AIM Engineering & Surveying, Inc.

Corporate Office
2161 Fowler Street
Suite 100
Fort Myers, FL 33901

239-332-4569
800-226-4569
Fax: 855-731-7971
www.aimengr.com

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September 30, 2017

Geotechnical Memorandum on the Myakka State Forest Water Quality and Bank Stabilization

On September 30, 2017 soil borings were performed on the proposed improvement area of the Myakka State Forest project near the westerly end of Foresman Boulevard, in Section 36, T40S, R20E, City of North Port, Sarasota County, Florida. Soil borings were taken at the proposed swales, the low water crossing access, the spoil deposit removal area and the proposed flow-way. The proposed site work involves shallow grading of the site.

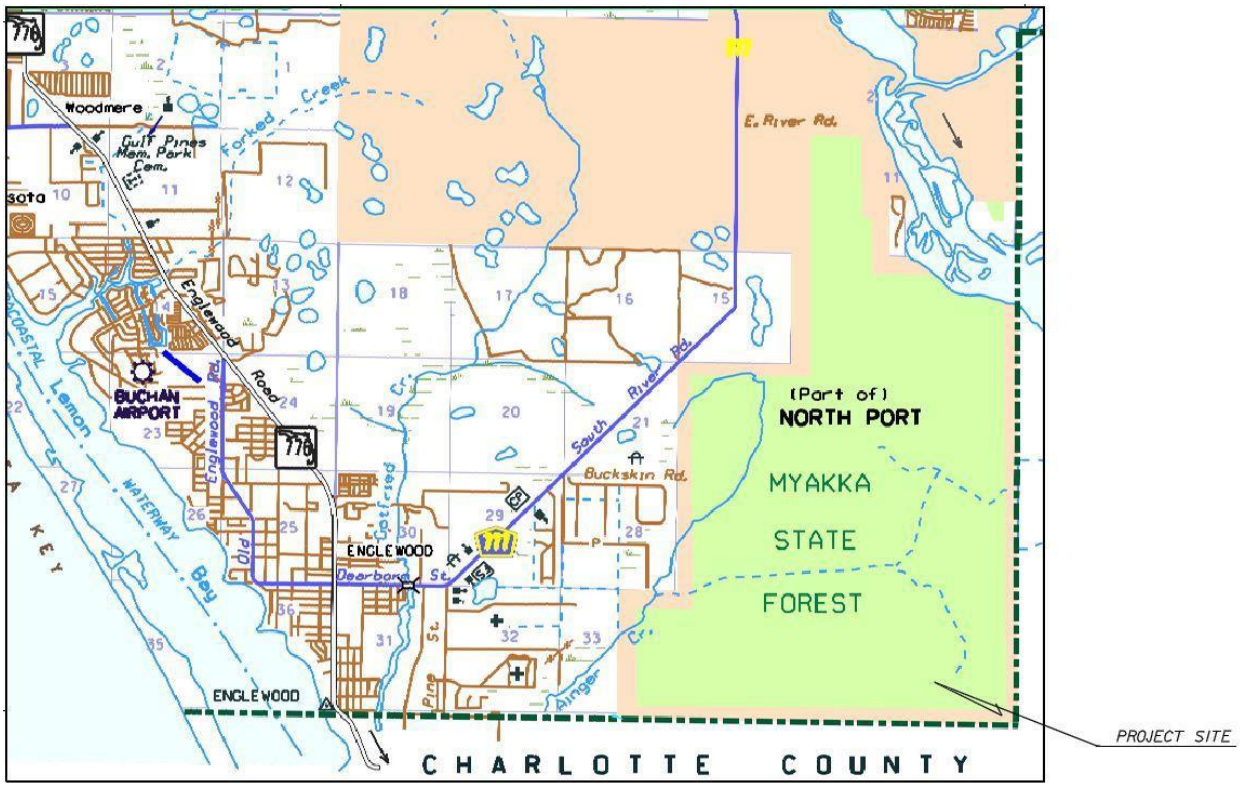
This general area of the Forest lays in the Eaugallie-Myakka-Holopaw-Felda general soil types which are located on nearly level, poorly drained and very poorly drain soils that have a sandy surface layer and a sandy and loamy subsoil, are sandy throughout, or have a sandy surface layer and a loamy subsoil. Specifically, the site has three major soil types, being Soil Type 8 (Delray fine sand, depressional) in the wetlands, Soil Type 22 (Holopaw fine sand, depressional) in the pine prairies and Soil Type 31 (Pineda fine sand) at the higher elevation forested areas. See attached SCS Soil Survey description of the soil types.

The soil borings were conducted to approximately five (5') feet of depth with a probe examination to eight (8') feet of depth. No rock was discovered on the site and apparent water level depths for September 30, 2017, were noted when observed. Borings located near the existing ditch running through the site fully drained the area and no apparent water level was noted. Reddish-brown stains were noted when observed. The detailed findings are noted in soil boring logs attached herein.

The soil borings showed the site to be generally a sandy soil (SP), silty sand soil (SM) and clayey sand soil (SC) that is not anticipated to have any soil related issues with the proposed work for shallow regrading. Previous soil disturbing activity, such as, spoil deposits were noted in borings no. 5, 6 & 7 as white or light tan and gray soils at the surface. The sand materials at the site were noted to be very dense to 7 and 8 feet of depth, then loose material after that depth.

Exhibits:

- Location Map
- SCS Soils Map
- SCS Soils Descriptions
- Boring Location Map
- Boring Logs
- Unified Soil Classification System Reference



LOCATION MAP OF

MYAKKA STATE FOREST FLOW-WAY RESTORATION
(A Water Quality and Bank Stabilization Project)

Section 36, T40S, R20E, City of North Port, Sarasota County, Florida


(Joins sheet 30)
MYAKKA RIVER
14
13
23
24
25
26
35
36
Flying A Ranch
COUNTY
CHARLOTTE
415,000 FEET
950,000 FEET
31
N
2 MILES
2 KILOMETERS
SCALE 1:24 000

United States Department of Agriculture

Soil Conservation Service

In cooperation with the University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil Science Department; and the Florida Department of Agriculture and Consumer Services

Soil Survey of Sarasota County, Florida

soil but have a thin, brown subsoil that is weakly coated with colloidal organic matter, have a subsoil that is more than 20 inches thick, or are underlain by material that has shell fragments below a depth of 60 inches.

