CHAPTER 3

PLANNING AND PLANS

SECTION I – PLANNING

Planning is the critical process by which land-disturbing activities are formulated. The planning process for activities governed by Act 599 can be broken down into the following four progressive stages:

1. preliminary site investigations
2. preliminary design
3. subsurface investigation
4. final design

For many small land-disturbing activities, steps one and two are sometimes combined but planning for major developments normally follows these three steps. The Erosion and Sedimentation Act of 1975 does not change this planning process. It merely states that erosion and sediment control planning should be included as one of the major considerations.

To be successful, a plan must include measures for efficient scheduling and coordination of construction activities and provisions for the maintenance of conservation practices. Stormwater management facilities should be included to reduce the impact of stormwater runoff to on-site facilities both during and after construction is completed. It is *desirable* to include stormwater retention structures. Land-disturbing activities normally will result in an increase in runoff from the site. Stormwater management structures will reduce the impact of damages on downstream facilities resulting from an increase in runoff.

PLANNING STAGES

Preliminary Site Investigation Stage. The first consideration in the preliminary site investigation stage should be the assimilation of all available resource information. This information will assist the planners in identifying critical physical features of the site which would have significant impact on erosion and sediment control. Delineation of flood-prone areas and areas which would have a high aesthetic value if protected can be identified. Sources of resource information are included in Chapter 5 of this handbook.

A conservation planning base map should be prepared utilizing all information available. The final step would be a detailed *on-site inspection.* At this time, base maps should be thoroughly checked for accuracy.

Preliminary Design Stage. In the preliminary design stage, a thorough analysis of the information assembled during the preliminary site investigation stage should be accomplished. The objective of the analysis is to determine how the proposed site can be best utilized as intended without causing undue harm to the environment. Areas particularly vulnerable to erosion and sedimentation because of existing topography, soils, vegetation or drainage should be identified. The planner is encouraged to use available soils information in his site analysis. A discussion of the use of soils information in site planning follows in this chapter.

Subsurface Investigation Stage. A subsurface investigation should be accomplished to determine the geological features and the nature and properties of the soils present on the site. A detailed on-site soils investigation will be necessary for the design of complex buildings, roadways, and other engineering structures. Facilities which will be serviced by septic tank will require on-site testing. The stability of slopes should be determined based on soils analysis. Groundwater problems should be identified at this time. Soils subject to water flows should be analyzed for permissible velocities. Soils to be established in vegetation should be examined for pH, nutrient levels and ease of establishing vegetation. Methods of overcoming soils limitations should be explored.

Final Design Stage. Final designs should be based on detailed engineering surveys, subsurface investigations and sound conservation and engineering principles. Permanent buildings, roadways and engineering structures should be fitted to the topography and soil types. Efficient, durable and easily maintained erosion control measures should be employed. Sediment basins, barriers and traps should be designed to trap sediment which would be transported from the site. All stormwater facilities should be of adequate capacity and have the ability to withstand peak velocities. Filling or development within flood-prone areas should be avoided except those activities necessary to promote public health and welfare. If, for example, roadway crossings are made, openings must be sized to eliminate undue restriction in water flows and excessive downstream velocities. Natural vegetation and open space should be provided. Finally, rigid construction scheduling should be employed.

SOILS INFORMATION AND SITE PLANNING

An invaluable tool in planning for land disturbing activities is soils information available through Georgia Soil and Water Conservation Districts. The USDA Natural Resources Conservation Service soil scientists study, evaluate, classify and map soils in counties throughout

Georgia and publish soil surveys with maps and descriptions. This soils information can be related to local plat maps to identify kinds of soils in a specific area. The map on page 3-5 shows the status of soil survey publications in Georgia. If unpublished, arrangements can possibly be made through local Soil and Water Conservation Districts to examine available soils maps and to obtain additional soil information for the proposed land-disturbing activity.

