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DELINEATION SAMPLING PLAN FOR SOLID WASTE MANAGEMENT UNITS 1, 2, 3 AND 7,
SITES 1 AND 3 AND AREAS OF CONCERN A AND B NAS KEY WEST FL
7/1/1995
BECHTEL ENVIRONMENTAL INC

DELINEATION SAMPLING PLAN
FOR
SWMU-3, SWMU-7, AOC-A, AOC-B, IR-3,
SWMU-1, SWMU-2, AND IR-1

AT THE

NAVAL AIR STATION
KEY WEST, FLORIDA

BY

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**DELINEATION SAMPLING PLAN
FOR, SWMU-3, SWMU-7, AOC-A, AOC-B, IR-3,
SWMU-1, SWMU-2, and IR-1
AT NAS KEY WEST, FLORIDA**

1.0 INTRODUCTION

Interim remedial actions (IRAs) are planned for a number of locations at or near the Naval Air Station (NAS) at Key West, Florida. This Delineation Sampling Plan supplements the basic *Remedial Work Plan Delivery Order No. 004 Naval Air Station Key West, Florida (Remedial Work Plan)* background information and the information contained in the reference document is not repeated here. Remedial activities at several of these sites will include excavation/treatment and disposal of impacted soils. For these sites, data are needed to determine the boundaries and limits of excavation, and to meet transportation and disposal requirements.

The objectives of this sample plan are to gather data to determine limits of excavation, and transportation and disposal requirements for material excavated from the sites listed below:

- SWMU-3, Fire Fighting Training Area
- SWMU-7, Building A-824
- IR-3, Truman Annex DDT Mixing Area
- AOC-A, Demolition Key
- AOC-B, Big Coppitt Key Abandoned Civilian Disposal Area
- SWMU-1, Boca Chica Open Disposal Area
- SWMU-2, Boca Chica DDT Mixing Area
- IR-1, Truman Annex Refuse Disposal Area

The number and location of post construction confirmation samples will vary for each site depending on the area of excavation. Post construction confirmation sampling is described in Section 5.2.4 of the *Remedial Work Plan* and is not addressed in this Delineation Sampling Plan.

2.0 SCHEDULE

The sampling investigation for SWMU-3, SWMU-7, IR-3, AOC-A, and AOC-B is scheduled for February/March, 1995. The sampling investigation for SWMU-1, SWMU-2, and IR-1 is scheduled for July 1995. Additionally, during the July 1995 sampling event additional samples are going to be collected at IR-3.

3.0 GENERAL SAMPLING APPROACH

3.1 DELINEATION SAMPLING

3.1.1 General

Delineation sampling to support IRAs is the primary focus of this sampling effort. Delineation sampling is conducted to determine the boundaries for excavation of contaminated soil. The initial phase of delineation sampling attempts to establish the general horizontal limits of excavation. Horizontal limits are achieved when a series of sample locations below cleanup levels are established

showing a clean boundary encircling the general area of contamination (existing structures or other features may establish a portion of the boundary).

Once horizontal limits are determined, progressive sampling and analysis to determine the vertical limits of contaminated soil are conducted. The lower boundary of soil excavation in upland areas has been determined by the Navy no deeper than the water table. If the water table is not encountered, or if in wetlands areas, contaminated soil down to cap rock will typically be excavated. Therefore, vertical soil sampling will terminate if these conditions are encountered.

Depending on the data, sampling schedule, and excavation/disposal costs, further sampling between "clean" and contaminated locations are conducted, if applicable, to reduce the volume of material to be excavated. This effort is pursued when data show additional sampling will yield significant overall cost savings from reduced excavation and disposal.

3.1.2 Site Specific

Immunoassay (IMU) methodology will be used at SWMU-2, SWMU-3, and SWMU-7 for delineation sampling. At these sites, the contaminants of concern are organic contaminants that may be analyzed in the field by IMU methodology. IMU methodology allows several rounds of samples to be collected and analyzed in a relatively short period of time, and thus is a powerful tool when utilized for delineation sampling.

The contaminants of concern at SWMU-1, IR-1, AOC-A and AOC-B consist of inorganics, which are not amenable for IMU analysis, and will require offsite laboratory analysis. A disadvantage of offsite analysis is the turnaround time required before analytical results are available after sampling. Only one round of sampling is anticipated for these areas under the current sampling schedule. Additional sampling at a later date may or may not be needed to fully delineate these areas.

The primary contaminant at IR-3 is organic (pesticides), but inorganics (lead and arsenic) have also been detected. The site will be delineated for pesticides by IMU methodology and samples also analyzed offsite for lead and arsenic. If data show lead and arsenic have not been fully delineated by the initial sampling effort, additional samples for these parameters are anticipated.

3.2 TOXICITY CHARACTERISTICS SAMPLING

In order to determine transportation and disposal requirements for the material to be excavated, data on the presence or absence of toxicity characteristics are needed. At least one sample from each site will be collected and analyzed at an offsite laboratory using the toxicity characteristics leaching procedure (TCLP) to provide this data.

3.3 QUALITY CONTROL

Quality Control (QC) samples and frequency of collection are as follows:

Laboratory confirmation of IMU samples	5% (1 per 20 samples)
Duplicates	5% (1 per 20 samples for offsite analysis) 10% (1 per 10 samples for onsite analysis)

Equipment Rinsates	5% (1 per 20 samples)
Trip Blanks	No Volatile Organic samples planned.
Decontaminated Disposable Equipment samples	5% (1 per 20 samples locations, for organics contaminated locations only)

3.4 STATISTICAL SAMPLING APPROACH

The sampling approach is based on detection and/or delineation of isolated hot spots (area of contamination above cleanup criteria) within the area or site of concern. If an area is systematically sampled on a grid pattern, the level of confidence for detection or failure to detect a isolated hot spot can be calculated based on the size of the grid. A complete description of hot spot detection based on grid sampling is contained in the EPA document *Methods for Evaluating the Attainment of Cleanup Standards. Volume 1: Soils and Solid Media*.

Several of the sites to be sampled in this plan of areas known spills, releases or disposal which constitute known hotspots. In this instance, a statistic model for detection of an unknown hot spot does not apply. The statistical approach for each site is addressed Section 4.0.

4.0 SITE-SPECIFIC SAMPLING PLANS

4.1 SWMU-3: BOCA CHICA FIRE FIGHTING TRAINING AREA

The site consists of a bermed area approximately 40 - 50 ft in diameter. The contaminant of concern is petroleum in the soil and free product at the water table. The lower boundary of excavation has been determined to be no deeper than the water table or cap rock. An initial round (Round 1) of samples will be collected and analyzed in the field by IMU methodology. Additional rounds of samples will be collected, based on Round 1 data, to delineate the limits of excavation.

4.1.1 Estimated number of samples, locations and depths

Sampling locations are shown on Figure 1.

- Four locations on the side of the berm. Sample depth: 1 ft and 2 ft (total of 8 samples)
- Two locations inside berm. Sample depth: 3-4 ft and 4-5 ft (total of 4 samples)

Actual sample sampling depth will be adjusted in the field depending on depth to water table or caprock. A second and third round may be required depending on results of first 12 samples. Sample locations will be extended outward from the bermed area, as necessary, to locate the edge of contamination. For planning purposes, 24 total samples are assumed.

4.1.2 Sample Analysis

The total number and type of sample analyses anticipated are shown on Table 1. An estimated 24 samples will be analyzed onsite using IMU test kits for PAHs and BETX. One composite sample, comprised of samples collected within the bermed area, will be shipped to an offsite laboratory for TCLP VOA and TCLP metals analysis. QC samples will be collected based on 5 percent (minimum of one) of the total IMU and total TCLP samples collected, as described in Section 3.3.

4.1.3 Statistical Approach

The sampling approach is based on delineation of a known isolated hot spot resulting from a release of petroleum contamination within a site consisting of a bermed area approximately 40 - 50 ft in diameter. The sampling approach is not based upon detection of a unknown isolated hot spot, and a statistical model is not applicable.

4.2 SWMU-7: BUILDING A-824

The site is located at the north end of building A-824, which was used as a transformer storage building. PCBs have been detected in the soil around the concrete pad located at that north end of the building. The lower boundary of excavation has been determined to be no deeper than the water table. If data show only a small quantity of soil is impacted (i.e., about 1 cubic yard), an optional remedial action task may be added to this study if approved by the Navy (see Section 4.2.3).

4.2.1 Estimated number of samples, locations and depths

Sampling locations are shown on Figure 2.