The Cassia soil has a seasonal high water table at a depth of 18 to 42 inches for about 6 months. The water table recedes to a depth of more than 42 inches during extended dry periods. Permeability is rapid in the surface layer, subsurface layer, and substratum. It is moderate or moderately rapid in the subsoil. The available water capacity is low.

Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, sand live oak, sand pine, and a few longleaf pines. The understory includes saw palmetto, running oak, creeping bluestem, broomsedge bluestem, lopsided indiangrass, pineland threeawn, cinnamon fern, panicum, and various other grasses.

Under natural conditions, this soil is poorly suited to cultivated crops and to citrus trees because of the periodic wetness and the low available water capacity. The suitability for some vegetable crops is fair, however, if adequate water-control and soil-improving measures are applied. The water-control system should remove excess water during wet periods and provide water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

In areas that usually are not subject to freezing temperatures, the suitability for citrus trees is fair if good management is applied. The water-control system should maintain the water table below a depth of about 4 feet during wet periods and provide water through subsurface irrigation during periods of low rainfall. Regular applications of fertilizer and lime are needed. A suitable cover crop between the tree rows helps to control soil blowing.

The suitability of this soil for improved pasture grasses is fair. Bahiagrass and pangolagrass are the best suited species. Regular applications of fertilizer and lime are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. Seedling mortality is the main management concern. Longleaf pine, slash pine, and South Florida slash pine are suitable for planting.

This soil is poorly suited to the production of desirable range plants. The vegetative community is a dense understory of saw palmetto, running oak, and cinnamon fern. Although seldom grazed by livestock, this site provides protection for the livestock in winter. The soil is in the Sand Pine Scrub range site.

This soil is severely limited as a site for dwellings with basements and for recreational uses. It is moderately limited as a site for dwellings without basements, for small commercial buildings, and for local roads and streets. Water-control measures are needed. An increase in the size of septic tank absorption fields may be needed because of the wetness. The rapid permeability can cause pollution of ground water in areas of septic tank absorption fields. Community sewage systems help to prevent this pollution in areas of moderate or high housing density. The proximity to a stream or aquifer recharge area should be considered when a site for sanitary facilities is selected. Applying water-control measures and sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material help to prevent seepage. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is VIs.

8—Delray fine sand, depressional. This nearly level, very poorly drained soil is in depressions on flatwoods. Individual areas are oval, irregularly shaped, or elongated and range from 5 to 200 acres in size. Slopes are concave and are less than 2 percent.

Typically, the surface layer is black fine sand about 30 inches thick. The subsurface layer is light brownish gray fine sand to a depth of about 54 inches. The subsoil to a depth of 80 inches or more is olive gray fine sandy loam.

Included with this soil in mapping are small areas of Astor, Felda, Gator, and Pompano soils. Also included are soils that are similar to the Delray soil but have a thin surface layer of muck. Included soils make up less than 20 percent of the map unit.

Under natural conditions, the Delray soil is ponded for 6 to 9 months or more each year. For much of the remainder of most years, the seasonal high water table is within a depth of 12 inches. Permeability is rapid in the surface layer and subsurface layer and moderate or moderately rapid in the subsoil. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is moderate or high.

Most areas of this soil support natural vegetation of cypress, pickerelweed, maidencane, arrowhead, cutgrass, sand cordgrass, sedges, ferns, and other water-tolerant grasses. They provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suited to cultivated crops because of the ponding. Establishing an adequate drainage system is difficult because most areas do not have a suitable drainage outlet. The suitability for many vegetable crops remains poor even if intensive management and soil-improving measures are applied and a water-control system removes excess

water rapidly. Adequate seedbed preparation and crop rotations are needed. Seedbed preparation should include bedding of rows. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

Under natural conditions, this soil is not suited to citrus trees. The suitability is fair, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly and maintains the water table below a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A good close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

Under natural conditions, this soil is not suited to improved pasture grasses. The suitability is fair, however, if an adequate water-control system removes excess surface water after heavy rains. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Controlled grazing and regular applications of fertilizer and lime are needed.

This soil is not suitable for the commercial production of pine trees because of the long periods of ponding.

This soil is moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is close to the surface. This rest period increases forage production, but the high water levels may reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational development. Water-control measures are needed. Sealing or lining sewage lagoons and trench type sanitary landfills with impervious soil material helps to prevent seepage. Fill material should be used on sites for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

9—Delray and Astor soils, frequently flooded. These level and nearly level, very poorly drained soils are on the flood plain along the Myakka River and in swamps adjacent to Lake Myakka. The soils are frequently flooded after prolonged heavy rains. Individual areas are irregularly shaped or elongated and range from 10 to 100 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Delray and similar soils, some are entirely Astor and similar soils, and some are made up of Delray, Astor, and other soils. The Delray and similar soils make up about 45 percent of the map unit, and the Astor and similar soils make up about 35 percent.

Typically, the surface layer of the Delray soil is black fine sand about 30 inches thick. The subsurface layer is dark gray fine sand to a depth of about 54 inches. The subsoil to a depth of 80 inches or more is gray sandy loam.

Typically, the surface layer of the Astor soil is 32 inches thick. The upper 2 inches is black mucky fine sand. The next 20 inches is very dark gray mucky fine sand. The lower 10 inches is very dark gray fine sand. The underlying material extends to a depth of about 80 inches or more. The upper 15 inches is grayish brown loamy sand. The next 7 inches is light brownish gray loamy sand. The lower 26 inches or more is light brownish gray fine sand.

Included with these soils in mapping are small areas of Felda and Floridana soils. These included soils make up less than 20 percent of the map unit.

