Phase I and Phase II Environmental Investigation
Yerba Buena Project Site
Emeryville, California

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Volume II of IV
Appendices A, B, C, and D

Prepared for:

Catellus Development Corporation
201 Mission Street
San Francisco, California 94105

LEVINE·FRICKE

APPENDIX A

DETAILED FINDINGS FROM SITE INSPECTION AND SANBORN MAP REVIEW

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A1.0 SITE INSPECTION

In September 1989, a site inspection of the Yerba Buena Project Site (the "Site") in Oakland and Emeryville, California, was performed by Ms. Beth Gurney, R.E.A. and Senior Scientist, and Ms. Amanda Spencer, Project Hydrogeologist. This included a walk-through inspection of buildings occupied by tenants of Catellus Development Corporation, formerly Santa Fe Pacific Realty Corporation (SFPRC), and of accessible yard areas. The purpose of the site inspection was to obtain information concerning the use, storage, handling, and disposal of hazardous substances at the Site, and observe site features which may suggest the potential source(s) or the release(s) of such substances. Site uses and features relevant to an assessment of potential environmental impacts to soil or ground-water quality noted during the inspection and through interviews with tenants are discussed below. For purposes of description, the Site has been divided into three quadrants, Areas A, B, and C (Figure 2 of the Phase I and Phase II Environmental Investigation Report).

A1.1 Area A

The eastern half of Area A contained an approximately 60,000-square-foot building that has been used as a distribution warehouse by Clipper Exxpress Company (3871 San Pablo Avenue). The building is surrounded by an asphalt-paved, fenced yard. This building was demolished by SFPRC in June of 1990 in preparation for site development. At the time of the inspection, the western half of the Area A contained an unpaved, fenced yard that had been used for truck trailer storage by Santa Fe Terminal Services.

Clipper Exxpress

According to Mr. William Biggs of Clipper Exxpress, the building located in the eastern portion of Area A was originally constructed for Clipper, and Clipper has occupied the building for 20 years, using it for a distribution warehouse. According to Mr. Biggs, merchandise is stored only a few days before being shipped to its destination (personal communication, September 1989).

The warehouse was observed to have a concrete floor, elevated about 4 feet above grade, which generally appeared to be in good condition, with little staining or other evidence suggesting substantial releases of hazardous substances. A few small containers (less than 55-gallon) of chemical products were observed in the warehouse at the time of inspection (labeled oxides, acid rinse, and chlorinated alkaline cleaner), but the majority of the merchandise in the warehouse appeared to be dry goods and other types of manufactured products.

The yard area of the Clipper Exxpress property was completely paved with asphalt at the time of inspection. Railroad tracks transect the Site from west to east inside the northern border of Area A, terminating at the Clipper Exxpress building. With the possible exception of the underground fuel tank (discussed below), no evidence indicating a substantial source or release of hazardous substances was observed in the yard area (i.e. improper chemical storage, staining on the pavement, disturbed areas, unexplained piping, etc.). A chain-linked fence with a locking gate completely surrounds the Clipper Exxpress yard and warehouse, limiting unauthorized access to the property.

A 10,000-gallon underground diesel fuel tank was located in the paved yard south of the warehouse. According to Mr. Biggs, this tank had not been used since 1988, and Clipper had obtained a temporary closure permit for the tank from the Alameda County Health Department. The tank had reportedly been tested for leaks by Clipper prior to being removed from service and was found to be tight.

During a geotechnical investigation of the Site performed by Kaldveer Associates in 1989, hydrocarbon odors reportedly had been detected in soil samples collected from 15 and 30 feet below grade from a borehole located northeast of the Clipper Exxpress warehouse site (Kaldveer, April 1989). This reported detection suggests the possibility that petroleum hydrocarbons had been released to soil or were present in ground water at the Clipper site.

Santa Fe Terminal Services Yard

The western half of Area A contains a fenced, unpaved yard used by Santa Fe Terminal Services for truck trailer storage. Truck trailers covered much of this area at the time of the inspection, so much of the ground surface was not accessible for direct inspection for evidence of staining, etc. However, no evidence indicating a substantial release of hazardous substances at the surface of this property was observed on the areas inspected.

A1.2 Area B

The southern portion of this area contained an approximately 51,000-square-foot building, 21,000 square feet of which have most recently been used as a distribution warehouse by LDS Truck Lines. This building was demolished by SFPRC in April 1990 in preparation for site development. The northeastern and central portions of Area B consisted of an unpaved yard that has been used for truck trailer storage by Santa Fe Terminal Services. The historical Santa Fe Terminal Services passenger station building was located directly north of the LDS Trucking warehouse. Ransome Company, a construction firm and former asphalt batching plant, has occupied the northwestern portion of Area B for over 50 years. The Ransome area contained a number of small buildings, and both paved and unpaved yard areas. These buildings were demolished in June 1990.

LDS Trucking

At the time of the site inspection, LDS Trucking (1268 Yerba Buena Avenue) occupied the central portion of the warehouse building located along Yerba Buena Avenue in Area B; the space at each end of the warehouse was vacant. The warehouse had concrete floors elevated approximately 3 feet above the ground surface. The floors were generally in good condition, with oil staining in some locations. A freight scale was located near the center of the building, providing an opening through the floor and a possible conduit for substances spilled onto the floor to migrate beneath the building. Toward the western end of the LDS area, the concrete appeared to be the original flooring, and was highly cracked. An old transformer was noted in the northeastern corner of that portion of the building occupied by LDS. This area contained old equipment and debris, including a 55-gallon oil drum. A section of the floor in this area was heavily stained. The remainder of LDS's portion of the warehouse was actively used for storage and shipping of merchandise. A transformer was also located on the western wall of the area occupied by LDS. Given their apparent age, the transformers located at this site might have contained polychlorinated biphenyls (PCBs).

The eastern end of the building comprised a separate, vacant office with a concrete floor, and contained abandoned chairs and office supplies at the time of the site inspection. Signs labeled "Westransco" and "Atlas Van Lines" were observed on this part of the building.

The western end of the building was vacant at the time of the inspection, but also appeared to have been used as a warehouse. This portion of the building also had concrete floors and a freight scale. A sign reading "Balken Consolidators" was observed on the roof at this end of the building.

The yard area surrounding the LDS warehouse was predominantly paved with asphalt, which was highly cracked in several locations. Abundant cracks and heavy oil staining were observed south of the eastern end of the building, and west of the western end. The area west of the building, south of the rail tracks, was unpaved.

Specific observations that suggested the potential sources or release of hazardous substances in this portion of Area B included the following:

- A small storage shed with a concrete floor was observed outside the northwestern wall of the building. The shed may have been used as a hazardous substances storage area. The asphalt near this shed was stained with a white substance.

- The asphalt area outside the western end of the building was observed to be heavily stained with an oily substance.

- Imprints created by 55-gallon drum were observed along the outside western wall.

- Heavy oil stains were observed along the chain-link fence separating the western end of the building from the railroad tracks to the north, and in an unpaved area farther west of the building.

- A concrete pad, suggesting a possible underground storage tank area, was observed about 30 feet west of the building. According to Kaldveer Associates, this was the former location of an underground fuel storage pit (Kaldveer, February 2, 1989).

Santa Fe Terminal Services

Behind the LDS building was a vacant Santa Fe terminal building. A chain-link fence separated the LDS building from the railroad tracks and an unpaved yard area to the north and east. This yard area was used by the Santa Fe Terminal Services for storage and transfer of loaded truck trailers. A paved roadway located immediately north of the railroad tracks led from Hollis Street to the storage yard area in the northeastern portion of Area B. Trucks were stored north and south of the tracks along the eastern end of Area B, and between the southern boundary of the Ransome Company yard and the paved access roadway in the western portion of Area B.

Ransome Company

The Ransome Company site (4030 Hollis Street) contained eight buildings, as shown on Figure 3, which included an office (Building 1), a maintenance/machine shop (Building 2), four storage sheds (Buildings 3 through 6), a steam-cleaning shed, and a lavatory (Buildings 7 and 8). The yard area was used for storage of vehicles and equipment, construction materials, soil and asphalt debris, and fuel in underground tanks.

Railroad tracks transverse the northern boundary of the Ransome site. A one-story brick building, located north of the tracks, is occupied by United Stamping, a metalworking company. The Besler Building, a three-story building located east of United Stamping, is currently occupied by art studios and residences.

Building 1 contained the Ransome Company office. The area north and northeast of the building was elevated about 4 feet above the building grade to the northern fence line, and appeared to be filled with aggregate/gravel. An approximately 3-foot high concrete pad with concrete footings on its surface was located directly east of the building. South of the pad, at the grade of the Building, a concrete patch appeared in the asphalt paving of the parking area. The paving in the parking area east of the office was in poor condition, and dirt was exposed throughout this area.

Building 2, the vehicle maintenance/machine shop, was observed to have an old concrete floor, much of which was pitted and cracked. Machinery, tools, equipment, and numerous small containers of oil and other compounds were stored in this building. Heavy, oily stains were observed on the floor in several locations. Specific features observed which suggested potential sources or release of hazardous substances included the following:

- o The floor surrounding a floor drain located in the southwestern corner of the building was heavily stained.
- o An approximately 4-inch diameter hole, which penetrated to the soil below the floor, was observed in the concrete in one location about 15 feet east of the western wall.
- o A solvent tank for degreasing parts, and a sink were observed against the western wall.
- o Heavy staining and many deep pits were observed in the concrete in the northern portion of the building.
- o An approximately 30-gallon drum labeled "Hazardous Chemicals" was located in the southern portion of the building. The floor in the vicinity of this drum was heavily stained.
- o Batteries were stored on wooden pallets in the southern portion of the building. The floor beneath this area was dirt, and staining was observed on the floor in this area.
- o The concrete floor in the southeastern portion of this building was in poor condition, with dirt visible in several locations. Staining was observed along the southern wall of the building.

Attached to Building 2 was a canopy which extended over a concrete-paved area. This area appeared to be used for vehicle servicing, including oil changing. Notable features of this area included the following:

- The concrete in this area had abundant cracks and was heavily stained. Soil was exposed in the middle of this area.

- A storm drain that appeared to drain this area was located at the northern edge of the canopy.

- A partially underground 350-gallon steel waste oil tank was located along the northern wall of Building 2. The concrete surrounding the tank was heavily stained. A 55-gallon drum labeled "solvent" was on its side on top of the tank.

Building 3

The eastern portion of Building 3 served as an open oil storage shed, and contained five 55-gallon drums of oils and transmission fluid. The drums were stored on their sides on a wooden platform, with the drum valves positioned over a 3-inch wide concrete drainage trough. The trough crossed through the shed in a north-south direction alongside the drums, and apparently exited through the rear (south) of the building. Stained soil was noted south of Building 3. The floor of the shed, which was concrete, was heavily stained beneath the drums. Heavy, oily stains were also observed on the ground north of this shed. Five additional 55-gallon drums were stored on the asphalt pavement outside the shed.

The remainder of this building appeared relatively clean, with small areas of heavy, oily stains on the concrete floor. Equipment and trailers were stored under a canopy outside the eastern end of this building. The yard outside this area was unpaved, and heavy, oily stains were observed here.

Buildings 4, 5, and 6

The remaining storage sheds were elevated on posts with wooden plank floors, and were used for storage of miscellaneous materials and equipment.

Buildings 7 and 8

Buildings 7 and 8 contained a steam-cleaning area and lavatory. A storm drain was located within Building 7.

Yard Area

The yard area in the western portion of the Ransome Company site was partly paved with asphalt, and partly exposed dirt. The eastern portion of the yard was entirely unpaved. Notable features of this area included the following:

- o An elevated cement pad (2 to 4 feet above grade), apparently the foundation of a former rock bunker was observed south of the northern property boundary and east of Building 1.

- o The outlines of a possible concrete tank, vault, or building foundation were observed south of the elevated pad in the asphalt-paved parking lot.

- o An aboveground tank storing SS-1 (liquid asphalt oil) was located near the center of the yard. Valves and hoses connected to this tank, and soil areas surrounding the tank, were asphalt-coated or stained.

- A pile of mixed asphalt, concrete, and soil debris measuring approximately 8 feet by 10 feet was observed to be located along the northern fence line near the center of the property.

- A fuel pump island was observed north of Building 5. According to Mr. Kinnear Smith of Ransome Company, three underground storage tanks (a 1,000-gallon unleaded gasoline, a 10,000-gallon regular gasoline, and a 4,000-gallon diesel fuel tank), that were in use, were located on site. An old map provided by Mr. Smith indicated that a fourth 4,000-gallon underground tank had been located in this area and previously used for storing diesel fuel. These tanks were removed by Ransome in December 1989.

- Railroad ties, metal piping and other debris were observed in the eastern portion of the site. Staining on soil was observed in several areas.

According to a report by Kaldveer Associates, a buried, concrete-lined pit was reportedly located in the northeastern portion of the yard; the use of the pit was not indicated (Kaldveer Associates, February 1989).

A1.4 Area C

The eastern half of Area C contains an approximately 31,000-square-foot building owned and occupied by Bashland Company, a construction company, and an approximately 79,000-square-foot building occupied by Bay Area Warehouse. The western portion of this area contains an approximately 85,000-square-foot building most recently occupied by M & N Truck Lines, a distribution and storage warehouse. A small portion of the M & N building is sub-leased to ARC Roofing.

Bashland

A walk-through inspection was performed of the Bashland property (4015 Hollis Street) on February 2, 1990. The site was observed to contain a warehouse that bordered Hollis Street, and office trailers. The surface of the site not covered by buildings or trailers was asphalt-paved, and the site was surrounded by a chain-link fence.

According to Mr. Jeff Rexford, Vice President of Bashland, the site contained three underground storage tanks, located along the northern side of the building, that formerly contained diesel fuel. Mr. Rexford stated that the tanks were no longer in use, and that at the time the property was purchased from SFPRC, SFPRC indicated the tanks were empty. He did not know if the tanks had been properly disposed.

Other features of the site of potential environmental concern noted during the site inspection were staining on the pavement along the western fence line on the adjacent property; and storage of drums and paint on a pallet.

Bay Area Warehouse and Vicinity

The Bay Area Warehouse building (4001 Hollis Street) was reportedly constructed in 1903, and had predominantly concrete floors elevated approximately 6 feet above grade. The warehouse was observed to contain mostly packaged dry goods on pallets. Limited quantities of hazardous materials were stored in 55-gallon drums in the central area and eastern end of the building at the time of inspection; no evidence of leakage or spillage was observed in the vicinity of the drums. According to

Mr. Charles Wellnitz, manager of the warehouse, no repackaging of hazardous materials has occurred at the site. The concrete floor was cracked in some places, but the floor appeared generally clean and the building was well ordered and maintained.

The yard areas to the east and west were asphalt-paved, with minor localized staining and some cracks and holes in the paving. One underground storage tank was located in the yard area at the southwestern corner of the building. A pump island was located adjacent to the building, and a concrete pad covering the underground tank was located west of the pump island. A permit for use of the tank issued in March 1988 was found in the Alameda County Health Care Services Agency (ACHCSA) files. The yard area was enclosed with a chain-linked fence. A railroad spur paralleled the northern wall of the building. Farther north were railroad tracks and a brick building that appeared to contain a BMW auto repair shop. More than a dozen 55-gallon drums were observed on the ground behind (south) the shop.

An asphalt-paved roadway lies south of and parallel to the building. The property south of the roadway contained what appeared to be a recently-paved asphalt parking lot used for storage of semi-truck trailers. The Bashland property adjoins the Bay Area Warehouse to the east, and is separated from the Warehouse by a chain-linked fence.

A vacant parcel, where debris and junk have been dumped, lies north of the Yerba Buena right-of-way between the Bay Area Warehouse and M & N Truck Lines sites. This area contained railroad ties, asphalt and dirt piles, empty 55-gallon drums, and other assorted trash in piles as high as 6 feet above grade. A storm drain outlet was observed southwest of the Bay Area Warehouse property that appeared to drain the area to the west.

M & N Truck Lines

The M & N building (1549 40th Street) contains seven separate warehouses (all with concrete floors), an abandoned boiler room, and office and storage space. A chain-link fenced yard area located at the southeastern end of the warehouse was subleased to ARC Roofing, an asphalt roofing company. According to Ms. Sara Sharpe, co-owner of M & N, the firm had occupied the warehouse for six years.

The M & N site is fenced on all sides, except for the northwestern end of the building that is used as a loading dock. The Judson Steel manufacturing company is located across Beach Street to the northwest. Railroad tracks and spurs are located directly south and north of the site.

Notable features of this site include the following:

- o Hazardous materials have been stored in this warehouse in reportable quantities, and M & N has a Hazardous Materials Inventory on file with the Alameda County Health Care Services Agency.

- o Flammable and corrosive materials were stored in the northeastern wing of the building. These materials included aromatic solvents, alcohols, acetic acid, petroleum ether, dyes, pigments, and other hazardous substances. This room was observed to have open floor drains along the walls, which, according to Ms. Sharpe, were capped by M & N to prevent release of any spilled materials. No substantial evidence of release of substances (i.e. evident leakage from containers, or staining on the concrete floor) was observed in this area of the warehouse.

Small (less than one gallon) quantities of "specialty" chemicals were stored in the northern portion of the warehouse, including hydrofluoric acid, fluoroboric acid, ethyl bromide, and ethylene glycol.

- Other hazardous materials were observed in certain parts of the warehouse, most stored in 55-gallon steel or plastic drums. These included powder resins, paint pigments, clays, silica, titanium oxide, acids, carbamates, petroleum hydrocarbons, sodium hydroxide, and other solid and liquid materials. No floor drains were evident in the central and southern portions of the warehouse, but patched trenches were observed in the concrete floor that may have been old drains that have been filled. No evidence of substantial spillage of stored materials was observed. According to Ms. Sharpe, no repackaging of materials occurs at the site.

The warehouse was surrounded by a dirt yard to the east, railroad tracks to the south and east, and a loading area along the railroad tracks to the north. Notable features of the yard area included the following:

- A 550-gallon gasoline tank was noted on an old site plan of the property provided by M & N, but no visible evidence of such a tank was observed in the location indicated. What appeared to be a valve was observed in the side of the concrete platform of the warehouse, and a patch was observed on the top of the platform, suggesting that a tank (possibly aboveground) may have been located in that vicinity.

- The ARC Roofing yard area was not accessible for inspection, but asphalt mixing tanks, propane tanks, trucks, and other equipment were observed through the fence surrounding the dirt yard area.

- What appeared to be the former location of a well and pump indicated on historical Sanborn maps and a number of pipes leading into the warehouse building were observed outside the northwestern wall of the building, in the area that was previously a boiler room.

- A 2-foot by 4-foot cement patch (about 8 feet in diameter) was observed north of the old boiler room area. The 1911 Sanborn map indicated that an aboveground water tank has been located in this area.

- A pile of mixed asphalt, dirt, and debris was observed at the northwestern corner of the property, between Beach Street and the railroad tracks.

During a geotechnical investigation of the property, Kaldveer Associates reportedly detected a hydrocarbon odor in a soil sample collected approximately 2 to 4 feet below grade from a borehole in the northwestern corner of the M & N site (Kaldveer Associates, January 1989).

A1.5 Yerba Buena Right-of-Way

The western half of this easement was vacant, with the exception of trackage for the Atchison, Topeka & Santa Fe Railroad, and the Key Route electric rail system. The eastern half of the easement is a paved public roadway, Yerba Buena Avenue. Dumping of debris and junk materials was noted at several locations along the western portion of the Right-of-Way, and oily stains were noted in many places along the railroad tracks. A number of piles of debris fill and trash (tires, appliances, bedding, etc.) were observed west of Hollis Street, north of the McKay Markstein Beverage Company. Vegetation along the tracks appeared highly distressed. White powder was observed along the tracks south of the M & N warehouse.

A2.0 HISTORICAL SITE USAGE

Information concerning historical site usage was obtained from environmental and geotechnical reports prepared by Kaldveer Associates, a review of selected aerial photographs and Sanborn Fire Insurance Maps by Levine·Fricke, Inc., a review of other available files from the City of Emeryville Fire Department concerning underground storage tanks, a review of selected Polk and Haines City Directories for the City of Oakland (dating from 1967, 1974, 1978, 1983, and 1986), and a review of other available reports. Sanborn Fire Insurance Maps covering all or portions of the Site that were reviewed were dated 1911, 1912, 1930, 1931, 1940, 1951, 1956, and 1964. Aerial photographs were reviewed for the years 1936, 1949, 1953, 1957, 1959, 1969, 1979, and 1988.

Pertinent features observed in the aerial photographs and information obtained from City Directories are summarized in Section 4.2 and Table 1 of the Phase I and Phase II Environmental Investigation report. The report also provids a brief summary of information obtained from Sanborn maps. The following presents a more detailed summary of historical site use information obtained from Sanborn maps and other information sources. Figure 3 illustrates the locations of some of the more pertinent of these features, and Table 1A contains a key to the historical site features noted on Figure 3.

Much of history of the Site since the early 1900s has been dominated by operations of two rail systems, the Atchison, Topeka & Santa Fe Railroad, and the San Francisco, Oakland and San Jose Railroad, an electric train system known as the Key Route. Rail tracks for the Atchison, Topeka & Santa Fe Railroad transversed the Site along the Yerba Buena Right-of-Way in the western half of the Site, and then jogged to the northeast, across Area B. Atchison, Topeka & Santa Fe Railroad trackage also paralleled the northern boundary of the Site, and a triangular-shaped set of tracks entered the Site from the north along Hubbard Avenue, joining the tracks along Yerba Buena Avenue. The Key Route tracks entered the Site from the west through a subway tunnel at the Yerba Buena Right-of-Way, then transversed eastward across the Site along Yerba Buena Avenue. Additional Key Route trackage curved southward from the Yerba Buena Right-of-Way to Louise Avenue, south of the Site.

A2.1 Area A

In 1911, most of Area A contained the Oakland Traction Company's Car Shops, which serviced, painted and repaired electric rail cars. Items identified on the Sanborn maps which suggest potential environmental concerns include:

- o an oil warehouse
- o iron and brass foundries
- o a machine shop
- o a blacksmith's shop
- o a 9,000-gallon oil tank (underground)
- o an engine room
- o car repairing and painting.

Hay storage and a hay and grain warehouse were noted in the eastern portion of Area A.

In 1931 and 1940, Area A was occupied by the Key System Limited and the East Bay Transit Company. Site usage notations on the Sanborn Maps for these dates included the same items listed above, along with the following:

- o paint and oil storage room
- o car washing and repairing
- o varnishing
- o auto and bus repair
- o sheet metal workshop
- o car transfer table runway, with a railcar storage yard
- o planing mill
- o waste room
- o scrap bins.

The eastern portion of Area A was occupied in 1931 and 1940 by:

- o a hay and grain warehouse
- o auto storage, and an auto wrecking yard
- o electric printing.

In 1951, Key System Transit Lines occupied Area A. The usage of the area appears to have been essentially the same as in 1931 and 1940. Chemical storage was noted in one location. The eastern portion of Area A was noted as being occupied by a printing operation.

Sanborn maps were not available for this portion of the Site for 1956 or 1964.

A2.2 Area B

From 1904 to 1951 the southeastern portion of Area B served as a freight depot and passenger station for the Atchison, Topeka & Santa Fe Railroad. Railroad operations reportedly commenced on the site in 1904 (Kaldveer Associated, April 1989). In 1949 and 1951, the Republic Car Loading and Distributing Company was noted as a lessee of the freight terminal.

No usage was noted from 1911 to 1951 in the northeastern portion of Area B. Sanborn maps were not available from 1956 or 1964 that included this portion of the Site.