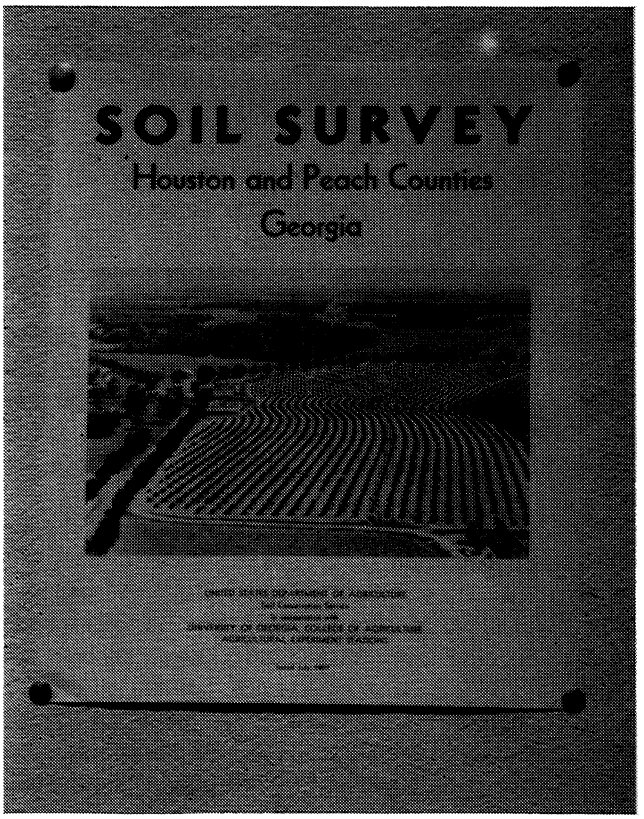


Figure 3-1. – Soils information is a valuable tool in planning for land-disturbing activities.

Soil maps and supporting data provide information about important soil properties, including the following:

Flood Hazards — Soil surveys show areas that are subject to flooding. Although this information is not a substitute for hydrologic surveys, which determine the limits of flooding on the basis of the severest flood expected once in 10, 25, 50 or 100 years, it does provide a good first approximation of the flood-prone areas.

Wetness — Soil surveys show if the soil is well drained, poorly drained, or seasonally waterlogged, and if the water table is seasonally high. The rating of the permeability of soils is also included.

Bearing Capacity — Soil surveys provide test data and estimates of the physical properties of soils that enable engineers to make sound judgments about bearing capacities for shallow foundations. Major soil layers to a depth of about 5 feet are classified in both the United and the AASHTO systems. Data is also given on grain-size distribution and expansiveness for each soil layer.

Depth to Rock — Soil surveys show locations where bedrock is at depths of less than 5 or 6 feet and describe the geologic material that underlies the soil.

Shrink-swell and Slippage — Soil properties that result in high swelling pressures, mainly the kind and amount of clay, are given in soil surveys. Soil surveys also indicate soil properties that make soils unstable and susceptible to slippage.

THE UNIVERSAL SOIL LOSS EQUATION

The properties that affect the erodibility of the soil are of particular interest in planning for the reduction of soil erosion and sedimentation. The erodibility of Georgia soils has been calculated.

The soil erodibility factor (k factor) is one of the variables in the Universal Soil Loss Equation. It will yield an estimate of the annual soil loss for a site in tons per acre. The equation is:

$$\text{Soil Loss} = RKLSCP$$

Where	R	=	rainfall factor
	K	=	soil erodibility factor
	LS	=	slope length and steepness
	C	=	vegetative cover
	P	=	support practice factor

A detailed discussion of the equation is contained in Appendix B-2 of this Manual.

To assist the user in the interpretation of soils for land-disturbing activities, a table of estimated soil properties for Georgia soils has been completed and is contained in Appendix B-1. Estimated soil properties are included for permeability, soil reaction (pH), shrink-swell potential, corrosivity, depth to water table and bedrock, flood frequencies, and hydrologic soil groupings. Soil limitation ratings for septic tank absorption fields, sewage lagoon areas, shallow excavations, dwellings and small commercial building, and local roads and streets have also been included. Planners are encouraged to use this material in evaluating the suitability of tracts of land for specific developments.

Additional soils information for site planning can be obtained during the subsurface investigation phase of planning. For example, the K values of the soils in Appendix B-1 of this manual are estimates for the surface layer of the soil. Because this value will differ at varying depths of the soil profile, planners of land-disturbing activities should specify that the estimated erodibility of subsurface soil be obtained during site borings.

SECTION II – PLANS

Following are examples illustrating methods used in the preparation of erosion and sediment control plans. The set of drawings is intended to demonstrate a methodology for the preparation of an erosion and sediment control plan for a land-disturbing activity.

It should be emphasized that the methodology utilized in this example is only one of many available to the designer or planner. Many other practical combinations of erosion control measures could have been employed to effectively reduce erosion on this site.

LAND DISTURBING ACTIVITY PLAN

The set of drawings for the proposed land disturbing activity are intended to illustrate a method for the preparation of plans for a *phased development.* Hypothetically, the owner has requested that the consulting engineering firm prepare a plan for a 105-acre development that will be constructed in two phases. The first phase will consist of a parcel of land to be developed into a public school facility. Phase two will consist of a single family residential development. Initially, the engineering firm is to select approximately 21 acres from the total tract of land. This first phase is then to be planned for the public school facility. The remaining acreage will be developed at a later date.

The first step that the engineering firm has undertaken is to prepare a detailed boundary line sketch for the total tract of land (See Drawing 1). On this sketch, all major roadways, watercourses, soils and vegetative information have been imposed.

Information on the soils, slope and drainage patterns was obtained from a soils map of the county. Vegetative information was obtained from a field reconnaissance survey of the site. A soils information chart was added to the drawing using soils information from Appendix B-1 of this manual. Each soil series was then shaded on the drawing to effectively illustrate the soils limitations of the site. A zoning sketch obtained from county zoning maps and a site location sketch obtained from the soil survey map were added to the drawing.