- Four locations at two depths on the assumed boundary of the spill (8 samples). Sample depths of 1-2 ft. and 2-3 ft.
- Two locations at three depths inside boundary (6 samples). Sample depths of 1-2 ft., 2-3 ft., and 3-4 ft (down to the water table).

Actual sample numbers, locations and depths will be adjusted in the field depending on depth to water table, caprock, site conditions, and field analytical data. A second round of samples may be required depending on results of first 14 samples. The locations would be determined in the field to locate the edge of contamination. For planning purposes, 10 additional samples are assumed.

4.2.2 Sample Analysis

The total number and type of sample analyses anticipated are shown on Table 1. During the first round of analysis, ten of the 14 samples will be analyzed onsite using IMU test kits for PCBs. Based on the results, further analysis and sampling will be conducted.

One sample will be shipped to an offsite laboratory for TCLP PCB/pesticides and TCLP metals analysis. A sample believed to represent relatively high concentrations of the contaminants present at the site will be selected for this analysis.

QC samples will be collected based on 5 percent (minimum of one) of the total IMU and total TCLP samples collected, as described in Section 3.3.

4.2.3 Statistical Approach

The sampling approach is based on delineation of a known hot spot resulting from a spill of transformer oil at a concrete pad at a transformers storage building. The sampling approach is not based upon detection of a unknown isolated hot spot, and a statistical model is not applicable.

4.3 AOC-A: DEMOLITION KEY

The site is located on an island where ordnance was burned for disposal. Four burn pits are to be sampled. The contaminants of concern are metals. An explosives consultant provided by the Navy or under subcontract to Bechtel will accompany the team as a safety measure. The lower boundary of excavation has been determined to be no deeper than the water table.

4.3.1 Estimated number of samples, locations and depths

Sampling locations are shown on Figure 3.

- Pit #1 is a large (approx 20 ft dia) pit near the water. Fourteen samples at 7 locations on the perimeter and inside of the pit and on the drainage cut leading to the water. Sample depths of 2-3 ft, 3-4 ft inside the pit and 0-1 ft, 1-2 ft. on the perimeter. Four additional samples at 2 locations on either side of the pit at depths of 0-1 and 1-2 ft. will also be taken.
- The other 3 pits will be sampled on the bottom and sides. A total of 10 samples at 5 locations will be taken at sample depths of 0-1 ft and 1-2 ft.

Sample depths: 0-1 ft. and 1-2 ft. Sampling depths may be adjusted upward depending on the water table.

4.3.2 Sample Analysis

The total number and type of sample analyses anticipated are shown on Table 1. Actual sample numbers, locations and depths may be adjusted in the field depending on depth to water table, caprock, and site conditions. All samples will be sent offsite for metals analysis for lead, arsenic, and antimony.

A sample from each pit will be analyzed for TCLP metals analysis.

QC samples will be collected based on 5 percent (minimum of one) of the total samples collected, as described in Section 3.3.

4.3.3 Statistical Approach

The sampling approach is based on delineation of a known or suspected isolated contamination within four burn pits. The sampling approach is not based upon detection of a unknown isolated hot spot, and a statistical model is not applicable.

4.4 AOC-B: BIG COPPITT KEY ABANDONED CIVILIAN DISPOSAL AREA

The area is located in a mangrove swamp and consists of remains of car and truck bodies which have rusted. The contaminants of concern are metals. Contaminants have not been detected in soil at levels that indicate hazardous waste. Sediment samples, however, exceed sediment quality guidelines for metals.

4.4.1 Estimated number of samples, locations and depths

Sampling locations are shown on Figure 4. The sampling approach calls for 49 samples at 24 locations covering an area of approximately 200 ft. by 300 ft.

- A composite sample of the fill material (estimated as 30 in.) will be taken at 3 locations on the high center ground. Depending on depth to cap rock, additional samples of native material underlying the fill may be taken.
- In the perimeter locations covered with water and mangroves, samples will be taken of the underlying native material, to find the edge of fill material and/or edge of contaminated material, if present.
- Six surface sediment locations shown in the RFI/RI Report contains metals above sediment quality goals. These locations and one surface soil location will be sampled at the subsurface interval (1-2 ft) only.

4.4.2 Sample Analysis

The total number and type of sample analyses anticipated are shown on Table 1. Actual sample numbers, locations and depths may be adjusted in the field depending on site conditions. All samples will be sent off site for TAL metals analysis.

Three samples from the fill material will be analyzed for TCLP metals analysis.

QC samples will be collected based on 5 percent (minimum of one) of the total samples collected, as described in Section 3.3.

4.4.3 Statistical Approach

AOC-B will be sampled within the area consisting of car/truck remains to determine the presence or absence of metals of a level indicating hazardous waste. A 50 ft grid pattern which utilizes previously collected sample data will be used. This grid size will give a 80% level of confidence for detection of isolated hotspots of 25 ft radius, and a 100% level of confidence for detecting isolated hotspots of 35 ft radius and greater.

The perimeter of the area will be sampled to determine the aerial extent of metals detected at levels that exceed sediment quality guidelines. This portion of the sampling effort is not based upon detection of isolated hotspots. However, since the perimeter samples will be collected based on a 100 ft grid, this gives a 80% level of confidence for detection of isolated hotspots of 50 ft radius, and a 100% level of confidence for detecting isolated hotspots of 70 ft radius and greater.

4.5 IR-3: TRUMAN ANNEX DDT MIXING AREA

The Truman Annex DDT Mixing Area is located at the former site of NAS Building 265. DDT (i.e., including its metabolites DDD & DDE) has been detected in the surface soil and subsurface soil at this location. Lead and arsenic were also detected above regulatory limits, but not as wide spread as the DDT. The lower boundary of excavation has been determined to be no deeper than the water table. The water table is estimated to be 6 - 8 ft below grade.

4.5.1 Estimated number of samples, locations and depths

Sampling locations based on a 25 ft grid are shown on Figure 4.

- 25 locations will be initially sampled at depths of 0-1 and 1-2 ft. The samples will be analyzed by IMU for DDT (including metabolites) during the first round of analysis to determine the horizontal extent of DDT contamination.
- Locations indicating contamination at the 1-2 ft interval will be sampled at depths of 2-3 ft and 3-4 ft and analyzed for DDT.
- Locations indicating contamination at 3-4 ft will be sampled at depths of 4-5 ft and 5-6 ft and analyzed for DDT.
- Progressive subsurface soil sampling will terminate if the water table, or caprock is encountered, or if analysis shows the lower boundary of contamination has been determined.
- For planning purposes, it is assumed that 24 sample locations would be sampled to 0-1 ft and 1-2 ft, 16 locations sampled at 2-3 ft and 3-4 ft, and 8 locations sampled at 4-5 ft and 5-6 ft, for a total of 96 samples.
- This site will be sampled early during the study in order to obtain preliminary data from the offsite laboratory on lead and arsenic.
- If lead and arsenic are not delineated during the DDT delineation effort, additional sampling for these parameters are anticipated.

4.5.2 Sample Analysis

The total number and type of sample analyses anticipated are shown on Table 1. Actual sample numbers, locations and depths will be adjusted in the field depending on depth to water table or caprock, site conditions, and field analytical data. Samples will be analyzed onsite using IMU test kits for DDT (and mobilities). Based on the results of the initial round of surface soil sampling, further analysis and sampling will be conducted. The samples will also be shipped offsite for lead and arsenic analysis.

Two samples, collected within the limits of excavation, will be shipped to an offsite laboratory for TCLP pesticides and TCLP metals analysis. QC samples will be collected based on 5 percent (minimum of one) of the total IMU and total TCLP samples collected, as described in Section 3.3.

4.5.3 Statistical Approach

IR-3 consists of an area approximately 150 ft long and 100 ft wide. IR-3 will be systematically sampled on a 25 ft grid pattern. This grid size will give a 80% level of confidence for detecting isolated hotspots of 12.5 ft radius, and a 100% level of confidence for detecting isolated hotspots of 17.5 ft radius and greater.

4.5.4 Additional Soil Sampling adjacent to IR-3

Additional soil sampling for the IR-3 is required. This additional sampling requires fourteen samples, seven across Fort Street and eight other characterization samples on the Truman Annex property. See Figure 9 for the locations of these additional samples. These samples will be analyzed for Appendix IX pesticides, TAL metals, cyanide and tin.

Sampling to help determine pesticide cleanup goals will be performed at other Navy property on Key West during this sampling effort. The locations and numbers of these samples will be determined by the field. These samples will also be analyzed for Appendix IX pesticides, TAL metals, cyanide and tin.