The northwestern portion of Area B was used as a Western Electric Company yard in 1911, and also contained a small warehouse. At that time, Western Electric also occupied the building directly west, on the opposite side of Hollis Street, that is now occupied by Bay Area Warehouse. In 1930, the Hutchinson Company was noted as occupying this part of Area B. Items noted in this area included:

- cement storage and a 20 horse-power engine
- concrete oil tank - underground
- asphalt kettles, mixer
- asphalt tank (7,722-gallon)
- electric company old pole yard.

No map was available from 1940 that included this area. The 1949 and 1951 Sanborn Maps showed the Ransome Company as occupying this area. Ransome Company was indicated as an asphalt plant at that time, pertinent site features noted on the Sanborn Maps included:

- five steel asphalt tanks
- a boiler house
- two asphalt mixers
- oil storage
- two steel butane tanks on a concrete base

- o butane and propane cylinder filling
- o auto repair
- o warehouse.

An incinerator was noted on Sanborn maps dating from 1956 and 1964.

According to information obtained from interviews with current and past Ransome Company employees presented in a report by Kennedy/Jenks/Chilton (K/J/C) for the Ransome Company (Kennedy/Jenks/Chilton, 1989), the Ransome Company occupied the site since approximately 1938. Operations at the site reportedly included asphaltic concrete mixing, metalworking, and assembly of torch and burner equipment. A small printing shop recently operated in part of one of the storage sheds (Building 5 on Figure 3) for approximately two to three years. Raw materials for the production and distribution of asphaltic concrete (asphalt, aggregate, and SS-1) were received by both rail and truck, and subsurface receiving pits that have been filled are reportedly present at the site. Two batch asphalt plants with a combined capacity of 5,000 pounds were reportedly present on the site until their removal in 1983. Two asbestos-insulated aboveground tanks used for the storage of liquid asphalt were present on the site. Fuel for heating asphalt was provided by natural gas and backup supplies of butane and propane; butane and propane were stored in aboveground tanks on the east end of the Site. Building 4 on Figure 3 has reportedly been used for painting and storage of paints and thinner.

According to K/J/C, oil contained by the catch pan beneath the oil drums in Building 3 was allowed to drain onto the ground south of the oil shed for several decades. This is presumably the source of the oil staining noted on the soil south of this building. Reportedly, oil drippings are currently collected and disposed of with other waste oil. Other historical practices reported by K/J/C which may have impacted soil or ground water at the site include the following:

- Diesel fuel was sprayed onto the back of delivery trucks at diesel racks located south of the former 3,000-pound asphalt plant and west of the dry concrete storage, and sometimes at the diesel pump.

- Off-specification SS-1 was sprayed on the debris soil/asphalt pile, and solids collected in the steam-cleaning sump may have been deposited here.

- Waste oil was reportedly used as an herbicide along the northern fence line.

- Oil, grease, and other materials may have been discharged to the storm sewers located under the canopy of Building 2 and in the steam-cleaning shed (Building 7).

- A large volume (up to 10,000 gallons) of butane was reportedly released at the Ransome site in 1959 or 1960 due to an underground pipe break. Holes were reportedly bored to the depth of the pipe (approximately 36 inches) and the soil was aerated and subsequently backfilled.

- Former aboveground asphalt tanks were reportedly wrapped in asbestos insulation. The means used to dispose of the asbestos-containing materials following tank dismantling are unknown.

- PCBs may have been contained in electrical transformers that were removed in 1983 at the time of the closure of the asphalt plant. It is not known if leaks or spills of PCBs occurred at the Site.

- o "Tar boils" have been noted east of the lavatory building on the site of the former asphalt plant, and north of the oil shed. A collection pit for asphalt may have been buried south of the lavatory under the former asphalt plant.

- o Small leaks from the aboveground SS-1 tank were reported by Ransome personnel to have been common, and larger spills reportedly have occurred.

A letter from Testing and Technology dated February 12, 1988 indicated that four underground storage tanks (two gasoline, one diesel, and one waste oil) at the Site had been precision tested for tightness, and that a leak had been detected in the piping of the diesel tank. A leak was also reportedly indicated near the top of the regular gasoline tank, approximately 24 inches below grade. Both the unleaded and waste oil tanks reportedly tested tight. The three underground diesel and gasoline tanks were removed by K/J/C for Ransome in December 1989.

A2.3 Area C

As mentioned above, the building presently occupied by Bay Area Warehouse in the eastern portion of Area C was occupied by the Western Electric Company Warehouse in 1911. The Western Electric Company also used a yard area east of the building, which contained a small shop building. The American Fuel Company yard, which was used for coal storage, was located west of Hollis Street, just north of the Yerba Buena Right-of-Way.

Bay Area Warehouse

In 1930, the warehouse building was occupied by the Furniture Corporation of America. Items noted on the Sanborn map included:

- o spray painting and finishing department
- o paint storage
- o pumps and air compressor.

By 1951, the building had been expanded and contained the following:

- o an oil house
- o truck washing
- o a new auto warehouse and service shop
- o Rosenberg Brothers Dried Fruit Warehouse
- o a beer warehouse
- o an incinerator.

The 1964 map indicated that the western end of the building was a metal shelving warehouse, and the remainder of the building was occupied by Bay Cities Warehouse.

Bashland

A drawing of the Bashland property dated April 7, 1957 prepared by the Atchison, Topeka & Santa Fe Railway Company shows that this was the site of a Santa Fe Transportation Company Bus and Truck Service Garage in the late 1950s. According to the site plan, three underground storage tanks were installed at the site: one 12,000-gallon gasoline tank; one 12,000-gallon diesel tank; and one 1,200-gallon lube oil tank.

M & N

The building now occupied by M & N Truck Lines, in the western portion of Area C, was occupied by the Griffen & Skelly Company Fruit Cannery in 1911. Notable features of this operation indicated on the Sanborn maps included:

- o eight private wells
- o an oil tank
- o a 40-gallon badger chemical cart.

The California Packing Corporation occupied this site in 1930, 1940, and 1951. Notable features included:

- o equipment shed and paint house
- o a tank located on the ground (possibly a water tank)
- o machine shop and cooling room
- o label room, 5-gallon badger chemical cart
- o box printing.

The building was used as a warehouse in 1956 and 1964 by the California Packing Corporation. The 1956 Sanborn map showed the following features:

- o one 40-gallon gadger chemical cart
- o 43 chemicals
- o four 40-gallon and two 20-gallon chemical carts on wheels.

The 1964 map indicates eight 40-gallon chemical carts.

REFERENCES

Kaldveer Associates, 1989. "Geotechnical Investigation for Santa Fe R&D Development, Emeryville, California," January.

Kaldveer Associates, 1989. "Preliminary Environmental Assessment, Santa Fe R&D Development, Emeryville, California," February 2.

Kaldveer Associates, 1989. "Preliminary Environmental Assessment - Phase II for Santa Fe R&D Development, Emeryville, California," April 19.

APPENDIX B

FIELD PROCEDURES

August 15, 1990 LF-1649

FIELD PROCEDURES
PHASE I AND PHASE II ENVIRONMENTAL INVESTIGATION
Yerba Buena Project Site
Emeryville, California

Section B1.0 of this appendix to the Phase I and Phase II Environmental Investigation Report for the Yerba Buena Project Site describes the rational used to determine the spacing of soil sampling locations at the Yerba Buena Project. Section B2.0 provides soil sampling, and monitoring well installation, development, and sampling field procedures used during Phase I of the Investigation. Section B3.0 provides soil sampling, and monitoring well installation, development, and sampling field procedures used during Phase II of the Investigation.

B1.0 STATISTICAL METHOD FOR DETERMINING SAMPLE LOCATION SPACING

The statistical method (Gilbert 1987) used to determine sample location spacing for non-targeted sampling is based on an assumed probability of not hitting a "hot spot" (localized area of chemical-affected soil or ground water) of a specified size. The method assumes that the hot spots are either circular or elliptical in shape and that samples will be collected on a rectangular, triangular, or square grid.

To determine the spacing between sample locations, the size and shape of the potential hot spot must be specified and an acceptable probability (risk) of not finding a hot spot of the specified size must be determined. For the Yerba Buena Site, a circular hot spot with a radius of 80 feet was chosen as appropriate for the level of investigation being conducted at the

Site. A probability of not intercepting a hot spot of this size of 10 percent (i.e. a 90 percent probability of intercepting a hot spot if it is present) was considered appropriate for the investigation.

These parameters were then evaluated using a nomograph (Gilbert 1987, p. 122) to determine the appropriate spacing between sample locations. According to the method presented by Gilbert (1987), a spacing of approximately 150 feet would present a 90 present chance that a circular hot spot with a radius of 80 feet would be found.

B2.0 SOIL SAMPLING, AND MONITORING WELL INSTALLATION, DEVELOPMENT, AND SAMPLING, PHASE I OF THE INVESTIGATION

B2.1 Soil Sampling

Drilling of soil borings for sample collection was conducted by Spectrum, Inc. of Stockton, California, between January 21 and February 22, 1990 under the supervision of a Levine·Fricke geologist. Eighty-six soil samples were collected for laboratory analysis from targeted locations throughout the Site. Graphic illustrations and lithologic descriptions of sediments encountered during drilling are presented in Appendix D of the Phase I and Phase II Environmental Investigation Report.

Six-inch diameter soil borings were drilled to depths of up to 8 feet below ground surface using hollow-stem auger drilling equipment. Soil samples for chemical analysis were collected in clean brass tubes, tightly sealed, and stored in a cooled ice chest for transportation to the analytical laboratory.

Drilling and sampling equipment was steam-cleaned prior to each use. After sample collection, boreholes were backfilled with drill cuttings.

B2.2 Well Drilling and Installation

Drilling of wellbores was conducted by Spectrum, Inc., between January 21 and February 22, 1990 under the supervision of a Levine·Fricke geologist.

Fifteen shallow (less than 25 feet deep) 8-inch diameter wellbores were drilled using hollow-stem auger drilling equipment. Soil samples were collected using a modified California split-spoon sampler at approximately 2-and-1/2-foot intervals for lithologic description and possible chemical analysis. Soil samples for chemical analysis were collected in clean brass tubes, tightly sealed, and stored in a cooled ice chest for transportation to the analytical laboratory. Graphic illustrations and lithologic descriptions of sediments encountered and depths of samples retained for chemical analysis are presented on Figures C1 through C13 of Appendix C.

Wellbores were completed as ground-water monitoring wells by installing threaded-joint, 4-inch-diameter PVC casing with factory-slotted (0.020-inch) perforations. The well annulus surrounding the perforated intervals in each well was backfilled with clean Monterey No. 3 sand to approximately 1 to 2 feet above the top of the screened interval. A layer of bentonite approximately 1 to 2 feet thick was placed above the sand pack to isolate the screened interval from the material above and to prevent the entrance of grout into the sand pack. A cement-bentonite grout was then placed above the bentonite seal up to the land surface to seal the remainder of the borehole. A locking cover was placed over the top of the casing to protect the integrity of the well.

All drilling and sampling equipment was steam-cleaned prior to use in each boring. The well casing was also steam-cleaned before it was installed in the borehole.

B2.3 Well Development

The wells were developed by purging four to ten well volumes from the well with a centrifugal or submersible pump. The purpose of the well development was to remove sediments left in the well and sand pack during construction and enhance hydraulic communication with the surrounding formation. Observations of the quantity, clarity, pH, temperature, and specific conductance were recorded during this process. Ground-water sampling was conducted immediately following this procedure.

B2.4 Water-Quality Sampling

Ground-water samples were collected from the newly installed wells immediately following well development between February 6 and February 9, 1990 and on February 23, 1990.

Four to ten well volumes were purged from each monitoring well during well development using a centrifugal or a submersible pump until indicator parameter readings (pH, electrical conductivity, and temperature) stabilized, thereby indicating complete removal of static water from the well. The sample was then collected using a clean Teflon bailer, and laboratory-supplied sample containers were filled to overflowing directly from the bailer. The samples were immediately capped and placed in a chilled cooler for transportation to the analytical laboratory.

For quality control/assurance, one bailer blank sample was collected each day prior to sampling one of the wells by filling the bailer with organic-free water and pouring the water into two

VOA (volatile organic analyzer) containers. A duplicate sample was collected for laboratory quality assurance from well LF-6 during the Phase I ground-water sampling event. The ground-water and quality assurance samples were stored in a chilled cooler for transportation to the analytical laboratory.

B2.5 Water-Level Measurements

Top-of-casing elevations of the newly installed wells (LF-1 through LF-12, and LF-16) were surveyed by Moran Engineering of Berkeley, California, to a datum of mean sea level. Water-level measurements were collected on February 23, 1990 using an electric water-level probe.

B3.0 SOIL SAMPLING, MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING, AND SOIL-GAS AND GROUND-WATER RECONNAISSANCE SURVEY, PHASE II OF THE INVESTIGATION

B3.1 Soil Sampling

Drilling of soil borings for sample collection was conducted by Spectrum, Inc. of Stockton, California, between April 13 and April 20, 1990 under the supervision of a Levine·Fricke geologist. Soil samples were collected for laboratory analysis from 25 locations in four areas of the Site. These included:

- the vicinity of wells LF-4 and LF-5
- the vicinity of Phase I location B26
- the vicinity of Phase I location C17
- the vicinity of Phase I location A5

Six-inch diameter soil borings were drilled to depths of up to 8 feet below ground surface using hollow-stem auger drilling equipment. Soil samples for chemical analysis were collected in clean brass tubes, tightly sealed, and stored in a cooled ice chest for transportation to the analytical laboratory.

Drilling and sampling equipment was steam-cleaned prior to each use. After sample collection, boreholes were backfilled with drill cuttings and bentonite.

B3.2 Well Drilling and Installation

Drilling of Phase II wellbores was conducted by Spectrum, Inc. of Stockton, California, between April 16 and April 20, 1990 under the supervision of a Levine·Fricke geologist.

B3.2.1 SHALLOW MONITORING WELLS

Four 8-inch diameter wellbores were drilled to depths of 20 to 23 feet below ground surface using hollow-stem auger drilling equipment. Soil samples were collected using a modified California split-spoon sampler at approximately 2-and-1/2-foot intervals for lithologic description and possible chemical analysis. Soil samples for chemical analysis were collected in clean brass tubes, tightly sealed, and stored in a cooled ice chest for transportation to the analytical laboratory. Graphic illustrations and lithologic descriptions of sediments encountered and depths of samples retained for chemical analysis are presented on Figures C14 through C19 of Appendix C.

Wellbores were completed as ground-water monitoring wells by installing threaded-joint, 2-inch-diameter polyvinyl chloride (PVC) casing with factory-slotted perforations. The well annulus surrounding the perforated intervals in each well was backfilled with clean Monterey No. 3 sand to approximately 2 feet above the top of the screened interval. Two feet of bentonite was placed above the sand pack to isolate the screened interval from the material above and to prevent the entrance of grout into the sand pack. A cement-bentonite grout was then placed above the bentonite seal up to the land surface to seal the remainder of the borehole. A locking cover was placed over the top of the casing to protect the integrity of the well.

B3.2.2 DEEPER MONITORING WELLS

Deeper (39 to 44 feet) monitoring wells (LF-4D and LF-5D) were installed using hollow-stem auger drilling equipment and double-cased well construction methods to prevent fluids and sediments from the upper, potentially contaminated zone from moving deeper through the borehole during or following well installation. Deeper monitoring wells were drilled using the following procedures:

The first stage was drilled to the depth of the base of the nearby shallow monitoring well (LF-4 or LF-5) using 12-inch diameter hollow-stem augers. After drilling approximately 1 foot into a clay layer that was present at a depth of 20 to 25 feet, a 10-inch diameter, PVC conductor casing (Schedule 80) was set in the borehole as surface casing and pushed 1 to 2 feet into the clay layer. The annulus between the casing and the borehole was then pressure-grouted by pumping a bentonite-cement grout (less than 5 percent bentonite by weight) through a tremie pipe from the bottom of the borehole to the ground surface.

The grout was allowed to set for 24 hours before initiating the second phase of the drilling. The second stage was drilled through the conductor casing to the final completion depth of the well using 8-inch diameter hollow-stem auger drilling equipment. Soil samples were collected using a California split-spoon sampler at approximately 2-and-1/2-foot intervals for lithologic description according to the Unified Soil Classification System. The deeper wells were screened from 29 to 39 feet (LF-4) and from 34 to 44 feet (LF-5) below grade.

Monitoring wells were constructed using 4-inch diameter, flush-threaded, PVC casing; the slotted portion of the well consisted of 0.020-inch machine-slotted perforations. After the well casing was placed in the completed borehole, the well annulus opposite the perforated interval was backfilled with Number 3 Monterey sand pack to approximately 1-1/2 or 2 feet above the perforations. Two feet of bentonite was placed above the sand pack to isolate the perforated interval from material above and to prevent the entrance of grout into the sand pack. A cement-bentonite grout was then placed above the bentonite seal up to the land surface to seal the remainder of the borehole interval from surface water. A protective, locking steel cover was placed over the top of the casing to protect the well's integrity.

All drilling and sampling equipment was steam-cleaned prior to use in each boring. The well casing was also steam-cleaned prior to installation in the wellbore.

B3.3 Well Development

The wells were developed by purging between 6 and 13 well volumes from the well using a centrifugal or submersible pump. The purpose of the well development was to remove sediments left in the well and sand pack during construction and enhance hydraulic communication with the surrounding formation. Observations of the quantity, clarity, pH, temperature, and specific conductance were recorded during this process. Ground-water sampling was conducted immediately following this procedure.

B3.4 Water-Quality Sampling

Ground-water samples were collected from the newly installed wells between April 25 and April 27, 1990 directly following well development.

Six to 13 well volumes were purged from each monitoring well using a centrifugal or submersible pump until indicator parameter readings (pH, electrical conductivity, and temperature) stabilized, thereby indicating complete removal of static water from the well. If the well was slow in recovering, the well was purged dry several times and then sampled after recovering 80 percent or within two hours. The sample was then collected using a clean Teflon bailer, and sample containers were filled to overflowing directly from the bailer. The samples were immediately capped and placed in a chilled cooler for transportation to the analytical laboratory.

For quality control/assurance, a bailer blank sample was collected each day prior to sampling one of the wells by filling the bailer with organic-free water and pouring the water into two VOA (volatile organic analyzer) containers. A duplicate sample was collected from well LF-20 for laboratory quality assurance. The ground-water and quality assurance samples were stored in a chilled cooler for transportation to the analytical laboratory.

B3.5 Soil-Gas Sampling

Soil-gas samples were collected from 25 locations in the vicinity of wells LF-4 and LF-5 to better assess the extent of VOC-affected ground water and to aid in locating a possible source for the VOCs.

The sampling methodology was as follows. A small diameter (1-inch) pipe with a drive-point was hydraulically pushed approximately 3 to 6 feet below grade and then pulled back approximately 1 foot to dislodge the drive-point and create a small open space below the end of the pipe. A vacuum was applied at the top of the drive-pipe in order to evacuate air from the pipe and to collect a soil-gas sample. Several pipe volumes were evacuated prior to sample collection so that a representative sample was collected from the surrounding formation. The soil-gas sample was then analyzed using portable gas chromatograph (GC) equipment.

B3.6 Ground-Water Reconnaissance Survey

Shallow ground-water samples were collected and analyzed using soil-gas equipment from five of the soil-gas sampling locations mentioned above. The use of soil-gas sampling equipment to collect and analyze shallow ground-water samples has proven to be an effective method of providing reconnaissance data regarding ground-water quality. Ground-water samples can be analyzed on site immediately after sample collection. These real-time data can then be used to adjust, as appropriate, the placement of subsequent sampling locations during the investigation.

The sampling methodology was as follows. A small diameter (1-inch) pipe with a drive-point was hydraulically pushed to approximately 6 to 12 feet below grade and then pulled back approximately 1 foot to dislodge the drive-point and create a small open space below the end of the pipe. A vacuum was applied at the top of the drive pipe in order to evacuate air from the pipe. A 0.25-inch inner diameter PVC line was then inserted into the rod to the bottom depth. A vacuum was applied to the top of the line, causing water to enter the line. The line was then pinched off, pulled out of the rod, and the water in the line was carefully decanted into a 40-ml glass vial. A water sample was then extracted from the vial using a syringe and immediately injected into the gas chromatograph (GC) injection port.

Soil boreholes from the shallow ground-water survey were backfilled with bentonite.

B3.7 Water-Level Measurements

Top-of-casing elevations of the newly installed wells (LF-17, LF-18, LF-19, LF-20, LF-4D, and LF-5D) were surveyed on May 7, 1990 by Moran Engineering of Berkeley, California, to a datum of mean sea level. Water-level measurements were collected on April 23, 1990 using an electric water-level probe.

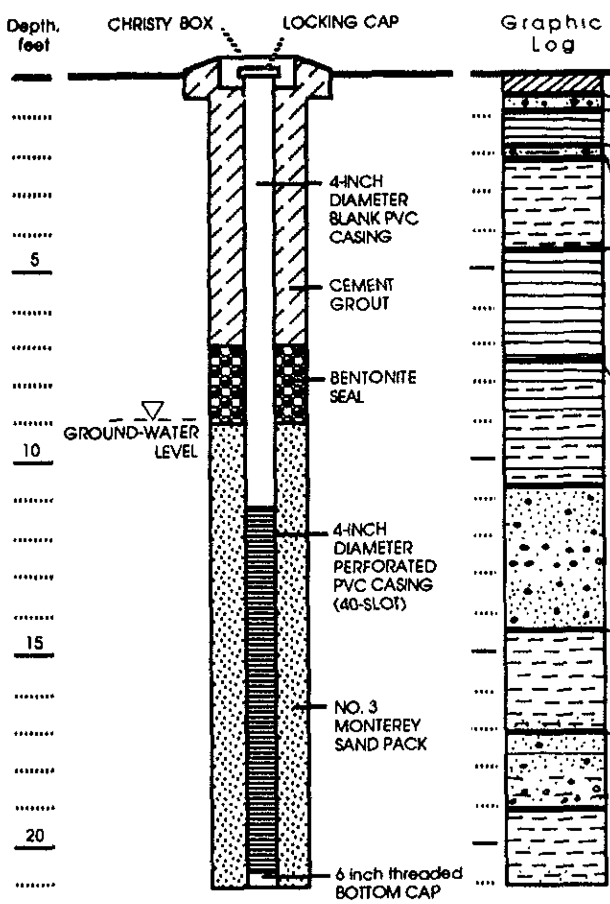
REFERENCE

Gilbert, Richard O., 1987. <u>Statistical Methods for Environmental Pollution Monitoring</u>, Van Nostrand Reinhold Company, Inc. 115 Firth Avenue, New York, New York 10003.

APPENDIX C

WELL BORING LOGS

WELL CONSTRUCTION — LITHOLOGY



Description

Asphalt (4")

SANDY GRAVEL/GRAVELLY SAND (GM), yellowish brown (10YR-5/6-5/8), moist, very loose gravel (1-2 inch diameter), fine sand.

CLAY (CL), black (7.5YR N2), dry, moderate plasticity, stiff, odor at 1.8-2.4'.

GRAVELLY/CLAYEY SAND (GC), brown (10YR 4/3) to dark yellow (10YR 4/4), moist, loose, angular gravel to 2 inch diameter.

SILT (ML), mottled olive yellow (2.5Y 6/6 6/8), moist low plasticity, stiff, minor amount gravel, clayey at 5.0-6.0', no odor.

CLAY (CC), olive (5Y 5/3), moist, moderate plasticity, stiff, minor amount coarse sand, organics common, no odor.

SILTY CLAY/CLAYEY SILT (CC/ML), olive (5Y 5/3).

GRAVELLY SAND/SANDY GRAVEL(GM), dark brown (10YR 3/3) to dark yellowish brown (10YR 3/4), water at 12.0', moderately dense, angular to subangular, gravel up to 1.25 inch diameter.

SILT (ML), light olive gray (5Y 6/2), moist, low plasticity, moderately stiff, very fine to fine sand, minor amount gravel.