The Delray and Astor soils have a seasonal high water table at or above the surface during the summer rainy season. During dry periods the water table may recede to a depth of 30 inches or more. Sheet flow occurs during periods of heavy rainfall. The duration and extent of flooding vary, depending on the intensity and frequency of rainfall. Permeability is rapid in the Astor soil and moderate or moderately rapid in the subsoil of the Delray soil. The available water capacity is moderate in both soils. Natural fertility is high in both soils, and the organic matter content is very high or high.

Most areas of these soils support natural vegetation of cypress, sweetgum, water oak, laurel oak, red maple, cabbage palm, and pine. The understory is scattered saw palmetto, waxmyrtle, greenbrier, poison ivy, maidencane, chalky bluestem, sedges, and other water-tolerant grasses.

Under natural conditions, these soils are unsuited to cultivated crops and citrus trees because of the frequent flooding and very poor drainage. The suitability for many vegetable crops is fair, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly. Adequate seedbed preparation and crop rotations are needed. Seedbed preparation should include bedding of rows. Cover crops and crop residue management help to control erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

Under natural conditions, these soils are poorly suited to improved pasture. The suitability is good,

lime are needed. Controlled grazing helps to maintain plant vigor.

This soil is not suitable for the commercial production of pine trees because of the long periods of ponding.

This soil is moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is near the surface. This rest period increases forage production, but the high water levels reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to prevent excessive seepage. Fill material is needed on sites for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

13—Felda and Pompano fine sands, frequently flooded. These nearly level, poorly drained soils are on flood plains throughout the county. They are frequently flooded following prolonged, heavy rains. Individual areas are elongated and range from 10 to more than 100 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Felda and similar soils, some are entirely Pompano and similar soils, and some are made up of Felda, Pompano, and other soils. The Felda and similar soils make up about 45 percent of the map unit, and the Pompano and similar soils make up about 35 percent.

Typically, the surface layer of the Felda soil is very dark gray fine sand about 4 inches thick. The subsurface layer is dark grayish brown fine sand to a depth of about 24 inches. The subsoil to a depth of 65 inches is sandy clay loam. The upper 24 inches is dark grayish brown, and the lower 17 inches is grayish brown. The substratum to a depth of about 80 inches is light gray loamy sand.

Typically, the surface layer of the Pompano soil is black fine sand about 3 inches thick. The underlying material to a depth of about 80 inches is gray, light brownish gray, and grayish brown fine sand.

Included with these soils in mapping are areas of Astor, Bradenton, Delray, and Holopaw soils. Also included are a few areas of soils that are similar to the Felda soil but have an organic surface layer as much as 15 inches thick. Included soils make up about 20 percent of the map unit.

The Felda and Pompano soils have a seasonal high water table within 12 inches of the surface for 2 to 6 months in most years. These soils usually are flooded every year and more than once in most years. The duration and extent of flooding vary, depending on the intensity and frequency of rainfall. Permeability is rapid or very rapid in the sandy layers and moderate or moderately rapid in the loamy layers. The available water capacity is low. Natural fertility also is low.

Most areas of these soils support natural vegetation of baldcypress, laurel oak, water oak, pond pine, slash pine, South Florida slash pine, longleaf pine, and cabbage palm. The understory vegetation is waxmyrtle, pineland threeawn, maidencane, greenbrier, poison ivy, and other water-tolerant grasses and plants.

Under natural conditions, these soils are not suited to cultivated crops, citrus, or improved pasture. The suitability for some vegetable crops and improved pasture is fair, however, if a water-control system reduces the hazard of flooding, removes excess water rapidly, and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop. Improved bahiagrass grows well in properly managed areas. Management should include controlled grazing and applications of fertilizer and lime.

The potential productivity of these soils for pine trees is moderate. South Florida slash pine and slash pine are suitable for planting. Water-control measures are needed. Bedding of rows helps to overcome wetness. The equipment limitation and seedling mortality are the main management concerns.

These soils generally are not used as rangeland. They are in the Swamp Hardwoods ecological plant community.

These soils are severely limited as sites for buildings, sanitary facilities, and recreational uses because of the flooding and the wetness. Major flood-control structures and extensive local drainage systems are needed. Limitations are severe on sites for septic tank absorption fields. Installing water-control measures, adding fill material, and mounding the absorption field can help to overcome wetness. The proximity to a stream or aquifer recharge area should be considered when a site for sanitary facilities is selected because the effluent from these facilities can contaminate water supplies. Fill material is needed on sites for local roads and streets, small commercial buildings, and playgrounds.

These soils are well suited to habitat for wetland and woodland wildlife. Shallow water areas can be easily developed, and the vegetation provides abundant food and shelter.

The Felda soil is in capability subclass Vw, and the Pompano soil is in capability subclass Vlw.

14—Floridana mucky fine sand. This nearly level, very poorly drained soil is in poorly defined drainageways on broad, low flats. Individual areas are larger than 100 acres. Slopes are smooth or concave and range from 0 to 2 percent.

Typically, the surface layer is black mucky fine sand about 14 inches thick. The subsurface layer is light gray and light brownish gray sand to a depth of 22 inches. The subsoil to a depth of about 60 inches is gray sandy loam. The substratum to a depth of 80 inches or more is gray loamy sand.

Included with this soil in mapping are small areas of Delray, Felda, and Manatee soils. Also included are small areas of soils that are similar to the Floridana soil but have a thin layer of muck at the surface. Included soils make up about 15 percent of the map unit.

The Floridana soil has a water table above the surface for short periods after heavy rainfall and within 12 inches of the surface for more than 6 months during most years. The water table is at a depth of 12 to 30 inches for short dry periods. Permeability is rapid in the surface layer and subsurface layer and slow or very slow in the subsoil and substratum. The available water capacity is moderate. Natural fertility is medium, and the organic matter content is high.