4.6 SWMU-1: BOCA CHICA OPEN DISPOSAL AREA

The site was used as an open disposal and burning area from 1942 to mid 1960s, with miscellaneous debris deposited into adjacent mangroves and brush. The site received general waste and refuse associated with the operation and maintenance of aircraft. The site is bounded to the north and west by gravel roadways and to the southeast by mangroves. The site is mostly bare ground or rock, with a windrow of debris extending across part of the site. The contaminant of concern is primarily lead in soil and sediment.

Samples will be collected for lead analysis to determine the extent of lead impacted soil and sediment. Sampling will be conducted in the upland portion of the site and will extend approximately 100 ft into the adjacent mangrove swamp. To gather additional characterization data, eight soil/sediment and three surface water samples will be analyzed for full Appendix IX organics and TAL metals, cyanide and tin.

4.6.1 Estimated number of samples, locations and depths

Proposed sampling locations and sampling depths are shown on Figure 6.

Delineation Sampling:

- An estimated 70 sample locations are planned at depth intervals of 0-1 ft for upland locations, and depths of 0-1 ft and 1-2 ft for wetland locations.
- The south and southeast portions of the site, where impacted soil has been detected, will be sampled on a 50 ft grid pattern.
- The upland northwest portion of the site, consisting primarily of shallow soil and bare rock, will be sampled using a staggered pattern on the 50 ft grid.

- The row of debris extending across the site will be sampled separately from grid based samples (estimated 2 composite samples).
- If an obvious potential pathway for contaminant migration from the area is identified (i.e., culvert under road) it will be sampled (estimated 2 samples).

Characterization Sampling:

- Eight soil/sediment samples and three surface water samples will be collected for full Appendix IX organics and TAL metals, cyanide and tin analysis. The location of the surface water samples will be determined based on field conditions.

A total of 115 soil/sediment samples, 3 surface water samples, and 12 QC samples are estimated for this site. Actual sample numbers, locations and depths will be adjusted in the field depending on depth to water table, caprock, presence or absence of surface water, and site conditions.

4.6.2 Sample Analysis

The total number and type of sample analyses anticipated are shown in Table 1. Based on the laboratory analytical data, three samples, representing relatively high level of contaminants (if present) will be selected by the laboratory for TCLP metals analysis. QC samples will be collected as described in Section 3.3.

4.6.3 Statistical Approach

A staggered 50 ft grid pattern will be used as a basis for sampling the northwest portion of the site. This grid size will give an 80% level of confidence for detecting isolated hotspots of 35 ft radius, and a 100% level of confidence for detecting isolated hotspots of 50 ft radius and greater.

The south and southeast portion of the site, where impacted soil has been detected, a 50 ft grid pattern will be used. This grid size will give an 80% level of confidence for detecting isolated hotspots of 25 ft radius, and a 100% level of confidence for detecting isolated hotspots of 37.5 ft radius and greater.

4.7 SWMU-2 BOCA CHICA DDT MIXING AREA

The site is adjacent to a man-made ditch connected to a large borrow pit along the southeast side of a taxiway at Boca Chica Island. DDT operations were conducted from the 1940s to early 1970s in a former building (demolished in 1982) located approximately 30 ft from the ditch. DDT (i.e., including its metabolites DDD & DDE) has been detected in surface and subsurface soil. DDT and lead were also detected above sediment quality criteria in the adjacent ditch.

Soil samples will be collected and analyzed for DDT by IMU methodology to delineate the extent of DDT impacted soil around the former building. Sediment samples will be collected from the adjacent ditch and screened onsite for DDT and sent to an offsite laboratory for lead analysis. Samples that are below the detection limit of the IMU analysis will be analyzed offsite for DDT (Note: the DDT criteria for sediment is below the detection limit of the IMU analysis).

To gather additional characterization data for the site, five soil samples along the periphery of the site, a sediment sample from each sampling station along the ditch and one additional sediment sample approximately 300 feet west of the ditch, and three surface water samples at locations identified on Figure 7 will be collected. These samples will be analyzed for full Appendix IX organics (except BNA's), TAL metals, cyanide and tin.

4.7.1 Estimated number of samples, locations and depths

Proposed sampling locations are shown on Figure 7. Soil samples will be collected around the former building based on a 25 ft grid pattern extended over the site. Existing analytical data will be utilized to provide data for portions of the sample grid. The ditch adjacent to the former building will be sampled at the center and adjacent upland banks at five sampling stations along the length of the ditch (see typical cross-section on Figure 7).

Delineation Sampling:

- Around the former building, approximately 19 soil locations, based on the sample grid, will be initially sampled at depths of 0-1 and 1-2 ft. The samples will be analyzed by IMU methodology for DDT to determine the horizontal extent of DDT contamination.
- Based on IMU results, additional sample locations will be selected to delineate the horizontal boundary of impacted soil.
- Locations indicating contamination at the 1-2 ft interval will be sampled at increasing depths, if applicable, to determine vertical extent of impacted soil.
- Subsurface soil sampling will terminate if the water table or caprock is encountered.
- The ditch will be sampled at the center and on both banks at stations selected at approximately 100-120 ft intervals along the length of the ditch. Five ditch sampling stations are planned. Sediment sampling depths are anticipated to be 0-1 ft and 1-2 ft. Approximately 20 soil samples and 10 sediment samples associated with the ditch are anticipated.

Characterization Sampling:

- Five soil samples along the periphery of the site will be analyzed for full Appendix IX organics (except BNA's), TAL metals, cyanide and tin.
- One sediment sample from each of the five ditch sampling stations and one sediment sample will be collected from a location approximately 300 feet from west of the ditch will be analyzed for full Appendix IX organics (except BNA's), TAL metals, cyanide and tin.
- Three surface water samples will be collected as locations shown on Figure 7.

For planning purposes, it is assumed that 50 grid based soil samples, 5 soil samples along the periphery of the site, 30 soil/sediment samples along the ditch, three surface water, and 17 QC samples are anticipated. For planning purposes, 110 samples are estimated. Actual sample

numbers, locations and depths will be adjusted in the field depending on depth to water table, caprock, site conditions, and field analytical data.

4.7.2 Sample Analysis

The total number and type of sample analyses anticipated are shown in Table 1. Soil samples will be analyzed onsite for DDT by IMU methodology. Sediment samples will be screened onsite for DDT; sediment samples below the detection limit of IMU methodology will be sent to an offsite laboratory for DDT analysis. All sediment samples will be analyzed offsite for lead.

Based on the laboratory analytical data, three samples will be selected for TCLP metals and TCLP pesticides analysis. QC samples will be collected as described in Section 3.3. Ten percent of samples analyzed by IMU methodology will be sent for offsite laboratory analysis for DDT.

4.7.3 Statistical Approach

SWMU-2 will be systematically sampled on a 25 ft grid pattern extending outward from an area of known impacted soil (based on existing data). This grid size will give an 80% level of confidence for detecting isolated hotspots of 12.5 ft radius, and a 100% level of confidence for detecting isolated hotspots of 17.5 ft radius and greater.

4.8 IR-1: TRUMAN ANNEX REFUSE DISPOSAL AREA

This site is located along the southern shore of Truman Annex on Key West Island. IR-1 covers an area of approximately seven acres including an antenna field. From 1952 to mid 1960s this site was used for general refuse disposal. The main sewer outfall line for Key West runs through the property (along with other underground utilities associated with the antenna field). Soils have been excavated and replaced for approximately 10-20 feet on either side of the sewer line. A previous sampling investigation at IR-1 detected lead impacted surface soil along the southern portion of the site. Planned remedial action includes possible excavation of the upper 2 ft soil in this area and capping/covering the area with clean fill. The identified area will be sampled for TAL metals analysis to determine the extent of impacted soil in the upper 2 feet of soil and supplement existing characterization data for the site.

4.8.1 Estimated number of samples, locations and depths

Proposed sampling locations are shown on Figure 8.

- Samples will be collected for TAL metals analysis at depths of 0-6" and 12"-18".
- Samples to be collected within the area of concern will be based on a 50 ft grid sampled in a staggered pattern

Actual sample numbers, locations and depths will be adjusted in the field depending on depth to water table, caprock, site conditions, and analytical data. Approximately 48 sample locations are planned for a total of approximately 96 soil/sediment samples and 10 QC samples.

4.8.2 Sample Analysis

The total number and type of sample analyses anticipated are shown in Table 1. Based on the laboratory analytical data, approximately three samples will be selected by the laboratory for TCLP metals analysis. QC samples will be collected as described in Section 3.3.

4.8.3 Statistical Approach

The sample area at IR-1 will be systematically sampled on a 50 ft staggered grid pattern extending outward from an area of known impacted soil. This grid size will give an 80% level of confidence for detecting isolated hotspots of 35 ft radius, and a 100% level of confidence for detecting isolated hotspots of 50 ft radius or greater.