CLAYEY GRAVELLY SANDY/SANDY GRAVEL(GC), dark brown (10YR 3/3), very moist, loose, clay and gravel content increase from 17.3-18.3'.

SILT (ML), dark yellowish brown (10YR 4/4 4/6), moist, low plasticity, stiff, clayey 19.3 to 20.0', very fine to fine sand at bottom.

Notes:
- Bottom of boring to 21.0 feet.

Depth, feet	Sample No. and Interval	Penetration Rate (Blows/ft.)	Ambient/Soil
	LF1 A (1.0)	14	0
	LF1 B (1.5)		0
		10	0
5		13	0
10		12	0
	LF1 C (11.0)	29	0
		39	0
15		8	0
		17	0
20		12	0

Date well drilled: 23 January 1990

Date water level measured: 23 April 1990

Well elevation: 29.74

LF Geologist: Chris Goodrum

Approved by:

EXPLANATION

Clay

Silt

Sand

Gravel

Sample interval

Sample retained for analysis

Figure C1 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-1

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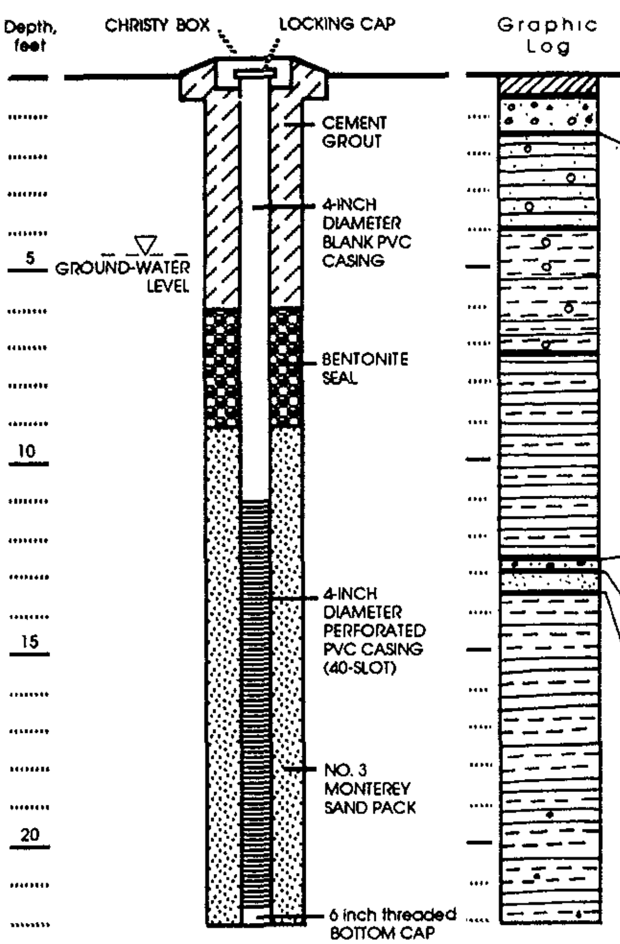
1649AS14May90kgb•LF1

WELL CONSTRUCTION | LITHOLOGY



Description

Asphalt (4")

SANDY GRAVEL (GM), light olive brown (2.5Y 5/6), moist, gravel up to 3/4 inch diameter, fine to medium sand.

SANDY CLAY (CL), very dark gray (7.5YR N3), moist, low plasticity, stiff, abundant amount organics and oxidation , minor gravel (up to 3/4 inch diameter).

SILT (ML), dark grayish brown (2.5Y 4/2), to olive (5Y 5/3), moist, loose, rounded pebbles present, increasing clay content.

SILTY CLAY (CL), olive (5Y 5/3) mottled with yellowish brown (10YR 5/6), moist, moderate plasticity, stiff, to very stiff, minor angular to subangular, gravel, abundant amount organics and oxidation.

SANDY GRAVEL/GRAVELLY SAND (GM), yellowish brown (10YR 5/6), moist, gravel (up to 3/4-inch diameter), fine sand, trace amount silt.

SAND (SP), yellowish brown (10YR 5/6), very moist, very fine to fine grained, subangular to subrounded, no odor.

CLAYEY SILT/SILTY CLAY (ML/CL), olive gray (2.5YR 4/4) moist, moderate plasticity, stiff, minor organics.

mottled yellowish-brown (10YR 5/6) with yellowish gray (10YR 6/1), minor angular gravel up to 1/2 inch diameter

Notes:
- Bottom of boring at 22.0'

Sample No. and Interval	Penetration Rate (Blows/ft)	Ambient/Soil
LF2 A (1.5)	15	0
LF2 B (3.0)	16	0.6
	14	0
		0.6
	13	0
	20	0
	16	0
	21	1.7
LF2 (13)	9	1 8
LF2 C (15.5)	11	0
	11	0
	11	0
	28	0.6
	21	1.2

Date well drilled: 22 January 1990

Date water level measured: 23 April 1990

Well elevation: 30.36

LF Geologist: Chris Goodrum

EXPLANATION

Clay
Silt
Sand
Gravel
Sample interval
Sample retained for analysis

Approved by:

Figure C2 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-2

Project No. 1649

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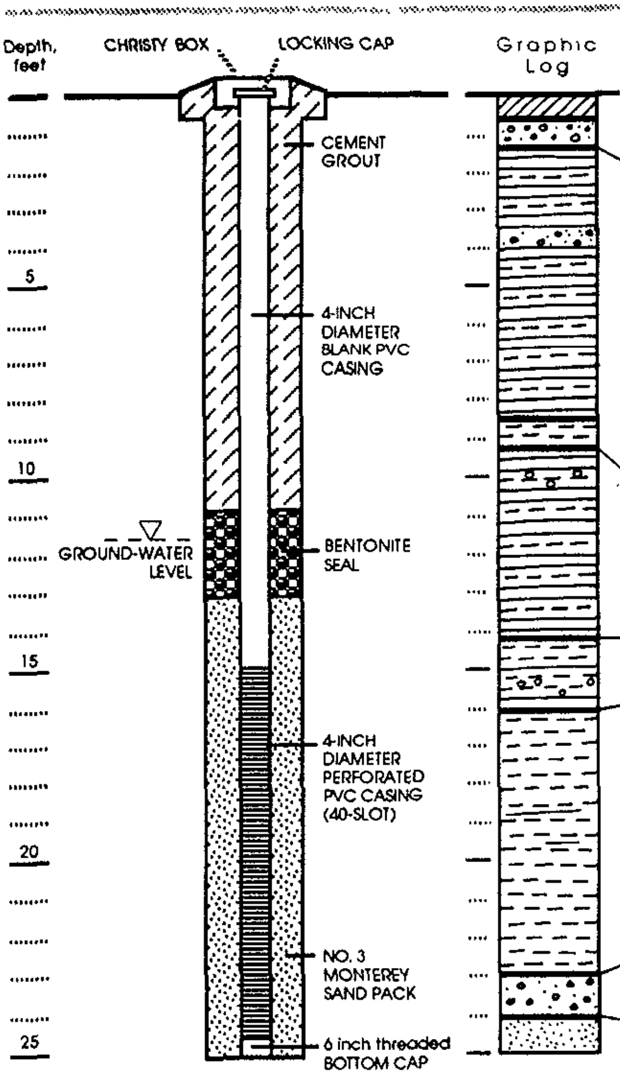
1649AS14May90kgb•LF2

WELL CONSTRUCTION

LITHOLOGY



Description

ASPHALT (4")
SANDY GRAVEL (GM), yellowish brown (10YR 5/6), moist, loose, gravel (up to 3-inch diameter)
SILTY CLAY (CL), very dark brown (10YR 3/2), dry, low plasticity, very stiff, minor amount gravel.
-sand and gravel zone at 3.5-4.0', sand fine grained angular to subrounded gravel (up to 2 inch diameter)
-color change to olive (5Y 5/3)

SILT (ML), olive yellow (2.5 6/6), to light brownish gray (2.5Y 6/2), moist, oxidation abundant, minor amount organics.
SILTY CLAY (CL), olive (5Y 5/3), dry, moderate plasticity, very stiff, minor amount organics, gravel at 10.5'.

CLAYEY SILT (ML), pale olive (5Y 6/4), moist, low plasticity, stiff, minor amount oxidation.
-gravelly at 15.0-15.5'
SILT (ML), mottled pale olive (5Y 6/4), with brownish yellow (10YR 6/8), saturated.

-increasing clay content, yellowish brown (10YR 5/8) slightly moist.

SANDY GRAVEL (GM), dark yellowish brown (10YR 4/4) to black (10YR 2/1), saturated, moderately dense, fine to course sand, gravel (up to 3-inch diameter)
SAND (SP), brown (10YR 5/3), saturated, loose, fine to course grained.
Notes:
- Bottom of boring at 25.0'

Sample No. and Interval: LF3 A (1.0); LF3 B (1.5); LF3 C (15.5)

Penetration Rate (Blows/ft.): 19, 29, 25, 15, 24, 34, 22, 20, 30, 28, 9, 15, 18, 18, 39, 17

Ambient/Soi

Date well drilled: 23 January 1990
Date water level measured: 23 April 1990
Well elevation: 25.29
LF Geologist: Chris Goodrum

Approved by:

EXPLANATION

Clay
Silt
Sand
Gravel
Sample interval
Sample retained for analysis

Figure C3 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-3

Project No. 1649

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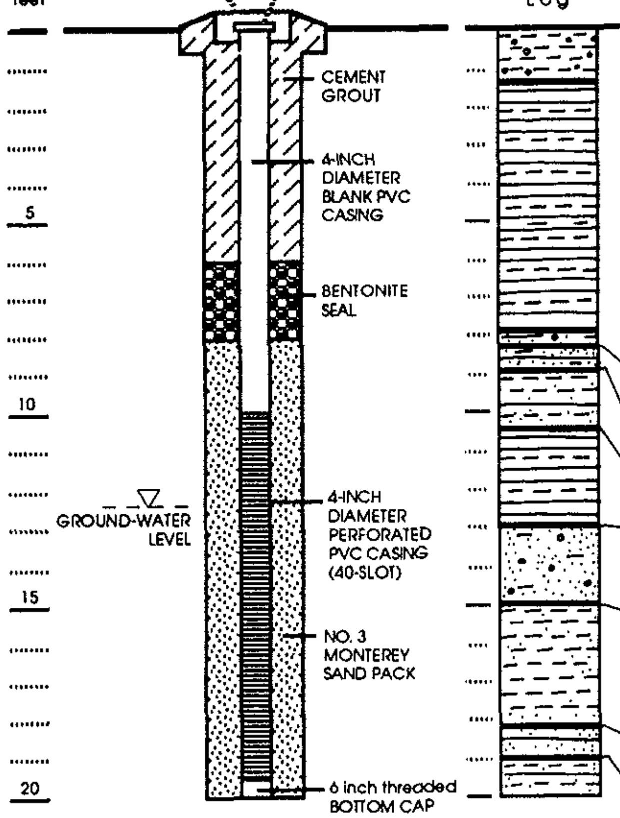
1649AS14May90kgb•LF3

WELL CONSTRUCTION

LITHOLOGY



Description

GRAVELLY SILT (ML), black (5Y 2.5/1), very moist, fill.

SILTY CLAY (CL), black (5Y 2.5/1) to dark redish brown (5YR 3/3), moist, very soft to soft, moderate plasticity, gravelly at 2.5'.
-color change to olive gray (5Y 5/2), moderately stiff to stiff, moderate plasticity, organic material/oxidation common
-increasing silt content

GRAVELLY SANDY CLAY (CL), light olive brown (2.5Y 5/4), moist, grained sand.

SILTY CLAYEY SAND (SM), light olive brown (2.5Y 5/4), very fine to fine, moderately dense, moist, abundant oxidation.

SANDY CLAYEY SILT (ML), olive gray (5Y 4/2), moist, loose, fine sand.

SILTY CLAY (CL), olive gray (5Y 5/2), moist, moderate plasticity, stiff.

SILTY GRAVELLY SAND (SM), greenish gray (5BG 5/1), very moist to wet, moderately dense, subangular to subrounded, fine to coarse sand.

SANDY SILT (ML), dark yellowish brown (10YR 4/4),very moist to wet, very loose to loose, fine grained sand.
-clay content increases with minor amount fine sand.

CLAYEY SAND (SC), dark yellowish brown (10YR 4/4), saturated, very loose, fine grained with minor amount coarse grained sand and gravel.

CLAYEY/SANDY SILT (ML), dark yellowish brown (10YR 4/4), saturated, very loose, fine sand common.

Notes:
- Bottom of boring at 20.0'

Sample No. and Interval	Penetration Rate (Blows/ft)	Ambient/Soil
LF4 A (0.5)		
LF4 (2.5)	7	0
LF4 B (4.0)	11	0
	8	0
	11	0
	14	0
	20	0
	28	0
LF4 C (13.0)	33	0
	23	0
	8	
	10	
	8	

Date well drilled: 25 January 1990

Date water level measured: 23 April 1990

Well elevation: 26.09

LF Geologist: Chris Goodrum

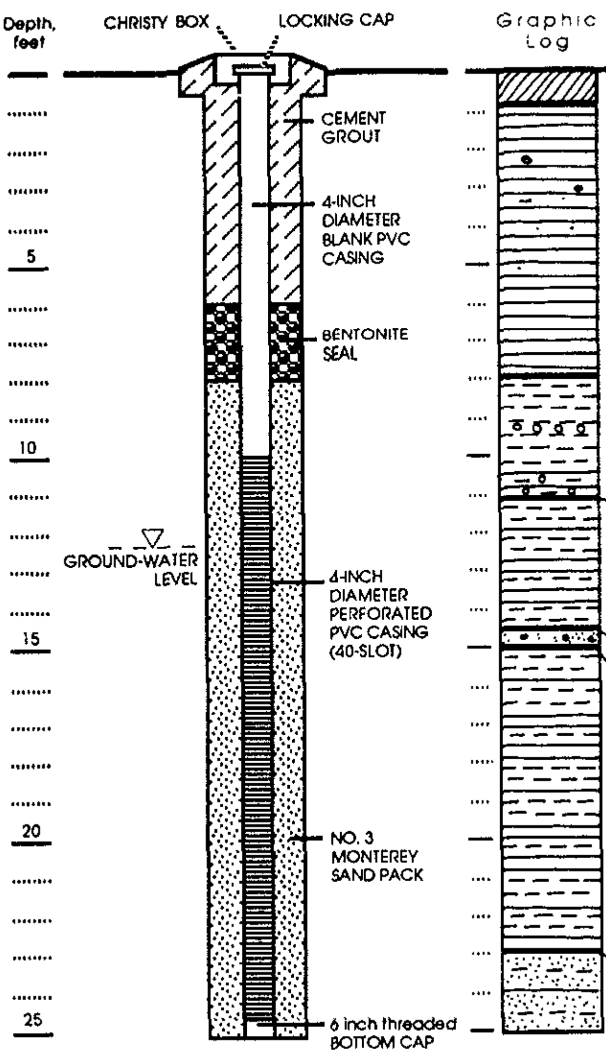
Approved by:

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Sample interval
- Sample retained for analysis

Figure C4 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-4

WELL CONSTRUCTION — LITHOLOGY



Description

ASPHALT (4")
CLAY (CL), black (5Y 2.5/1), dry, low plasticity, stiff to very stiff, minor amount gravel, no odor.
increasing gravel content, (up to 2-inches diameter)

silt/sand, wood fragments present, minor amount gravel

color change to olive gray (5Y 5/2), minor amount gravel

SILT (ML), olive (5Y 5/3) with brownish yellow, oxidation, moist, low plasticity, moderately dense, gravelly at 9.2 to 9.5' with coarse angular to subrounded sand, no odor.
-increase in clay content, gravel at 10.6 to 11.1'

CLAYEY SILT/SILTY CLAY (ML/CL), olive gray (5Y 5/2), moist, low plasticity, very stiff, minor amount gravel, no odor.
-oxidation increases with depth

GRAVELLY SAND (SP), olive gray (5Y 5/2), abundant gravel (up to 1-inch diameter), no odor.
CLAYEY SILT/SILTY CLAY (ML/CL), grayish brown (2.5Y 5/2), moist, moderate plasticity, moderately stiff to stiff, minor amount fine grained sand.

-water present within root structures in soil

(-soil very moist.)

CLAYEY/SILTY SAND (SC/SM), grayish brown (2.5Y 5/2) to light olive brown (2.54 5/4), saturated, very fine grained, subangular to subrounded, very loose.

Notes:
- Bottom of boring at 25.0'

Sample No and Interval: LF5 A (1.0); LF5 B (4.0); LF5 (14.0)

Penetration Rate (Blows/ft)	Ambient/Soil
11	0
21	0
6	0
9	0
22	0
30	0
28	0
35	0
21	0
23	1.2
12	1.8
11	
11	
8	
8	
8	

EXPLANATION

Clay
Silt
Sand
Gravel
Sample interval
Sample retained for analysis

Date well drilled: 24 January 1990
Date water level measured: 23 April 1990
Well elevation: 27.01
LF Geologist: Chris Goodrum

Approved by:

Figure C5 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-5

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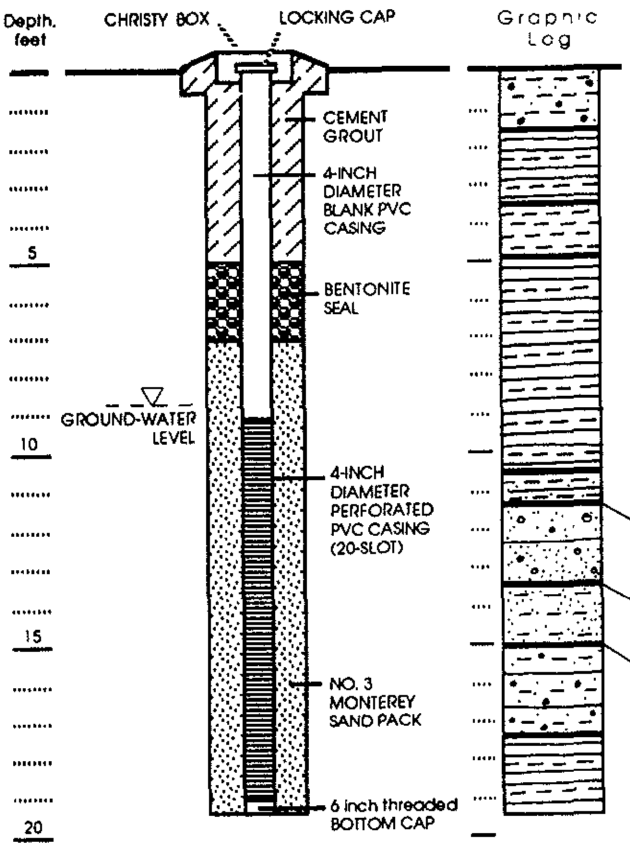
1649AS14May90kgb•LF5

WELL CONSTRUCTION



LITHOLOGY

Description

SANDY GRAVELLY SILT (ML), very dark grayish brown (10YR 3/2), moist, soft, angular gravel.

SILTY CLAY (CL), very dark gray (10YR 3/1), moist, low plasticity, soft

SILT (ML), light olive brown (2.5Y 5/4), moist, soft, minor black mottling.

SILTY CLAY (CL), grayish brown (2.5Y 5/2), damp, stiff, low plasticity.

increasing mud, minor amounts of sand

SANDY CLAYEY SILT (ML), moist, low plasticity, moderately stiff, rust color mottling.

CLAYEY GRAVELLY SAND (SW), yellowish brown (10YR 5/8) saturated, coarse grain, poorly sorted, loose, gravel subangular, poorly sorted 1/2-inch diamater to smaller.

SILTY SAND (SW), strong brown (5YR 5/8), streaked with rust color, saturated, very fine grain, well sorted, coarsening with depth.

SANDY SILTY CLAY GRAVEL, strong brownish (5YR 5/8) rust streaks, subangular to subrounded, poorly sorted.

SILTY CLAY (CL), strong brown (5YR 5/8), moist, low plasticity, stiff.

Bottom of boring at 19.5 feet.

Bottom of boring at 19.5 feet.

Sample No. and Interval	Penetration Rate (Blows/ft)	Ambient/Soil
LF6 A (1.5)	5	
LF6 B (4.5)	12	
LF6 B (5)	13	
	18	
LF6 C (10)	16	
LF6 C (10.5)	16	
	22	
	36	
	12	
LF6 (19)	23	

Date well drilled: 29 January 1990

Date water level measured: 23 April 1990

Well elevation: 18.12

LF Geologist: Larry Lapuyade

EXPLANATION

Clay

Silt

Sand

Gravel

Sample interval

Sample retained for analysis

Approved by:

Figure C6 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-6

Project No. 1649

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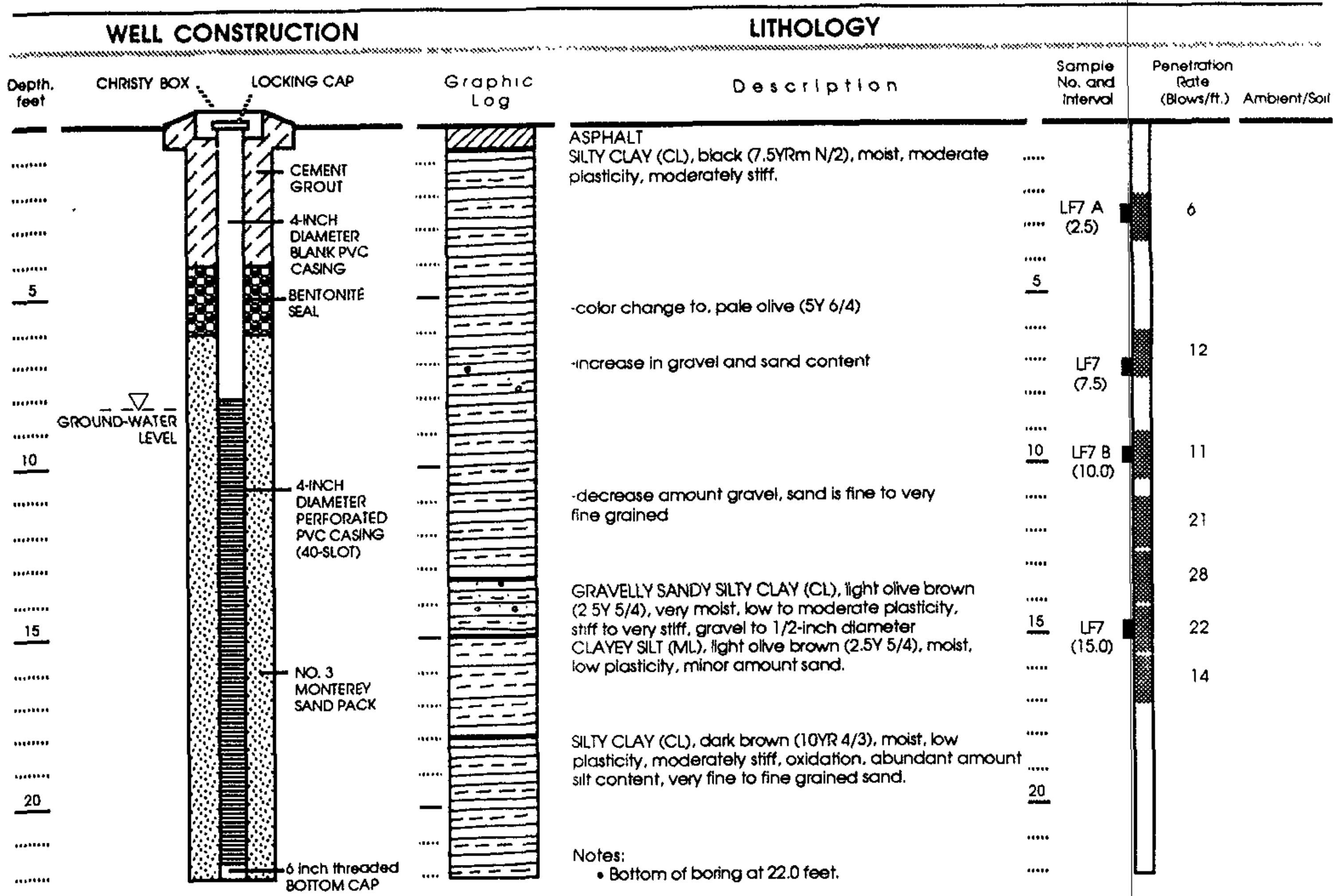
1649AS14May90kgb•LF6



EXPLANATION

Date well drilled:	26 January 1990
Date water level measured:	23 April 1990
Well elevation:	37.94
LF Geologist:	Chris Goodrum

Clay
Silt
Sand
Gravel
Sample interval
Sample retained for analysis

Approved by:

Figure C7 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-7

Project No. 1649

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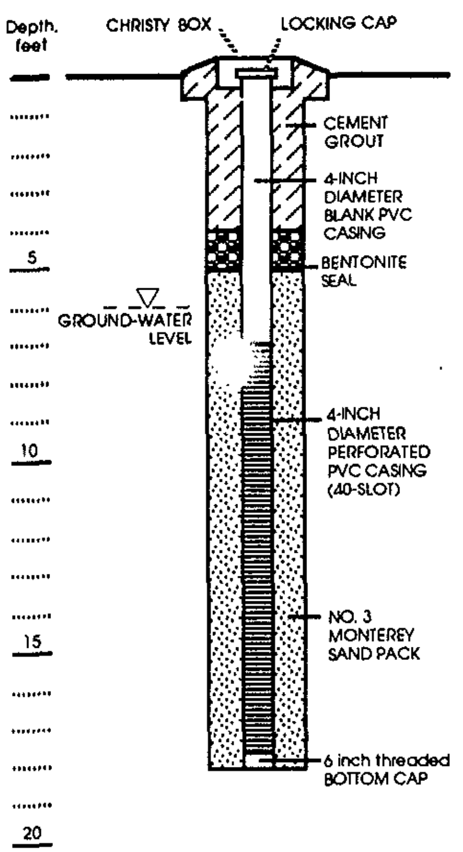
1649AS14May90kgb•LF7

WELL CONSTRUCTION



LITHOLOGY

Description

GRAVELLY SAND (SP), brown (10YR 5/3), moist, very loose, fine to coarse sand, gravel (1/4 to 3 inch diameter).

