball would not travel as fast and as far as it might.
- The farther away from the centerline, the less force powering the ball, and therefore the ball will travel even less distance.

In the double-fairway layout, the rule of thumb was that, where possible, the parallel centerlines should be no fewer than 200 feet apart. These dimensional standards are now outdated, however, with the advent of new technology and new designs for golf equipment (particularly golf clubs) to gain

more distance and the desire of many golfers to "smack the ball" as far as they can without regard for safety.



Outdated 1970s single-fairway standards. Courtesy: Patrick Shane Mulligan.

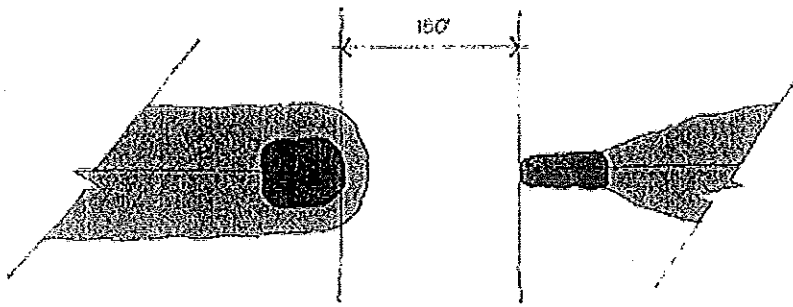
The standards of the 1960s and 1970s were coupled with caveats to consider such factors as topography, vegetation, elevation, temperature, humidity, wind, location of hazards, and elevated features like tees and greens. They are still critical, but safety is not a cookie-cutter process. Defining parameters for safety on a golf course could be a major issue confronting today's golf course developers, and any member of the team could make a decision that would directly affect safety. Golf integrated with real estate development requires the establishment of a team to review every stage of planning and design. The temptation to encroach on the safety perimeter for the golf course to gain frontage for real estate, enhance real estate values, or economize on the golf course is always considerable, and it is heightened by the fact that contemporary golf courses require substantially larger areas of land to accommodate safety in an age of high-tech equipment. Golf course architects and land planners must work with the development team to resolve the problems involved in siting a golf course next to real estate. The professional expertise, knowledge, and experience of every member of the design team must be applied toward ensuring that the public is not exposed to undue risk. In a society prone to litigation, it is in the best interests of any development project to establish the best standards and criteria for safety. Because design and construction often span long periods of time, the intent of the design and safety considerations developed during the planning process should be carefully documented to ensure that it is not compromised by later decisions.

The Safety Perimeter

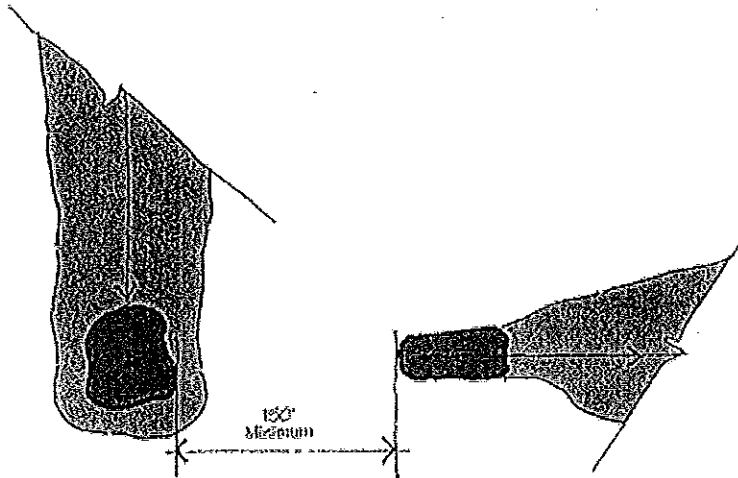
Defining the safety corridor for a golf course is not necessarily synonymous with establishing the boundary of the golf course, although the two can be related. The following definitions are used in this text. The *golf course boundary* is the legal description of the property boundary for that area of land dedicated to the golf course and its facilities. If the operation were to be sold, this legal description would be used to describe the property in the sales documents. The *golf course safety corridor* is that area of land required to play the game plus the area of land that can be affected or threatened by golfing such that limits are placed on the use of that area. For example, the golf course safety corridor might include the area within the golf course boundary plus an area around that boundary where construction of any buildings is restricted (often called a building setback line or building restriction line). The restrictions on use within the setback area must be clearly stated in legal documents (covenants, for example) describing the affected properties.

Largely because of legal implications, professionals and their attendant organizations have been reluctant to adopt any specific written criteria for golf course safety corridors. The official approach of the American Society of Golf Course Architects (ASGCA) is verbal and very general, and strongly emphasizes site-specific criteria. The prudent course of action is to contract with an experienced, reputable golf course architect early during the planning process.

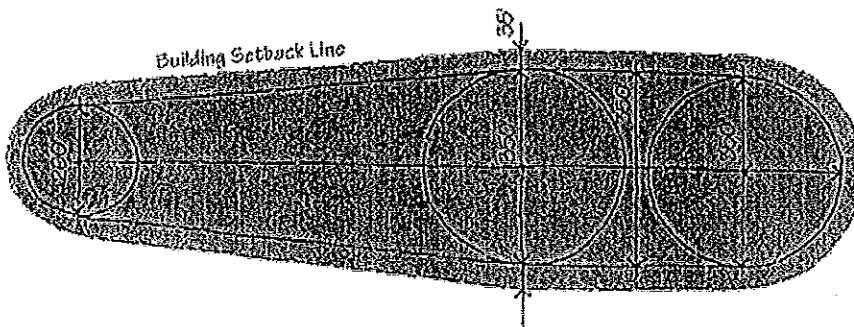
The following dimensions for the golf course safety corridor are provided solely to illustrate this discussion; they are not to be applied arbitrarily. The dimensions are based on an unrestricted flat site, and they must be adjusted to accommodate site-specific features like topography, vegetation, and elevation. Applicable local building and land use regulations could preclude the use of any dimension used in the illustrations, and this information is not a substitute for consultation



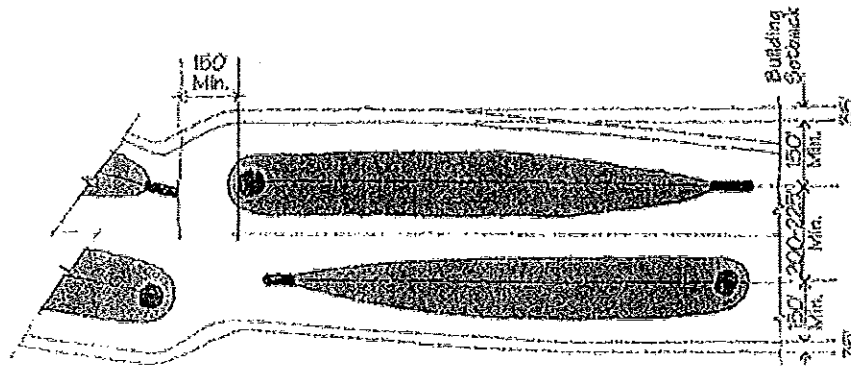
Minimum clearance between the green and the next tee.



Minimum clearance between adjacent tees and greens.



Minimum dimensions for a single-fairway golf corridor.



Minimum dimensions for a double-fairway golf corridor.

Minimum safety guidelines for a windless site on flat topography. Other conditions require additional clearances.

Source: Nicklaus Design.

with a qualified, experienced golf course architect.

- Minimum horizontal clearance between the green and the next tee is 150 feet. If the adjacent green and tees are separated by a change in elevation, the distance might be greater or less.
- Minimum clearance between adjacent tees and greens is 150 feet.
- Adjacent landing areas should be no less than 200 to 250 feet apart (from centerline to centerline).
- The centerline of a golf hole should be no less than 150 feet from any road right-of-way or boundary.
- The centerline of a golf hole should be no less than 175 feet from any boundary with adjacent development. A setback of no less than 35 feet from the boundary line should also be added.
- The minimum safety corridor for a single-fairway course with development on both sides of the fairway is 420 feet between any building in the landing and greens areas. The minimum safety corridor for a course with surrounding development in other than the landing and greens areas is 370 feet, which allows for a 300-foot corridor with 35-foot building setbacks on either side.
- On a double-fairway course, the centerlines of parallel fairways should be no less than 200 to 225 feet apart in wooded areas (where vegetation is present between the fairways) and no less than 250 feet apart in open areas (no buffering vegetation between fairways). Adding a minimum of 150 feet from each centerline to the property line yields a minimum corridor of 500 to 550 feet for a double-fairway course. If the course is surrounded by development, a building setback of 35 feet from the property line on either side yields a total minimum safety corridor of 570 to 620 feet. The safety corridor can be narrower in the area between the green and the next tee—approximately 400 feet (a 100-foot buffer off the center point of the tee, a 150-foot minimum on the green's centerline, and 150 feet between the green and the next tee).⁸

Safety on the Golf Course

The responsibility of a golfer for the safety of others, such as shouting "Fore!" to warn that a ball is approaching, is defined by rules of etiquette and enforced by golf associations. These rules and responsibilities should be posted in a readily visible location on the golf course. Handbooks specifically addressing rules and responsibilities should also be made available to every golfer and key points printed directly on scorecards. Designing a safe golf course includes not only concern for the safety of players, but also for guests, maintenance personnel, and spectators. Many design guidelines involve common sense:

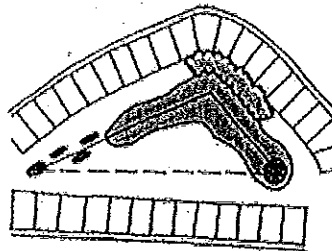
- Blind shots should be avoided, and holes should be designed so that players can clearly see the target area, hazards, and other players on the course. While several mitigating measures to reduce the risk of blind shots have been developed—special flags, caddies as target indicators, and even traffic lights—they are at best only mitigating measures.
- Shelters should be provided at key locations on the course for golfers seeking safe shelter from inclement weather, particularly lightning storms.
- Specific safety guidelines and procedures regarding lightning storms should be readily visible to every golfer, employee, or visitor.
- Circulation patterns should be readily apparent and organized to minimize conflicts between autos and pedestrians, golf cars and pedestrians, maintenance vehicles or equipment and golfers, and golfers and non-golfers, for example. A golf course, for example, is not a safe or appropriate place for a nature walk while play is in progress. Security measures should be in place to prevent intentional or unintentional trespassing on the golf course by non-golfers while play is in progress.
- Paths for golf cars should be specifically engineered as roads for vehicular traffic, not sidewalks, but the fact that the path is often a hard surface (usually asphalt or concrete) should be given due consideration when locating it. Such paths

are potentially dangerous if a ball bounces or ricochets off the pavement, and for this reason it is inadvisable to have the car path cross the fairway. The path should be out of the area of play (see further discussion later in this chapter).