5.0 WASTE MANAGEMENT

Waste minimization will be an ongoing part of the sampling effort as a means to reduce or eliminate the generation of Investigation Derived Waste (IDW) of a nature that would require handling as a hazardous waste. IDW will be managed on the principal that, to the extent possible, no contamination will be added to or taken from a site.

Soil disturbed during subsurface soil sampling will be retrieved in one foot intervals, sampled/tested/examined (if applicable), and returned to its original location and depth, and tamped back in place. Disposable plastic (sheeting, gloves, PPE, etc.) that is soiled or visually contaminated from a location within a contaminated area will be decontaminated in accordance with the *State of Florida Department of Environmental Regulation Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, DER-QA-001/92* (FDER SOPs), for decontamination of plastic equipment. After decontamination, the plastic may be reused or disposed of as garbage. Used glass sample containers will be similarly decontaminated in accordance with FDER SOPs and reused or disposed of as garbage.

Samples from decontaminated disposable equipment will be collected as described in Section 3.3 and analyzed for the organic constituents present at the site. A small quantity of soiled disposable material which cannot be decontaminated, such as paper towels, is expected to be generated. This material, if soiled from a location within a contaminated area, will be placed with the soil it contacted when the soil is returned to its original location, or containerized for disposal offsite.

All wash water from decontamination activities will be disposed of at the site where used, and within the general center of the area identified for remediation. Solvent from decontamination and/or analysis that evaporates during decontamination and/or analysis are exempt from disposal/treatment consideration. A small amount of solvent may remain after decontamination and/or analysis and may be utilized for preparation of a laboratory blank and/or spike sample, for offsite analysis. All samples shipped for offsite analysis will be retained and disposed of by the offsite laboratory. Any waste solvent remaining after sampling/analysis will properly packaged and shipped offsite for disposal in accordance with FDER, DOT, and other applicable regulations.

6.0 SAFETY AND HEALTH

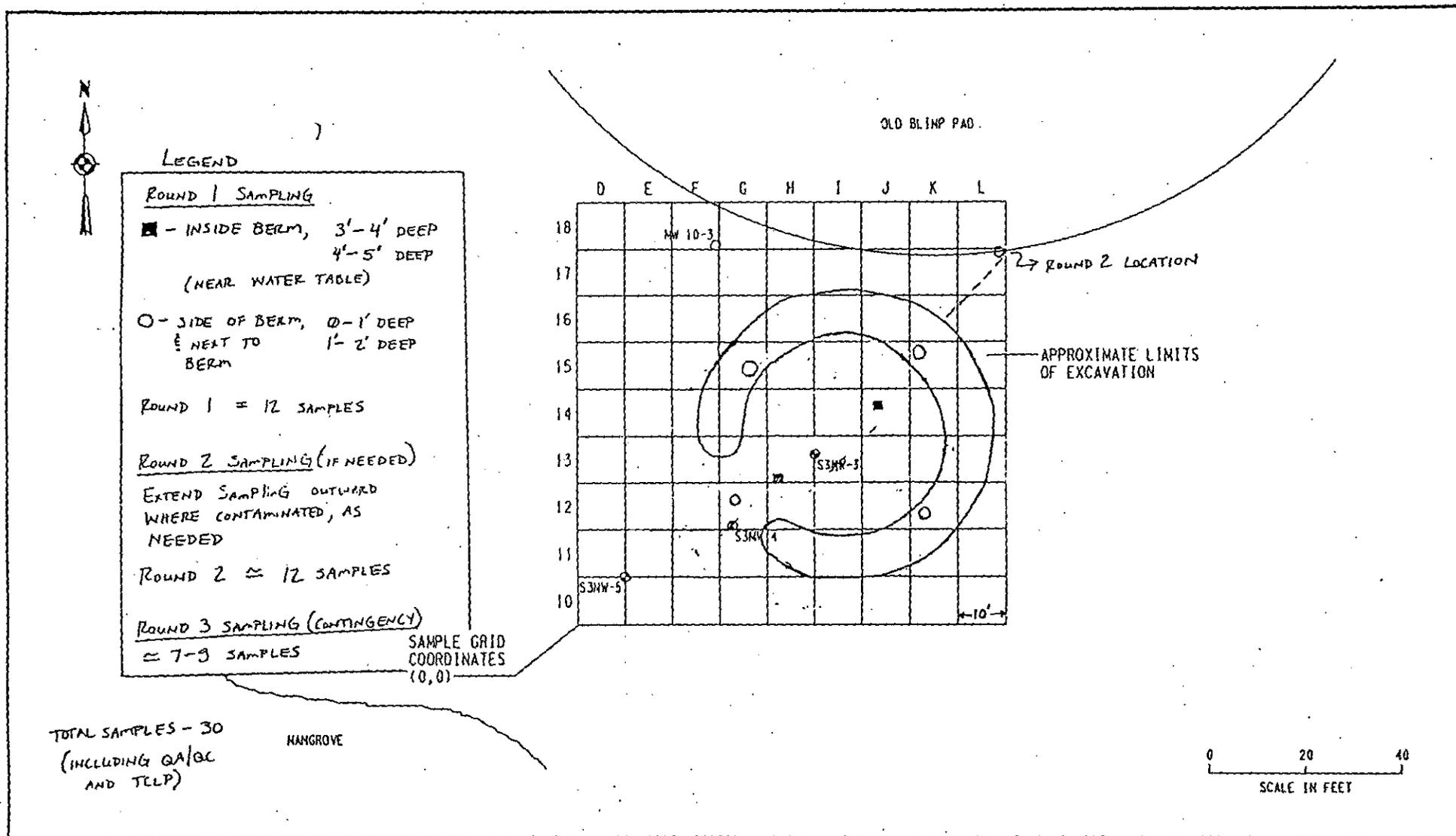
Safety and health protocols will be followed in accordance with the Task Specific Site Safety and Health Plan (TSSHP). A Site Safety and Health Representative (SSHR) will be present during all sample collection activities. Sampling activities are anticipated to be conducted using personal protective equipment (PPE) defined in the SSHP as standard construction attire (CA). The TSSHR may modify or upgrade the level of PPE based on site conditions.

Site controls will be maintained during sampling operations to preclude entry by unauthorized individuals. A control zone encompassing the sample collection area will be established using rope and/or barricade tape as necessary. Bechtel authorized visitors will be required to take site specific health and safety training prior to entering controlled zones. Visits within control zones by personnel who are not part of the sample team (i.e., oversight personnel, etc.) will be documented in the site logbook.

7.0 FIELD SAMPLING PROCEDURES AND DOCUMENTATION

Field sampling activities and documentation be will be conducted in accordance with FDER SOPs.