SILTY CLAY (CL), black (5YR 2.5/1), to very dark grayish brown (10YR 3/2), moist, moderate plasticity, soft, minor amount oxidation.
-color change to olive gray (5Y 5/2)

-gravelly at 5.0' and 6.0', gravel 1/4-1"

SANDY/CLAYEY SILT (ML), light olive brown (2.5Y 5/4), moist, low plasticity, stiff, very fine to fine, abundant amount oxidation and organics.

INTERBEDDED SILTY GRAVELLY SANDS AND SILTY CLAYS, light olive brown (2.5Y 5/4 5/6), very moist to wet.

-predominanthly saturated sands and silts

-gravelly at 14.0-14.5'

SILTY CLAY (CL), light olive brown (2.5Y 5/4), moist, low to moderate plasticity, stiff.

GRAVELLY SANDY CLAY (CL), very darkish brown (10YR 3/2), wet, low to moderate plasticity, stiff to very stiff, fine to coarse sand, gravel up to 3/4 inch diameter.

Sample No and Interval	Penetration Rate (Blows/ft)	Ambient/Soil
LF8 A (1.0)	13	0
LF8 B (3.0)	10	0
	7	0
	11	0
	19	0
LF8 C (9.0)	12	0
	22	0
	17	0
	27	0
	70	0
	13	0
	6	0

Notes:
- Bottom of boring at 18.0'

Date well drilled: 26 January 1990
Date water level measured: 23 February 1990
Well elevation: 29.70
LF Geologist: Chris Goodrum

EXPLANATION

Clay
Silt
Sand
Gravel
Sample interval
Sample retained for analysis

Approved by:

Figure C8 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-8

Project No. 1649

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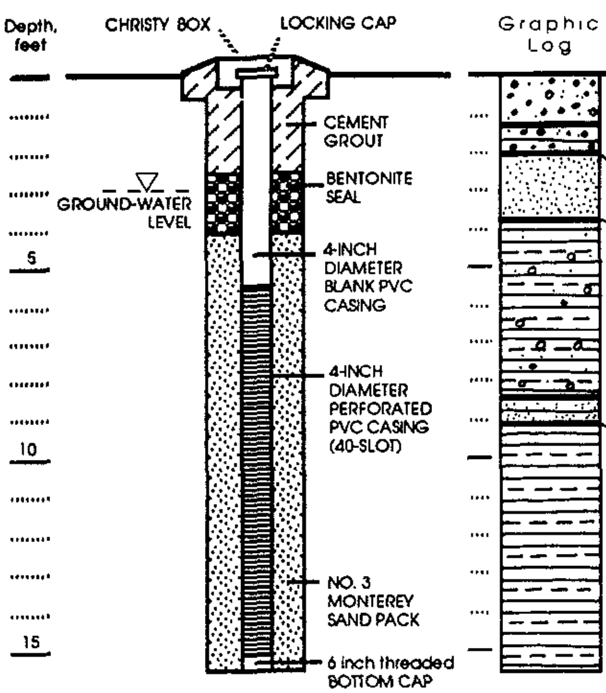
1649AS14May90kgb•LF8

WELL CONSTRUCTION	LITHOLOGY



Description

SANDY GRAVEL (GW), black (7.5YR N2/0), moist, subangular, up to 2 inch diameter, poorly sorted, loose.
SANDY CLAYEY GRAVEL (GC), very dark gray (10YR 3/1), moist, subangular up to 2 inch diameter, poorly sorted, loose.
SAND (SP), very dark gray (2.5Y N3/0), saturated, fine to coarse grain.
SANDY SILTY CLAY (CL), yellowish brown (10YR 5/4), moist, low plasticity, stiff, rust mottling, abundant amount sand and gravel.

CLAYEY SAND (SC), yellowish brown (10YR 5/4), very moist, fine to coarse grain, poorly sorted, very loose.
SILTY CLAY (CL), yellowish brown (10YR 5/4), moist, low plasticity, moderately stiff, moderate rust color mottling, minor amount organics

Notes:
- Bottom of boring 15 1/2'
- Base of sampling 16'

Sample No. and Interval	Penetration Rate (Blows/ft)	Ambient/Soil
LF9 A (1.5)	9	
	6	
LF9 B (3.5)		
LF9 B (4.5)	21	
	22	
LF9 C (9.5)	10	
LF9 C (10)		
	8	
	7	

EXPLANATION

Date well drilled: 30 January 1990
Date water level measured: 23 April 1990
Well elevation: 14.59
LF Geologist: Larry Lapuyade

Clay
Silt
Sand
Gravel
Sample interval
Sample retained for analysis

Approved by:

Figure C9 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-9

Project No. 1649

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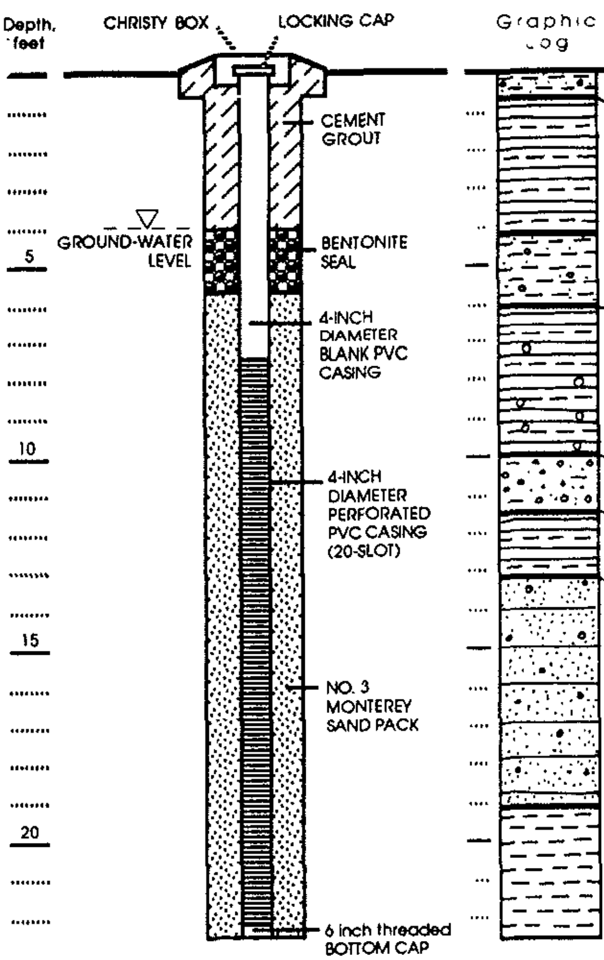
1649AS14May90kgb•LF9

WELL CONSTRUCTION | LITHOLOGY



Description

GRAVELLY SANDY SILT (ML), very dark brown (10YR 3/2), moist, soft, sand fine to coarse grain, minor gravel.

SILTY CLAY (CL), black (10YR 2/1), moist, moderate plasticity, stiff.

GRAVELLY SANDY SILT (ML), very dark grayish brown (10YR 3/2), moist, loose.

SILTY CLAY (CL), olive (5Y 5/3), damp, moderate plasticity, stiff, amount gravel increasing with depth.

SILTY SANDY GRAVEL (GW), yellowish red (5YR 4/6), very moist, up to 1 - 1/2 inch diameter, subangular, poorly sorted, loose, coarse grain sand.

SILTY CLAY (CL), pale olive (5Y 6/3), moist, low plasticity, soft, very silty.

GRAVELLY CLAYEY SAND (SC), pale olive to rust, very moist, fine to medium grain, moderately loose.

-sand coarsens

SILT (ML), grayish brown (2.5Y 5/2), moist, moderately stiff, some rust mottling.

Notes:
- Bottom of boring at 22 1/2 feet.

Sample No. and Interval	Penetration Rate (Blows/ft)	Ambient/Soil
	14	
LF10 A (2)		
	9	
LF10 B (4.5)		
	12	
LF10 C (7)		
LF10 C (9.5)	40	
	14	
	20	
	19	
	33	
	18	

Date well drilled: 31 January 1990

Date water level measured: 23 April 1990

Well elevation: 14.09

LF Geologist: Larry Lapuyade

EXPLANATION

Clay

Silt

Sand

Gravel

Sample interval

Sample retained for analysis

Approved by:

Figure C10 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-10

Project No. 1649

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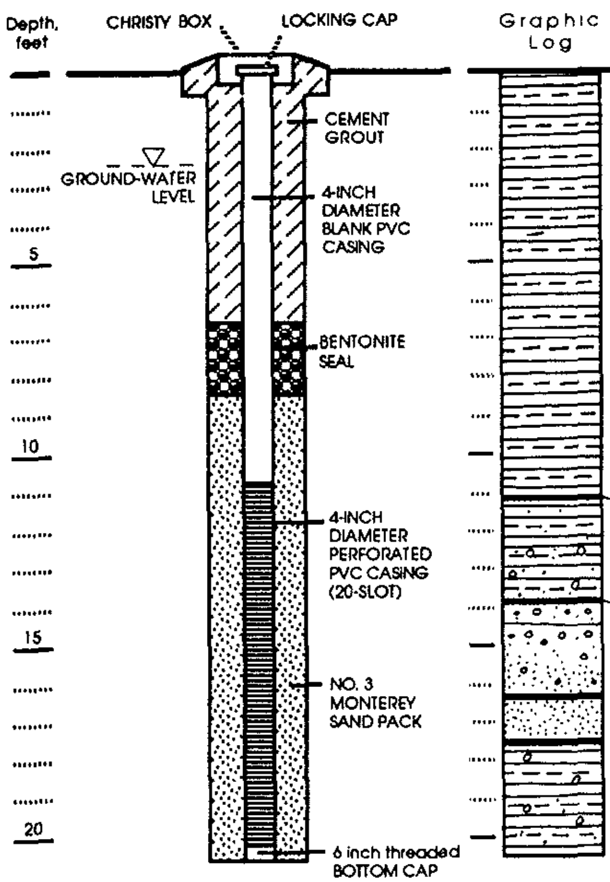
1649AS15May90kgb•LF10

WELL CONSTRUCTION



LITHOLOGY

Description

SILTY CLAY (CL), black (10YR 2/1), moist, moderate plasticity, moderately stiff.

-color change to greenish gray (5G 5/1), very mottled with tan silt, organic matter present (roots).

-increasing silt context low plasticity, color change to light olive brown (2.5Y 5/4), damp, very stiff, mottling with greenish gray and dark brown organics.

-abundant rust color mottling, very silty minor organics
-color change to olive (5Y 5/3).

SANDY SILTY CLAY (CL), olive (5Y 5/3), damp, low plasticity, moderately stiff to stiff, increasing angular gravel with depth, increasing rust mottling with depth increasing sand with depth.

CLAYEY SANDY GRAVEL/GRAVELLY SAND (GW/SW), very moist, coarse grain sand, gravel up to 1inch diameter, predominantly pea size, subangular.

SAND (SP), dark yellowish brown (10YR 4/4), very moist, fine to coarse grain, well sorted coarsens with depth.
SILTY CLAY (CL), dark yellowish brown (10YR 4/6), moist, low plasticity, moderately stiff, very mottled with gray, increasing silt with depth.

-amount gravel and sand increase with depth.

Notes:
- Bottom of boring at 20 1/2 feet.

Sample No. and Interval	Penetration Rate (Blows/ft.)	Ambient/Soil
LF11 A (1.5)	8	
LF11 B (4)	9	
LF11 B (4.5)		
LF11 C (7.5)	17	
LF11 C (10)	17	
	19	
	10	
	9	
	20	

Date well drilled: 31 January 1990
Date water level measured: 23 April 1990
Well elevation: 10.06
LF Geologist: Larry Lapuyade

EXPLANATION

Clay
Silt
Sand
Gravel
Sample interval
Sample retained for analysis

Approved by:

Figure C11 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-11

Project No. 1649

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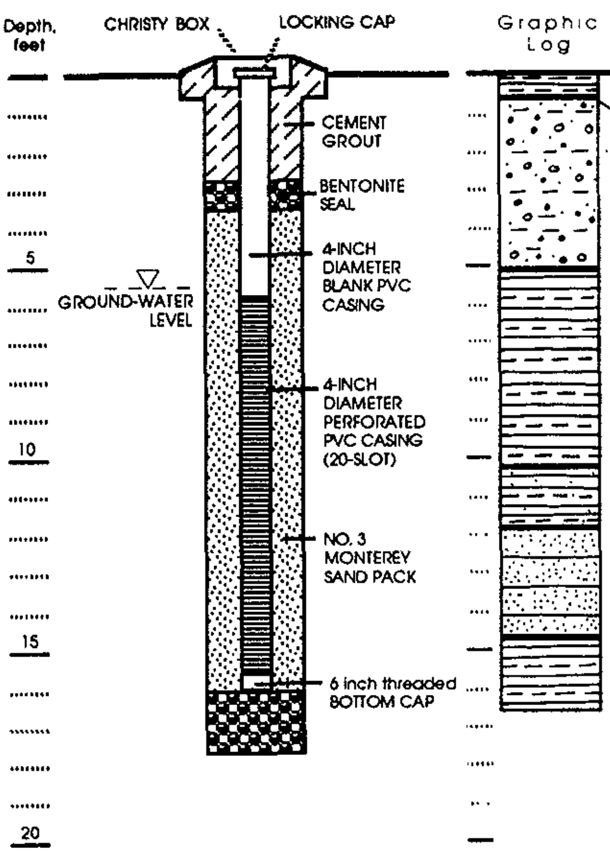
1649AS16May90kgb•LF11

WELL CONSTRUCTION

LITHOLOGY



Description

CLAYEY SILT (ML), very dark grayish brown (10YR 3/2), damp, soft, minor amount gravel.

SANDY SILTY GRAVEL (GM), very dark grayish brown (10YR 3/2), damp, subangular, up to 2 inch diameter, poorly sorted.

-increasing amount silt, decreasing amount sand and gravel

-increasing amount gravel

SILTY CLAY (CL), black (7.5YR N2/0), moist, moderate plasticity, soft.

-color change to dark gray greenish silt, minor organics, minor gravel.

SANDY SILTY CLAY (CL), dark greenish gray (5GY 4/1), slightly moist, low plasticity, stiff, moderate gravel, sand and silt, gravel increases with depth.

CLAYEY SAND (SC), dark yellowish brown (10YR 3/6), very moist, fine to coarse grain, poorly sorted, moderate gravel subround to subangular 1/2" diameter and smaller.

SILTY CLAY (CL), light olive brown (2.5Y 5/6), very moist, low plasticity, soft minor rust color mottling.

-color change to olive (5Y 5/4), increasing silt.

Notes:

- Bottom of boring at 16 feet.

Sample No. and Interval	Penetration Rate (Blows/ft)	Ambient/Soil
LF12 A (2)	42	
LF12 B (4.5)	24	
LF12 (6.5)	5	
LF12 (7)		
LF12 C (9)	5	
LF12 C (9.5)		
LF12 C (12)	20	
	13	
	9	

EXPLANATION

Date well drilled: 12 February 1990

Date water level measured: 23 February 1990

Well elevation: 8.18

LF Geologist: Larry Lapuyade

Clay

Silt

Sand

Gravel

Sample interval

Sample retained for analysis

Approved by:

Figure C12 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-12

Project No. 1649

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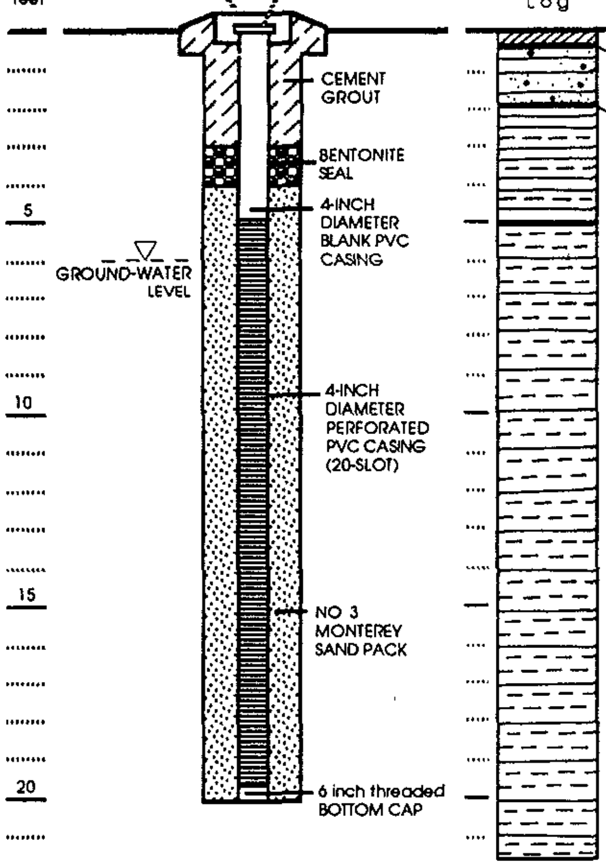
1649AS16May90kgb•LF12

WELL CONSTRUCTION



LITHOLOGY

Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	Ambient/Soil
0	ASPHALT/SUBGRADE (3"/4")			
	GRAVELLY SANDY CLAY/GRAVELLY CLAYEY SAND (CC/SC), moist, gravel angular to subangular, to 1 1/2 inch diameter.	LF16 A (1.0)	7	
	SILTY CLAY (CL), dark gray (5Y 4/1)			
	-color change to dark brown (10YR 4/3)			
5	CLAYEY SILT (ML), brown (10YR 5/3), moist, low plasticity, stiff, organics common, no odor.	LF16 (6.0)	27	
10	-color change to brown (10YR 5/3)	LF16 (11.5)	13	
15		LF16 (16.5)	9	
20	-color change to light olive brown (2.5Y 5/4)	LF16 (21.5)	11	

Notes:
- Bottom of boring at 20 feet.

Date well drilled: 13 February 1990

Date water level measured: 23 February 1990

Well elevation: 17.56

LF Geologist: Chris Goodrum

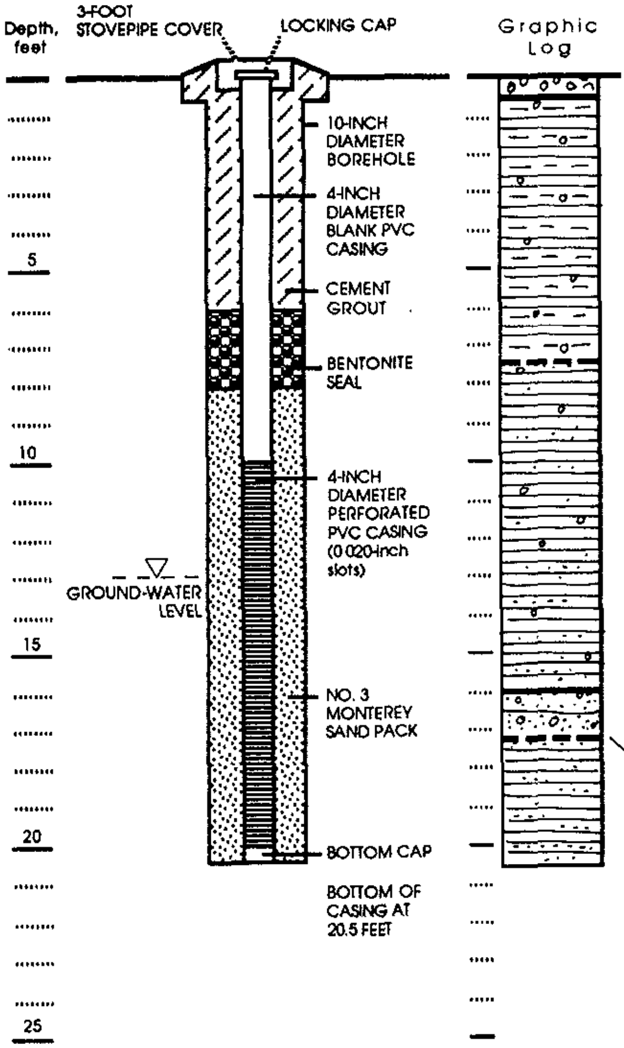
Approved by:

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Sample interval
- Sample retained for analysis

Figure C13 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-16

WELL CONSTRUCTION | LITHOLOGY



Description

GRAVEL FILL.

GRAVELLY SILTY CLAY (CH), dark reddish brown (5YR 2.5/2), trace amount of sand and gravel, clasts to 1/4-inch diameter, slightly moist, high plasticity, medium stiff.

GRAVELLY SANDY CLAY (CL), light olive-brown (2.5Y 5/4), minor amount of medium- to coarse-grained sand, trace amount of gravel clasts to approximately 1/3-inch diameter, slightly moist, low plasticity, stiff.

Amount of fine-grained sand increases (abundant amount), rust -brown mottling; medium stiff.

GRAVELLY CLAYEY SAND (SP), light olive-brown (2.5Y 5/4), abundant amount of clay, minor amount of gravel clasts to 3/4 inch diameter, wet, loose.

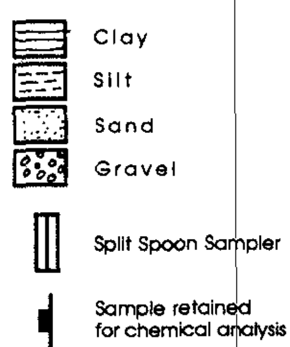
SANDY CLAY (CL), light olive-brown (2.5Y 5/4), minor amount of fine- to coarse-grained sand, trace amount of gravel, wet, medium stiff.