Many areas of this soil are drained and used for citrus trees or cultivated crops. The natural vegetation is mainly sand cordgrass, maidencane, St. Johnswort, scattered waxmyrtle, Carolina willow, pickerelweed, cutgrass, primrose willow, sawgrass, and other water-tolerant grasses.

Under natural conditions, this soil is not suited to cultivated crops. The suitability for many vegetable crops is fair, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly. Adequate seedbed preparation and crop rotations are needed. Seedbed preparation should include bedding of rows. Soil-improving crops and crop residue management help to control erosion and maintain the content of organic matter. Fertilizer and lime should be applied according to the needs of the crop.

Under natural conditions, this soil is not suited to citrus trees. The suitability is fair, however, if intensive management and soil-improving measures are applied and if a water-control system removes excess water rapidly and maintains good drainage to a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

Under natural conditions, this soil is poorly suited to improved pasture. The suitability is fair, however, if an adequate water-control system removes excess surface water after heavy rains. Pangolagrass and improved bahiagrass grow well in properly managed areas. Controlled grazing and regular applications of fertilizer and lime are needed.

The potential productivity of this soil for pine trees is moderately high. South Florida slash pine and slash pine are suitable for planting. Water-control measures are needed before trees can be planted. The equipment limitation and seedling mortality are the main management concerns.

This soil is moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is near the surface. This rest period increases forage production, but the high water levels reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material can help to prevent seepage. Fill material is needed on sites for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is IIIw.

15—Floridana and Gator soils, depressional. These very poorly drained, nearly level soils are in depressions. They are subject to ponding. Individual areas are oval or irregular in shape and range from 5 to about 100 acres in size. Slopes are dominantly concave and are less than 2 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Floridana and similar soils, some are entirely Gator and similar soils, and some are made up of Floridana, Gator, and other soils. The Floridana and similar soils make up about 75 percent of the map unit, and the Gator and similar soils make up about 25 percent.

Typically, the surface layer of the Floridana soil is about 14 inches of black mucky fine sand and fine sand. The subsurface layer to a depth of about 22 inches is gray and light gray fine sand. The subsoil to a depth of about 52 inches is grayish brown sandy clay

EauGallie, Holopaw, Malabar, and Wabasso soils. Also included are wet soils in scattered small depressions. Included soils make up less than 15 percent of the map unit.

The Ft. Green soil has a water table at a depth of 6 to 18 inches for 2 to 4 months during wet periods and within a depth of 40 inches for more than 6 months. Permeability is rapid in the surface layer and subsurface layer and slow or moderately slow in the subsoil. The available water capacity is low. Natural fertility also is low.

Most areas of this soil support natural vegetation. Areas that have been cleared are used dominantly for citrus trees. The natural vegetation is slash pine, South Florida slash pine, longleaf pine, cabbage palm, saw palmetto, inkberry, rusty lyonia, blackroot, pennyroyal, pineland threeawn, chalky bluestem, panicum, and various other weeds and grasses.

The suitability of this soil for citrus trees is good if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. A suitable cover crop between the tree rows helps to control erosion. Regular applications of fertilizer and lime are needed.

This soil is very severely limited if it is used for cultivated crops because of the wetness and the sandy texture in the root zone. The suitability for many vegetable crops is fair, however, if a water-control system removes excess water and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management can help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer and lime should be applied according to the needs of the crop.

The suitability of this soil for improved pasture is good. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Water-control measures are needed to remove excess surface water after heavy rains. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderately high. The equipment limitation, seedling mortality, and plant competition are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

This soil is moderately suited to the production of desirable range plants. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, and chalky bluestem. Management should include deferred grazing and brush control. The soil is in the South Florida Flatwoods range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. An increase in the size of septic tank absorption fields may be needed because of the slow permeability. Sealing or lining sewage lagoons with impervious soil material helps to control seepage. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IIIw.

22—Holopaw fine sand, depressional. This nearly level, very poorly drained soil is in depressions. Individual areas range from 4 to 50 acres in size. Slopes are concave and are less than 2 percent.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer is light gray and grayish brown fine sand to a depth of about 50 inches. The subsoil to a depth of 66 inches is grayish brown sandy loam that has pockets of brown fine sand. The substratum to a depth of 80 inches or more is olive gray loamy fine sand that has pockets of brown fine sand.

Included with this soil in mapping are small areas of Floridana, Manatee, Malabar, and Pineda soils. Also included are soils that are similar to the Holopaw soil but have a surface layer of muck or mucky fine sand less than 15 inches thick. Included soils make up less than 20 percent of the map unit.

The Holopaw soil is ponded for 6 to 9 months or more each year. The water table is within 12 inches of the surface for 2 to 4 months of the year and at a depth of 12 to 40 inches during most of the remainder of the year. Permeability is rapid in the surface layer and subsurface layer and moderately slow or moderate in the subsoil. The available water capacity is low. Natural fertility and the organic matter content also are low.

The natural vegetation is blue maidencane, broomsedge, St. Johnswort, waxmyrtle, panicum, sand cordgrass, white bracted sedge, pipewort, stiff paspalum, and various other water-tolerant weeds and grasses. Areas of this soil provide excellent habitat for wading birds and other wetland wildlife.

Under natural conditions, this soil is not suitable for cultivated crops. Even if a water-control system protects the soil from ponding and removes excess water rapidly, the suitability for vegetable crops is poor. Crop rotations, soil-improving crops, and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop.

The suitability of this soil for citrus trees is poor. A water-control system that maintains good drainage to a depth of about 4 feet is needed. Planting the trees on

beds lowers the effective depth of the water table. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

The suitability of this soil for pasture and hay crops is fair. Pangolagrass and improved bahiagrass grow well in properly managed areas. A water-control system is needed to remove excess surface water after heavy rains. Regular applications of fertilizer are needed. Overgrazing should be prevented.

This soil is not suitable for the commercial production of pine trees because of the long periods of ponding.