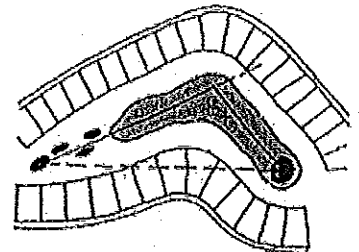
- If spectator galleries are anticipated, the course's design should specifically provide for them. Measures should be implemented to make the inherent risks of watching golf on the golf course readily apparent to the ordinarily prudent eye.
- Buildings of any type should not be used as the obstacle that forces a dogleg hole, and the inside angle of a dogleg hole should be treated as a hazardous zone. Obstacles or barriers of sufficient height, density, and width should be located on the in-

side angle of the dogleg to prevent players from attempting to hit the ball across the inside angle. Housing or any other buildings, playgrounds, recreational facilities, paths, or parking lots should *never* be located on the inside angle of a dogleg where injury or damage to property is possible!

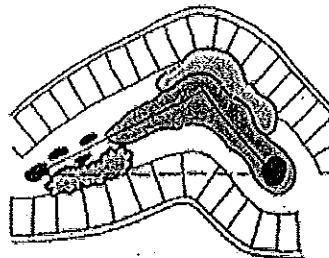
- Clear sightlines and visibility of players on the course should be maintained, particularly near landing areas and paths for golf cars.
- Signs, benches, tee markers, and other furnishings can cause a ball to ricochet, injuring people or damaging property. Their placement on the golf course and design should be seriously considered and constantly reviewed for safety.



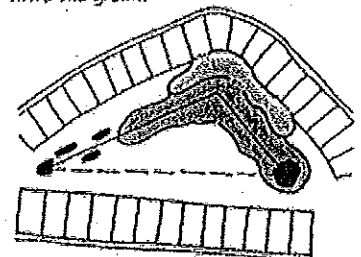
A. An acceptable design but wastes land. Trees protect lots, but golfers are likely to drive the green.



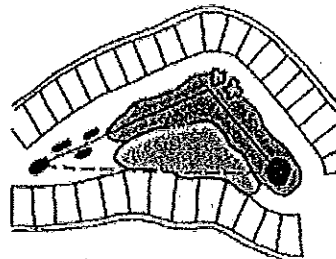
B. A layout to be avoided. Golfers are likely to overshoot the landing area or drive the green.



C. An acceptable layout if trees are large and dense. Some golfers might still drive the green, putting lots at risk.



D. An acceptable design but wastes land. Lake protects lots, but most golfers are likely to drive the green.



E. An acceptable design, because traps discourage overshooting the landing area and the lake adds value while discouraging driving the green.

Hazards must be considered when development surrounds a dogleg hole.
Source: Walter Stewart/Desmond Muirhead, Inc.

- Trees should not be considered an effective means of catching errant balls, particularly between the golf course and adjacent real estate development.

Topography and Safety

A sloped lie directly affects the distance and direction a golf ball will fly. The more severe the slope, the greater the impact on the distance and direction of the ball. Therefore, the design of a golf hole and its associated safety corridor must be adjusted to accommodate the tendencies for balls to fly right, left, short, or long despite a golfer's best efforts.

On long approach shots, the ball's trajectory tends to be low, and the ball tends to bounce and roll on impact unless the golfer can put a backspin on the ball. If a long approach shot is coupled with a downhill lie, the ball tends to travel lower and farther than if the lie is flat. The inherent danger of overshooting the target must be considered and the safety clearance between the green and the next tee or land use beyond the green increased accordingly. On short approach shots, the ball's trajectory tends to be high and to bounce and roll little on impact. If a

short approach shot is coupled with a downhill lie, the ball tends to fly lower and farther than for a flat lie. Again, the margin of safety must be increased.

On side-sloping lies, the ball tends to fly left or right, depending on whether the ball is above or below, respectively, the golfer's feet. The margin of safety between adjacent fairways and between the golf course and adjacent land uses must be increased and configured to accommodate the ball's flight pattern.

Paths for Golf Cars

The driving ability of golfers varies with the number of individuals playing golf, and it is virtually impossible to judge their ability to drive a golf car on appearance alone. Understanding the abilities, limitations, and tendencies of both vehicles and drivers provides some basis for planning and designing safe paths for golf cars.

Golfers tend to drive golf cars along the path of least resistance—along the most direct route to where the ball lands, whether paved or not—and sometimes the chosen route is not the safest route. The sensible guideline therefore is to align the path where

most golfers will find it convenient and to provide physical and regulatory means to encourage golfers to stay on the path. A majority of players are right-handed and tend to slice the ball (to the right), particularly off the first tee. Therefore, paths for golf cars should generally be aligned to the right side of the fairway, where most golfers hit their shots. An exception occurs when the hole is designed to encourage play toward the left of the fairway—where a water hazard is located on the right side of the fairway, for example. In this case, aligning the path to the left side of the fairway would be more convenient. The National Golf Foundation suggests that the path be located at least 25 feet from the edge of the fairway, a compromise between keeping the path out of play but close enough for convenient use.

The shared use of a path between two adjacent golf holes might appear to be an economical and more cost-efficient means of accommodating golf cars, but it is highly inadvisable. Shared use of a path presents a higher risk of unsafe conditions, and rarely does the shared path serve both holes with the same convenience for both golfers. If the path is not conveniently

Additional Thoughts on Safety

Include an insurance underwriter as a member of the development team.

The developer might wish to forge a link with the insurance company that will provide public liability insurance for the golf course. While no substitute exists for safe design criteria, to the extent that risks are unavoidable, perhaps they can also be insurable. Having a representative of an insurance company involved at the inception increases the likelihood that appropriate coverage can be obtained. Input from the insurance company can shed light on safety criteria based on actual claims as well as information about costs for budgeting. It is important to select a representative who is actually involved in underwriting and claims rather than a sales broker whose primary interest is a commission.

Give thought during planning to defenses for negligence.

Part of the application for a golf course adjacent to a public road, for example, should point out the issue of errant golf balls and the built-in safety criteria to minimize this risk. After entitlements are received, a planning department's signing off can be characterized as an impartial judgment of a safe design. Similarly, regarding the sale of houses adjoining a golf course, a part of the purchase agreement should be the acknowledgment of the proximity of the golf course and an assumption of the buyer's risk and/or waiver of claims. This type of provision can also be built into a community's covenants and restrictions, which attach to the title and bind succeeding owners.

Publish rules and regulations governing conduct on the course.

Consider prohibiting or limiting the consumption of alcoholic beverages on the course. Post signs prohibiting nonlicensed drivers from operating golf cars.

Alert golfers to potentially unsafe areas without admitting to an unsafe condition.

For example, a sign might say "Reduce Speed—Downhill Grade" rather than "Dangerous Grade" or "Snakes in Stream" rather than "Watch for Poisonous Snakes."

Physical safety features are generally more effective than cautionary signs alone.

Speed bumps or textured rumble strips should be considered where control of golf cars' speed is needed. On long downhill grades, safety features like "turnouts" for runaway golf cars should be considered, similar to gravel turnouts for runaway tractor-trailers on long downhill grades.

The factory's safety criteria and performance specifications for golf cars should be considered during design of the course.

If a manufacturer has published safety guidelines for the operation of its product, then the design team should consider them during design.

Safety should be an integral part of employee training programs.

Employees should be required to attend regular meetings on safety policies and practices. They should provide written acknowledgment that they understand all policies, procedures, and rules, including wearing hard hats on the course, who is permitted to handle chemicals, and the procedures for handling them.

Source: John B. Miles, McDermott, Will & Emery, Newport Beach, California.

located, golfers will not use it and the purpose of shared paths is defeated.

From the standpoint of safety, vertical and horizontal alignments should be based on the vehicle's physical capabilities to maintain controlled speed and direction of travel. The path should be intentionally designed to assist drivers in maintaining control over the vehicle, regardless of their skill in operating it. For example:

- Grades (the vertical alignment) should not be so steep as to cause the vehicle to slip backward while going uphill or to attain uncontrolled speed while going downhill.
- Horizontal curves should be gentle and sweeping rather than sharp and abrupt to maintain control around curves.
- The path should include no abrupt dips or bumps that might cause the driver to lose control; grades should be carefully engineered.
- Curves at the beginning, end, or middle of an incline should be engineered to help the driver maintain control.
- Pavement on the path should be crowned or sloped for proper drainage, as excess water on the surface can cause the driver to lose control.

Design of a safe path for golf cars requires that the path be engineered and designed for vehicular travel, just like roads for automobiles, considering such factors as:

- The vehicle's physical capabilities (turning radius, speed, braking distance, et cetera);
- Design speed (maximum desired vehicle speed);
- Friction (ability of the surface to hold the vehicle in place);
- Centrifugal force (the tendency of a vehicle to leave a path on a curve);
- Sight distance and average eye height;
- Grade (percentage of slope);
- Minimum safe radius for curves;
- Rate of superelevation of curves (the banking curve to help hold the vehicle to the pavement);
- Maximum safe slope;
- Maximum safe length of a slope;
- Minimum safe sight distance; and
- Minimum width of the recovery area (an unobstructed, relatively even area next to the pavement that provides

an opportunity to bring an out-of-control vehicle back onto the pavement).

Typical paths are constructed of a hard surface like concrete or asphalt, but the hard surface also presents safety hazards from balls ricocheting off the pavement. Other pavement materials might present less risk but have other consequences in terms of cost and maintenance. Such alternatives include loose materials like gravel, stone dust, or ground shells for paths and open-celled paving units or geotextiles designed to support vehicular traffic that permit grass to grow as part of the pavement surface.

Special attention must be given to the routing of foot traffic and golf cars on slopes. Slopes are prone to wear and tear and to erosion, and the problems and conflicts with safety increase with severity of the slope. Generally, gently ramped paths should be provided for both golf cars and foot traffic in steep areas. Gentle switchbacks can be used to provide adequate horizontal distance to negotiate the vertical change in elevation. A sufficient turning radius and leveling or grading at regular intervals must be provided to help maintain the golf car's speed and direction of travel.

Intended versus Perceived Line of Play

The centerline of a golf course is not an engineered, fixed line, and no white line is painted down the middle of the fairway. The centerline is one of several ideal flight lines, or the mean of several flight lines, of an ideally struck golf ball responding to the challenge of a particular hole. The challenge might include forced carries over water, an unplayable rough, bunkers, trees, and other vegetation. The golf course architect must take into account all the implications of these elements and others that might affect golfers' responses. For a golfer, the ideal line of play is largely a psychological perception, and the player's perception of the line of play is highly vulnerable to change, with its significant implications for safety. Seemingly minor operational procedures, such as the position of tee markers or the mowing pattern of the turf, can dramati-

cally affect a golfer's perception of a hole and how he or she decides to address the challenge. A major change to the course, such as expansion of a storm-water retention pond toward an adjacent fairway, also affects the perceived centerline of play. Whenever the design of a hole is changed, the resulting impact on safety must be analyzed. Ongoing reviews of safety should be an integral part of every phase of planning, design, construction, and operation.