BOTTOM OF BORING AT 20.5 FEET.

Depth, feet	Sample No. and Interval	Penetration Rate (Blows/ft.)
5		15
10		27
15		18
20		10 recorded

Date well drilled:	13 April 1990
Date water level measured:	23 April 1990
Well elevation:	25.60 feet
LF Geologists:	Amanda Spencer/ Jenifer Carter

EXPLANATION



Approved by:

Figure C14 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-17

Project No. 1649

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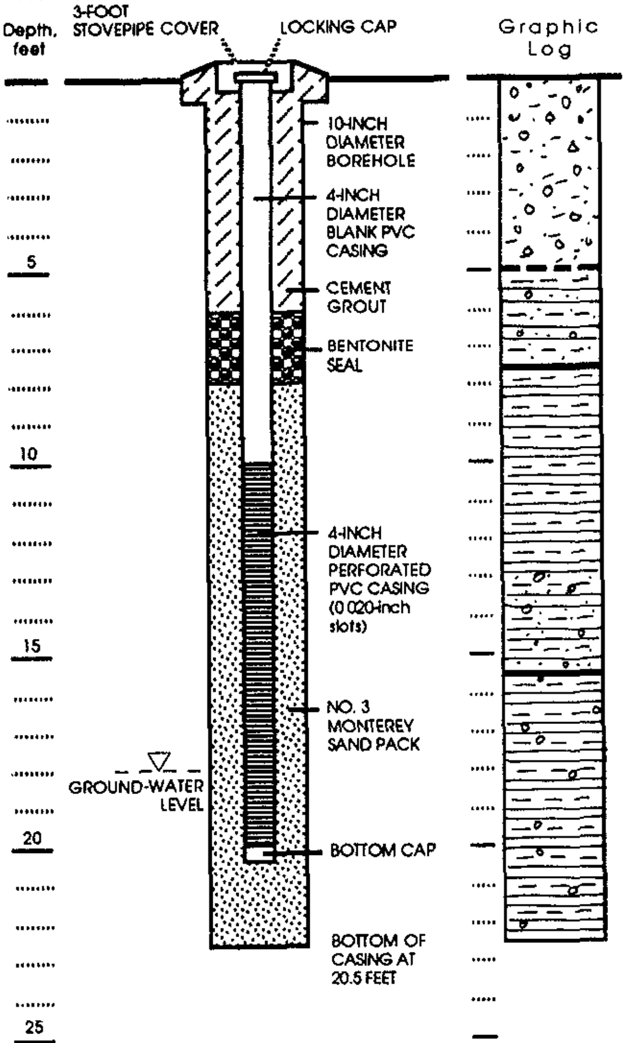
ALS12JUN90em

WELL CONSTRUCTION



LITHOLOGY

Description

GRAVEL FILL, rust color

Loose, gravel fill.

GRAVELLY SANDY SILTY CLAY (CL), very dark grayish brown (10YR 3/2), clasts up to 1/3-inch diameter, slightly moist.

SILTY CLAY (CH), black (5Y 2.5/2), trace amount of brick or cement clasts, slightly mottled (5Y 4/3), stiff highly plastic.

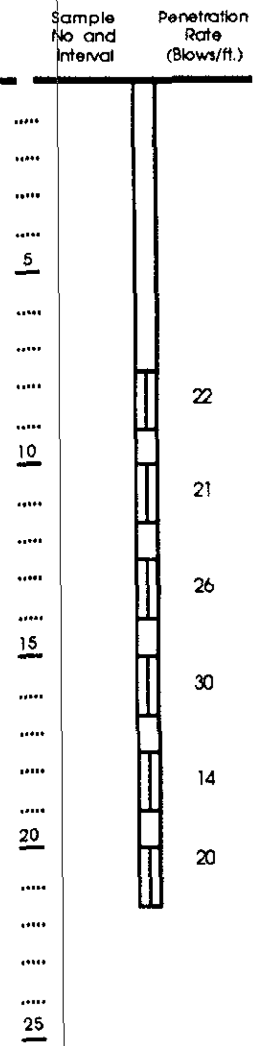
Color changed to olive (5Y 5/3), minor amount of gravel clasts to 1/8-inch diameter, stiff, slightly moist.

Amount of gravel increases, clasts to 1/2 inch diameter, predominant clasts size of 1/4 inch diameter.

GRAVELLY SILTY CLAY (CL), olive (5Y 5/3), moderate amount of gravel at 15.5 feet, trace amount of medium-grained sand, slightly mottled (rust color), moderate plasticity, slightly dry.
Very moist at approximately 18 feet, trace amount of gravel and organic material.

Increase mottling.

BOTTOM OF BORING AT 22.5 FEET.



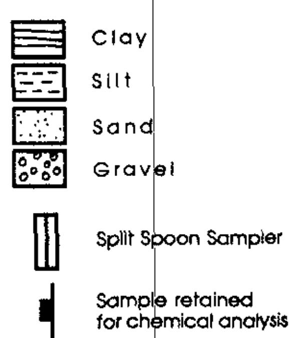
Date well drilled: 17 April 1990

Date water level measured: 23 April 1990

Well elevation: 24.48 feet

LF Geologist: Jenifer Carter

EXPLANATION



Approved by:

Figure C15 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-18

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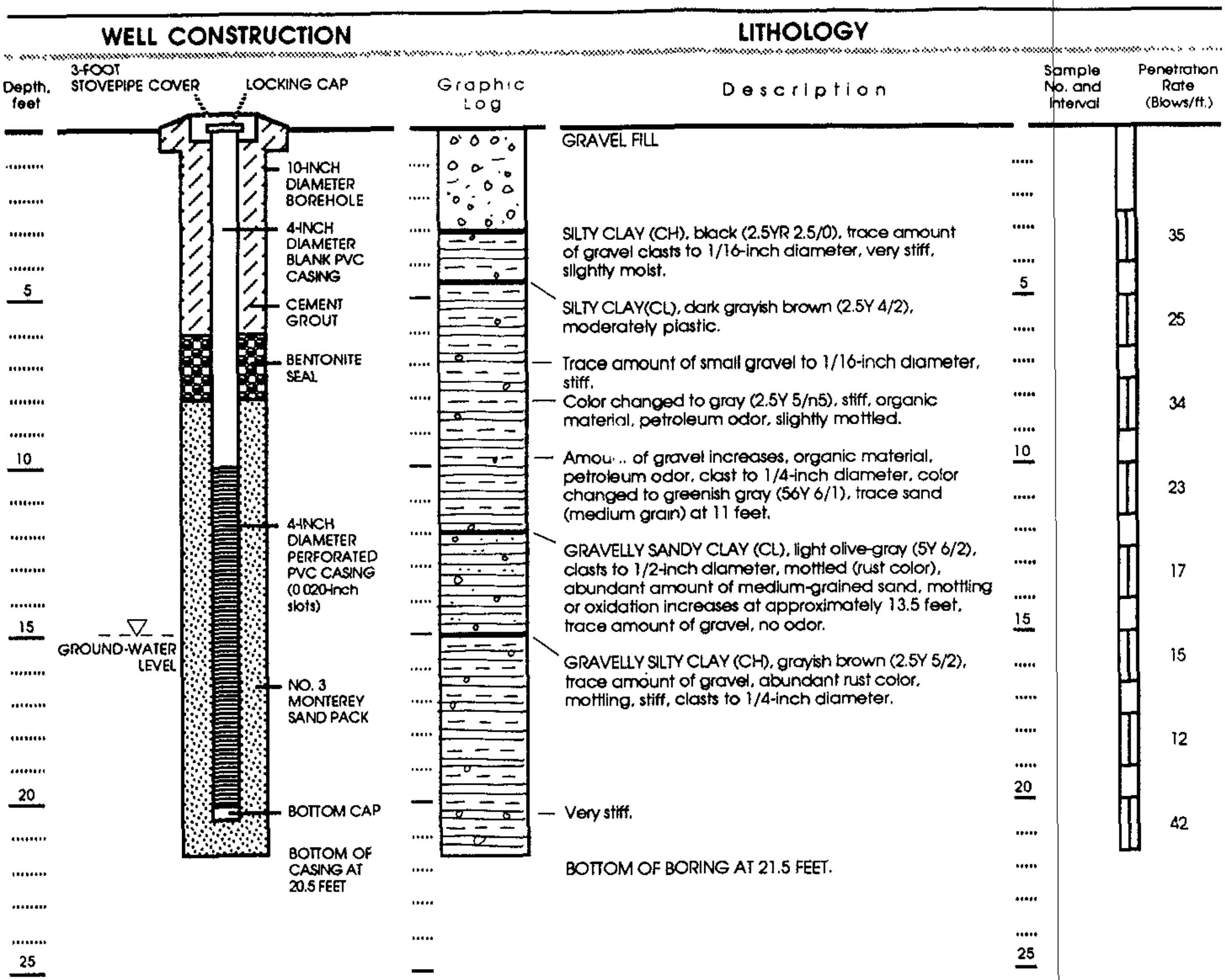


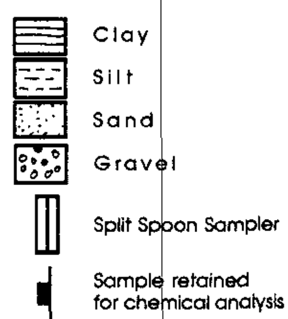
Date well drilled: 18 April 1990

Date water level measured: 23 April 1990

Well elevation: 20.88 feet

LF Geologist: Jenifer Carter

EXPLANATION



Approved by:

Figure C16 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-19

Project No. 1649

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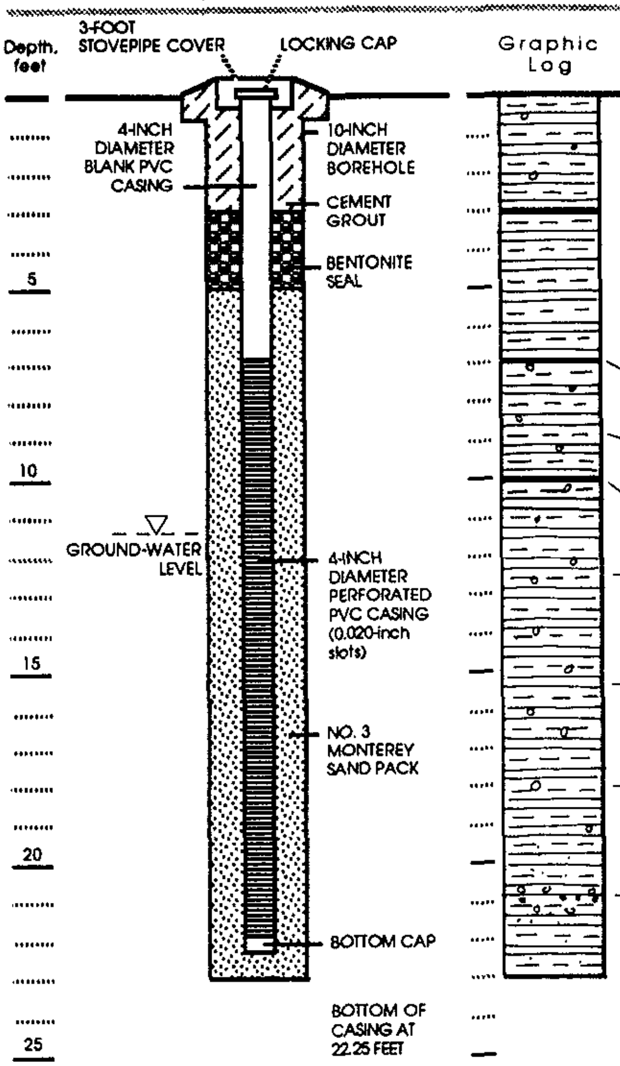
JC12JUN90em

WELL CONSTRUCTION — LITHOLOGY



Description

GRAVELLY SILTY CLAY (CL), dark brown, abundant amount of gravel, clasts up to 1/2-inch diameter; low plasticity, loose, dry.

SILTY CLAY (CH), very dark brown, trace amount of coarse sand and gravel, clasts up to 1/8-inch diameter, medium stiff, high plasticity, slightly moist.

Color changed to light tan-brown, increase amount of gravel, clasts up to 1/4-in diameter.

SANDY GRAVELLY SILTY CLAY (CL), mottled rust and light brown, minor amount of sand and gravel, clasts up to 3/4-inch diameter, slightly moist.

Increase amount of medium to coarse-grained sand, decreased amount of gravel.

GRAVELLY SILTY CLAY (CL), tan-brown, minor amount of gravel, clasts up to 1/3-inch diameter, medium plasticity, stiff, slightly moist.

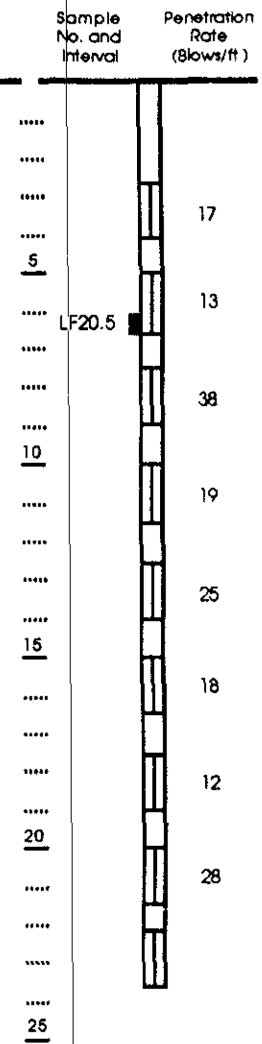
Increase rust mottling.

Moist, medium stiff.

Decreased amount of gravel, increase amount of silt and fine- to medium-grained sand.

6-inch thick layer of sand and gravel, loose, wet.

BOTTOM OF BORING AT 23 FEET.



Date well drilled: 19 April 1990

Date water level measured: 23 April 1990

Well elevation: 33.24 feet

LF Geologist: Amanda Spencer

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis

Approved by:

Figure C17 : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-20

Project No. 1649

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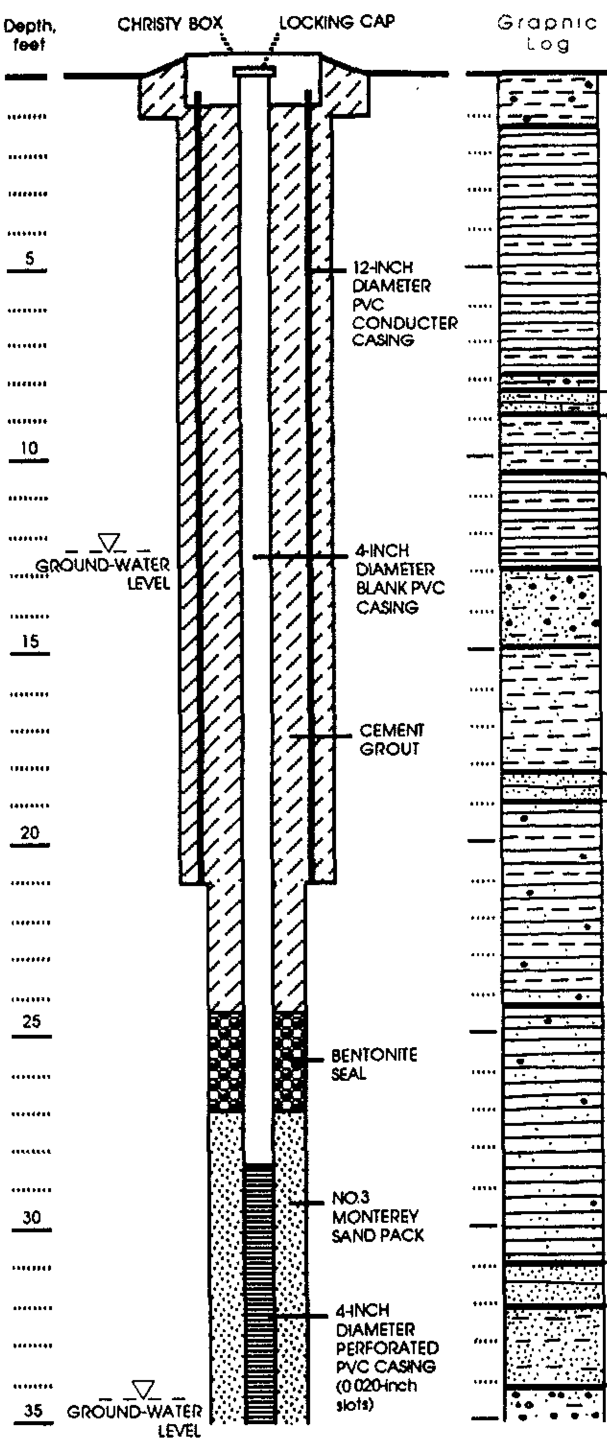
WELL CONSTRUCTION — LITHOLOGY



Description

GRAVELLY SILT (ML), black (5Y 2.5/1), very moist fill.

SILTY CLAY (CL), black (5Y 2.5/1) to dark redish brown (5YR 3/3), moist, very soft to soft, moderate plasticity, gravelly at 2.5'.
- color change to olive gray (5Y 5/2), stiff to stiff, moderate plasticity, carbonaceous material/ oxidation common
- increasing silt content

GRAVELLY SANDY CLAY (CL), light olive brown (2.5Y 5/4), moist, gravel.

SILTY CLAYEY SAND (SM), light olive brown (2.5Y 5/4), very fine to fine, moderately dense, moist, abundant oxidation.

SANDY CLAYEY SILT (ML), olive gray (5Y 4/2), moist, loose, fine sand.

SILTY CLAY (CL), olive gray (5Y 5/2), moist, moderate plasticity, stiff.

SILTY GRAVELLY SAND (SM), greenish gray (5BG 5/1), very moist to wet, moderately dense, subangular to subrounded, fine to coarse sand.

SANDY SILT (ML), dark yellowish brown (10YR 4/4), very moist to wet, very loose to loose, fine sand.
- clay content increases with minor fine sand.

CLAYEY SAND (SC), dark yellowish brown (10YR 4/4), saturated, very loose, fine grained with minor coarse grained sand and gravel.

GRAVELLY SANDY SILTY CLAY (CL), yellowish brown (10YR 5/4), very stiff to hard, minor amount of gravel, clasts to 1/4-inch diameter, minor amount of fine- to medium-grained sand.

GRAVELLY SANDY CLAY (CL), yellowish brown (10YR 5/4), dry to slightly moist, very stiff, moderate to abundant amount of gravel, clasts to 1/2-inch diameter, abundant amount of medium- to coarse-grained sand.
Amount of gravel decreases to trace, clasts to 1/8-inch diameter, abundant amount of medium-grained sand, soft to medium stiff, oxidation and some organics, slightly moist.

CLAYEY SAND (SC), dark yellowish brown (10YR 4/4), soft, moist, medium grain.

SILTY SAND (SM), light brownish gray (2.5Y 6/2), mottled with rust-colored oxidation, sand is fine- to medium-grained, slightly moist.

SILTY SANDY GRAVEL (GM), light brownish gray (2.5Y 6/2), wet, clasts to 1-inch diameter, minor amount of sand and silt.

Sample No. and Interval	Penetration Rate (Blows/ft)	Ambient/ Soil
	7	0
	11	0
5	8	0
	11	0
	14	0
10	20	0
	28	0
	33	0
	23	0
15	8	
	10	
	8	
20		
	70	
25	42	
	25	
30	18	
	14	
35		

Cont'd.......

Figure C18a: WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-4D

Project No. 1649

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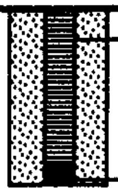
JJC5JULY90jc

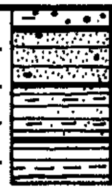
WELL CONSTRUCTION

LITHOLOGY

Depth, feet — Cont'd.......



Graphic Log



Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft)
	GRAVELLY CLAYEY SAND (SC), dark yellowish brown (10YR 4/4), moderate amount of gravel, clasts to 1/4-inch diameter, sand is medium- to coarse-grained.		30
	SANDY SILTY CLAY (CL), dark gray (7.5YR N4), slightly moist, moderate amount of fine- to medium-grained sand.		23
40	SILTY CLAY (CH), slightly moist, high plasticity, stiff, some organic material.		18
	BOTTOM OF BORING AT 39.5 FEET.		

Date well drilled: 19 April 1990

Date water level measured: 23 April 1990

Well elevation: 26.20 feet

LF Geologist: Jenifer Carter

EXPLANATION

Approved by:

Figure C18b : WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-4D (Cont'd.)

Project No.1649

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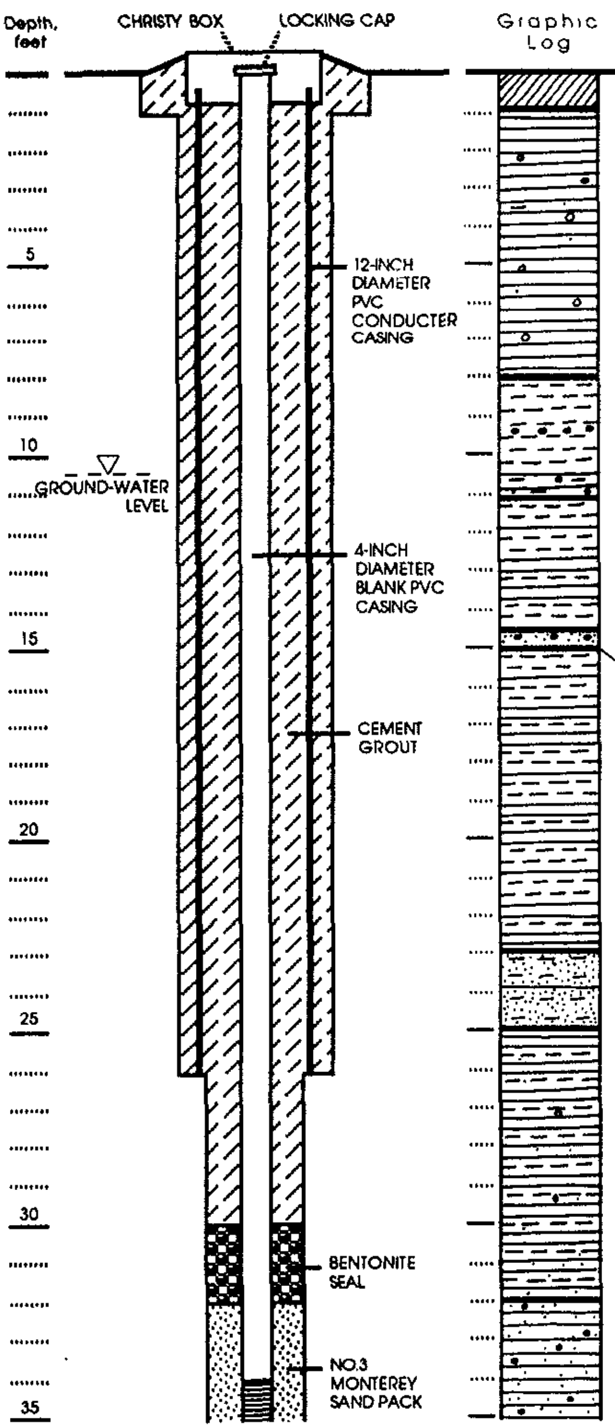
WELL CONSTRUCTION



LITHOLOGY

Description

4-inch thick ASPHALT.

CLAY (CL), black (5Y 2.5/1), dry, low plasticity, stiff to very stiff, minor gravel, no odor.
-increasing gravel content, gravel (up to 2-inches diameter)
- silt/sand, wood fragments present, minor amount gravel

-color change to olive gray (5Y 5/2), minor gavel

SILT (ML), olive (5Y 5/3) with brownish yellow, oxidation, moist, low plasticity, moderately dense, gravelly at 9.2 to 9.5' with coarse angular to subrounded sand, no odor.
-increase in clay content, gravel at 10.6 to 11.1'

CLAYEY SILT/SILTY CLAY (ML/CL), olive gray (5Y 5/2), moist, low plasticity, very stiff, minor gravel, no odor.
-oxidation increases with depth

GRAVELLY SAND (SP), olive gray (5Y 5/2), abundant gravel (up to 1-inch diameter), no odor.
CLAYEY SILT/SILTY CLAY (ML/CL), grayish brown (2.5Y 5/2), moist, moderate plasticity, moderately stiff to stiff, minor fine grained sand.