FIGURES AND TABLES



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FIGURE 1

SAMPLE GRID FOR
SWMU NO.3 - BOCA CHICA
FIRE FIGHTING TRAINING AREA

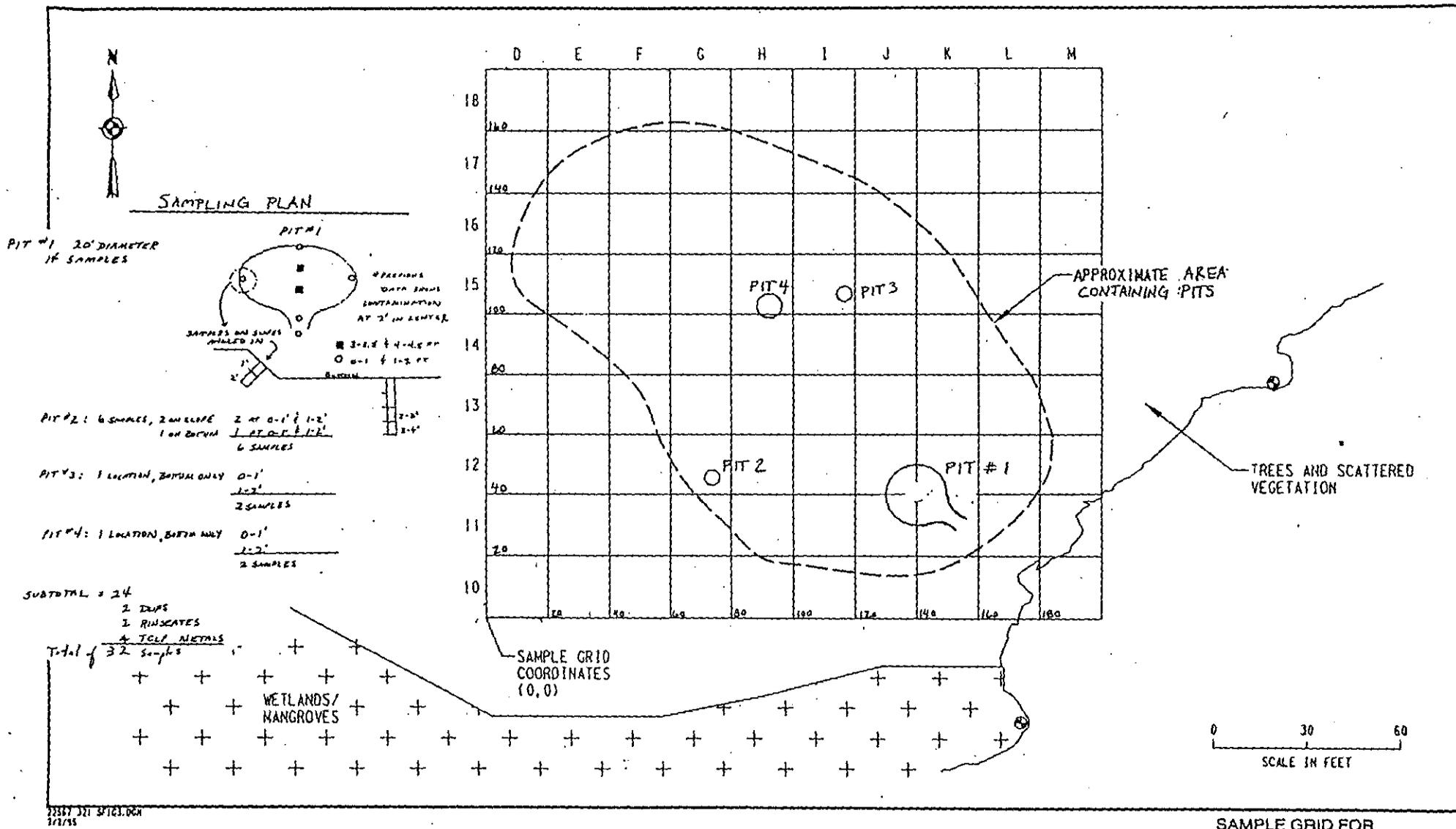
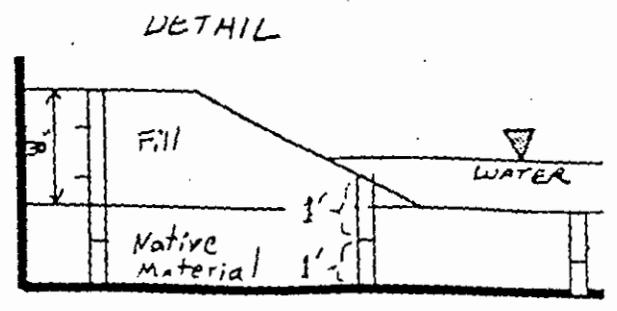


FIGURE 3

SAMPLE GRID FOR
AOC SITE A - DEMOLITION KEY
OPEN DISPOSAL AREA



- Previous Sample Location (Surface)
- Proposed Sampling Location
- ▲ Proposed TCLP Location
- ⊙ Proposed subsurface sample at a Location Previously Sampled at Surface.



Samples	Depths	Total
15	0-1' 1-2'	30
3	0-1' 1-2' 2-3'	9
7	1-2'	7
TCLP		
3	0-1'	3
Sub total =		49
QC Duplicates =		2
QC Rinsates =		2
Total samples		53

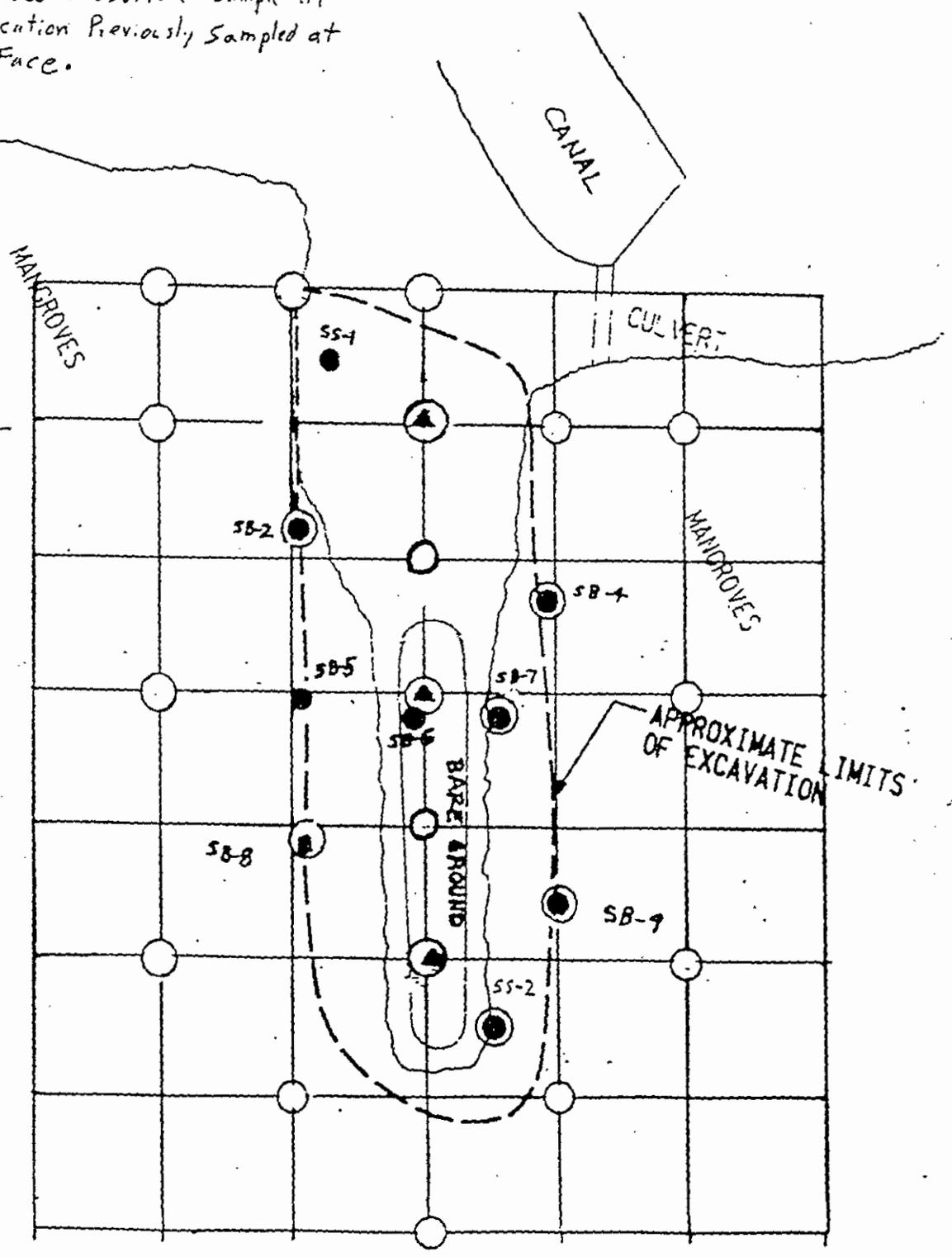
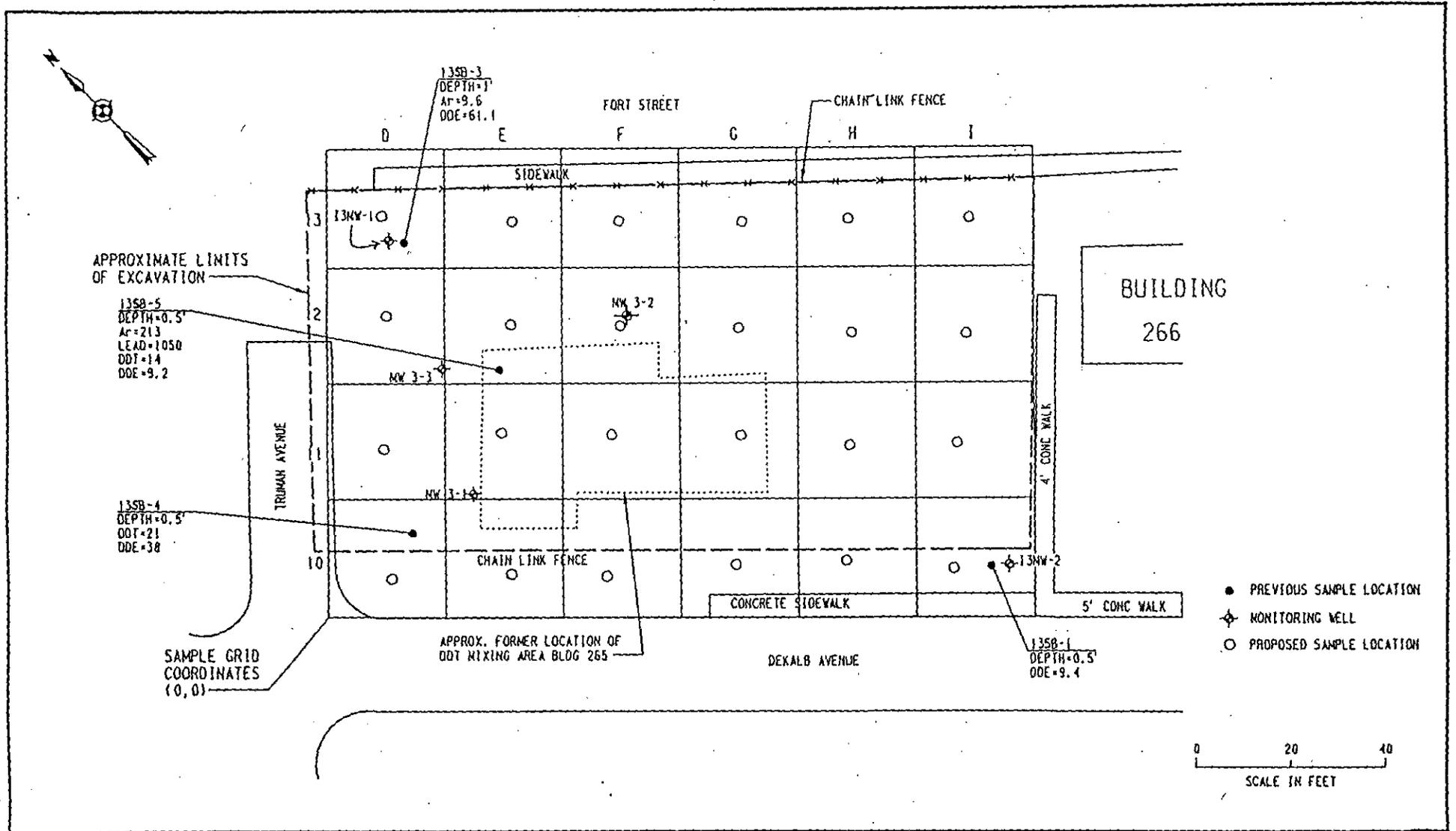