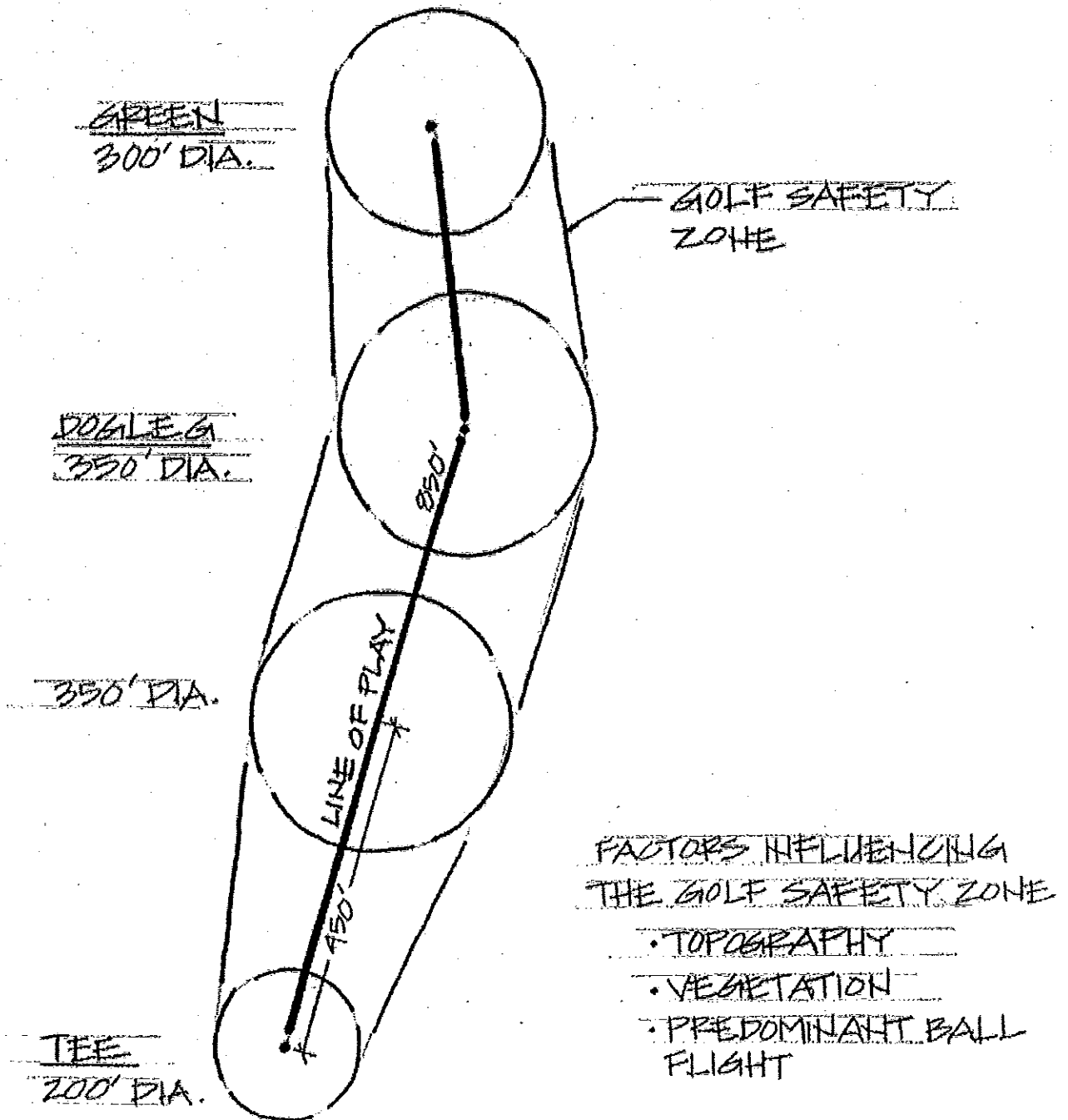
Other Safety Issues

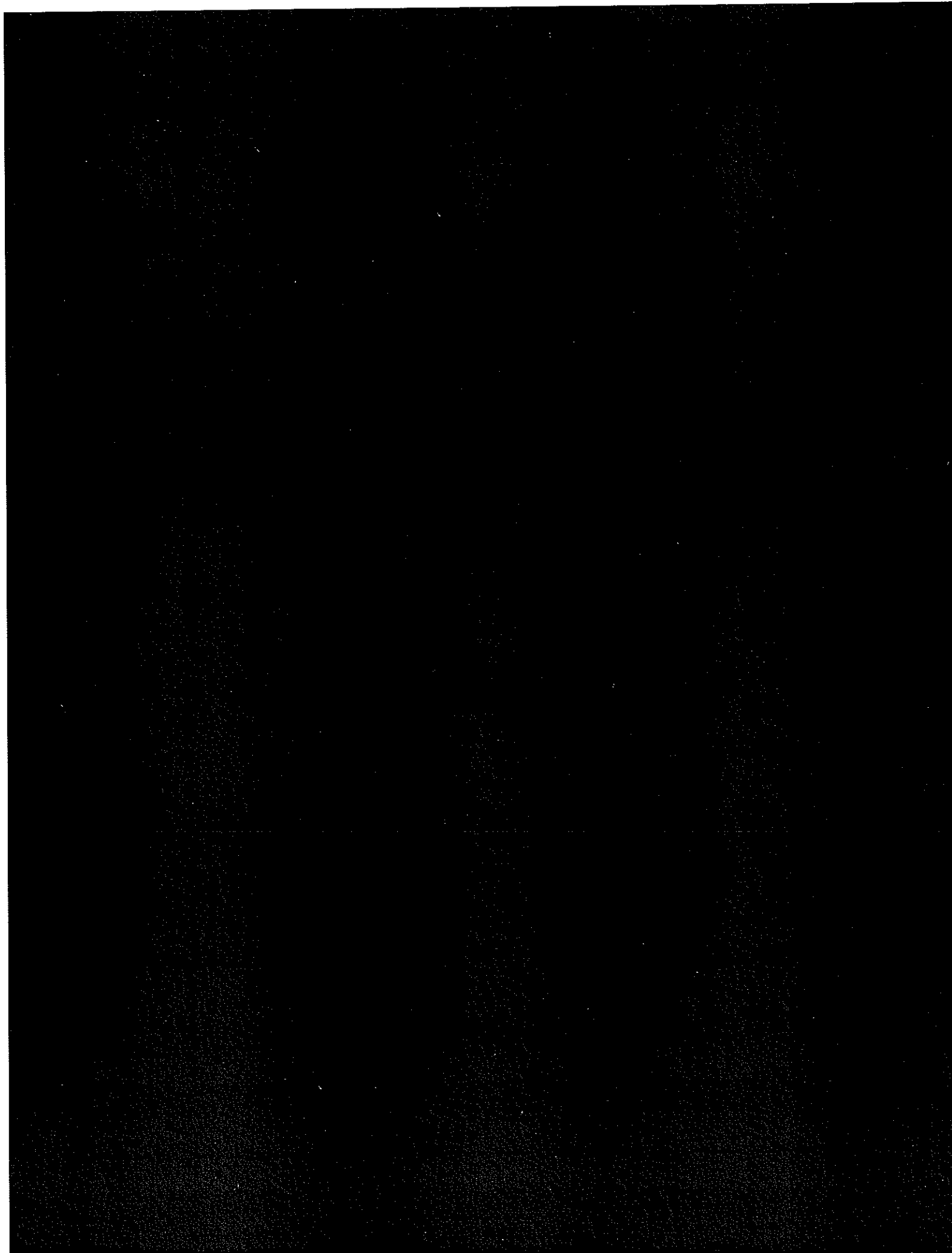
The range of safety issues of concern to any type of real estate development—with or without golf—includes compliance with all federal, state, and local regulations covering employees' safety, building codes, environmental protection regulations, and the like. Some of them involve design, others operational and management policies and procedures. Dangerous conditions can be the result of oversight, ignorance, negligence, or choice.

The restriction of nongolfing and unauthorized uses of a golf course can still find a developer liable for untoward events. The *attractive nuisance* of a large pond on a hot day can invite swimmers, and the slopes of that pond's banks should anticipate the possibility of a child's attempting to wade into the pond. Another potential exposure to liability is the "Central-Park-at-night syndrome," in which the operator of a golf course was found responsible for not warning golfers in a remote location that muggers might be an additional hazard during off-peak hours. Inappropriate access and abuse during construction and when a course is in operation are always of concern.

While compromising safety might have some short-term "benefits," such as reduced costs or increased developable real estate, it is without question an unacceptable approach to responsible design. The benefits are usually illusory and the results often counterproductive. The burden is on the developer and the team to ensure that no such conditions are created. The starting point is to be aware of the potential problems and to address the issues effectively during planning and design.

RECOMMENDED GOLF SAFETY ZONE AS IT RELATES TO RESIDENTIAL DEVELOPMENT





VI. Response to Public Comment - Golf Course Irrigation Demands

This section provides a summary of the irrigation demands for the golf course and the associated aquifer testing activities carried out at the Preserve during the summer and fall of 2004.

Background

BL Companies has been retained by River Sound Development, LLC to provide consulting services regarding the development of the site (planning, site design and permitting), including development of an irrigation water supply source for the proposed 18-hole golf course.

An on-site irrigation supply is desired. Use of public water is not preferred due to cost and other logistical considerations. Public supplies should be maintained for potable use.

Connecticut Water Company (CWC) will provide potable supply. The CWC has indicated in writing that it has the available water supply and is willing to supply the residential component of the project. The CWC also has indicated that it does not object to the use of an on-site ground water supply for irrigation of the golf course.

Irrigation Demand

Irrigation demand calculated is based on the number of acres of fairways, tees, and greens for the proposed golf course.

The irrigation season for a typical New England course is April to October (approximately 210 days per year). The irrigation wells will not be used from November to April, and therefore, there is not a continuous withdrawal on the bedrock aquifer.

Average irrigation demand ranges from 50,000 gallons per day (gpd) in spring and fall to 250,000 gpd in July. During drought conditions in July or August, demand can increase to approximately 300,000 gpd. Average annual use is expected to range from 50,000 gpd to 70,000 gpd.

To put these numbers in perspective, assuming 1,000 acres, 44 inches of annual precipitation, and 25 - 50% recharge to the bedrock aquifer, the annual recharge to the bedrock aquifer is estimated at 302 million to 605 million gallons per year. The amount of water required for irrigation is approximately 5 to 10 % of this annual recharge. This does not take into account recharge to the bedrock aquifer from off-site areas that border the site.

Peak irrigation demands will be met from a combination of pumping the wells and withdrawal from lined storage ponds located in upland areas of the site.