-water present within root structures in soil

(-soil very moist.)

CLAYEY/SILTY SAND (SC/SM), grayish brown (2.5Y 5/2) to light olive brown (2.54 5/4), saturated, very fine grained, subangular to subrounded, very loose.

SANDY SILTY CLAY (CL), greenish gray (5G 5/2), slightly moist, moderate plasticity, stiff, slightly mottled (reddish brown color), trace amount of gravel, clasts to 1/4-inch diameter, minor amount of sand, fine to medium grain.

Slight increase in amount of sand, medium stiff, no gravel, minor amount of organic material.

GRAVELLY SANDY CLAY (CL), greenish gray (5G 5/1), abundant amount of medium- to coarse-grained sand, trace amount of gravel, clasts to 1/2-inch diameter.
Grades to moderate amount of sand at 33 feet, very moist, low plasticity.

Sample No. and Interval	Penetration Rate (Blows/ft)	Ambient/ Soil
	11	0
	21	0
	6	0
5	9	0
	22	0
	30	0
10	28	0
	35	0
	21	0
15	23	1.2
	12	1.8
	11	
20	11	
	8	
	8	
	8	
25		
	24	
30	15	
	24	
35		

Cont'd.......

Figure C19a: WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-5D

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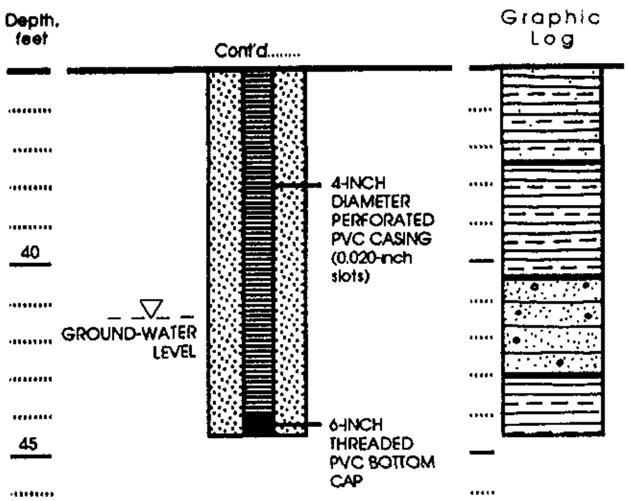
WELL CONSTRUCTION | LITHOLOGY



Description	Depth, feet	Penetration Rate (Blows/ft.)
SANDY SILTY CLAY (CH), greenish gray (5G 5/1), moist, stiff, high plasticity, organic material, trace amount of fine- to medium-grained sand.		16
SILTY CLAY (CH), dark gray (2.5YR N4/0), very stiff, minor amount of organic matter.		16
	40	33
GRAVELLY CLAYEY SAND (SC), olive-brown (2.5Y 4/4), moderate gravel, clasts to 3/4-inch diameter, medium- to coarse-grained sand, dry to slightly moist at 40.5 feet, wet at 42.5 feet.		28
SILTY CLAY (CH), greenish gray (5G 5/1), dry to slightly moist, very stiff.	45	29
BOTTOM OF BORING AT 44.5 FEET.		

Sample No. and Interval

Date well drilled: 19 April 1990

Date water level measured: 23 April 1990

Well elevation: 27.09 feet

LF Geologist: Jenifer Carter

EXPLANATION

Clay

Silt

Sand

Gravel

Modified California Sampler

Sample retained for analysis

Approved by:

Figure C19b: WELL CONSTRUCTION AND LITHOLOGY FOR WELL LF-5D (Cont'd.)

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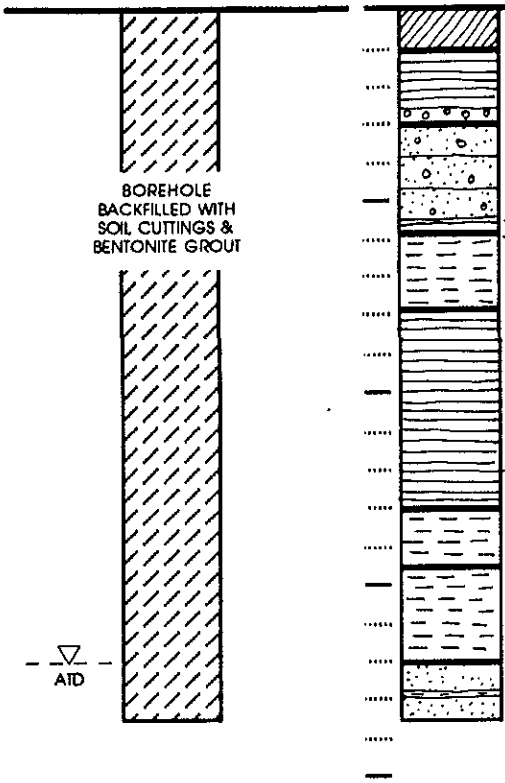
APPENDIX D

SOIL BORING LOGS

LITHOLOGY

Depth, feet | Graphic Log | Description | Sample No and Interval | Penetration Rate (Blows/ft.) | OVA (ppm)



Depth, feet	Description	Sample No and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
	ASPHALT.	A1-B (1)	23	
	CLAY (CL), black (7.5YR N2/0), damp, medium plasticity, very stiff.			
	Some large gravel encountered.		11	
	CLAYEY GRAVELLY SAND (SP), dark yellowish brown (10YR 4/6), damp, fine to coarse, gravel up to cobble size 2-1/2-inch diameter, poorly sorted, subangular, minor amount of clay, much rust color.		22	
5	5-inch thick Clay lens mottled with rust color, very stiff.		21	
	SILT (ML), light olive-brown (2.5Y 5/6), damp, very stiff, low plasticity, slightly mottled with rust color.		28	
	CLAY (CH), light olive-brown (2.5Y 5/4), damp, very stiff, high plasticity.		18	
10			20	
			23	
	Mottled, abundant amount of black organic matter.		25	
	SILT (ML), light olive-brown (2.5Y 5/4), damp, stiff, low plasticity, mottled with black (organics ?) and rust color.	A1(14)		
15	5-inch thick clayey gravelly sand lens, moist, rust color.		18	
	SILT (ML), light olive-brown (2.5Y 5/4), moist, medium stiff, low plasticity, top 6 inches - abundant rust mottling.	A1 (16)	18	
	Minor rust mottling.			
	SAND (SP), dark yellowish brown (10YR 4/6), very moist, poorly sorted, fine-grained, minor amount of gravel.	A1 (17.5)	29	
	3-inch thick silt lens.			
	BOTTOM OF BORING AT 18.5 FEET.			
20				

Date boring drilled: 22 January 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Larry Lapuyade

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING A1

Project No. 1649

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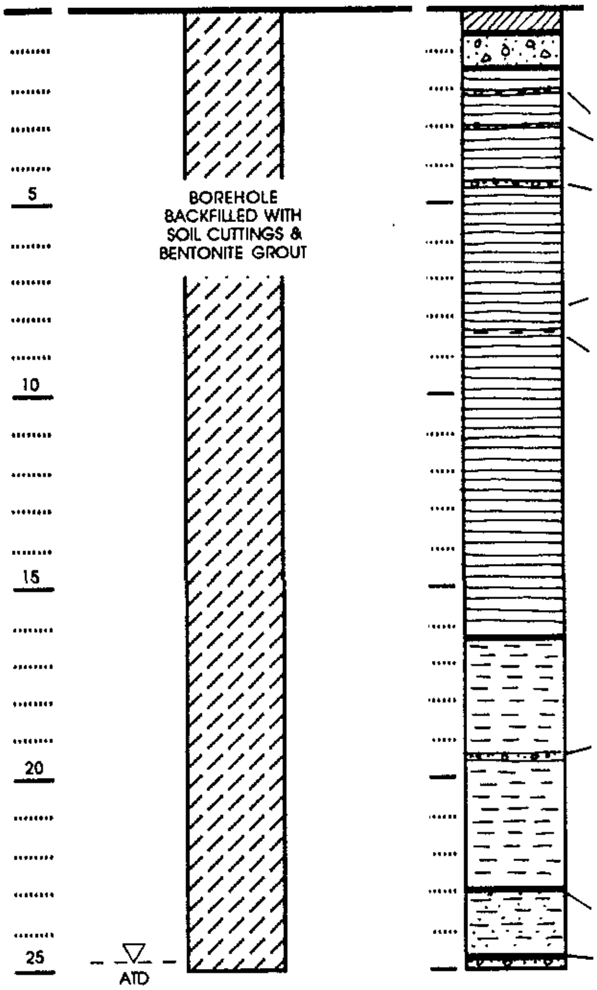
LITHOLOGY



Description

ASPHALT.
FILL GRAVELLY SAND/SANDY GRAVEL.
CLAY (CL), black (7.5YR N2/), damp, medium plasticity, very stiff.
2-inch thick gravel lens appears to have asphalt present.
1-inch thick lens of fill gravelly sand.
Color change to very dark grayish brown (10YR 3/2).
2-inch thick lens of gravelly clay.

Color change to light olive-brown (2.5Y 5/4).
Clay fractured with one fracture blue-gray color on fracture surface.
Some blue-gray and rust mottling here.
4-inch thick silty clay lens with some sand.

Moisture increases, considerable rust colored mottling appears.

SILT (ML), light brownish gray (10YR 6/2), moist, soft, low plasticity, rust colored mottling continues.

2-inch thick lens sandy clayey gravel, very moist.
Color change to dark yellowish brown (10YR 4/6) with some gray mottling.

Color change to light brownish gray (10YR 6/2) with rust and gray mottling.
SANDY SILT (ML), dark yellowish brown (10YR 4/6), moist, soft, fine-grained sand.
CLAYEY GRAVELLY SAND (SW), very moist, well sorted, fine-grained, gravel up to 3/4-inch diameter, subangular, poorly sorted.

BOTTOM OF BORING AT 25 FEET.

Sample No. and Interval
A6-A (1)
A6-B (1.5)
A6-D (25)

Penetration Rate (Blows/ft)	OVA (ppm)
43	
18	
22	
27	
26	
25	
22	
19	
17	
14	
13	
16	

Date boring drilled: 23 January 1990
Drilling method: Hollow Stem Auger
Hammer weight: 140 lbs/30-inch drop
LF Geologist: Larry Lapuyade

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ▽ ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING A6

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LITHOLOGY

Depth, feet	Graphic Log	Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
0		ASPHALT.			
		FILL GRAVELLY SAND.			
		CLAY (CL), black (2.5Y N2/0), damp, moderately stiff, moderately plastic.	A10-A (1.5)	28	
		SILTY SANDY GRAVEL (GM), gray (7.5YR N6/0), dry, poorly sorted, subangular, up to cobble size (2-inch), predominantly 1/2-inch diameter, sand fine- to coarse-grained.			
5		CLAY (CL-CH), black (2.5Y N2/0), damp, medium stiff, medium to high plasticity.	A10-B (4.5)	12	
		Color change to dark grayish brown (10YR 3/2).			
		Color change to olive-brown (2.5Y 4/4).			
10					
15		CLAYEY SANDY GRAVEL (GC), dark yellowish brown (10YR 4/6), very moist, poorly sorted, up to 1-inch diameter, fine- to coarse-grained sand.	A10-D (15)	32	
		BOTTOM OF BORING AT 16 FEET.			
20					

BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT

ATD (water level at 15 feet)

Date boring drilled: 24 January 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Larry Lapuyade

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING A10

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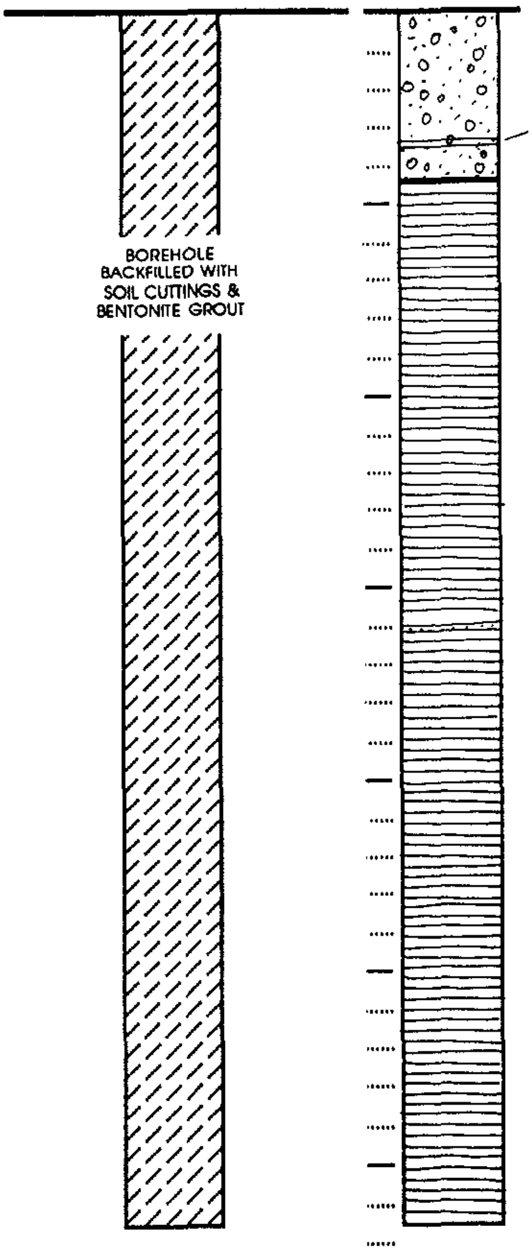
LITHOLOGY



Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
0	SANDY GRAVEL (GW), light olive-brown (2.5Y 5/6), moist, subangular, up to 1-1/2-inch diameter, poorly sorted, sand fine- to coarse-grained.			
	Gravel becomes smaller (3/4-inch diameter) and subrounded, color change to dark brown (10YR 3/3), damp.			
	2-inch thick clay lens.		42	
	Angular gravel.			
5	CLAY (CL), dark grayish brown (10YR 4/2), damp, medium plasticity, hard, some gravel.	A14-B (5.5)	44	
	1-inch thick sandy gravel lens.	A14-B (6)		
	Color change to black (10YR N2/0).			
				7.8
10		A14-C (10)		13.9
				4.3
		A14-C (12)		9.7
				5.6
	Color change to olive-brown (2.5Y 4/4).			3.6
15	Increasing moisture with depth, clay is soft, high plasticity.		35	2.3
	3-inch thick sandy clay lens, moist. Rust mottling, staining continue.		33	
	Very moist.			
			18	
20		A14-C (19.5)		
			18	4.0
			22	7.6
25	Very stiff.			
			56	
				3.7
30	Color change to light olive-brown (2.5Y 5/4), some rust mottling.		30	
	BOTTOM OF BORING AT 31.5 FEET.			

Date boring drilled: 25 January 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Larry Lapuyade

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING A14

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LITHOLOGY

Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
0–3	SANDY GRAVEL (GW), dark brown (10YR 3/3), damp, up to 1-1/2-inch diameter, poorly sorted, sand fine- to coarse-grained.	A15-A (3)		
	4-inch thick gravelly silt. 1-inch asphalt layer.	A15-A (3.5)	27	
	CLAY (CL), black (7.5YR N2/0), damp, medium plasticity, hard.	A15-B (4.5)	24	3.9
5	Color change to very dark grayish brown, stiff.			
	Color change to light olive-brown, moist, high plasticity.	A15 (9.5)	25	6.2
10		A15 (12.5)	32	12.2
15	Petroleum (?) odor.	A15-G (16)		8.4
	Rust color mottling.	A15 (17.5)	15	22.7
20	GRAVELLY SANDY CLAY (CL), yellowish brown (10YR 5/8), very moist, medium plasticity, soft, sand fine- to coarse-grained.	A15-C (21)	13	
	CLAY (CL), black (7.5YR N2/0), damp, medium plastic, hard.			
	BOTTOM OF BORING AT 23 FEET.			
25				

BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT

▽ ATD (water level at approximately 19.5 feet)

Date boring drilled: 25 January 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Larry Lapuyade

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ▽ ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING A15

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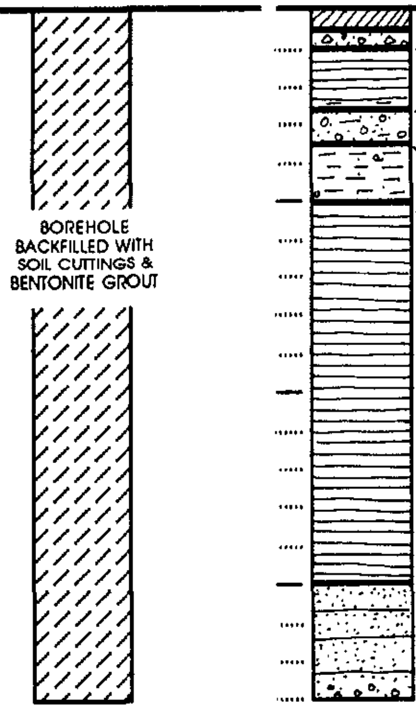
LITHOLOGY



Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
	ASPHALT.			
	FILL GRAVELLY SAND/SANDY GRAVEL.	A24-B (1)	26	
	CLAY (CL), black (7.5YR N2/0), damp, medium plasticity, very stiff.			
	4-inch thick silty clay with some gravel lens.			
	SILTY SANDY GRAVEL (GM), dark yellowish brown (10YR 4/6), moist, poorly sorted, subangular, gravel up to 1/2-inch diameter.	A24 (3.5)	28	
5	SANDY SILT (ML), dark yellowish brown (10YR 4/6), moist, low plasticity, fine- to coarse-grained sand, some gravel, loose, increase in gravel with depth.			
	CLAY (CL-CH), light olive-brown (2.5Y 5/6), moist, medium to high plasticity, very stiff, considerable rust mottling in first 6 inches, minor mottling for next 1 inch.		23	
	No mottling.		18	
10	Mottled with rust and gray.		21	
	Color change to yellowish brown (10YR 5/8).			
15	CLAYEY SAND (SC), dark brown (7.5YR 3/4), very moist, fine- to coarse-grained, some gravel.		19	
	Increase amount of gravel.	A24-C (17)	36	
	BOTTOM OF BORING AT 18 FEET.			
20				

Date boring drilled: 23 January 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Larry Lapuyade

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA: Organic vapor analyzer in parts-per-million (ppm)
- ATD: Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING A24

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LITHOLOGY

Depth, feet	Graphic Log	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
0		ASPHALT.			
		GRAVELLY SILTY SAND (SM), fill.			
		SILTY CLAY (CL), black (7.5YR N2/0), damp, low plasticity, stiff to very stiff.	B3-A (1.5)	23	4.5
			B3-B (4.5)	13	3.3
5		Increasing silt, color change to dark grayish brown (2.5Y 3/2), medium stiff.			
		SILT (ML), light olive-brown (2.5Y 5/4), damp, low plasticity, medium stiff, dark brown, mottling.			
			B3-C (9.5)	20	1.2
10		SILTY CLAY (CL), dark grayish brown (2.5Y 3/2), damp, low plasticity, stiff.			
15		Dark brown mottling.			
		GRAVELLY SILTY CLAY (CL), strong brown (7.5YR 4/6), saturated, low plasticity, medium stiff.		10	
		BOTTOM OF BORING AT 16.5 FEET.			
20					

BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT

▽ ATD (water level at approximately 14 feet)

Date boring drilled: 26 January 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Larry Lapuyade

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA Organic vapor analyzer in parts-per-million (ppm)
- ▽ ATD Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B3

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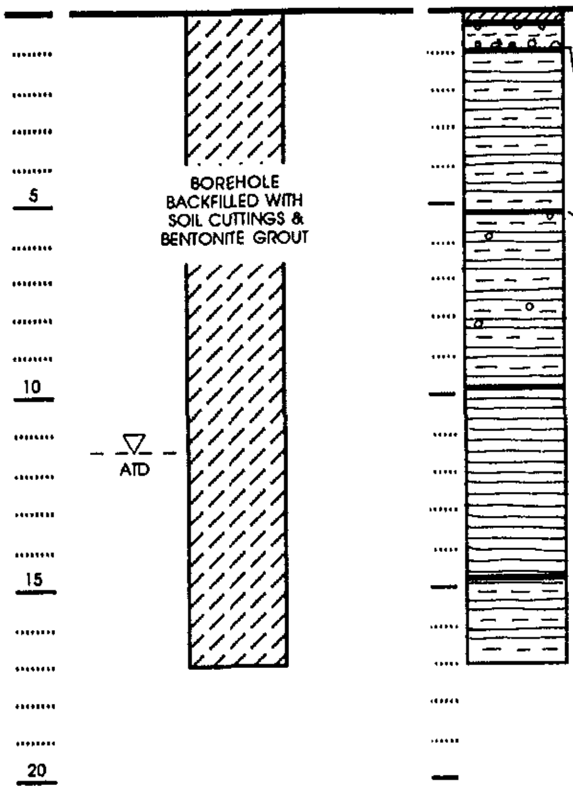
LITHOLOGY



Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
ASPHALT. 3-inch thick silt lens. FILL SANDY GRAVEL (GW), very dark gray (10YR 3/1), dry, subangular, poorly sorted, up to 1/2-inch diameter, sand fine- to coarse-grained.		18	2.4
SILTY CLAY (CL), black (7.5YR N2/0), damp, low plasticity, medium stiff, some gravel angular. Becomes moist, minor amount of gravel.	B4-B (3.0) B4-B (3.5)	12	2.7
GRAVELLY SILTY CLAY (CL), dark greenish gray (5GY 4/1), damp, low plasticity, stiff to very stiff, with green silt mottling, solvent odor.	B4 (7) B4 (7.5)	46	105.0
CLAY (CL), light olive-brown (2.5Y 5/4), damp, low to medium plasticity, very stiff, contains minor amount of sand.	B4-C (11) B4 (11.5)	20	
SILTY CLAY (CL), light brownish gray (2.5Y 6/2), saturated, low plasticity, medium stiff to stiff, very mottled with rust-colored silt.		13	2.0
BOTTOM OF BORING AT 17 FEET.			

Date boring drilled: 26 January 1990
Drilling method: Hollow Stem Auger
Hammer weight: 140 lbs/30-inch drop
LF Geologist: Larry Lapuyade

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA: Organic vapor analyzer in parts-per-million (ppm)
- ▽ ATD: Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B4

Project No. 1649

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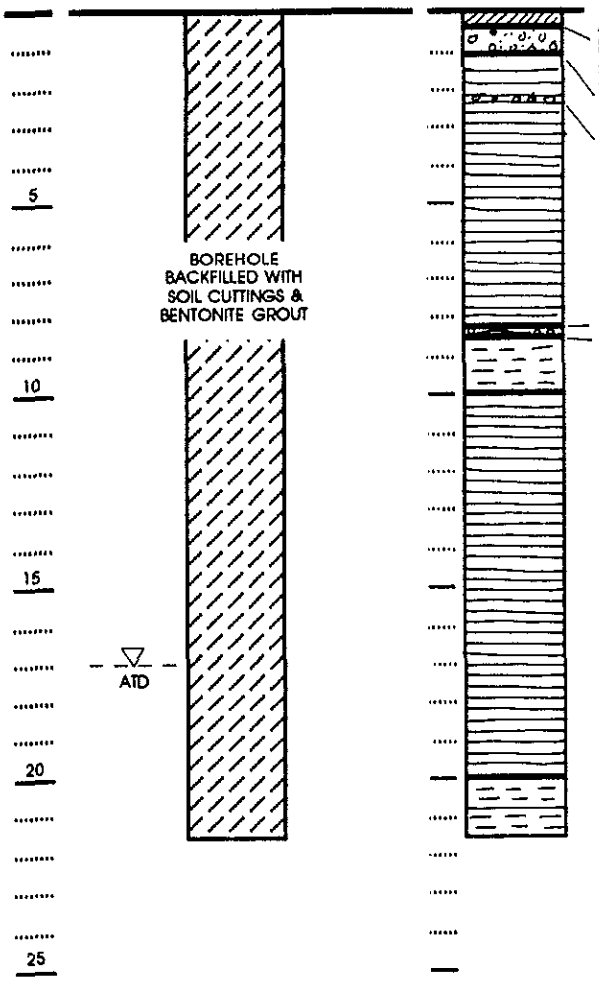
LITHOLOGY

Depth, feet	Graphic Log	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)



ASPHALT.
FILL SANDY GRAVEL (GW), very dark gray (10YR 3/1), dry, subangular, poorly sorted, up to 1/2-inch diameter, sand fine- to coarse-grained.
CLAY (CL), black (7.5YR N2/0), damp, medium plasticity, stiff.
2-inch thick gravel lens.