FIGURE 4

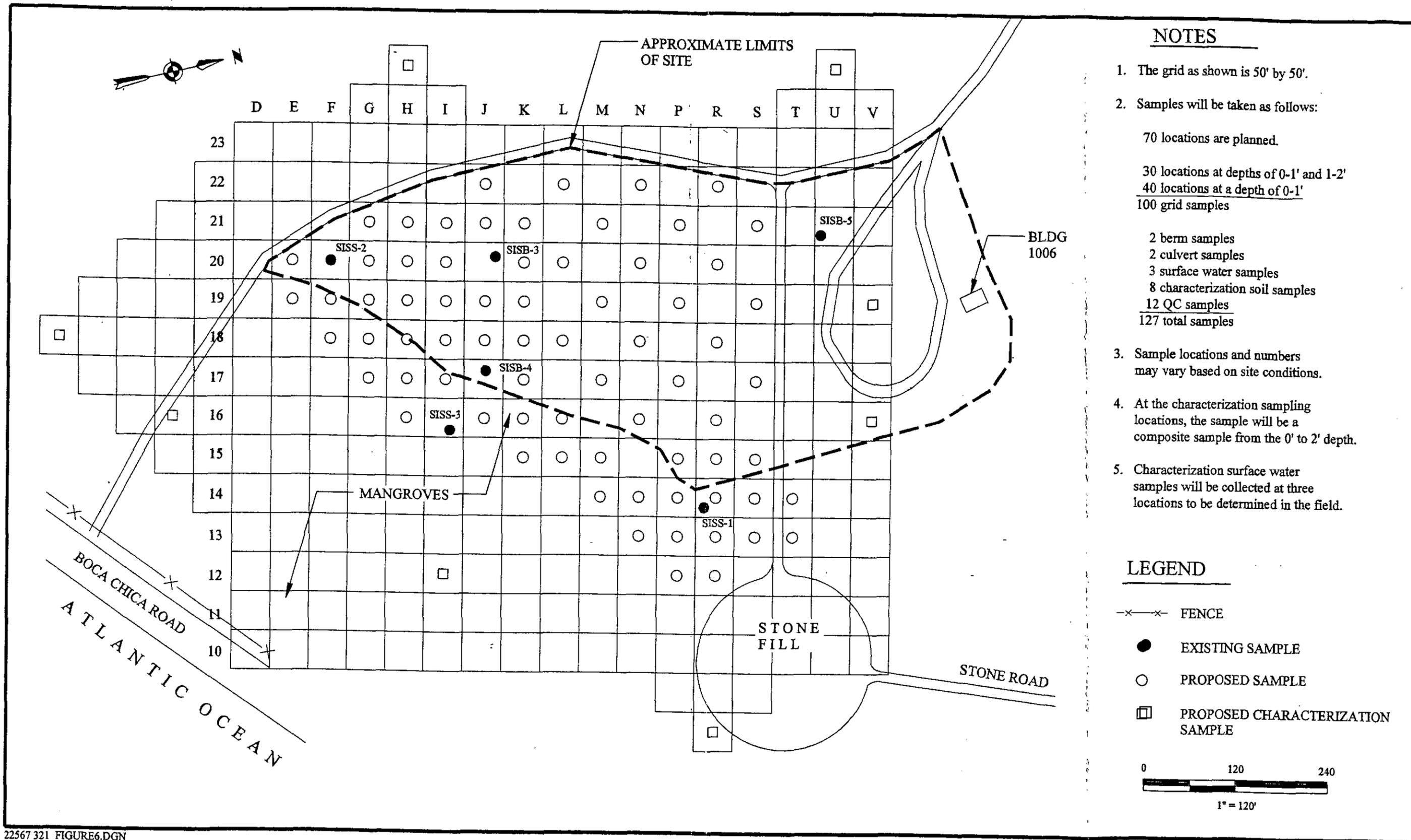
SAMPLE GRID FOR BIG COPPITT KEY



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FIGURE 5

SAMPLE GRID FOR
IR NO.3 - TRUMAN ANNEX (KEYWEST)
DDT MIXING AREA



NOTES

1. The grid as shown is 50' by 50'.
2. Samples will be taken as follows:
 70 locations are planned.
 30 locations at depths of 0-1' and 1-2'
 40 locations at a depth of 0-1'
 100 grid samples
 2 berm samples
 2 culvert samples
 3 surface water samples
 8 characterization soil samples
 12 QC samples
 127 total samples
3. Sample locations and numbers may vary based on site conditions.
4. At the characterization sampling locations, the sample will be a composite sample from the 0' to 2' depth.
5. Characterization surface water samples will be collected at three locations to be determined in the field.