An analysis of the combined soils, vegetation and drainage drawing indicated that the portion of the total development which can best support a development requiring extensive grading is located in the northwest portion of the overall tract, on soils with the symbol GeB2, Gwinnett Clay Loam. This portion of the tract would permit an intensive development with a minimum of clearing, grading and potential erosion. After analysis, conclusions were obtained from Drawing Number 1 and a detailed boundary line survey and a topographic map was then completed for the phase one development (See Drawing 2).

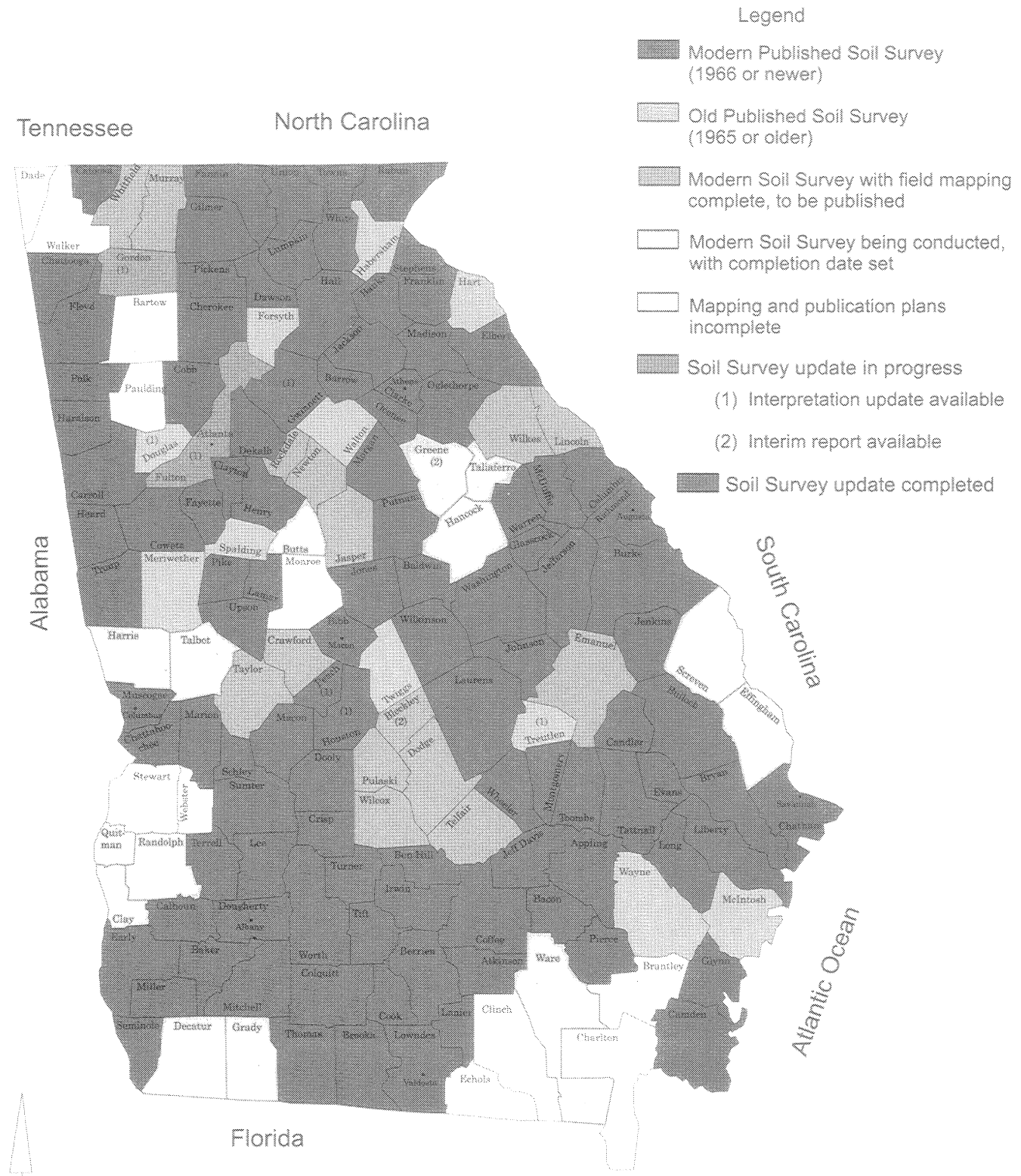
All fixed improvements including the school buildings, gymnasium, football field, playground area, and roadways were then located on the topographic map in a manner which would reduce disturbed areas and avoid the steeper, more erodible slopes. Volumes of earth work were reduced as much as possible by balancing the cut from the school and parking area with the fill required for the football field. Cuts and fills for the playground area and roadway were carefully balanced. As much vegetation as practical was preserved and protected as planned.