Color change to light olive-brown (2.5Y 5/6), moist, soft.

Color change to dark yellowish brown (10YR 4/4), moist, soft.
GRAVELLY SANDY CLAY (SC).
SILT (ML), yellowish brown (10YR 5/6), moist, low plasticity, soft.

CLAY (CL), black (7.5YR N2/0), damp, medium plasticity, stiff.

CLAYEY SILT (ML), dark yellowish brown (10YR 4/6), very moist, low to medium plasticity, soft.

BOTTOM OF BORING AT 21.5 FEET.

Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
B5-A (2.5)	16	4.6
B5-B (5)	23	5.0
		6.7
B5-C (10)	26	6.7
B5 (14), B5-C (14.5)	21	
B5 (20.5)	9	

Date boring drilled: 26 January 1990
Drilling method: Hollow Stem Auger
Hammer weight: 140 lbs/30-inch drop
LF Geologist: Larry Lapuyade

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B5

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LITHOLOGY

Depth, feet	Graphic Log / Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
0	GRAVELLY SANDY CLAY FILL	B14 A (1)	64	22
	SILTY CLAY (CL), black, stiff to very stiff, low to medium plasticity		22	12
		B14 A (4)	21	
5	SANDY GRAVELLY CLAY (CL), gley (56Y 5/1), fine grained sand, stiff to very stiff, moist.			
		B14 A (9)	22	150
10	SILTY CLAY (CL), light brown (2.5Y 5/4), minor amount organics and oxidation, moist, medium plasticity, stiff.	B14 A (12)	24	
	Bottom of boring 12.5 feet.			
15				

BOREHOLE BACKFILLED WITH SOIL CUTTINGS AND BENTONITE GROUT

Date boring drilled:	January 29, 1990
Drilling method:	Hollow Stem Auger
Hammer weight:	140 lbs/30-inch drop
LF Geologist:	Chris Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B14A

Project No. 1649

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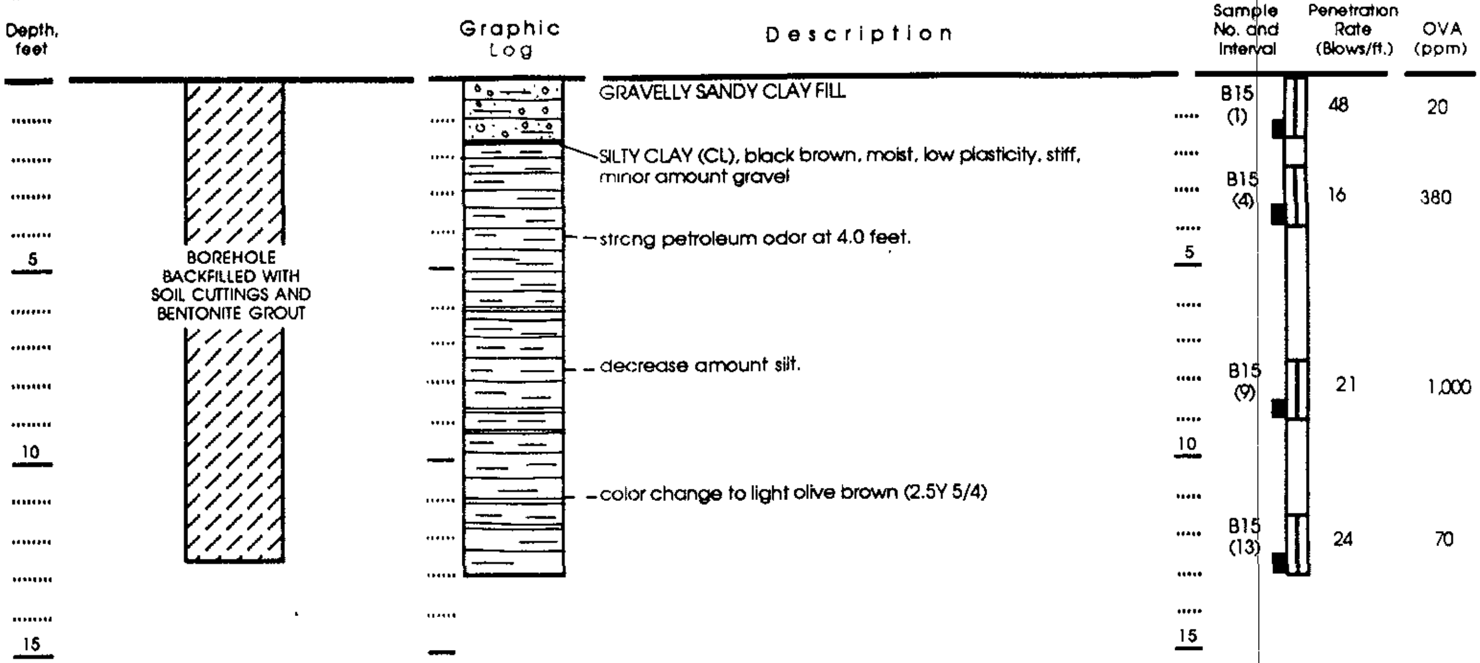
1649ALSMAY90kgb•B14A

LITHOLOGY



Date boring drilled: January 29, 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Chris Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B15

Project No. 1649

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1649ALSMAY90kgb+B15

LITHOLOGY

Depth, feet	Graphic Log / Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
0	GRAVEL FILL.			
	SANDY CLAYEY SILT (ML), dark gray, moist, low plasticity, slight petroleum odor, moderately dense.			
			28	
		B17-B (4)		
5	SILTY CLAY (CL), black, petroleum odor, moist, stiff, moderate plasticity.		27	
		B17 (5.5)		
	Color change to gray.		19	
		B17 (9)		
10				
	GRAVELLY SANDY CLAY (CL), light gray, moist, low plasticity, stiff, no odor.		30	
		B17 (13)		
15	BOTTOM OF BORING AT 13 FEET.			

BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT

Date boring drilled: 22 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B17

Project No. 1649

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CG05JUN90em

LITHOLOGY

Depth, feet		Graphic Log	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
	BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT		ASPHALT.			23
			SAND (SP), dark brown, fine sand with angular gravel, moderately dense.	B24-A (2)	25	150
			CLAY (CL), black (7.5YR N/2), moist, low to medium plasticity, moderately stiff to stiff, slight waste oil odor.	B24-B (4)	19	330
5						
			CLAYEY SILT to SILTY CLAY (ML-CL), grayish brown (2.5Y 5/2) to gray (5GY 5/1), moist, low plasticity.		33	33
			BOTTOM OF BORING AT 8.5 FEET			
10						

Date boring drilled: 22 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B24

Project No. 1649

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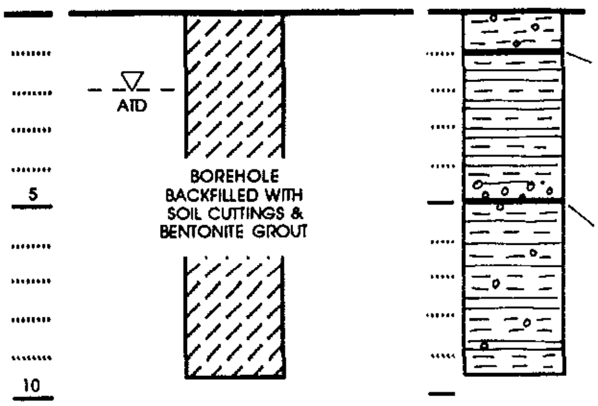
LITHOLOGY



Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
GRAVELLY SILTY and CLAY SURFACE COVER, very dark grayish brown (10YR 3/2), gravel to 1-inch diameter.		16	
SILTY CLAY (CL), black (5Y 2.5/1), mottled with olive-gray (5Y 5/2), moist, medium plasticity, medium stiff. Color change to gray (5GY 5/1).	B26-A (1)	11	
Gravelly at 4.5 to 5 feet, gravel size increase, abundant amount of fine sand, angular to subangular gravel to 1/2-inch diameter, stiff.	B26-B (3.5)		
GRAVELLY SILTY CLAY to GRAVELLY CLAYEY SILT (CL-ML), light olive-brown (2.5Y 5/4), moist, angular to subangular gravel to 2-inch diameter, sand fine to very fine, stiff to very stiff.		19	
	B26-C (9)	37	
BOTTOM OF BORING AT 9.5 FEET.			

Date boring drilled: 29 January 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Chistopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : **LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B26**

Project No. 1649

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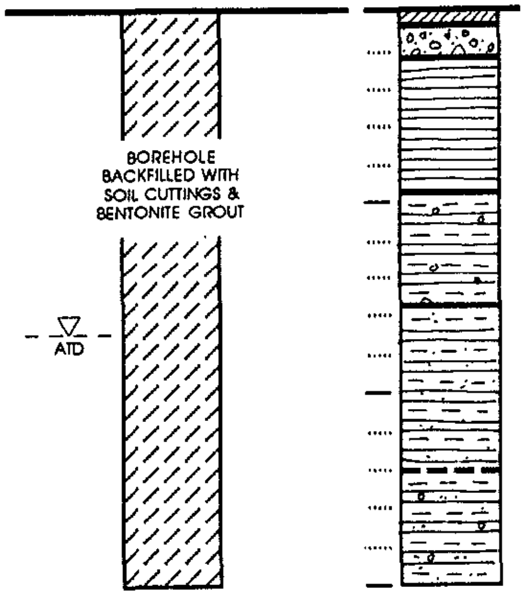
LITHOLOGY



Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
0	ASPHALT (3-inch thick)/SUBGRADE (10-inch thick).			
	CLAY (CL), black (7.5YR N/2), moist, low to medium plasticity, stiff, no odor.		55	480 / 1000
	Color change from dark gray (5Y 4/1) to gray.		20	1000
5	GRAVELLY SILTY CLAY (CL), very dark gray (5Y 3/1).	5		
	Color change to olive-brown (2.5Y 4/4), no odor.			
	SILTY SANDY CLAY (CL), light olive-brown (2.5Y 5/4), moist, low plasticity, some gravel and fine sand, no odor. Increase in gravel and sand content, no odor.		34	110
10		10		
	GRAVELLY SANDY SILTY CLAY (CL), saturated, sand fine to very fine, angular to subangular gravel to 1-inch diameter, no odor.		21	
15	BOTTOM OF BORING AT 15 FEET.	15		

Date boring drilled: 22 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Modified California Sampler
- Sample retained for chemical analysis
- OVA Organic vapor analyzer, in parts-per-million (ppm)
- ▽ ATD Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B27

Project No. 1649

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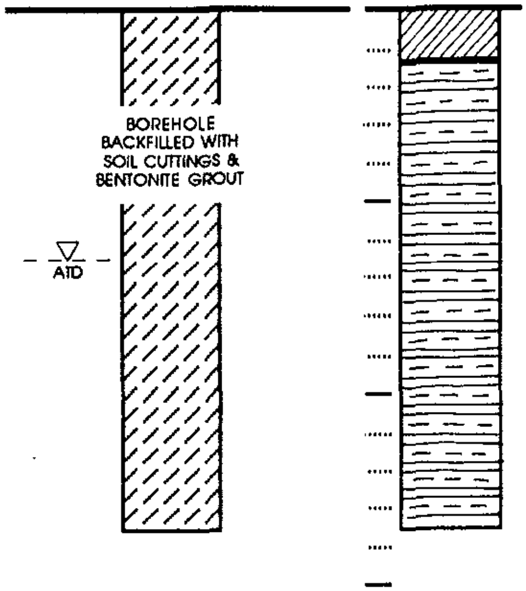
LITHOLOGY



Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
0	ASPHALT.			
	SILTY CLAY (CL), black (7.5YR N/2), moist, medium plasticity, stiff, minor oxidation, root structures.	B29-A (3)		1000
	Color change to very dark gray (10YR 3/1). Color change to gray (5GY 4/1), minor amount of gravel.	B29-B (4.5)		1000
5				
	Color change to light olive-brown (2.5Y 5/4), minor amount of organic matter and oxidation.	B29-C (10)		30
10				
	Abundant amount of organic matter and oxidation.	B29-D (13.5)		--
	BOTTOM OF BORING AT 13.5 FEET.			
15				

Date boring drilled: 21 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B29

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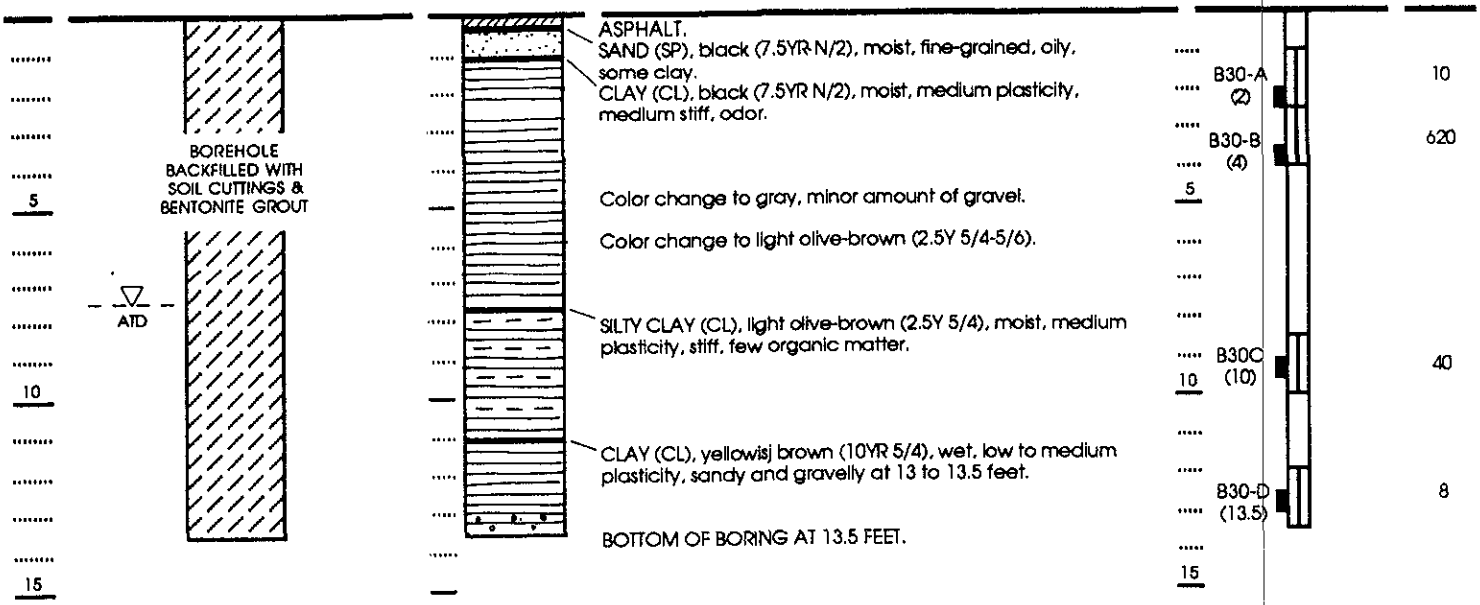
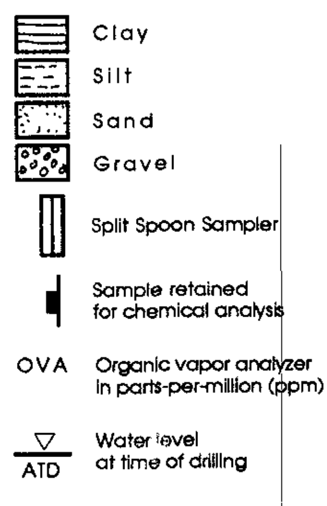
LITHOLOGY



Date boring drilled:	21 February 1990
Drilling method:	Hollow Stem Auger
Hammer weight:	140 lbs/30-inch drop
LF Geologist:	Christopher Goodrum

EXPLANATION



Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B30

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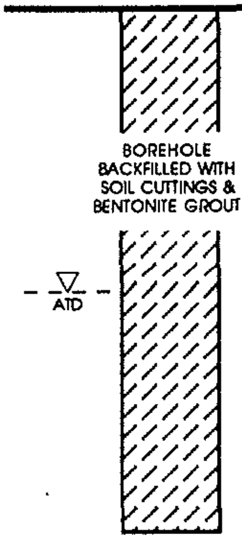
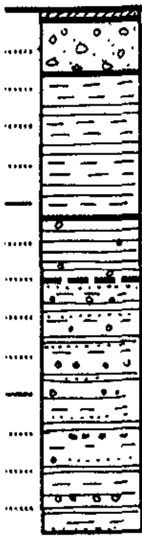
LITHOLOGY

Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
0	ASPHALT (2-inch thick)/SUBGRADE (1-1/2-foot thick).			
2	SILTY CLAY to CLAYEY SILT (CL-ML), very dark gray (10YR 3/1), moist, low plasticity, stiff, no odor.	B31-A (2)		680
5		B31-B (5)		220
6	GRAVELLY CLAY (CL), yellowish brown (10YR 5/4).			
8	Interbedded GRAVEL, SAND, SILT and CLAY, light olive-brown (2.5Y 5/4), moist, low plasticity, medium stiff to stiff, no odor, fine- to coarse-grained sand, pebbly, pebbles/coarse sand, subrounded.			
10		B31-C (10)		12
12	Predominantly gravelly at 12 to 12.5 feet.			
13.5	BOTTOM OF BORING AT 13.5 FEET.	B31-D (13.5)		
15				



Graphic Log



Date boring drilled: 21 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B31

Project No. 1649

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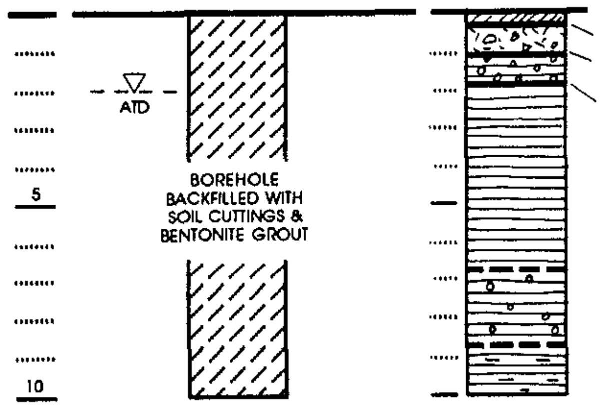
LITHOLOGY



Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
	ASPHALT/SUBGRADE.			
	SLAG/GRAVEL.			
	GRAVELLY CLAY to CLAYEY GRAVEL (CL-GC), gray (7.5YR N6), wet.	B32-A (1.5)	46	210
	CLAY (CL), black (7.5YR N/2) to very dark gray (7.5YR N/3), moist, moderately plastic, stiff.	B32-B (4)	16	240
5				160
	GRAVELLY CLAY (CL), gray (5GY 4/1).			
	SILTY CLAY (CL), gray (5GY 4/1).	B32-C (10)	24	30
10	BOTTOM OF BORING AT 10 FEET.			

Date boring drilled: 21 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B32

Project No. 1649

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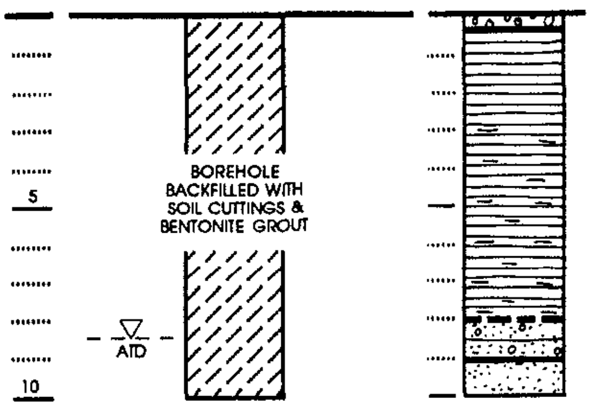
CG06JUN90em

LITHOLOGY



Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
GRAVEL SURFACE.			
CLAY (CL), black (7.5YR N/2), moist, low to medium plasticity, moderately stiff to stiff, odor, organic matter, rootholes.	B33-A (2)	12	300
Silty, very dark gray, very moist, strong odor (oil?).	B33-B (4.5)	18	320
CLAYEY GRAVELLY SAND (SP), gravel clast to 1/2-inch diameter.			
SAND (SP), light olive-brown (2.5Y 5/4), saturated, moderately dense, fine gravel, no odor.	B33-C (10)	22	
BOTTOM OF BORING AT 10 FEET.			