This soil is moderately suited to the production of desirable range plants. The dominant forage is maidencane and cutgrass. Grazing is naturally deferred when the water table is near the surface. This rest period increases forage production, but the high water levels reduce the grazing value of the site. The soil is in the Freshwater Marshes and Ponds range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons and trench sanitary landfills with impervious soil material helps to control seepage. Fill material is needed on sites for septic tank absorption fields, local roads and streets, small commercial buildings, and playgrounds. The sides of shallow excavations should be shored. Mounding may be needed on sites for septic tank absorption fields.

The capability subclass is VIIw.

24—Kesson and Wulfert mucks, frequently flooded. These nearly level, very poorly drained soils are in tidal marshes and tidal swamps adjacent to coastal islands and estuaries. Individual areas are irregular in shape and range from about 2 to 80 acres in size. Slopes are smooth and are less than 1 percent.

The components of this map unit do not occur in a regular and repeating pattern. Some areas are entirely Kesson and similar soils, some are entirely Wulfert and similar soils, and some are made up of Kesson, Wulfert, and other soils. The Kesson and similar soils make up about 50 percent of the map unit, and the Wulfert and similar soils make up about 40 percent.

Typically, the surface layer of the Kesson soil is dark reddish brown muck about 7 inches thick. The underlying material to a depth of more than 80 inches is gray, grayish brown, and dark greenish gray fine sand. Shell fragments are common in the underlying material.

Typically, the upper 38 inches of the Wulfert soil is black muck. The underlying material to a depth of more than 80 inches is dark gray and grayish brown fine sand.

Included with these soils in mapping are small areas of Beaches and St. Augustine soils. Also included are soils that are similar to the Kesson soil but have an organic surface layer 8 to 15 inches thick. Included soils make up less than 10 percent of the map unit.

Under natural conditions, the Kesson and Wulfert soils are flooded during normal high tides. Permeability is moderately rapid or rapid. The available water capacity and natural fertility are high for saltwater-tolerant plants. The organic matter content is very high.

The native vegetation is red, black, and white mangroves. Searocket, saltwort, perennial glasswort, seashore saltgrass, and seashore paspalum grow in some areas.

Because of the tidal flooding, these soils are not suited to cropland, citrus, improved pasture, rangeland, woodland, or urban uses. They are in the Mangrove Swamp ecological plant community.

These soils are in mangrove swamps (fig. 6), which are unique, biologically productive areas that are very important to many species of fish and wildlife. Many sport and commercial finfish, shellfish, and other crustaceans use these areas as spawning grounds and nurseries. Birds use the areas as rookeries and feeding grounds. Mangrove swamps also serve as protective barriers against excessive wave action in estuaries during tropical storms.

The capability subclass is VIIIw.

25—Malabar fine sand. This nearly level, poorly drained soil is in low, narrow to broad sloughs and poorly defined drainageways and on flats. Individual areas range from 20 to 250 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

Typically, the surface layer is very dark gray fine sand about 4 inches thick. The subsurface layer to a depth of 13 inches is gray fine sand. The subsoil is brownish yellow and reddish yellow fine sand in the upper 32 inches, dark grayish brown sandy clay loam in the next 5 inches, and light gray sandy loam in the lower 30 inches.

Included with this soil in mapping are small areas of Felda, Pineda, Pompano, and Wabasso soils. Also included are soils in small depressional areas that are ponded. Included soils make up less than 15 percent of the map unit.

The Malabar soil has a water table within 12 inches of the surface for 2 to 6 months and at a depth of 12 to 40 inches for most of each year. Permeability is rapid in the surface layer and subsurface layer and in the upper part of the subsoil. It is slow or very slow in the lower part of the subsoil. The available water capacity is low. Natural fertility and the organic matter content also are low.

Most areas of this soil support natural vegetation of

Typically, the surface layer is dark gray fine sand about 6 inches thick. The subsoil is dark reddish brown and dark brown fine sand to a depth of about 16 inches. Below this to a depth of 80 inches or more is brown and gray fine sand.

Included with this soil in mapping are small areas of EauGallie, Myakka, Pomello, and Pompano soils. Some areas of the Myakka soils are depressional. Also included are areas of soils that are similar to the Ona soil but have a surface layer more than 9 inches thick. Included soils make up about 15 percent of the map unit.

Under natural conditions, the Ona soil has a water table within a depth of 40 inches for more than 6 months during most years and at a depth of 6 to 18 inches for 1 to 3 months during wet periods. Permeability is rapid in the surface layer and substratum and moderate in the subsoil. The available water capacity is low. Natural fertility and the organic matter content are low or medium.

Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, and longleaf pine and scattered live oak, inkberry, fetterbush, waxmyrtle, pineland threeawn, bluestems, panicum, and various other grasses.

The suitability of this soil for citrus trees is good if a water-control system is installed to maintain the water table below a depth of about 4 feet. Planting the trees on beds lowers the effective depth of the water table. Regular applications of lime and fertilizer are needed.

Under natural conditions, this soil is poorly suited to cultivated crops because of the wetness and the sandy texture in the root zone. The suitability for many vegetable crops is good, however, if a water-control system removes excess water during wet periods and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Regular applications of fertilizer and lime are needed.

The suitability of this soil for improved pasture is good. Pangolagrass, improved bahiagrass, and white clover grow well in properly managed areas. Water-control measures are needed to remove excess surface water after heavy rains. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

The potential productivity of this soil for pine trees is moderate. The equipment limitation, seedling mortality, and plant competition are the main management concerns. South Florida slash pine and slash pine are suitable for planting.

This soil is moderately suited to the production of desirable range plants. The dominant forage is creeping bluestem, lopsided indiangrass, pineland threeawn, South Florida bluestem, and chalky bluestem. Management should include deferred grazing and brush control. The soil is in the South Florida Flatwoods range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. An increase in the size of septic tank absorption fields may be needed. Sealing or lining sewage lagoons with impervious soil material helps to prevent seepage. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IIIw.

31—Pineda fine sand. This nearly level, poorly drained soil is on low hammocks and in broad, poorly defined sloughs. Individual areas range from 10 to 200 acres in size. Slopes are smooth or concave and range from 0 to 2 percent.