After determining the location of proposed fixed improvements, the next step was to plan for the installation of stormwater management and erosion control measures (See Drawing 3). The final erosion and sediment control plan contains combinations of vegetative measures and structural erosion and sediment control practices which should conform to the requirements of the law, and effectively reduce erosion from the land-disturbing activity site. Sediment retention structures have been added to reduce the probability of sediment leaving the site. A timing schedule was developed and has been included on the drawing.

It should be emphasized again that there are numerous methodologies, techniques, and combinations of erosion and sediment control practices which could have been employed in this example.

U.S. Department of Agriculture

Natural Resources Conservation Service



STATUS OF SOIL SURVEYS
GEORGIA
December 1997

0 25 50 75 100 miles

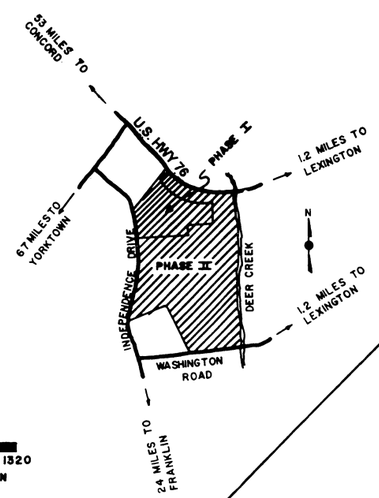
20 0 20 40 60 80 100 Kilometers

Scale is approximate

Source:
Information provided by NRCS field personnel.
Natural Resources Conservation Service, Athens, GA 1997.