LEGEND

- x-x- FENCE
- EXISTING SAMPLE
- PROPOSED SAMPLE
- PROPOSED CHARACTERIZATION SAMPLE

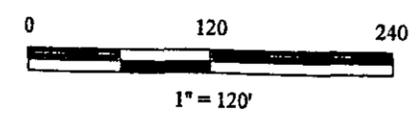
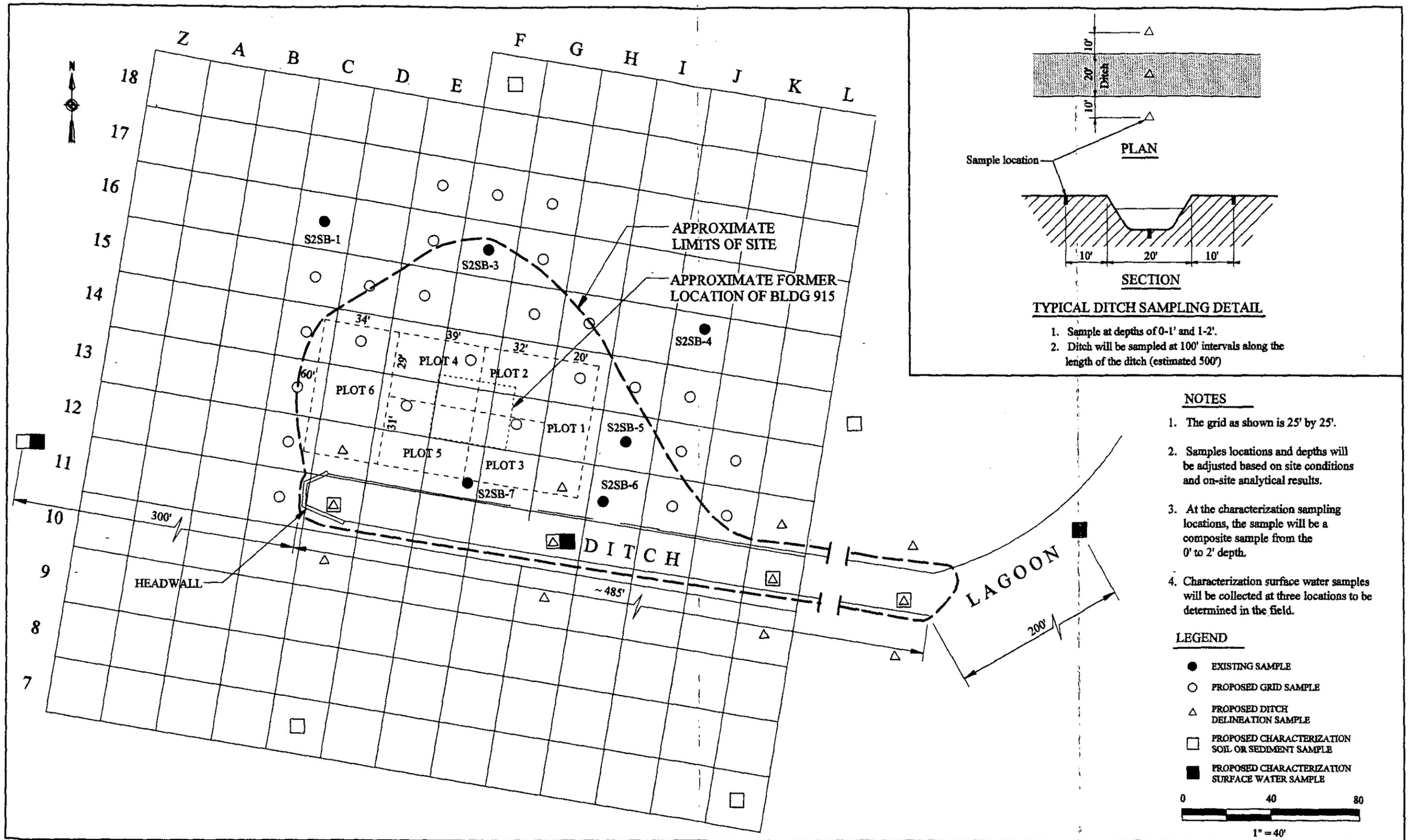
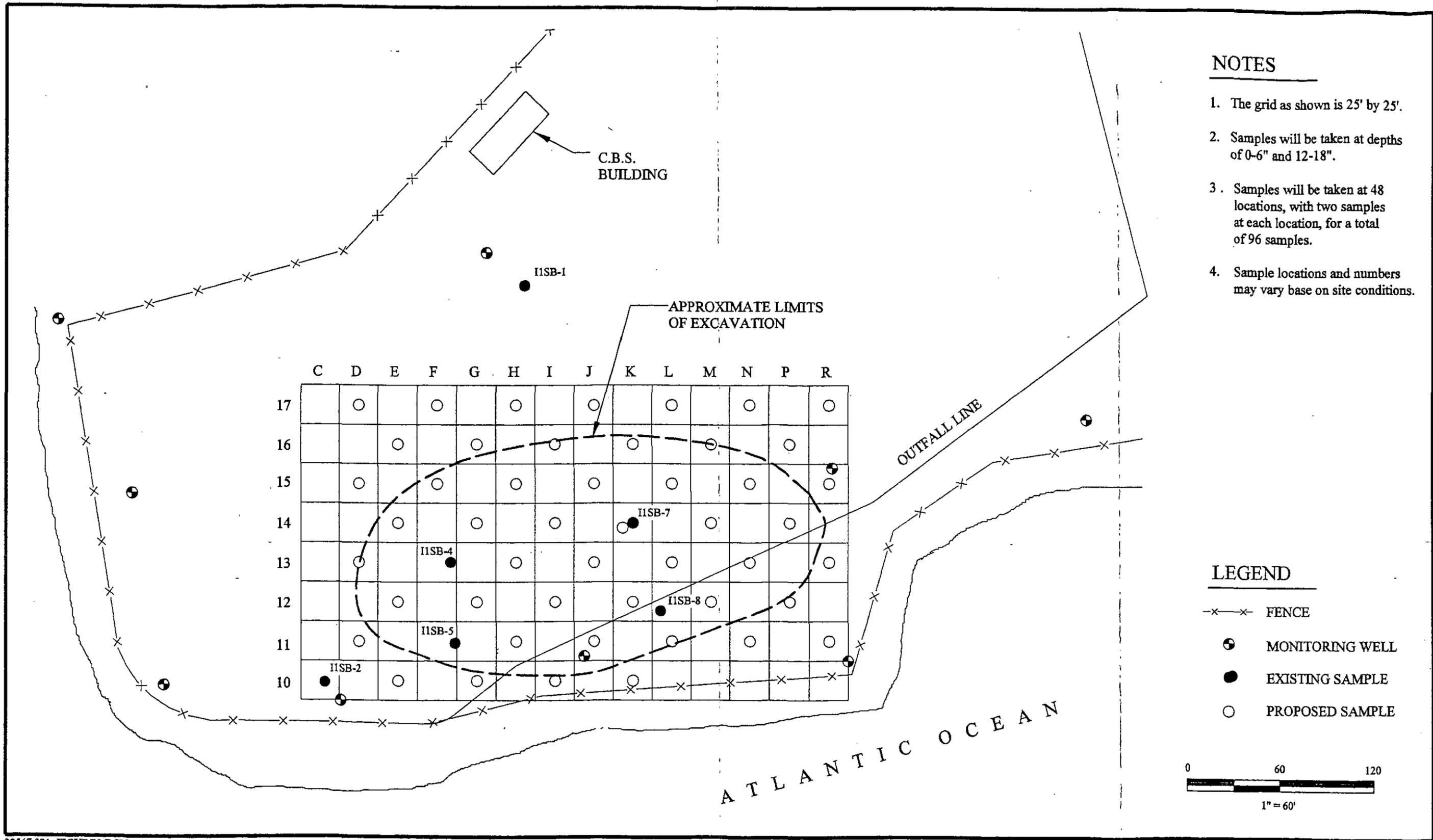


FIGURE 6
SWMU NO.1 - BOCA CHICA
OPEN DISPOSAL AREA



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FIGURE 7
SAMPLE GRID FOR
SWMU NO.2 - BOCA CHICA
DDT MIXING AREA



NOTES

1. The grid as shown is 25' by 25'.
2. Samples will be taken at depths of 0-6" and 12-18".
3. Samples will be taken at 48 locations, with two samples at each location, for a total of 96 samples.
4. Sample locations and numbers may vary base on site conditions.