Typically, the surface layer is dark gray fine sand about 8 inches thick. The subsurface layer is 14 inches of gray fine sand. The upper 14 inches of the subsoil is dark yellowish brown and pale brown fine sand. The lower 12 inches is light brownish gray fine sandy loam mottled with dark yellowish brown. The substratum to a depth of 80 inches or more is grayish brown and dark grayish brown fine sand.

Included with this soil in mapping are small areas of EauGallie, Felda, Malabar, and Pople soils. Also included are a few areas of soils that have a thin layer of very friable, calcareous material at a depth of 10 to 30 inches. Included soils make up less than 20 percent of the map unit.

The Pineda soil has a water table that is above the surface for a short period after heavy rainfall. The water table is within 12 inches of the surface for 1 to 6 months and at a depth of 20 to 40 inches for more than 6 months. The available water capacity is low. Permeability is rapid in the surface layer and subsurface layer and in the upper part of the subsoil, slow or very slow in the lower part of the subsoil, and moderately rapid in the substratum. Natural fertility and the organic matter content are low.

A large part of the acreage of this soil has been cleared and supports citrus trees. The natural vegetation is scattered slash pine, South Florida slash pine, longleaf pine, cabbage palm, waxmyrtle, scattered saw palmetto, blue maidencane, pineland threeawn, low panicum, bluestems, and various weeds and grasses.

This soil is severely limited if it is used for cultivated crops. The suitability for vegetable crops is fair if a water-control system removes excess water rapidly

during wet periods and provides water through subsurface irrigation during dry periods. Soil-improving crops and crop residue management help to control erosion and maintain the organic matter content. Seedbed preparation should include bedding of rows. Fertilizer should be applied according to the needs of the crop.

The suitability of this soil for citrus trees is good if a water-control system maintains the water table below a depth of about 4 feet. Planting the trees on beds results in good surface drainage. A close-growing cover crop between the tree rows helps to control soil blowing. Regular applications of fertilizer are needed.

The suitability of this soil for pasture and hay crops is good. Pangolagrass, improved bahiagrass, and clover grow well in properly managed areas. A water-control system is needed to remove excess surface water after heavy rains. Management should include regular applications of fertilizer and controlled grazing.

The potential productivity of this soil for pine trees is moderately high. Slash pine and South Florida slash pine are suitable for planting. Water-control measures are necessary. The equipment limitation and seedling mortality are the main management concerns.

This soil is well suited to the production of desirable range plants. The dominant forage is blue maidencane, chalky bluestem, and bluejoint panicum. Management should include deferred grazing. The soil is in the Slough range site.

This soil is severely limited as a site for buildings, sanitary facilities, and recreational uses. Water-control measures are needed. Sealing or lining sewage lagoons with impervious soil material helps to prevent seepage. Mounding may be needed on sites for septic tank absorption fields. The sandy surface layer should be stabilized on sites for recreational uses. The sides of shallow excavations should be shored.

The capability subclass is IIIw.

32—Pits and Dumps. This map unit consists of excavated areas where limestone and phosphate have been mined. The refuse from mining activities has been left on the adjoining land. Several areas are in the northern part of the county. Most areas have been abandoned.

Excavations made to obtain marl, shells, clay, or other material for road construction or fill and the waste material from these excavations are part of this unit.

This map unit is not used for cropland, improved pasture, citrus, woodland, or rangeland. Some revegetated areas provide good wildlife habitat. Onsite investigation is recommended for all uses.

This map unit is not assigned to a capability subclass.

33—Pomello fine sand. This nearly level, moderately well drained soil is on low ridges and knolls on flatwoods. Individual areas range from 20 to 150 acres in size. Slopes are smooth or convex.

Typically, the surface layer is dark gray fine sand about 4 inches thick. The subsurface layer to a depth of about 48 inches is light gray fine sand. The subsoil to a depth of about 80 inches or more is dark reddish brown fine sand.

Included with this soil in mapping are small areas of EauGallie and Tavares soils and areas of soils that are similar to the Pomello soil but have a thin, brownish yellow layer directly below the surface layer. Also included are areas of soils that have a subsoil below a depth of 50 inches and areas of soils that have a weakly cemented subsoil. Included soils make up less than 15 percent of the map unit.

Under natural conditions, the Pomello soil usually has a water table at a depth of 24 to 40 inches for 1 to 4 months during wet periods and at a depth of 40 to 60 inches during the drier periods. Permeability is very rapid in the surface layer and subsurface layer and moderately rapid in the subsoil. The available water capacity is low. Natural fertility and the organic matter content are very low.