Drawing 1
Soils, Vegetation, and Drainage

SITE LOCATION SKETCH



LEGEND

STREAMS
- Perennial
- Intermittent

PROPERTY LINE

POWER LINE

TELEPHONE LINE

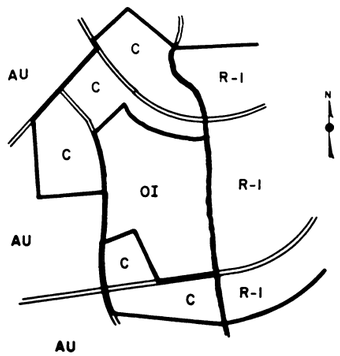
SOIL BOUNDARY

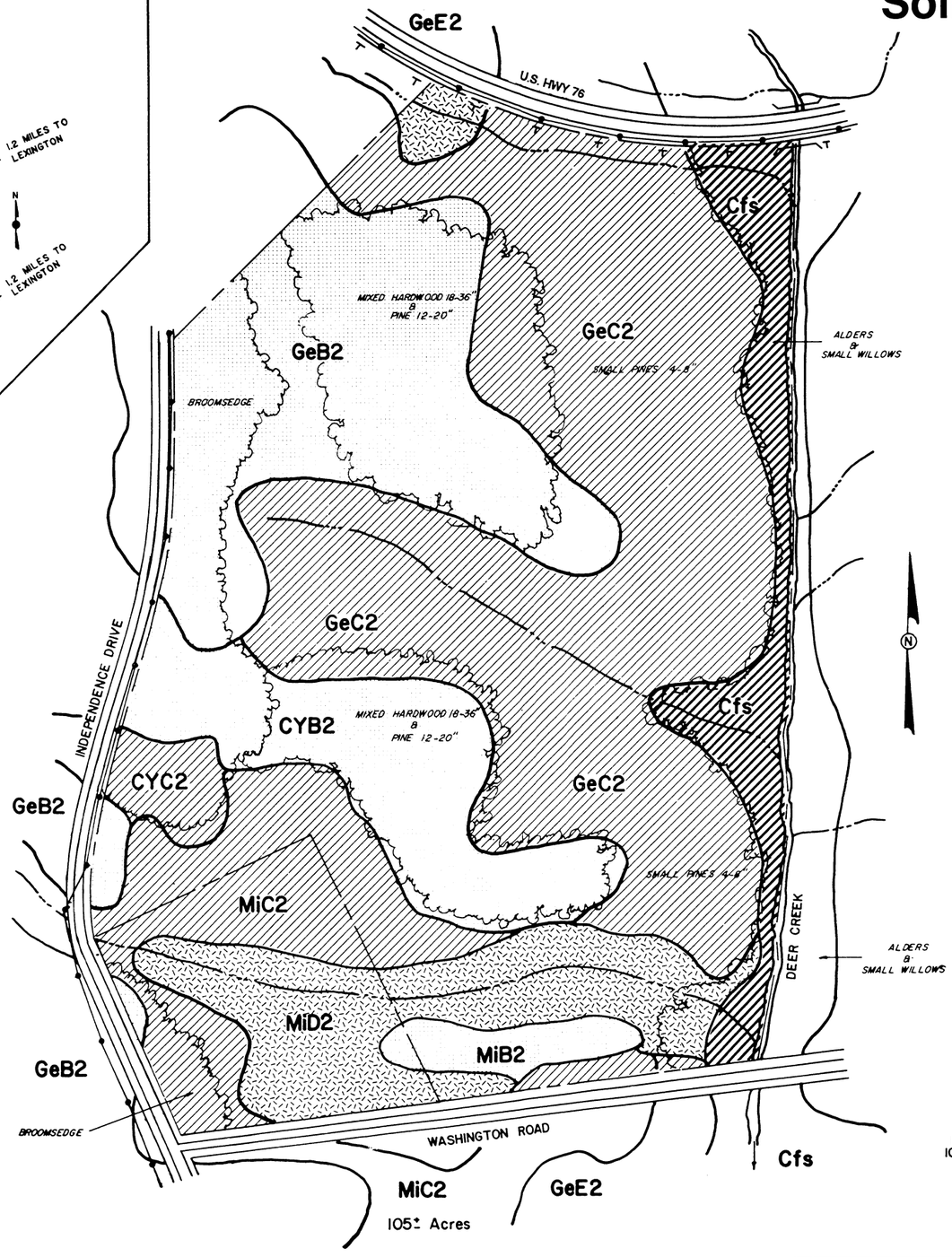
SOIL SYMBOL — CYC2

VEGETATION — TYPE

ZONING SKETCH

AU - AGRICULTURAL, URBAN
C - COMMERCIAL
R-I - RESIDENTIAL
OI - OFFICE, INSTITUTIONAL





SOILS INFORMATION

SOIL SYMBOL	NAME	SLOPE %	K	LIMITATION	SYMBOL	REASONS FOR LIMITATIONS
Cfs	Chewacla	0-2	.32	Severe		Very frequent flooding high seasonal water table
CYB2	Cecil Sandy Loam	2-6	.32	Slight		
GeB2	Gwinnett Clay Loam	2-6	.28	Slight		
GeC2	Gwinnett Clay Loam	6-10	.28	Moderate		Slopes
GeE2	Gwinnett Clay Loam	10-25	.28	Severe		Slopes
MiC2	Madison Sandy Clay Loam	6-10	.32	Moderate		Slopes; moderate shrink-swell potential
MiD2	Madison Sandy Clay Loam	10-15	.32	Severe		Slopes