LEGEND

- x-x- FENCE
- ⊗ MONITORING WELL
- EXISTING SAMPLE
- PROPOSED SAMPLE

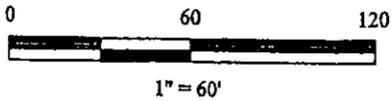
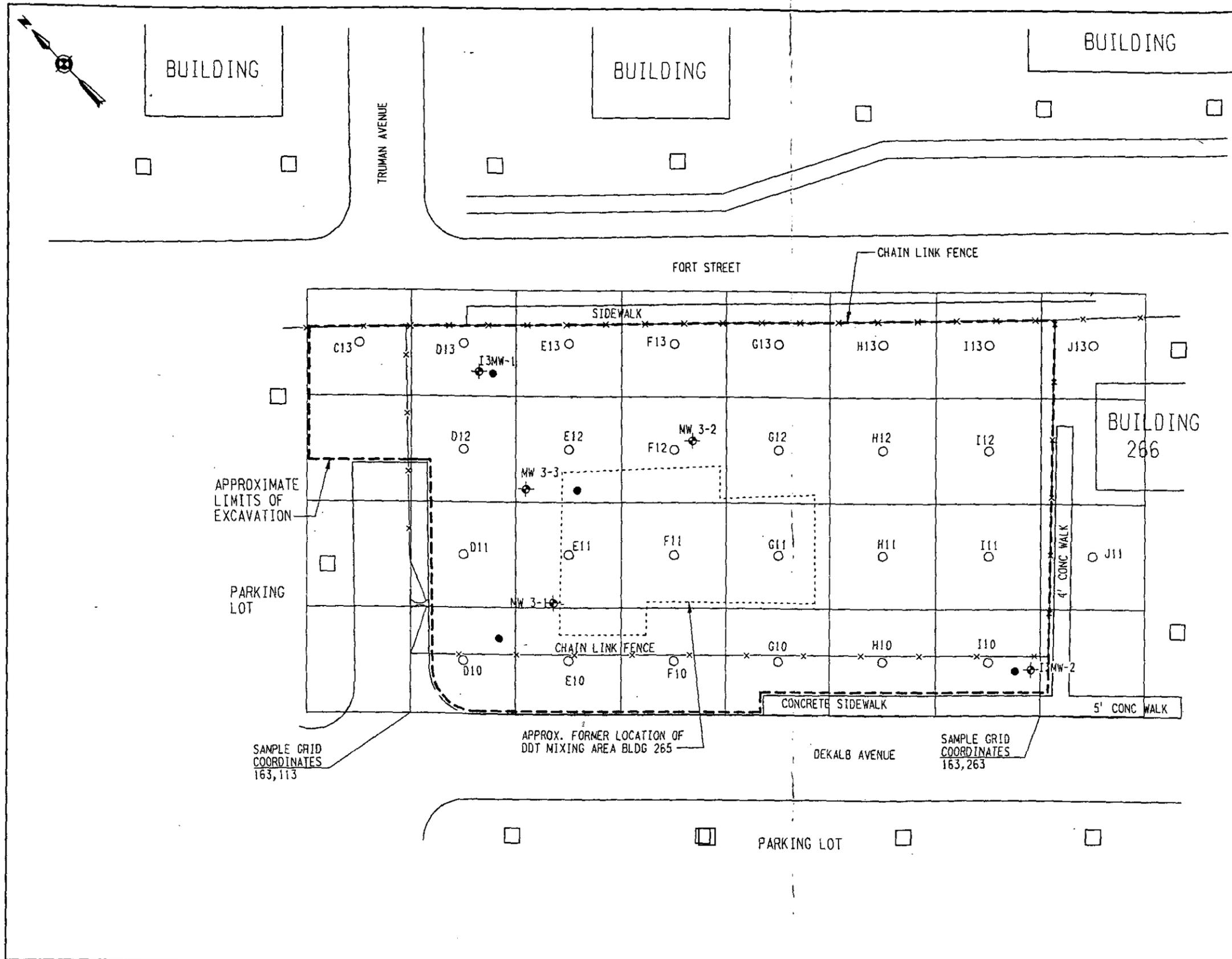


FIGURE 8
IR NO.1 - TRUMAN ANNEX (KEYWEST)
REFUSE DISPOSAL AREA

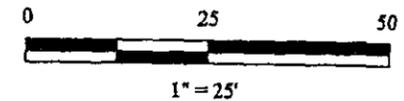


NOTES

1. The grid as shown is 25' by 25'.
2. Samples locations and depths will be adjusted based on site conditions and on-site analytical results.
3. At the characterization sampling locations, the sample will be a composite sample from the 0' to 2' depth.

LEGEND

- GRID 25' x 25'
- PREVIOUS SAMPLE LOCATION (RFI/RD)
- ⊕ MONITORING WELL
- SOIL SAMPLE LOCATION
- PROPOSED CHARACTERIZATION SOIL SAMPLE



**FIGURE 9
ADDITIONAL IR-3
CHARACTERIZATION SAMPLING**

Table 1.0
Key West Sample Quantities and Analysis Costs

Site	Reason for Sampling	Analyses	Est. No. of Samples	No. of Analyses	Turnaround Tim
SMWU 3	Extent of contamination	BTEX by immunoassay	24 samples	24 BTEX 24 PAH 2 duplicates BTEX 2 duplicates PAH 1 rinsate BTEX 1 rinsate PAH	Same Day
		GEL PAH/BTEX-5% confirmation samples	1 sample, no QC samples	1 PAH 1 BTEX	14 14
	Waste characterization	GEL TCLP VOAs, metals	1 sample, no QC samples	1 TCLP VOA 1 TCLP Metals	14 14
	Total SWMU-3 Samples= 31				
SWMU 7	Extent of contamination	PCB by immunoassay	20 samples - 2 rounds of 10 samples if required 2 duplicates 2 rinsate		Same Day
		GEL PCB-5% confirmation sample	1 sample, no QC		14
	Waste characterization	TCLP Metals	1 sample		14
	Total IR-3 Samples= 26				

Table 1.0 (continued)

Site	Reason for Sampling	Analyses	Est. No. of Samples	No. of Analyses	Turnaround Tim
AOC A Demolition Key	Extent of contamination	GEL TAL Metals	46 samples 2 duplicates 2 rinsates		14
	Waste characterization	TCLP Metals	1 sample		14
	Total Samples= 32				
AOC B Big Coppitt Key	Extent of contamination	GEL TAL Metals	46 samples 2 duplicates 2 rinsates		14
	Waste characterization	GEL TCLP Metals	3 samples		14
	Total Samples= 53				
IR 3	Extent of contamination	DDT by immunoassay	96 samples 10 duplicates 5 rinsates		Same Day
		GEL pesticides-5% confirmation samples	5 samples, no QC		14
		GEL Pb, As	96 samples 5 duplicates 5 rinsates		14
	Waste characteristic	GEL TCLP pesticides TCLP Metals	1 sample, no QC	1 TCLP pesticide 1 TCLP Metals	14
	Total Samples: 119				
	Total samples for SWMU 2, SWMU 7, AOC-A, AOC-B, and IR 3: 119				

Table 1.0 (continued)

Site	Reason for Sampling	Analyses	Est. No. of Samples	No. of Analyses	Turnaround Tim
SWMU 1 Boca Chica Open Disposal Area	Extent of contamination	GEL Pb	104 samples 5 duplicates 5 rinsates	104 Pb 5 duplicate Pb 5 rinsate Pb	3 weeks 3 weeks 3 weeks
	Site characterization	GEL Full App. IX Organics, TAL metals, CN And SN	8 soil/sed. 3 water 2 duplicate 2 rinsate	8 soil/sed. 3 water 2 duplicate 2 rinsate	3 weeks 3 weeks 3 weeks
	Waste characterization	GEL TCLP-PB		3 TCLP-Pb	3 weeks
	Total Samples= 127				
SWMU 2 Boca Chica DDT Mixing Area	Extent of contamination (Gridded Area)	DDT by immunoassay (IMU)	50 samples 3 duplicates 3 rinsates	50 IMU 3 duplicate IMU 3 rinsate IMU	Same day Same day Same day
		GEL Full App. IX Organics (except BNA's) and TAL metals, CN and SN	5 soil samples	5 soil samples	3 weeks
	Extent of contamination (Ditch)	Full App. IX Organics (except BNA's), TAL metals, CN and SN	6 soil/sediment 3 water	6 soil/sediment 3 water	3 weeks 3 weeks
		GEL Pb and DDT by immunoassay (IMU)	20 sed/soil samples	20 Pb 20 IMU	3 weeks Same day
		GEL Full App. IX Organics (except BNA's), TAL metals, CN and SN	1 dup. sediment 1 dup. water 1 rinsate	1 dup. sediment 1 dup. water 1 rinsate	3 weeks 3 weeks 3 weeks
	GEL DDT (for confirmation of IMU samples)	5 soil	5 soil	3 weeks	
Waste characterization	GEL TCLP Pest/Pb		3 soil	3 weeks	
Total Samples= 98					

Table 1.0 (continued)

Site	Reason for Sampling	Analyses	Est. No. of Samples	No. of Analyses	Turnaround Tim
IR 1 Truman Annex Refuse Disposal Area	Extent of contamination	GEL TAL metals	96 samples 5 duplicates 5 rinsate	96 TAL metals 5 dup. TAL met. 5 rins. TAL met.	3 weeks 3 weeks 3 weeks
	Waste characterization	GEL TCLP Pb		3 TCLP Pb	3 weeks
	Total Samples = 106				
IR 3 Truman Annex DDT Mixing Area Fort Street Samples	Extent of contamination	GEL App. IX Pesticides & TAL metals, CN and SN	14 soil 1 dup. soil 1 rinsate	14 soil 1 dup. soil 1 rinsate	3 weeks 3 weeks 3 weeks
	Total Samples = 16				
Total Samples for SWMU 1, SWMU 2, IR 1 and IR-3/Fort Street = 347					

Soil Criteria: Pb = 400 ppm
 PCB = 1 ppm
 PCB 1260 = 0.57 ppm
 DDT (IR-1) = 17 ppm
 DDT (IR-3) = 1.88 ppm
 BTEX = 200 ppm

Sediment Criteria: Pb = 21 ppm
 DDT = 0.0045 ppm