Development of On-site Supply

BL Companies has conducted a geophysical survey of the site and identified six locations across the site that have the potential to act as water supply sources for the irrigation water supply system.

At these six locations, test wells have been drilled into the bedrock aquifer.

Well depths range from 300 feet to 600 feet below ground surface.

Based on preliminary pumping tests conducted on these wells, three of the six wells were identified to have yields sufficient to act as irrigation supply wells.

Aquifer Testing

BL Companies has conducted a long-term aquifer test of these three wells. The long-term aquifer test consisted of simultaneously and continuously pumping the three proposed test wells (TW-2, TW-3 and TW-4) for a period of 189 hours. The combined pumping rate of the three wells during testing was 150 gallons per minute (gpm), which is the maximum anticipated pumping rate during golf course operations. The testing occurred from September 17 to September 25, 2004.

The purpose of aquifer testing is to determine:

- a) Determine if the wells can meet the irrigation demand without any consideration to adverse impacts to wetlands, watercourses, or other ground water uses.
- b) Determine amount of water that can be safely pumped without long-term impacts to off-site residences.
- c) Determine amount and location of interference (if any).
- d) Determine if pumping impacts surface water or wetlands.

This testing is required as part of the process to obtain a Ground Water Diversion Permit for the site from the Connecticut Department of Environmental Protection (CTDEP).

Off-site Well Monitoring

BL Companies was requested by the CTDEP to attempt to monitor off-site private wells as part of on-site testing activities. We have chosen specific homes based on criteria adopted by the CTDEP for monitoring domestic wells during pumping tests. These criteria require monitoring homes within a specific distance from each pumping well based on the pumping rate for each well. Approximately 115 residences were identified based on these criteria (3,000-foot radius from wells TW-2 and TW-3, and 2,000-foot radius from TW-4). We invited all homeowners within the monitoring radii to allow monitoring of their well during testing activities. Of the 115 residences canvassed, 52 homeowners allowed BL Companies to monitor their well.

Off-site well monitoring was conducted using automated water level recorders before, during, and after the test period.

On-site Monitoring Activities

Before, during, and after the test pumping period, surface water levels and stream flows were monitored at the 56 on-site monitoring points. The monitoring points consisted of wetland

monitoring piezometers, streambed monitoring piezometers, stream flow weirs, deep piezometers, and ground water monitoring wells. During the 1-week pre-testing period, the water levels/stream flows were measured once daily. During the test pumping period, the monitoring points were measured at least two times per day. Post-test monitoring was conducted daily for a period of 8 days after testing stopped.

Aquifer Testing Results - Preliminary

From the preliminary data analysis carried out to date on both the on-site and off-site monitoring points and residences, there was minimal impact to on-site monitoring points. There was no identifiable impact to wetland monitoring points, streambed water levels or stream flows due to pumping. There was measurable drawdown in a deep overburden piezometer (DMP-05 near TW-3) indicating leakage between the overburden and the bedrock aquifer.

Off-site impacts were identifiable in only two of the 52 wells monitored. The impact to these wells was observed to be minimal and will not impair the ability of these wells to meet average daily demand under normal or drought conditions, based on conservative analyses required by the CTDEP.

Diversion Permit Process

Once BL Companies has fully evaluated the data gathered from the aquifer testing and monitoring, a report will be prepared documenting the testing and monitoring activities along with the results of the testing. An application (along with the aquifer testing report) for a Ground Water Diversion Permit will be filed with the CTDEP. A permit is required because the irrigation system has the capacity to withdraw greater than 50,000 gpd.

This review consists of an evaluation of the technical documentation provided in the application as well as an assessment of the site and of the anticipated effects of the proposed activity. Upon completion of this technical review, a tentative determination to grant or deny the permit application will be made by the Commissioner.

A Notice of Tentative Determination will be published in a newspaper having a general circulation in the affected area and public comments will be solicited on the tentative determination. In some cases, a public hearing may be held. After completion of the technical review and consideration of any public comments, and subsequent to the close of any hearing, CTDEP will issue a final decision on the permit application.

A copy of the final report will be made available to the Towns of Westbrook, and Old Saybrook

Permit Compliance

Once granted, the operator of the golf course will be required to submit monthly pumping logs to the CTDEP to demonstrate that pumping is equal to or below the maximum permitted withdrawal.

If water supply problems arise at neighboring properties that are clearly due to the use of the irrigation wells, CTDEP has the authority to stop the withdrawal from the irrigation wells. In

addition, the use of the irrigation wells will be subject to CTDEP drought management planning requirements and restrictions.

Diversion Permits are typically issued with a 5 or 10 year permit period and require renewal. The renewal process can be a rigorous process and can require additional impact analysis if deemed necessary by the CTDEP.

Proper irrigation is a major component of the Turf Management Plan and the CTDEP Best Management Practices for Golf Course maintenance and operation. With the use of sophisticated valving and computers, the practice of over-watering is eliminated and prevents excess run-off and waste.

Response to Staff Comments – “Open Space Plan”

a. ZEO Comments

Private Country Club

It has been suggested to encourage the applicant to reduce the amount of disturbance within the upland review area as it relates to the Private Country Club. The Club with a golf course is proposed as part of the Preliminary Open Space Plan. Both the Country Club Clubhouse and related facilities have been substantially scaled down from those previously approved by the Zoning Commission. Similarly, the golf course routing, which was approved by both the Zoning Commission and Wetlands Commission, has been shortened and modified in several respects in response to environmental recommendations by Randall Arendt, Michael Klein and Michael Klemens. The applicant has followed this recommendation and will continue to do so.

All uses on site have been taken into consideration within the planning of the internal roadway system and the traffic study submitted on November 3, 2004. In fact the traffic study assumes ALL traffic generated by the golf course use will come from off site. Certainly this is a worst case scenario for the development of the property. This traffic study also includes the potential development of the Pianta Parcel. For clarification we have included a listing of all proposed uses and the spatial requirements associated each use. It must be noted that all uses are for members only and NOT open to the public and no guest homes or housing for staff is or will be provided.

<u>Use</u>	<u>Building Area</u>
a. Clubhouse (includes mechanical, storage and circulation)	
Basement	8,850 SF
First Floor	8,850 SF (grill room with 75 seats, no banquet facility)
Second Floor	none proposed
<i>Subtotal</i>	<i>17,000 SF</i>
b. Pro Shop	(767 SF) included within Total of clubhouse basement
c. Cart Barn	(3,600 SF) included within Total of clubhouse basement
d. Maintenance Buildings	9,045SF
Total Area of All Uses	26,045 SF

The facility could not nor is it intended to accommodate any events anywhere near the size of the GHO. Any speculation in that regard is totally unwarranted. In order to assure that the facilities are limited can be accomplished at the time of the application as a Special Exception (Z.R. §52.7.16) or

as a use within a Planned Residential Development (Z.R. §55.6.9.1). The limitations will be incorporated into the Statement of Use required for such applications and can be made specific conditions of the Permit. At this stage we are also prepared to amend our Statement of Use for this Special Exception to provide such necessary required limitations.

Infrastructure, Traffic & Circulation

The Board of Selectmen has encouraged the use of Alternative Road Standards and the applicant concurs with this recommendation. The Town's Consulting Engineer may recommend pavement widths wider than proposed in certain designated areas. The applicant is prepared to comply with any such requirements at the time of final subdivision approval. Again, the Preliminary Open Space Plan is not intended for such final detail.

Best management practices will be employed in the final design throughout the entire project area. Permeable surfaces will be proposed for parking areas, village back lanes, and open space trails which are not for golf use. A comprehensive treatment train for stormwater runoff composed of mechanical and biological means will be employed. All trails and walks do and will lead to a destination such as housing, public space, or Town owned open space.

No uses requiring impervious surfaces, other than three road crossings and golf cart paths, are proposed to be located within 100' of a wetland area. All roadway drainage will be pretreated through mechanical and natural means prior to discharge into wetlands, as described in the preliminary meeting with the Applicant and the Wetlands Commission. The applicant is prepared to present full engineering details consistent with the above at the time of the required application to the Wetlands Commission for approval of the regulated activities associated with the Open Space Subdivision and PRD. All wetland crossings (roadway and golf) have considered alternative designs and are situated in locations, which minimize the potential impacts for to the wetlands and environment.

The trail system within the Open Space is designed for pedestrian use only, as distinguished from those areas adjacent to roadways that are also suitable for biking. Since the trail system is located mostly within the Open Space to be conveyed in fee to the Town, it will be able to enforce such use restrictions. The applicant will fully cooperate with the above in the detailed design phase.

The goal of the applicant is to minimize unnecessary land clearing and disturbance. Two objectives employed to accomplish this include utilization of the town's Open Space Subdivision regulation and the policy statement of alternative roadway design standards. These standards have been discussed with staff during the summer of 2004 and were encouraged by the Board of Selectmen at its meeting on September 16, 2004. (see Response to Town Comments, dated November 10, 2004) The Planning Commission has received comments from the town traffic consultant (such as a recommendation for wider roadway widths) that appears to be contradictory to the standards which were discussed with and endorsed by staff and selectmen This is a result of the reviewer NOT being part of or privy to the previous meetings in July 2004 – when roadway design standards were discussed. Wider roads lead to greater disturbances on the landscape. We believe they should be no wider than reasonably required.

It is not a legal necessity to construct all sidewalks and trails with handicapped accessibility. However, all walks and trails will be constructed to meet ADA requirements where feasible. To do otherwise would lead to greater disturbances in the landscape and would be counter-productive. In

fact, village housing has been designed to allow for 'visitability' – a means of allowing not only handicapped residences but visitors to be able to move within a home with ease. Additionally, each village home can accommodate a residential scale elevator.

In past response dated November 10, 2004 a discussion was provided regarding various access points to the property. We understand that this is a point of discussion with the commission and town staff. In any event the Home Owners Association will maintain the emergency access gate if it remains in place as proposed.

Planned Residential Development (PRD)

The village back lanes (aka "alleys") are proposed to be 18' in width, the same as many local streets. Turning movements at each intersection have been designed in consultation with the fire marshal and fire chief to provide for access by emergency vehicles and service vehicles. Visitors may park in the rear lanes. However, it is more likely that visitors will park in the front of a home in designated on-street parking locations. In the case of front access driveway, visitors may also park within the driveways.

A goal of the applicant and certainly a significant component of promoting neighborhoods is the provision of green and social spaces. There are eight proposed green spaces ranging in size from 2,000 SF to 35,000 SF and totaling 3 acres. The specific uses of these spaces have not yet been defined, as this application is preliminary in nature only. However, it is envisioned that the greens will allow for passive recreation, light recreation, monuments for creating identity and defining social gathering spaces. We believe such specific review comments are more appropriate for the final site plan application.