Seal

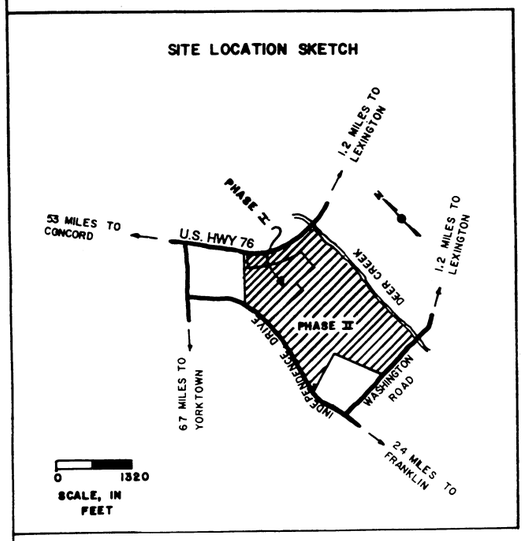
Certification

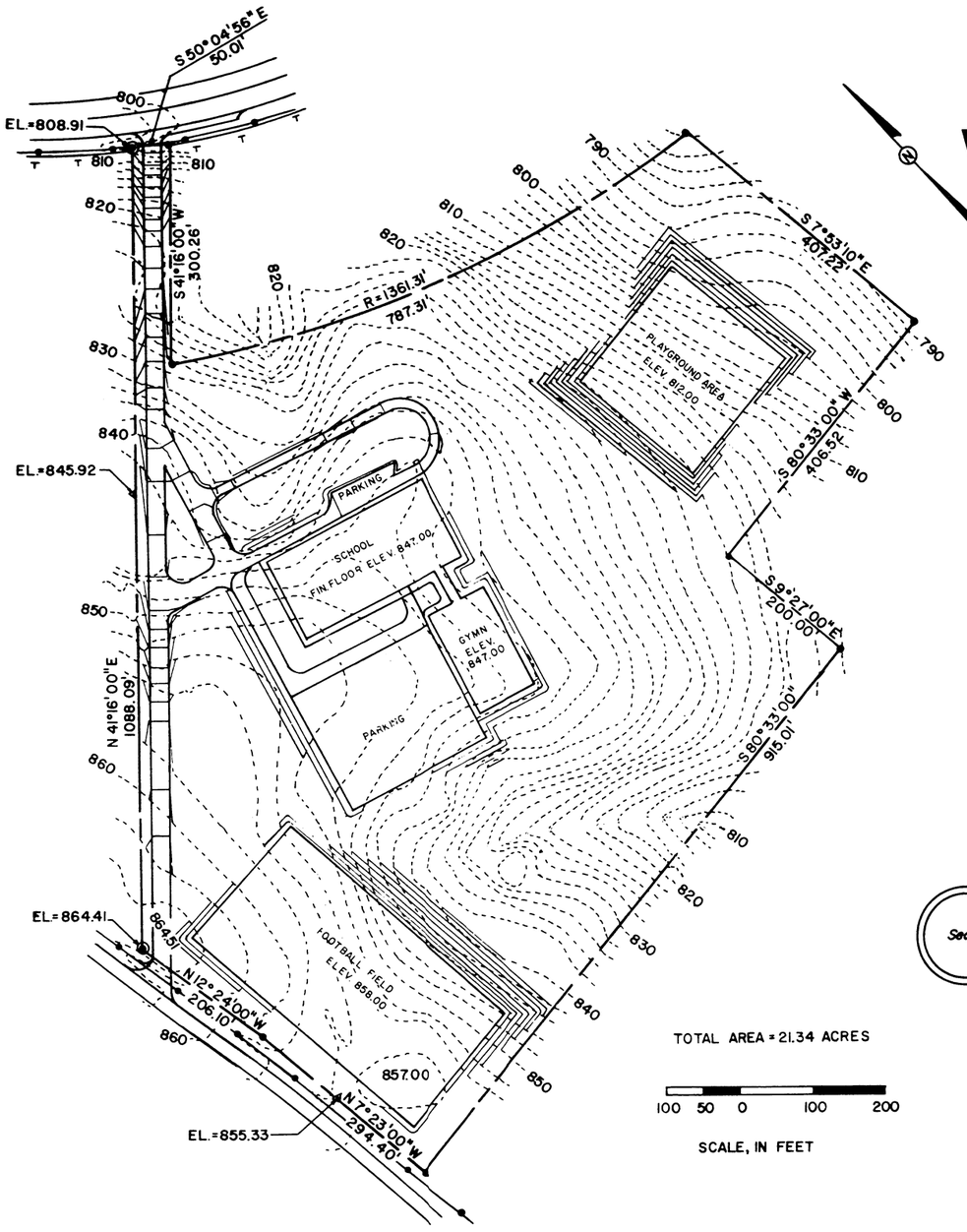
INDEPENDENCE DEVELOPMENT

BILL PENN
CONSULTING PLANNERS AND ENGINEERS

OWNER: G. WASHINGTON	COUNTY, STATE: GWINNETT, GEORGIA
DRAWN BY: TOM JEFFERSON	LAND LOT: 200
DATE: JULY 4, 1990	LAND DISTRICT: 26th.

Drawing 2
Detailed Boundary Line and Topographic Survey With Fixed Improvements





LEGEND

- IRON PIN FOUND
- PROPERTY LINE
- TEMPORARY BENCH MARK
- POWER LINE
- TELEPHONE LINE T T T T
- CONTOUR LINE, EXISTING
- CONTOUR LINE, FINISH

TOTAL AREA = 21.34 ACRES

100 50 0 100 200

SCALE, IN FEET

Seal

Certification

NOTE: SLOPE PARKING LOT AREA TO DRAIN AWAY FROM MAIN SCHOOL BUILDING ON 1.0% GRADE AND TOWARD CENTERLINE OF LOT ON 0.5% GRADE

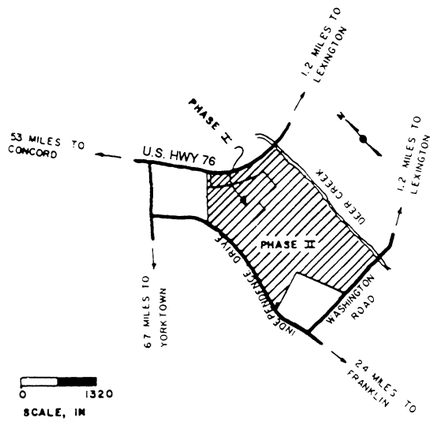
CROWN FOOTBALL FIELD 1.5 FEET AT CENTER

SLOPE PLAYGROUND AREA TO DRAIN TOWARD CENTERLINE ORIENTED NORTH-SOUTH

INDEPENDENCE SCHOOL	
BILL PENN CONSULTING PLANNERS AND ENGINEERS	
OWNER G. WASHINGTON	COUNTY, STATE GWINNETT, GEORGIA
DRAWN BY TOM JEFFERSON	LAND LOT 200
DATE JULY 4, 1990	LAND DISTRICT 26th.