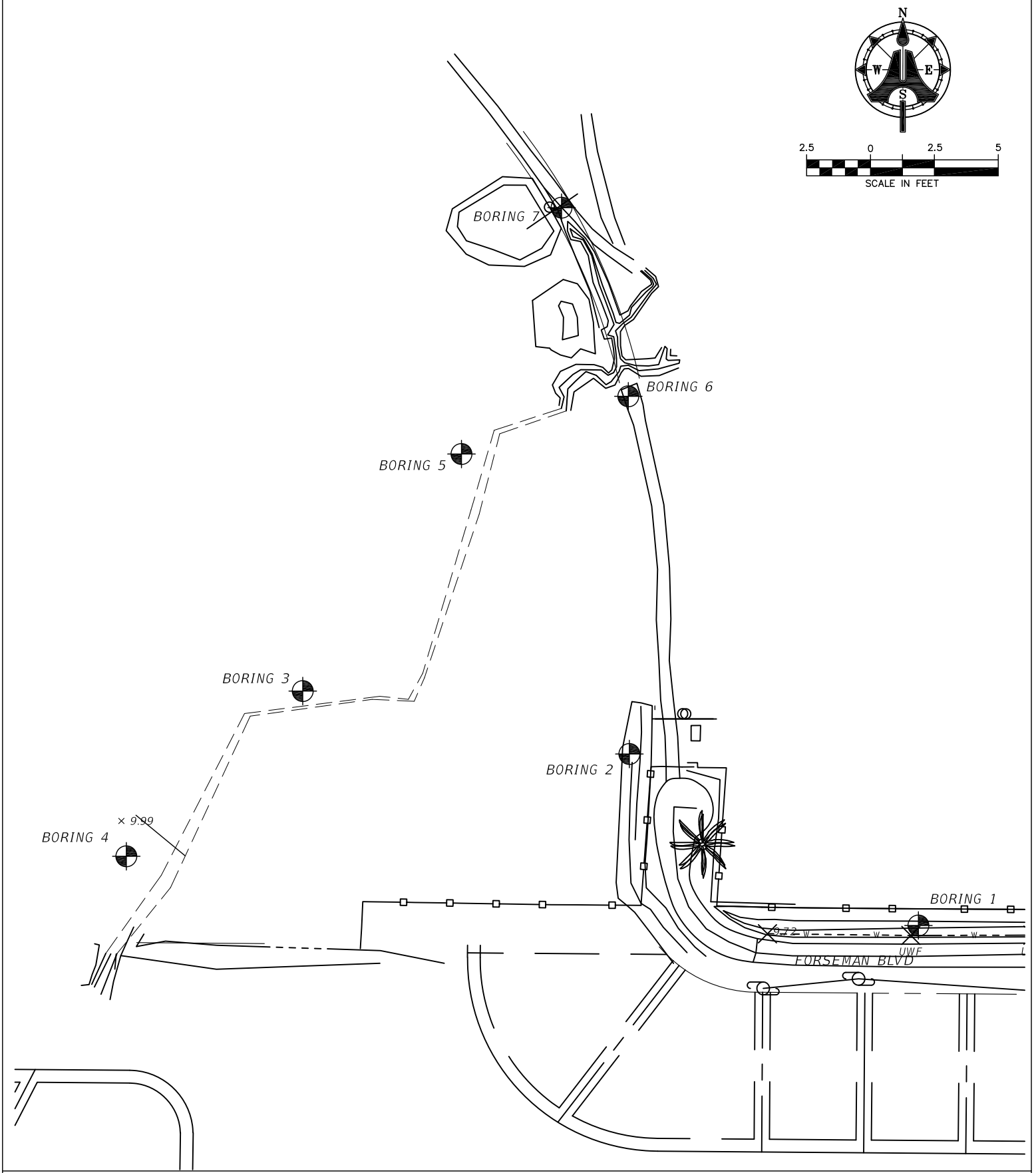
Most areas of this soil support natural vegetation of slash pine, South Florida slash pine, longleaf pine, scrub live oak, saw palmetto, fetterbush, rusty lyonia, running oak, indiangrass, pineland threeawn, grassleaf goldaster, flag pawpaw, mosses, lichens, panicum, bluestems, and various other grasses. Sand pine grows in some areas.

This soil is poorly suited to citrus trees. Only fair yields can be obtained even if the level of management is high. A water-control system is necessary to maintain the water table below a depth of about 4 feet during wet periods and to provide water for irrigation during dry periods. Regular applications of fertilizer and lime are needed. A suitable cover crop between the tree rows helps to control soil blowing.

This soil is poorly suited to cultivated crops. If intensive management is applied, however, a few crops can be grown. The number of suitable crops is limited unless intensive management is applied. Irrigation is needed. Fertilizer and lime should be applied according to the needs of the crop.

The suitability of this soil for improved pasture grasses is fair. Bahiagrass is the best suited species. Droughtiness is the major limitation during the drier periods. Regular applications of lime and fertilizer are needed. Overgrazing should be prevented.

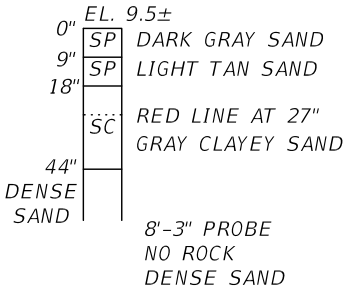
The potential productivity of this soil for pine trees is moderate. Seedling mortality, plant competition, and the equipment limitation are the main management



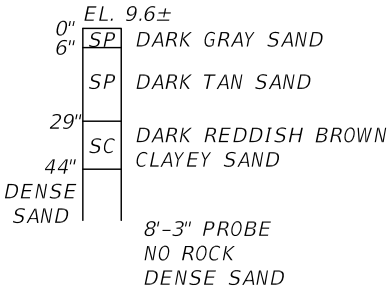
MYAKKA STATE FOREST

FLOW-WAY RESTORATION

SOIL BORING MAP



BORING 1



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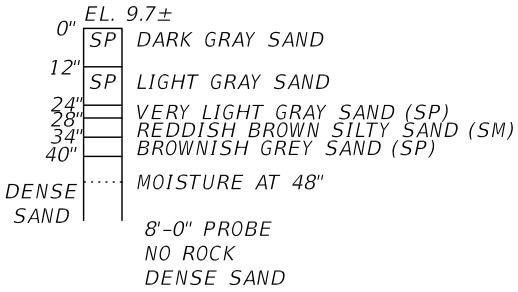

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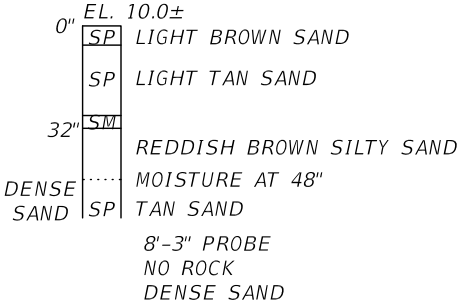

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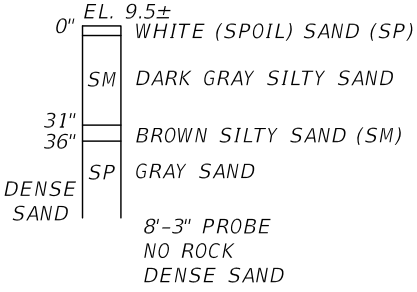