The layout of the golf course has taken into consideration as to its proximity to other site uses – including housing. The driving range and practice area are accessory to the private golf course and will not be open to the public. Such facilities are provided at almost every like golf course facility (Black Hall, Fox Hopyard, Clinton Country Club, etc.) It is typical for a driving range at a private course - such as proposed at The Preserve - to have significantly fewer users than at a public commercial practice facility like that adjacent to Cherrystone's Restaurant on Route 156 in Old Lyme. Public driving ranges are designed for far different user needs, and comparisons between the two are invalid.

Furthermore, the Preserve practice range has been designed with the proper industry standards for setbacks to residential areas for safety, privacy and compatibility. Buffers to adjacent residential uses will be provided by earthen berms and evergreen and deciduous plantings. There will be no lighting of any portion of the golf course including the driving range and all practice areas. Minimal lighting will be proposed and restricted to the parking area, and adjacent to the clubhouse at a level sufficient for safety and security. In addition, future homebuyers of property at the Preserve will be purchasing homes with the knowledge of community uses and for the specific reason to live within a golf community.

Lots for Single Family Dwellings (SFD)/Estate Dwellings

Several comments have been made with respect to specific measures of land conservation and protection. At this point in time and considering the nature of the application the applicant feels it is not necessary to address the comments in detail and on the plans. However, we do agree with the

objectives of these comments and the applicant will employ these measures to the greatest extent practical during the detailed design stages.

The measures of conservation and land preservation the applicant will consider include are:

- Clearly identifying conservation easements not only on the plans but, at time of construction and during occupancy.
- Encourage shared driveways to minimize intrusion into regulated and upland review areas.
- Encourage minimum tree clearing and impervious driveways near wetland/water resources to prevent leaching of non-point source pollution into the fragile headwaters of their watersheds.

It has been suggested that the Planning Commission request several modifications to the site plan to reduce potential disturbances within the 100' upland review area including relocating boundaries, housing lots, incorporating shared driveways and requesting waivers of standards. We offer the following suggestions:

- SFD Lots with activities or property lines within the 100' upland review area:
 - Each lot identified within the review comments will be further evaluated and all activities and property lines will be removed from the upland review areas. If this is not feasible a conservation restriction can be provided. These are final planning details which the applicant is prepared to adhere to in the required future application to the Wetlands Commission.
- Request waivers of number of lots to be served by a shared driveway.
 - Waivers will not be required because Private Residential Streets are proposed.
- Relocation of SFD Lots:
 - Suggestions associated with relocating cluster will be further evaluated and reconsidered at the time of final design.

It has been suggested that ALL lots conform to section 7.2 of the Old Saybrook Zoning Regulations. The referenced section is associated with the MABL requirements of a conventional subdivision. This section is not applicable to an Open Space Subdivision which is the subject of this special exception application. Section 56.6.3 of the Zoning Regulations establishes specific lot, area, shape and frontage requirements applicable to an Open Space Subdivision. All the SFD lots in the Preliminary Open Space Plan meet the requirements, and, of course, all the SFD lots in the final plan will have to meet these requirements. The applicant respectfully disagrees with this comment.

Aquifer Protection

Although The Preserve property is not located within the Saybrook Well aquifer protection area and only a small portion at the westerly boundary line is within the Holbrook Well aquifer protection area, the applicant remains committed to ensure the highest standards to protecting the ecology of the site – this includes protecting water quality as well as groundwater. Plans will be updated to identify

the location of any aquifers and as previously discussed various best management practices will be utilized.

Uses

Since the applicant proposes to have all its property include as a PRD, the Zoning Commission can limit the uses within the PRD, including uses of the SFD, within that approval process.

b. Alternate Road Standards

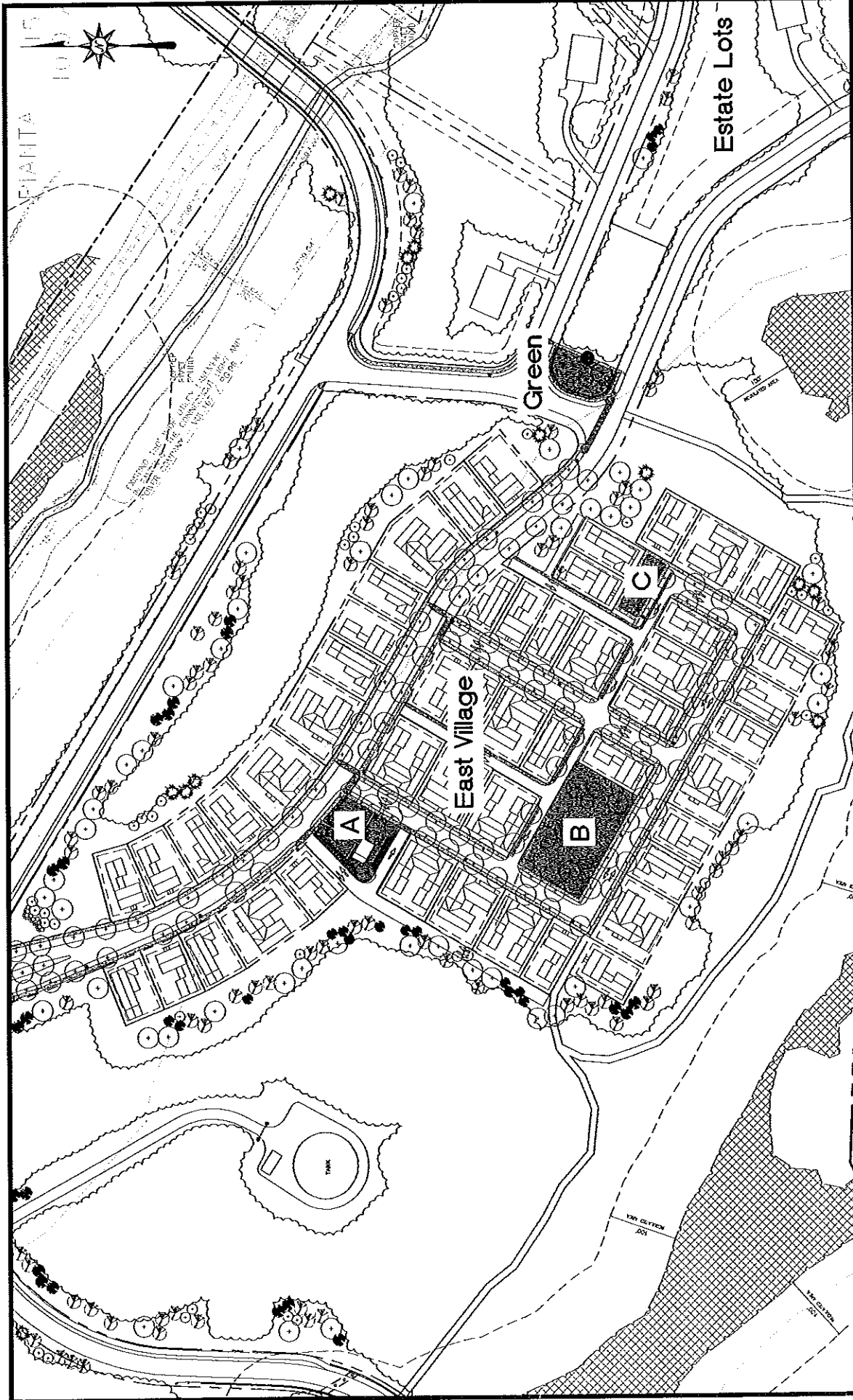
The applicant would like the commission to be aware that its use of alternate road standards in its conceptual standard plan and preliminary open space plan was only done after prior consultation with the staff and with the encouragement of the Board of Selectmen. These standards were used to limit disturbance within the landscape consistent with the Policy Statement promulgated by the Board of Selectmen. We request that the review be conducted by these proposed standards so that they will be included as part of any approved open space subdivision plan.

c. Is the Golf Course Integral to Open Space Plan?

The golf course is an integral element of the open space plan for a variety of reasons. The golf course provides an active recreational amenity for use by those residents and non-residents of the Preserve who belong to the club, and enhances the value of the surrounding real estate. The golf course is 'green' in nature—it is virtually all pervious surface, will contain a variety of landscaping and foliage, and will provide migratory surfaces for natural wildlife. It has been carefully designed to fit within the environmental constraints of the property.

In addition, the golf course has economic value to the Town of Old Saybrook, as well as the developer. The Town will receive substantial real property taxes from the Country Club Clubhouse and Golf Course, both of which are fully taxable. The Club will not require any substantial services from the Town in police or emergency services and will have no impact on the school system.

In consideration of an open space plan, it is common that the developer receive a 'density bonus' not only for conserving land, but for dedicating such land to the Town. In lieu of such an incentive, in the case of the Preserve the developer is only able to reduce the maximum potential density by reason of the golf course's inclusion.



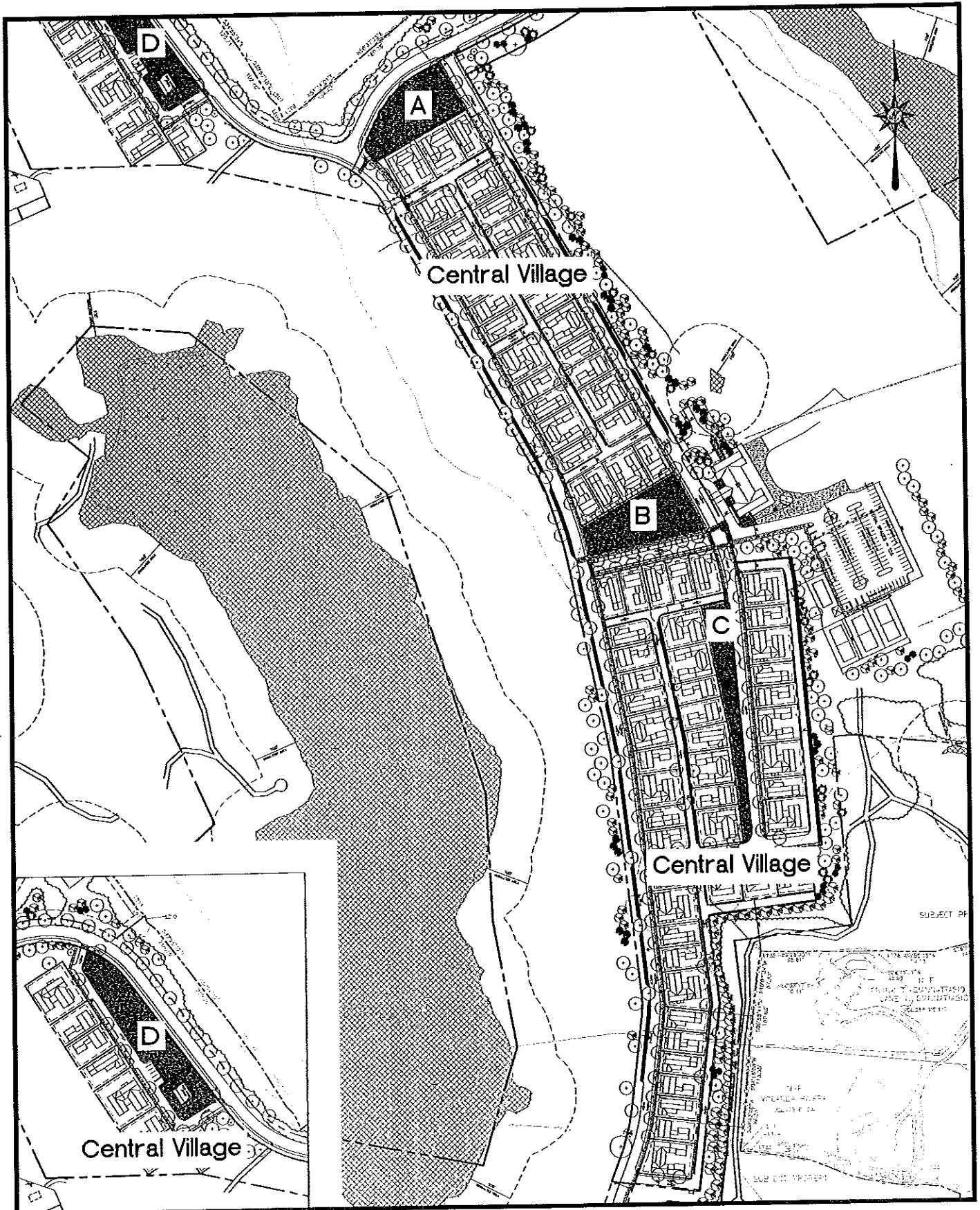
East Village/ Estate Green Key Map
THE PRESERVE
 AN OPEN SPACE AND RECREATION COMMUNITY
 OLD SAYBROOK, WESTBROOK
 MIDDLESEX COUNTY, CONNECTICUT