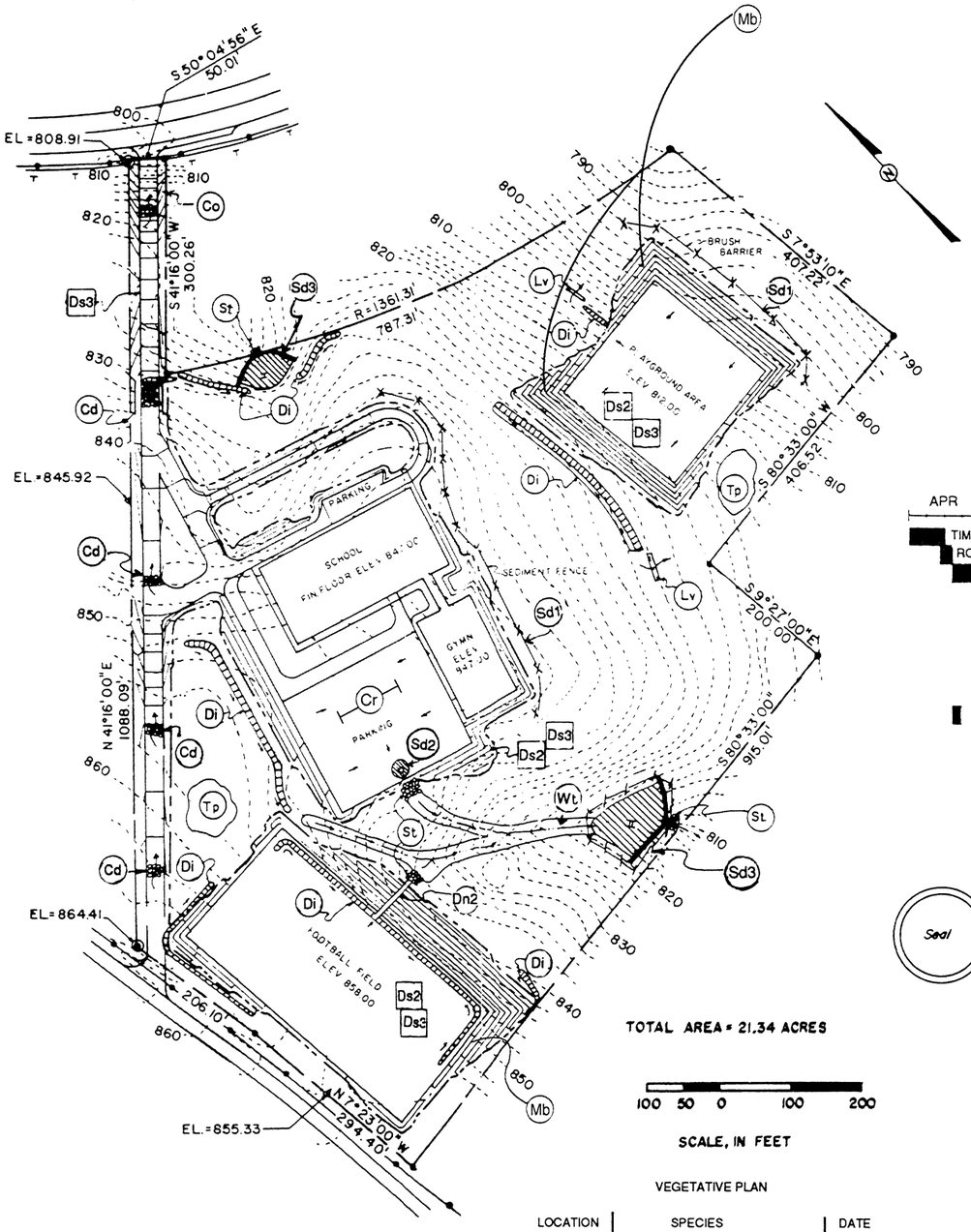
Drawing 3
Erosion and Sediment Control Plan

SITE LOCATION SKETCH

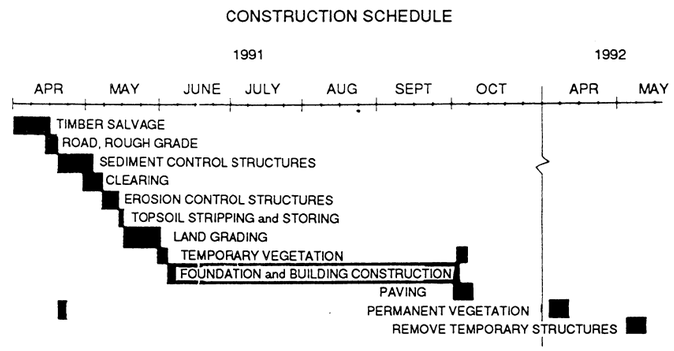


LEGEND

IRON PIN FOUND	⊙
PROPERTY LINE	—— — ——
TEMPORARY BENCH MARK	△
POWER LINE	——•—•——
TELEPHONE LINE	T T T T
CONTOUR LINE, EXISTING	~~~~
CONTOUR LINE, FINISH	——
CLEARING LIMIT LINE	—— — ——



CONSTRUCTION SCHEDULE



Seal

Certification

TOTAL AREA = 21.34 ACRES

100 50 0 100 200

SCALE, IN FEET

NOTE: SLOPE PARKING LOT AREA TO DRAIN AWAY FROM MAIN SCHOOL BUILDING ON 10% GRADE AND TOWARD CENTERLINE OF LOT ON 0.5% GRADE