Date boring drilled: 21 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B33

Project No. 1649

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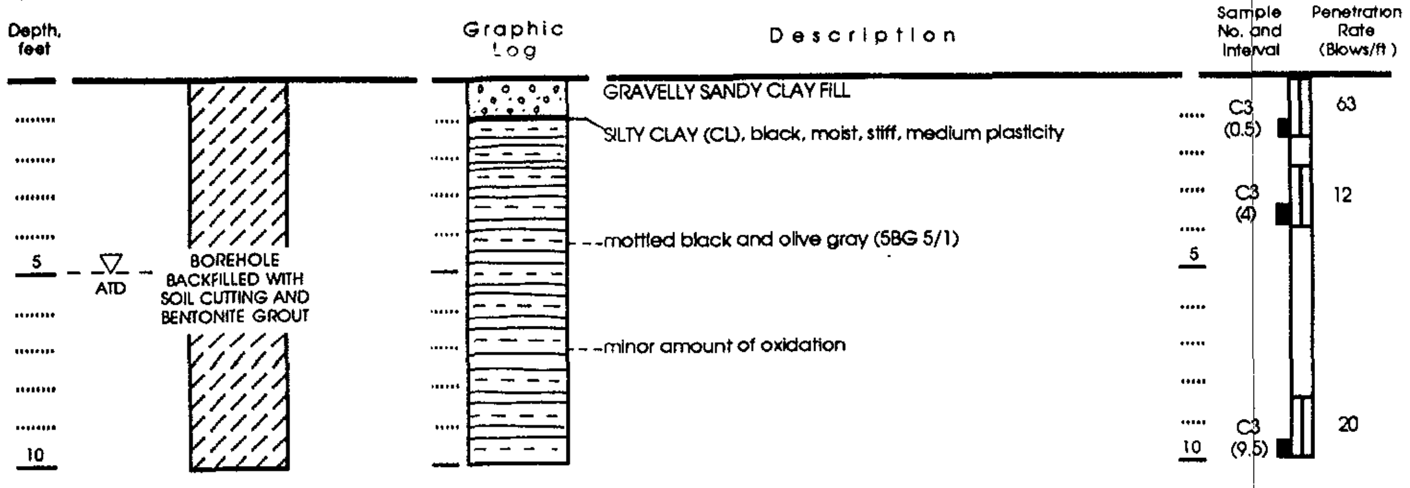
LITHOLOGY



Date boring drilled: February 5 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Chris Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C3

Project No. 1649

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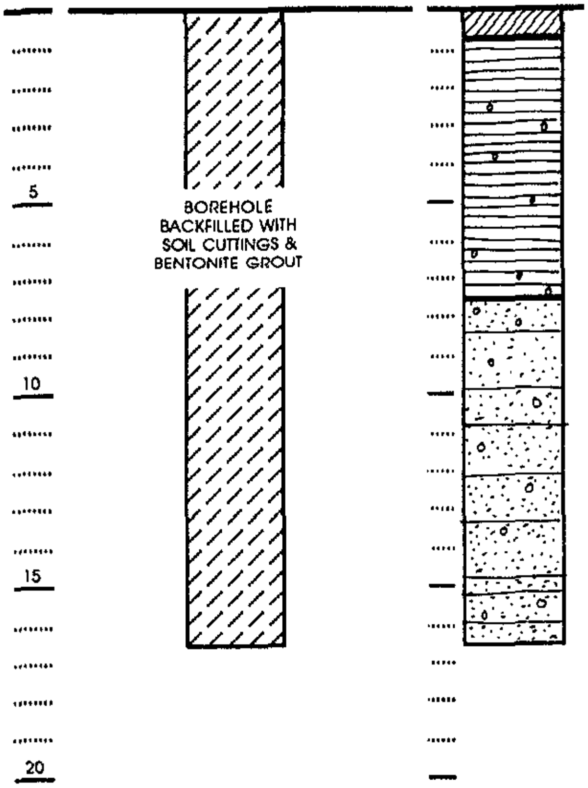
1649ALSMAY90kgb•C-3

LITHOLOGY



Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
ASPHALT/SUBGRADE. CLAY (CL), black (5Y 2.5/1), very moist (sticky), moderately plastic, soft to medium stiff.	C9-A (1)	6	12
Minor amount of gravel. Color change to dark gray (5Y 4/1).	C9-B (3.5)	11	0
CLAYEY GRAVELLY SAND (SC), brown (10YR 5/3), saturated, medium dense, fine to coarse sand, gravel clasts up to 1/2-inch diameter.	C9-C (9)	26	0
	Std. pin bag sample	13	
Wet.	C9-D (15)	30	0
	Std. pin bag sample	22	
BOTTOM OF BORING AT 16.5 FEET.			

Date boring drilled: 8 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA: Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C9

Project No. 1649

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LITHOLOGY

Depth, feet		Graphic Log	Description	Sample No. and Interval	Penetration Rate (Blows/ft)
0	BOREHOLE BACKFILLED WITH SOIL CUTTING AND BENTONITE GROUT		GRAVELLY SANDY SILT (ML), moist, dense	C7A (0.5)	
			SILTY CLAY (CL), dark gray (2.5Y N3), moist, medium plasticity, stiff	C7B (4)	
5			interbedded sand, silt and clay, yellow brown (10YR 5/6), moist, abundant amount oxidation.		
				C7C (9)	
10			gravel at 9.0 to 10.0 feet.		
15				C7 (14)	

Date boring drilled: February 6 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Chris Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C7

Project No. 1649

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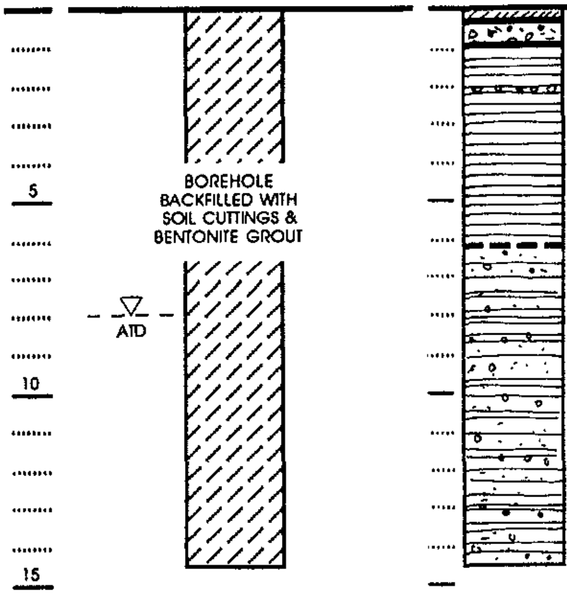
1649ALSMAY90kgb•C-7

LITHOLOGY



Description

ASPHALT/SUBGRADE.
CLAY (CL), black (5Y 2.5/1), moist, moderately plastic, soft to medium stiff.
2-inch thick gravelly sandy zone.
Minor amount of gravel (2-inch diameter) and increasing silt content to 4 feet; color change to dark gray (5Y 4/1).

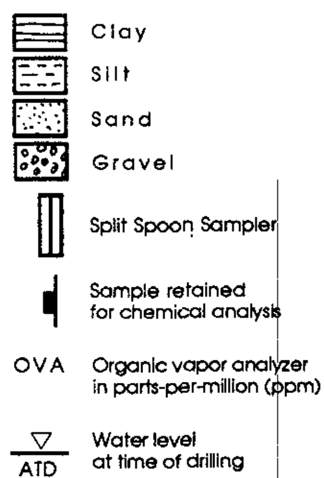
Interbedded CLAYEY GRAVELLY SAND and GRAVELLY SANDY CLAY (SC-CL), brown (10YR 5/3) to dark brown (10YR 4/3), saturated, loose, fine to coarse sand, gravel to 1-inch diameter.

BOTTOM OF BORING AT 14.5 FEET

Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
C10-A (2)	9	0
C10-B (4)	11	0
C10-C (9.5)	17	0
C10-D (14.5)	26	

Date boring drilled: 8 February 1990
Drilling method: Hollow Stem Auger
Hammer weight: 140 lbs/30-inch drop
LF Geologist: Christopher Goodrum

EXPLANATION



Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C10

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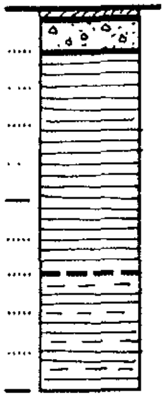
LITHOLOGY

Depth, feet		Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
	BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT	3-inch thick ASPHALT/6-inch thick CONCRETE.			
		CLAY (CL), very dark gray (10YR 3/1), moist, moderately plastic, soft to medium stiff, minor oxidation, root structures.	C11-A (2)	12	0
		Color change to olive-gray (5Y 5/2), organic matter common.	C11-B (4)	12	0
5					
		SILTY CLAY (CL), olive-gray (5Y 5/2), moist, medium plasticity, stiff, organic matter and oxidation common.	C11-C (10)	8	0
10		BOTTOM OF BORING AT 10 FEET.			

Graphic Log



Date boring drilled: 8 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C11

Project No. 1649

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CG05JUN90em

LITHOLOGY

Depth, feet		Graphic Log	Description	Sample No. and Interval	Penetration Rate (Blows/ft)
0	BOREHOLE BACKFILLED WITH SOIL CUTTING AND BENTONITE GROUT		GRAVELLY SANDY CLAY FILL	C15 A (0.5)	
			SILTY CLAY (CL), black brown, minor amount gravel, moist, low to medium plasticity, stiff.		
				C3 B (4)	
			— color change to black.		
5					
				C3 C (9.5)	
			sandy at 8.5 to 9.0 feet.		
10			Bottom of boring at 10 feet.		

Date boring drilled: February 6 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Chris Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis

Approved by:

Figure : **LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C15**

Project No. 1649

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CONSULTING ENGINEERS AND HYDROGEOLOGISTS

1649ALSMAY90kgb•C-15

LITHOLOGY

Depth, feet		Graphic Log	Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
	BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT		AGGREGATE FILL.			
			SILTY SAND (SM), light olive-brown (2.5Y 5/4), dry to moist, gravel common, loose.	C18-A (2)	10	
			SILTY CLAY (CL), black (10YR 2/1), moist, soft to medium stiff, moderately plastic.	Std. pin bag sample	8	
5				C18-B (4.5)	7	0
			Soft, mottled black with olive color, possibly laminated.			
10			No recovery between 9 and 14 feet.	C18-C (9)	16	0
15			CLAYEY SAND (SC), interbedded with SILT (ML), light olive-brown (2.5Y 5/4), wet, loose, silt oxidized strong brown (7.5YR 5/8).	C18-D (14.5)	17	0
			BOTTOM OF BORING AT 15 FEET.			

Date boring drilled: 7 February 1990
Drilling method: Hollow Stem Auger
Hammer weight: 140 lbs/30-inch drop
LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- Geotechnical sample
- OVA Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C18

Project No. 1649

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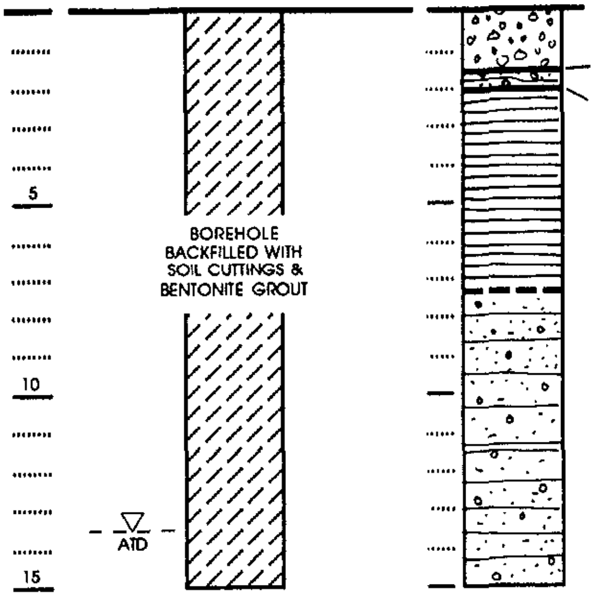
CG05JUN90em

LITHOLOGY

Depth, feet	Graphic Log	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)



GRAVEL, fine.

SANDY GRAVELLY CLAY (CL), olive (5Y 5/3), fine to coarse sand with gravel.

CLAY (CL), black (5Y 2.5/1), moist, medium to low plasticity, soft to medium stiff.

Color change to very dark gray (5YR 3/1).
Color change to grayish brown (2.5Y 5/2).

CLAYEY GRAVELLY SAND to GRAVELLY SANDY CLAY (SC-CL), dark brown (10YR 4/3), very moist, gravel clasts up to 2-inch diameter, fine- to coarse-grained sand.

BOTTOM OF BORING AT 15 FEET.

Depth	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
	C20-A (3)	9	0
	Std pin bag sample	7	0
5	C20-B (6)	6	6
10	C20-C (9.5)	32	
15	C20-D (14.5)	17	0

Date boring drilled: 7 February 1990
Drilling method: Hollow Stem Auger
Hammer weight: 140 lbs/30-inch drop
LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- Geotechnical sample
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ATD — Water level at time of drilling

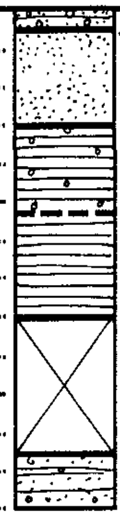
Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C20

LITHOLOGY

Depth, feet		Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
0–5	BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT	CLAYEY GRAVELLY SAND (SP), black (10YR 2/1), moist, fine- to coarse-grained.			
		SAND (SP), dark brown (10YR 3/3), moist, moderately dense, with subrounded gravel common.	C21-A (1)	26	0
		GRAVELLY CLAY (CL), gray (5GY 4/1), mottled with dark gray (5Y 4/1), no odor, moist, moderately plastic, medium stiff, color change to black at 4.5 feet.	C21-B (4)	8	3
5		CLAY (CL), black (10YR 2/1), very moist, medium plasticity, soft to medium stiff.			
		No recovery between 8 and 11.5 feet.	C21-C (8)	7	20
10					
		Interbedded CLAYEY SANDS (SC), CLAYEY GRAVEL and SANDY GRAVELLY CLAY (CL), pale olive (5Y 6/3), fine sand, gravel to 1-inch diameter.	C21-D (13)	19	0
		BOTTOM OF BORING AT 13 FEET.			
15					

Graphic Log



Date boring drilled: 8 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C21

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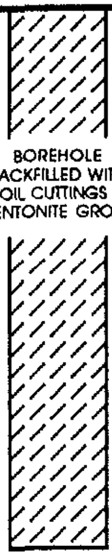
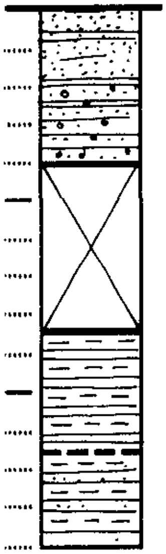
LITHOLOGY





Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
0–1.5	Fine SAND mixed with black clay, brick and construction debris, some gravel to 2-inch diameter, no odor, loose. (Fill)	C23-A (1.5)	11	
	Increase amount of clay and gravel.		12	0
		C23-B (4)	11	0
4–8.5	No recovery.			
8.5–11.5	SILTY CLAY (CL), black (10YR 2/1), moist, moderate plasticity, soft to medium stiff, no odor.	C23-C (10)	10	0
11.5–14	SILTY SANDY CLAY (CL), gray (5G 4/1), moist, moderate plasticity, medium stiff, sand and gravel increasing to 14 feet; interbedded gravelly clay with clayey sand and gravel at 13 to 14 feet; color change to very dark grayish brown (10YR 3/2), stiff to very stiff.	C23-D (14)	28	
14	BOTTOM OF BORINGAT 14 FEET.			

Date boring drilled: 7 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C23

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LITHOLOGY

BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT

Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
	CLAY (CL), black (5Y 2.5/1), moist, low plasticity, stiff to medium stiff, color change to olive-gray (5Y 5/2) at about 1 foot.	C24-A (1)	6	44
	Interbedded GRAVELLY SAND, SANDY/GRAVELLY CLAY (CL), CLAYEY SILTY SAND (SM), light olive-brown (2.5Y 5/4) with oxidation to strong brown (7.5YR 5/8), moist, no odor, fine- to coarse-grained sand, gravel clasts to 1/4-inch diameter.	C24-B (3.5)	18	--
5	SILTY CLAY to CLAYEY SILT (CL-ML), yellow-brown (10YR 5/6), sampler wet, moderate plasticity, stiff to very stiff.			
10	BOTTOM OF BORING AT 10 FEET.	C24-C (10)	34	50

Date boring drilled: 22 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

Clay

Silt

Sand

Gravel

Split Spoon Sampler

Sample retained for chemical analysis

OVA Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C24

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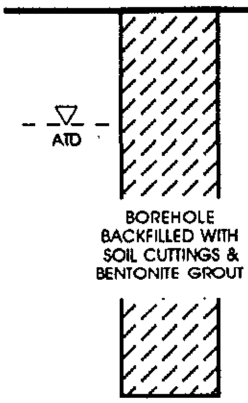
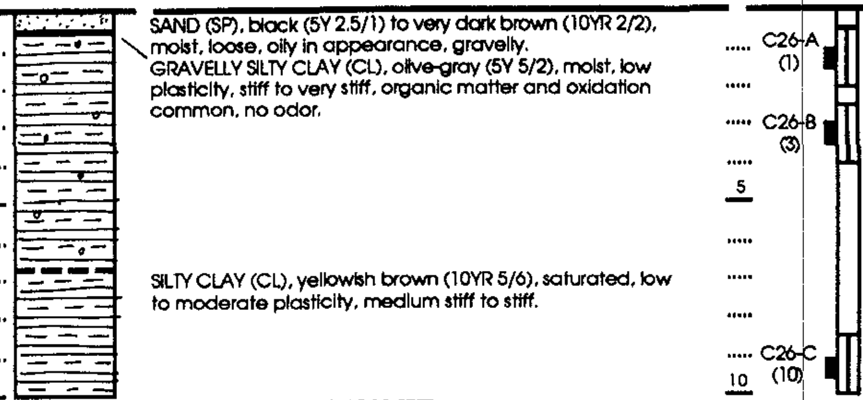
LITHOLOGY





Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
0	SAND (SP), black (5Y 2.5/1) to very dark brown (10YR 2/2), moist, loose, oily in appearance, gravelly.			
	GRAVELLY SILTY CLAY (CL), olive-gray (5Y 5/2), moist, low plasticity, stiff to very stiff, organic matter and oxidation common, no odor.	C26-A (1)	6	38
		C26-B (3)	21	62
5				
	SILTY CLAY (CL), yellowish brown (10YR 5/6), saturated, low to moderate plasticity, medium stiff to stiff.			
10		C26-C (10)	12	--

BOTTOM OF BORING AT 10 FEET.

Date boring drilled: 22 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA Organic vapor analyzer in parts-per-million (ppm)
- ATD Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C26

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LITHOLOGY

Depth, feet		Graphic Log	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
0			ASPHALT/SUBGRADE.			
			CLAY (CL), black (5YR 2.5/1), moist, moderately plastic, soft to medium stiff, becomes sandy and gravelly at shoe, color change to olive-brown (2.5Y 4/5) to olive (5Y 5/3).	C27-A (1)	6	0
	ATD		6-inch thick SAND lens, dark brown (10YR 3/3), fine-grained, subangular to subrounded gravel, very moist.	C27-B (3)	7	0
			CLAY (CL), black, moist, moderate plasticity, medium stiff.			
5	BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT					
			Color change to mottled black and olive.	C27-C (10)		--
10						
			SILTY CLAY (CL), light olive-brown (2.5Y 5/4), moist, low to medium plasticity, stiff, light gray root lining, very moist.	C27-D (14)		0
			BOTTOM OF BORING AT 14 FEET.			
15						

Date boring drilled: 7 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

- Clay
- Silt
- Sand
- Gravel
- Split Spoon Sampler
- Sample retained for chemical analysis
- OVA — Organic vapor analyzer in parts-per-million (ppm)
- ▽ ATD — Water level at time of drilling

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C27

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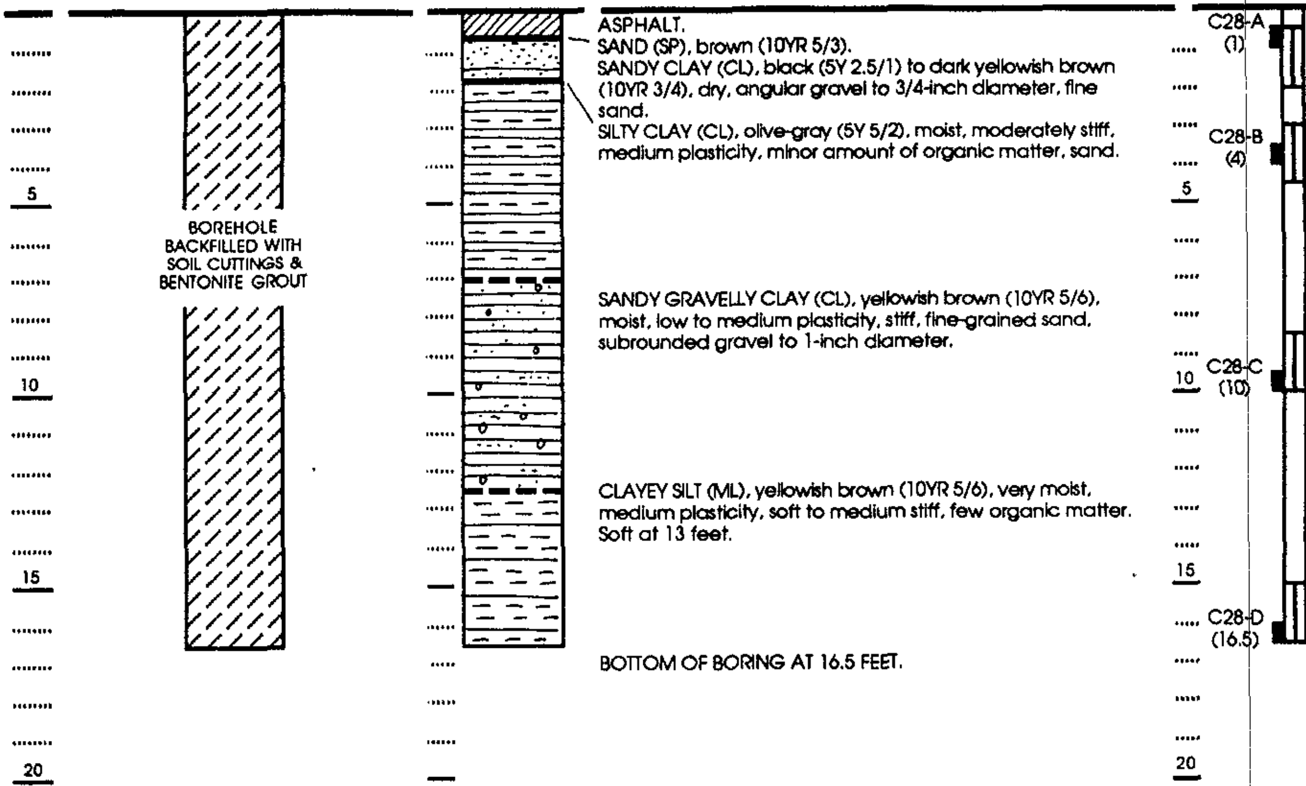
LITHOLOGY



Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft.)	OVA (ppm)
0–1	ASPHALT. SAND (SP), brown (10YR 5/3). SANDY CLAY (CL), black (5Y 2.5/1) to dark yellowish brown (10YR 3/4), dry, angular gravel to 3/4-inch diameter, fine sand. SILTY CLAY (CL), olive-gray (5Y 5/2), moist, moderately stiff, medium plasticity, minor amount of organic matter, sand.	C28-A (1)	20	7
4		C28-B (4)	9	5
10	SANDY GRAVELLY CLAY (CL), yellowish brown (10YR 5/6), moist, low to medium plasticity, stiff, fine-grained sand, subrounded gravel to 1-inch diameter.	C28-C (10)	22	9
12.5	CLAYEY SILT (ML), yellowish brown (10YR 5/6), very moist, medium plasticity, soft to medium stiff, few organic matter. Soft at 13 feet.			
16.5		C28-D (16.5)	7	--
16.5	BOTTOM OF BORING AT 16.5 FEET.			

Date boring drilled: 13 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

Clay

Silt

Sand

Gravel

Split Spoon Sampler

Sample retained for chemical analysis

OVA Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C28

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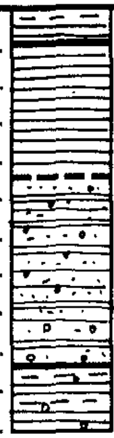
LITHOLOGY

BOREHOLE BACKFILLED WITH SOIL CUTTINGS & BENTONITE GROUT

Graphic Log



Depth, feet	Description	Sample No. and Interval	Penetration Rate (Blows/ft)	OVA (ppm)
0	GRAVELLY SANDY SILT and CLAY (ML-CL), brown (10YR 5/3), CLAY (CL), black (10YR 2/1), moist, moderate plasticity, soft to medium stiff.	C29-A (1)	16	7
	Color change to gray (5GY 5/1).	C29-B (4)	6	5
5	Interbedded SANDY GRAVELLY CLAY with CLAYEY SILT (CL-ML), moist, low plasticity, coarse sand, gravel to 1/2-inch diameter, yellowish brown (10YR 5/6).	C29-C (7)	16	9
10	SILTY GRAVELLY CLAY (CL), yellowish brown (10YR 5/6), moist, low to moderate plasticity, stiff, some fine sand, subrounded gravel to 1-inch diameter.	C29-D (11)	24	--
	BOTTOM OF BORING AT 11 FEET.			
15				

Date boring drilled: 15 February 1990

Drilling method: Hollow Stem Auger

Hammer weight: 140 lbs/30-inch drop

LF Geologist: Christopher Goodrum

EXPLANATION

OVA Organic vapor analyzer in parts-per-million (ppm)

Approved by:

Figure : LITHOLOGY AND SAMPLE DATA FOR SOIL BORING C29

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