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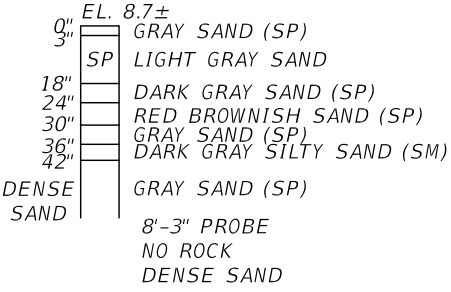

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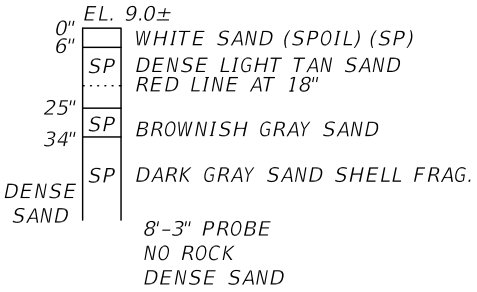
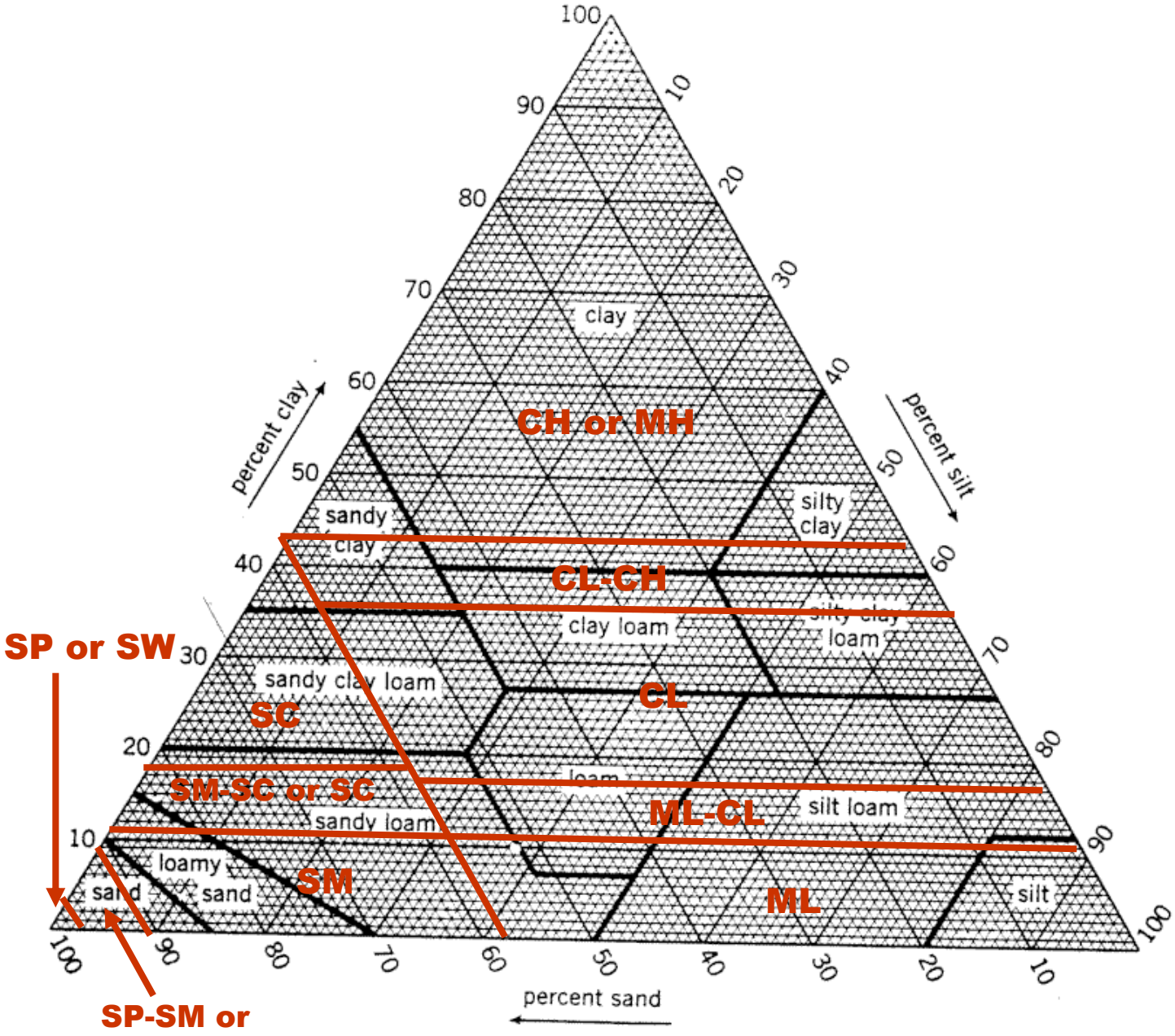


BORING 7

MYAKKA STATE FOREST

FLOW-WAY RESTORATION

SOIL BORING LOGS



Unified Soil Classification System (USCS)—Generalized

Well-Graded (many sizes):	Gravels	GW	Well-graded gravel
	Sands	SW	Well-graded sand
Poorly-Graded (uniform size)	Gravels	GP	Poorly-graded gravel
	Sands	SP	Poorly-graded sand
Sands with enough fines to stain a wet palm:			
	SW-SM		Well-graded sand with silt
	SW-SC		Well-graded sand with clay
	SP-SM		Poorly-graded sand with silt
	SP-SC		Poorly-graded sand with clay
Sandy loamy soils:			
	Non-sticky/Non-Plastic	SM	Silty sand
	Sticky/Plastic	SC	Clayey sand
Fine-Grained Soils:			
	Average NC clays	CL	Lean clay
	Average NC silts	ML	Lean silt
	Very heavy/sticky/plastic clays	CH	Heavy clay
	Very heavy/sticky/plastic silts	MH	Heavy silt