CROWN FOOTBALL FIELD 1.5 FEET AT CENTER

SLOPE PLAYGROUND AREA TO DRAIN TOWARD CENTERLINE ORIENTED NORTH-SOUTH

VEGETATIVE PLAN

LOCATION	SPECIES	DATE
Football Field & Playground	Hulled Common Bermudagrass	April '92
Roadside	Hulled Common Bermudagrass & Virgata Lespedeza	April '91
Waterway	Sod Common Bermudagrass	April '91
School	Ryegrass	Oct. '91

INDEPENDENCE SCHOOL

BILL PENN
CONSULTING PLANNERS AND ENGINEERS

OWNER: G. WASHINGTON	COUNTY, STATE: GWINNETT, GEORGIA
DRAWN BY: TOM JEFFERSON	LAND LOT: 200
DATE: JULY 4, 1990	LAND DISTRICT: 26th.

EXAMPLE NARRATIVE DESCRIPTION OF A LAND-DISTURBING ACTIVITY PLAN (Fictional)

DESCRIPTION: Phase I of this proposed development is located on Hwy. 76, 1.2 miles west of Lexington, Georgia, and contains 21.34 acres. This area will be developed for use as a public school facility. Improvements will consist of a 28,800-square-foot school building, a 13,500-square-foot gymnasium, .88 acres of parking, a football field, a one-acre playground, and service roads. Phase II, which comprises approximately 83.7 acres, will contain single family residences and will be developed at a later date.

ZONING: The present zoning classification of Phase I is Office-Institutional (O-I). (See zoning sketch of Drawing Number 1 for zoning classifications of adjacent properties.)

DATES OF CONSTRUCTION: Initial construction is scheduled to begin April 1, 1991. Final stabilization should be accomplished before May 15, 1992.

SOILS, TOPOGRAPHIC AND DRAINAGE INFORMATION: (For soils, topographic and drainage information, see Drawing Number 1.)

VEGETATION: (For a description of existing vegetation, see Drawing Number 1.) All marketable timber will be salvaged. Top soil will be salvaged, stockpiled and spread on areas to be vegetated. Trees outside of the clearing line will be protected from damage by appropriate markings. (See Drawing Number 1 for clearing information and vegetative plan.) Supplemental vegetation will be established.

BUFFER REQUIREMENTS: An undisturbed natural vegetative buffer of 25 feet measured from the stream banks (100 feet measured horizontally, adjacent to trout streams) shall normally be retained adjacent to any state waters except where otherwise required by Part 6 of Article 5 of Chapter 5 of this title, the "Metropolitan River Protection Act," or by the department pursuant to Code Section 12-2-8, or when the economic use and the contour of the land require a different buffer subject to the division's approval, or where a drainage structure must be constructed, provided that adequate erosion control measures are incorporated in the project plans and specifications are implemented.

EROSION CONTROL PROGRAM: Clearing will be kept to an absolute minimum. Vegetation and mulch will be applied to applicable areas immediately after grading is completed. Gravel will be applied to parking areas and roadways as soon as grading is completed. Land-disturbing will be scheduled to limit exposure of bare soils to erosive elements. Storm water management structures will be employed to prevent erosion in areas of concentrated water flows. Erosion at the exits of all stormwater structures will be prevented by the installation of storm drain outlet protection devices.

SEDIMENT CONTROL PROGRAM: Sediment control will be accomplished by the installation of two sediment basins, approximately 550 linear feet of sediment fences and 375 feet of temporary brush barriers. Diversions will be installed to divert sediment laden runoff into the sediment basins and to protect cut and fill slopes from erosive water flow. A temporary construction exit will be employed to prevent the transport of sediment from the site by vehicular traffic.

STANDARDS AND SPECIFICATIONS: All designs will conform to and all work will be performed in accordance with the Standards and Specifications of the publication entitled, *Manual for Erosion and Sediment Control in Georgia.* (See attached calculations).

SAFETY PROTECTION: Construction activities will be performed in compliance with all applicable laws, rules and regulations. Sediment basin number II, which will be converted to a storm water detention structure, will be posted and fenced to exclude children.

MAINTENANCE PROGRAM: Sediment and erosion control measures will be inspected daily. Any damages observed will be repaired by the end of that day. Cleanout of sediment control structures will be accomplished in accordance with the specifications and sediment disposal accomplished by spreading on the site. Sediment basins and barriers will remain in place until sediment contributing areas are stabilized. The sediment basin, sediment fences, and the barriers will then be removed and the areas occupied by these structures vegetated. Sediment from the detention basin will be removed and this basin converted to a storm water detention structure. Guidelines for the maintenance of established vegetation will be provided to the owner when all disturbed areas are stabilized.

24-HOUR CONTACT PERSON: The telephone number of a person responsible for the project's erosion and sediment control program must be provided.

CHAPTER 4
Local Programs: Principles and Processes