Designed
 Drawn
 Checked
 Approved
 Scale
 Project No.
 Date
 CAD File

D.C.G.
 K.T.
 1" = 200'
 01C955-F
 11/14/04
 PB-VILLAGEGREEN-1



Xref(s):



Central Village Key Map
THE PRESERVE

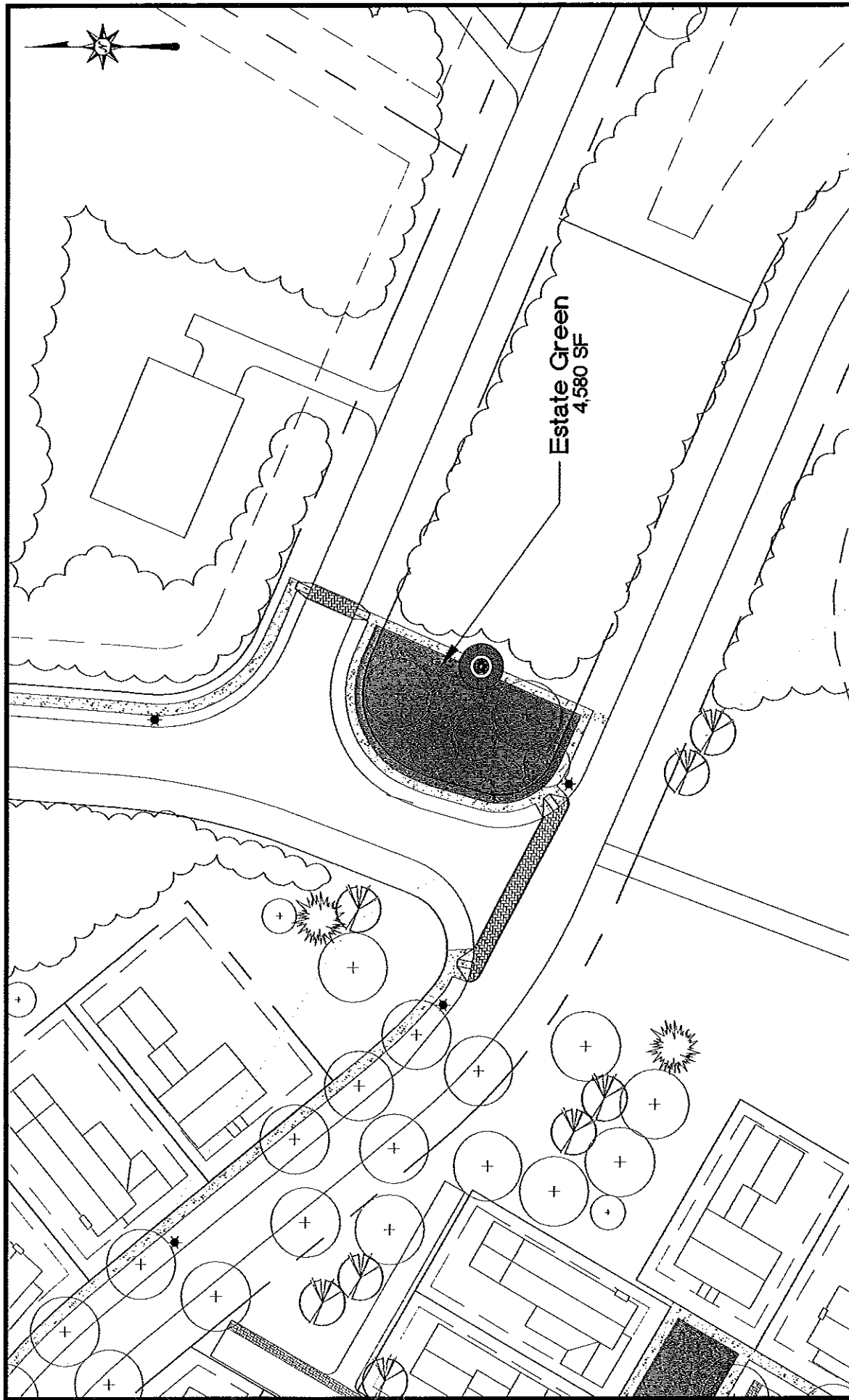
AN OPEN SPACE AND RECREATION COMMUNITY
 OLD SAYBROOK, WESTBROOK
 MIDDLESEX COUNTY, CONNECTICUT

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 Drawn K.T.
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 Approved
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 Project No. 01C955-F
 Date 11/14/04
 CAD File PB-VILLAGEGREEN-2

VG-00-B



Xref(s):



Estate Green
THE PRESERVE

AN OPEN SPACE AND RECREATION COMMUNITY
 OLD SAYBROOK, WESTBROOK
 MIDDLESEX COUNTY, CONNECTICUT

Designed
 Drawn
 Checked
 Approved
 Scale
 Project No.
 Date
 CAD File

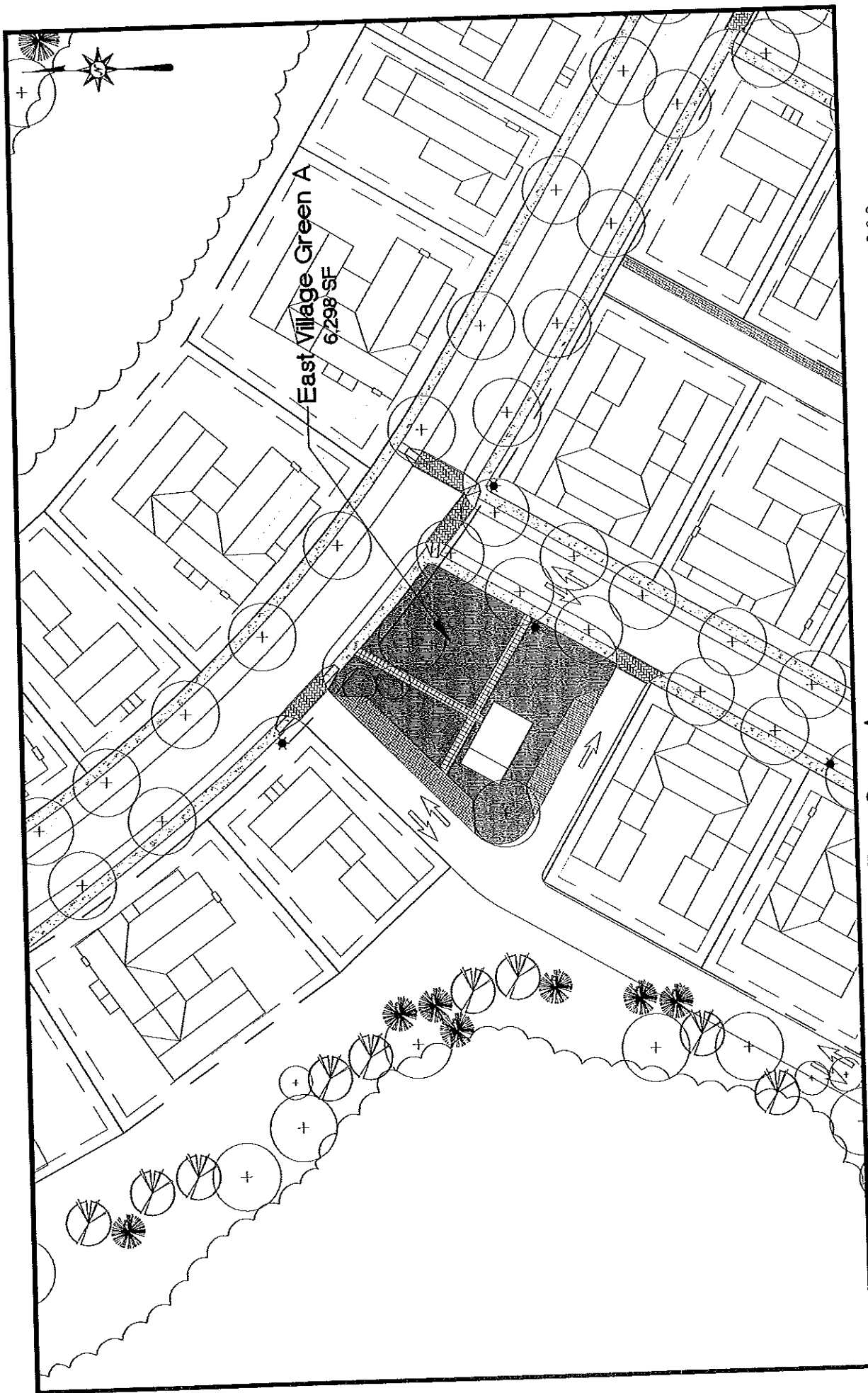
D.G.G.
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1" = 60'
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 11/14/04
 PB-VILLAGREEN-1

VG-1



Xref(s):



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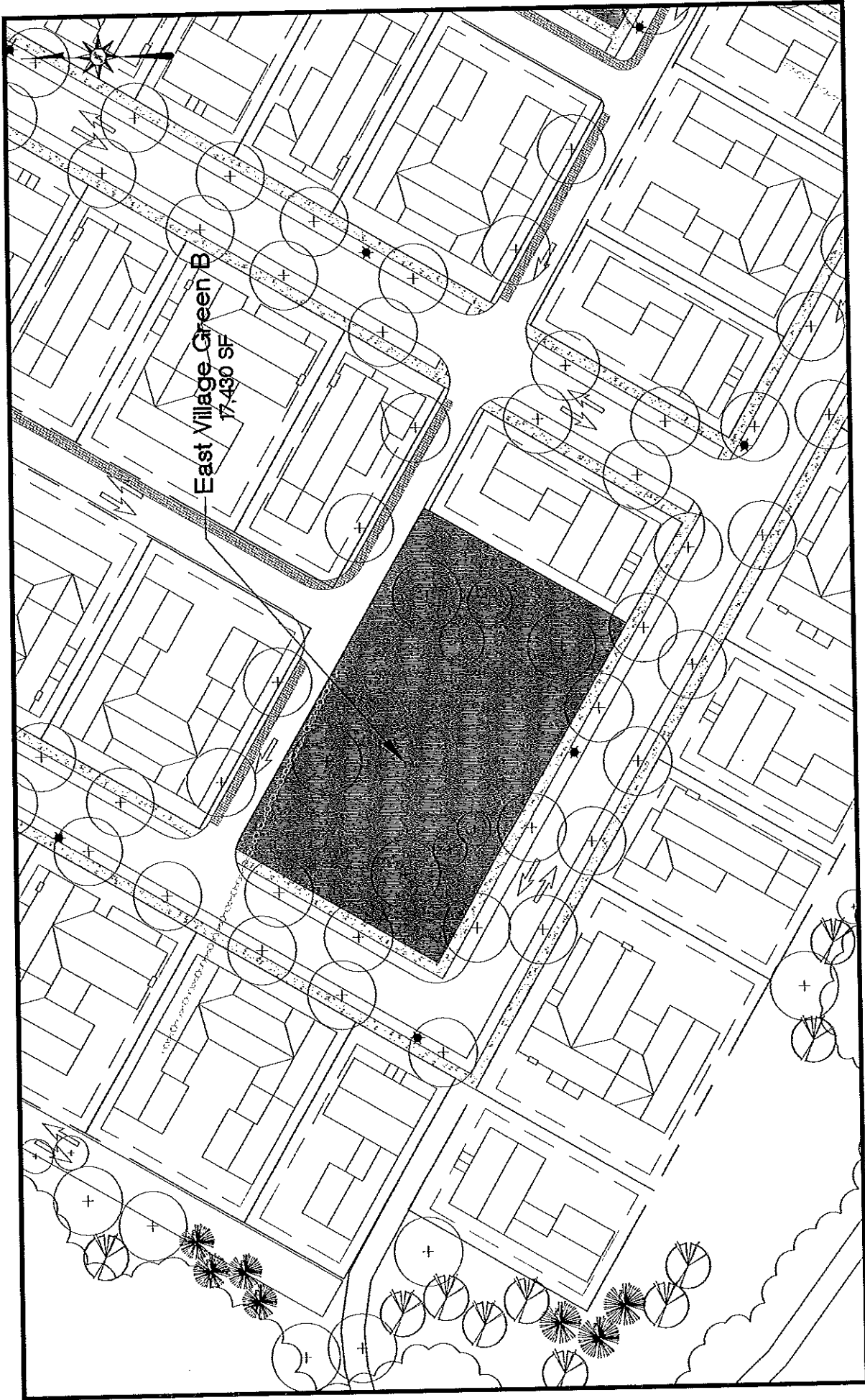
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11/14/04
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East Village Green A
THE PRESERVE
AN OPEN SPACE AND RECREATION COMMUNITY
OLD SAYBROOK, WESTBROOK
MIDDLESEX COUNTY, CONNECTICUT

Xref(s):



VG-2



**East Village Green B
THE PRESERVE**

AN OPEN SPACE AND RECREATION COMMUNITY
 OLD SAYBROOK, WESTBROOK
 MIDDLESEX COUNTY, CONNECTICUT

Designed D.G.G.
 Drawn K.T.
 Checked
 Approved
 Scale
 Project No.
 Date
 CAD File

VG-3

1" = 60'
 01C955-F
 11/14/04
 PB-VILLAGEGREEN-1

Xref(s):





East Village Green C
THE PRESERVE
 AN OPEN SPACE AND RECREATION COMMUNITY
 OLD SAYBROOK, WESTBROOK
 MIDDLESEX COUNTY, CONNECTICUT

Designed
 Drawn
 Checked
 Approved
 Scale
 Project No.
 Date
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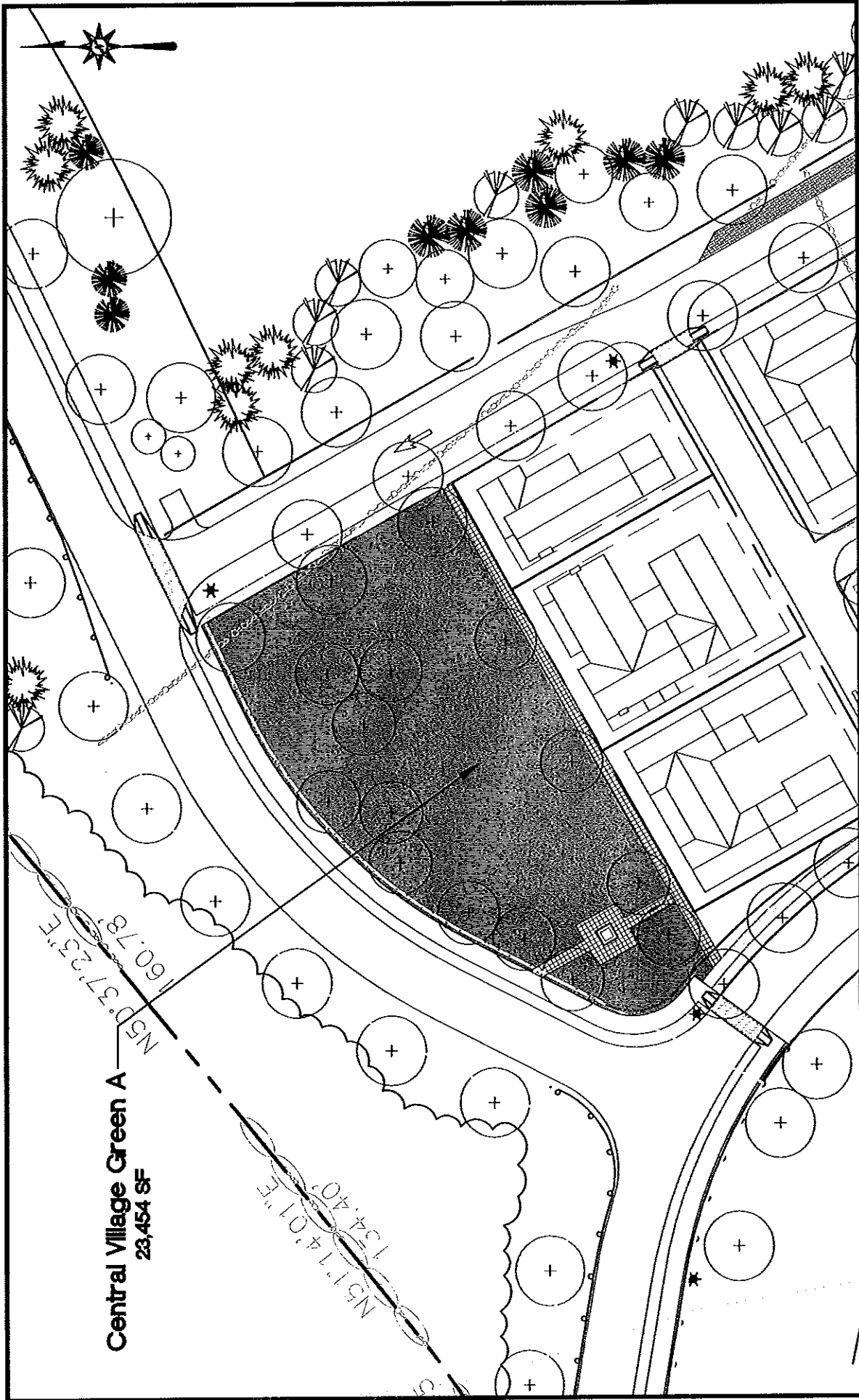
D.G.G.
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VG-4

1" = 60'
 01C955-F
 11/14/04
 PB-VILLAGEGREEN-1



Xref(s):



Central Village Green A
23,454 SF

N50°37'23"E
160.78'

N61°14'01"E
134.40'

Central Village Green A
THE PRESERVE

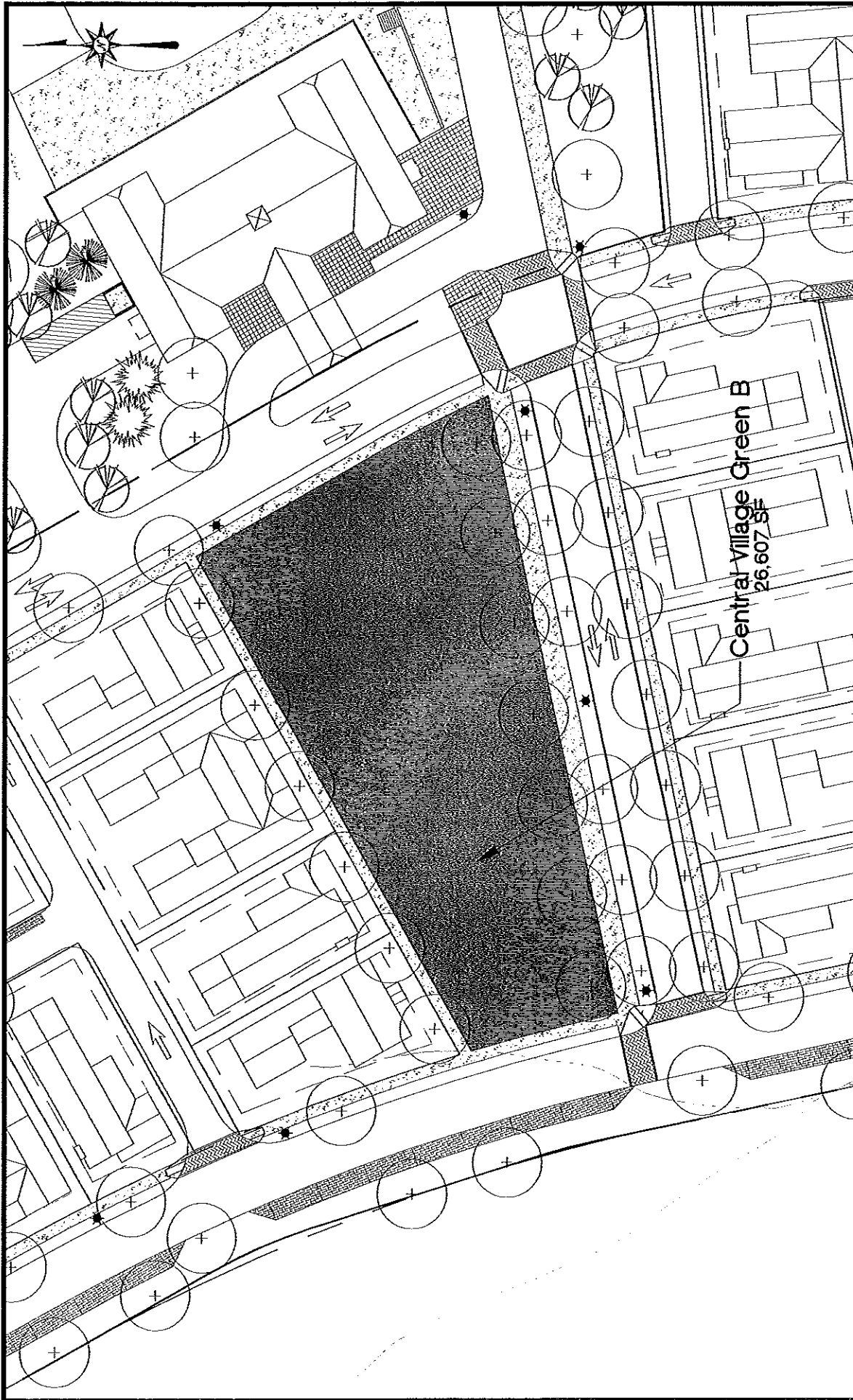
AN OPEN SPACE AND RECREATION COMMUNITY
OLD SAYBROOK, WESTBROOK
MIDDLESEX COUNTY, CONNECTICUT

Designed D.G.G.
Drawn K.T.
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Approved
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Project No. 01C955-F
Date 11/14/04
CAD File PB-VILLAGEGREEN-2

VG-5

Xref(s):





Central Village Green B
THE PRESERVE
 AN OPEN SPACE AND RECREATION COMMUNITY
 OLD SAYBROOK, WESTBROOK
 MIDDLESEX COUNTY, CONNECTICUT

Designed
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 Approved
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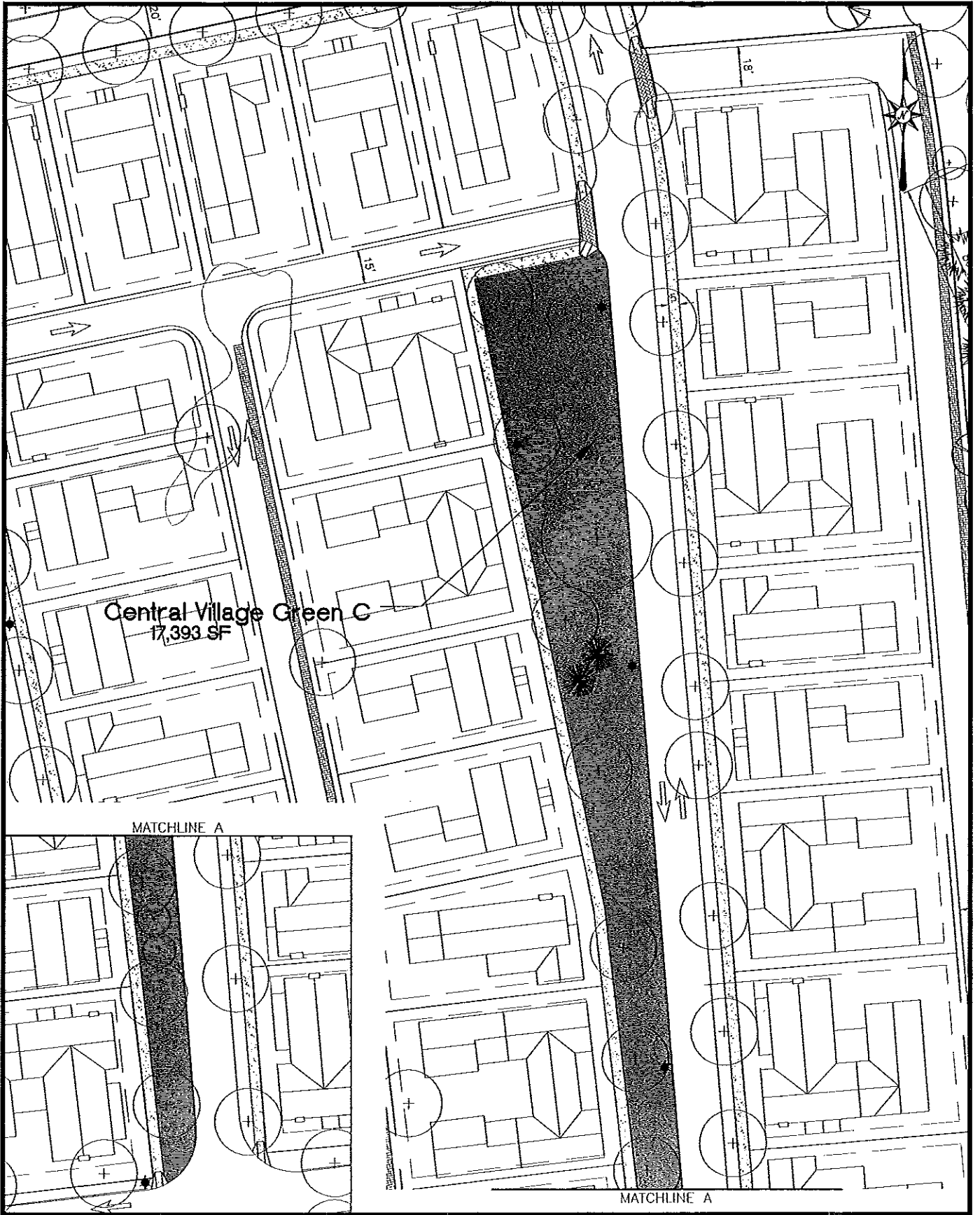
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 11/14/04
 PB-VILLAGEGREEN-2

VG-6

Xref(s):





Central Village Green C
17,393 SF

MATCHLINE A

MATCHLINE A



Central Village Green C
THE PRESERVE
 AN OPEN SPACE AND RECREATION COMMUNITY
 OLD SAYBROOK, WESTBROOK
 MIDDLESEX COUNTY, CONNECTICUT

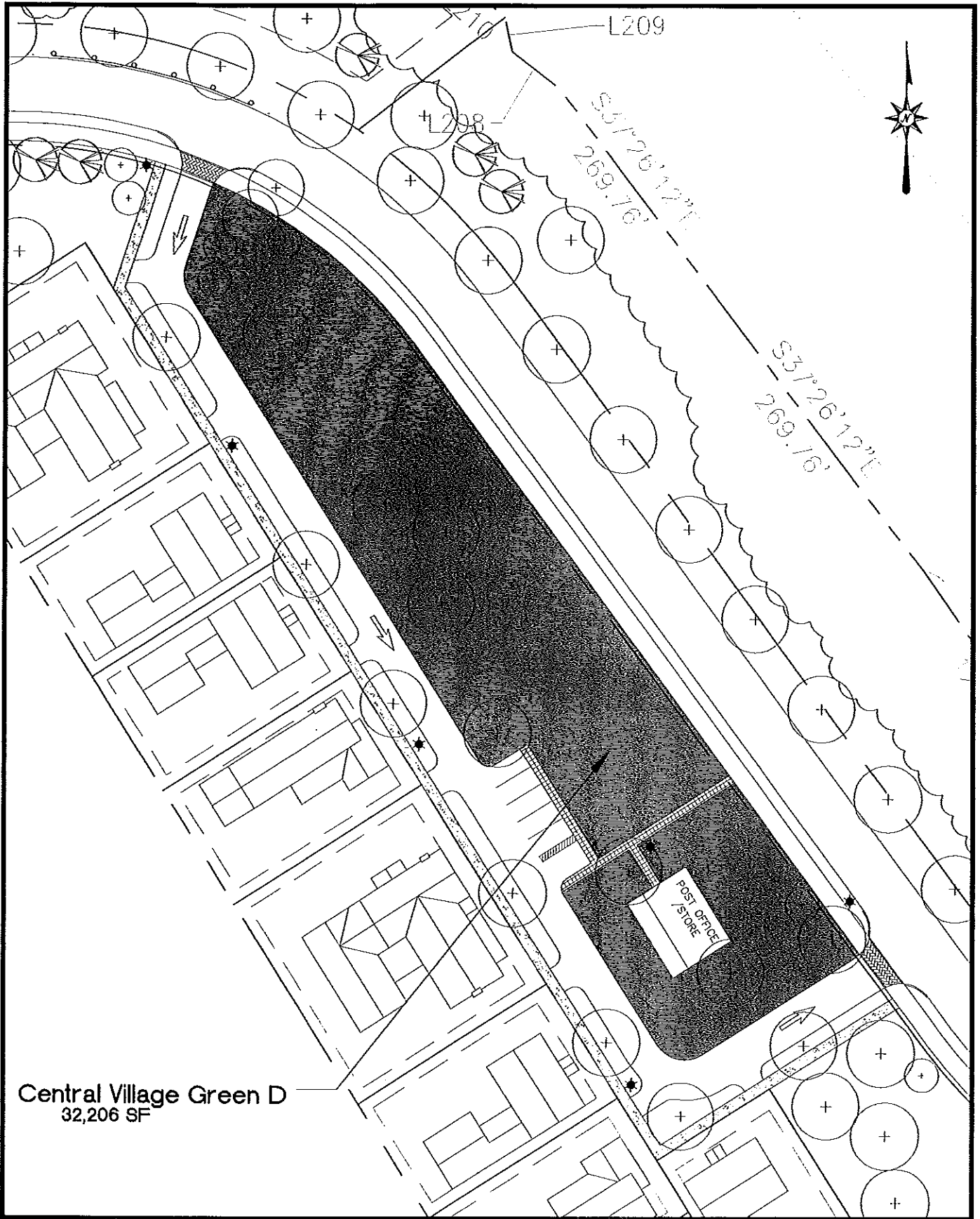
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 K.T.

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 PB-VILLAGEGREEN-2

VG-7

Xref(s):



Central Village Green D
32,206 SF



**Central Village Green D
THE PRESERVE**

AN OPEN SPACE AND RECREATION COMMUNITY
OLD SAYBROOK, WESTBROOK
MIDDLESEX COUNTY, CONNECTICUT

Designed
Drawn
Checked
Approved
Scale
Project No.
Date
CAD File

D.G.G.
K.T.

1" = 60'
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11/14/04
PB-VILLAGEGREEN-2

VG-8

Xref(s):