



DEPARTMENT OF THE NAVY

CRANE DIVISION  
NAVAL SURFACE WARFARE CENTER  
300 HIGHWAY 361  
CRANE, INDIANA 47522-5000

IN REPLY REFER TO:

5090 10-1-1999  
Ser 095/9225  
08 DEC 1999

U.S. Environmental Protection Agency, Region V  
Waste, Pesticides, & Toxics Division  
Waste Management Branch  
Illinois, Indiana, and Michigan Section  
Attn: Mr. Peter Ramanauskas (DW-8J)  
77 West Jackson Blvd.  
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center (NAVSURFWARCENDIV Crane) submits, for your review and approval, the Quarterly Interim Progress Reports (IPR) for March 27 through August 31, 1999 as enclosure (1). This report, as can be seen by the dates, covers more than one quarterly reporting period. Regretfully, there was a miscommunication during the contract turn over that led to this confusion. To return to the agreed upon quarterly schedule in January 2000, the next report will also include more than one quarterly reporting period, September through December 1999. Enclosure (2) is the required certification statement.

NAVSURFWARCENDIV Crane point of contact is  
Ms. Christine D. Freeman, Code 09511, telephone 812-854-4423.

Sincerely,

A handwritten signature in cursive script that reads "James M. Hunsicker".

JAMES M. HUNSICKER, DIRECTOR  
ENVIRONMENTAL PROTECTION DEPARTMENT  
BY DIRECTION OF THE COMMANDER

Encls:

- (1) IPR MAR - AUG 1999
- (2) Certification Statement

Copy to:

ADMINISTRATIVE RECORD  
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TOLTEST Crane (w/o encls)

**Southern Division  
Naval Facilities Engineering Command  
North Charleston, South Carolina**

**Full-Scale Operations  
Bioremediation of Explosives-Contaminated Soil  
Quarterly Interim Progress Report  
March 27 – August 31, 1999  
NSWC Crane  
Crane, Indiana**

**October, 1999**

***TOLTEST, INC.***

**QUARTERLY INTERIM PROGRESS REPORT  
MARCH 27-AUGUST 31, 1999**

**FULL-SCALE OPERATIONS  
BIOREMEDIATION OF EXPLOSIVES-CONTAMINATED SOIL  
NAVAL SURFACE WARFARE CENTER CRANE, INDIANA**

**ENVIRONMENTAL JOB ORDER CONTRACT  
CONTRACT NO. N68950-96-D-0052  
TOLTEST PROJECT NUMBER 37324.01**

*Submitted to:*

**SOUTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
NORTH CHARLESTON, SOUTH CAROLINA 29419-9010**

*Submitted by:*

**TOLTEST, INC.  
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**OCTOBER 1999**

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## EXECUTIVE SUMMARY

This interim progress report has been prepared by TolTest, Inc. (TolTest) for Southern Division, Naval Facilities Engineering Command. This is the fifth quarterly report (first quarterly report by TolTest) that has been prepared to document the progress of the full-scale bioremediation operation of explosives-contaminated soil at Naval Surface Warfare Center (NSWC) Crane, Crane, Indiana. On March 27, 1999, TolTest assumed responsibility for the excavation and treatment of contaminated soil at the Bioremediation Facility (Biofacility). This report summarizes the work actions performed from March 27 through August 31, 1999 pursuant to the requirements of the approved *Full-Scale Operational Plan* and the *Quality Assurance Project Plan*. Full-scale bioremediation operations started in April 1998.

The scope of work includes initial site characterization by sampling and analysis, excavation and screening of explosives-contaminated soil, transportation of screened soil for treatment to the Biofacility, process monitoring and confirmatory sampling of the compost windrows, and disposal of treated soil.

All initial characterization sampling at Mine Fill "A" (MFA) is now complete. Initial characterization sampling at Mine Fill "B" (MFB) indicated the presence of contamination. In-process and post excavation sampling for grids in MFA and MFB have been ongoing, indicating that industrial clean-up goals have been achieved at the excavation sites.

A total of 7,446.36 cubic yards of screened soil from Mine Fill A and a total of 2515.46 cubic yards of screened soil from Mine Fill B was transported to the Biofacility during this reporting period.

A total of 2612.4 tons of straw has been delivered by the straw sub-contractor. The majority of this straw (round bales) was stockpiled in the back storage lot. TolTest has made every effort to utilize the straw from the previous season first and as of this date the older straw is nearly gone. A total of 4691.25 ton of chicken manure was delivered during this reporting period.

A total of 56 new windrows were constructed during this reporting period, from windrow 51 to windrow 106. A total of 10,649 tons of contaminated soil was treated to residential or industrial clean up levels during the reporting period.

All interim measures work actions have been performed in accordance with approved plans.

## 1.0 INTRODUCTION

This interim progress report has been prepared by TolTest for Southern Division, Naval Facilities Engineering Command. This is the fifth quarterly report (first by TolTest) that has been prepared to document the progress of the full-scale bioremediation operation of explosives-contaminated soil at Naval Surface Warfare Center (NSWC) Crane, Crane, Indiana. It summarizes the work actions performed by TolTest during March 27 through August 28, 1999 pursuant to the requirements of the approved *Full-Scale Operational Plan* [MK, 1998a] and the *Quality Assurance Project Plan* [MK, 1998b]. Full-scale bioremediation operations started in April 1998. TolTest, Inc., assumed responsibility on March 27, 1999 after completion of Morrison Knudsen Corp. (MK) contract.

NSWC Crane, located in southwestern Indiana, provides support for equipment shipboard weapons systems, and ordnance. This site also supports Crane Army Ammunition Activity (CAAA), which includes production and renovation, storage, shipment, and demilitarization and disposal of conventional ammunition. Explosive-compounds contaminated soils resulting from the above operations have been identified at four solid waste management units (SWMUs): Ammunition Burning Ground (ABG) (SWMU-03/10); Rockeye Munitions Facility (SWMU-10/15); Mine Fill "A" (MFA) – (SWMU-12/14); and Mine Fill "B" (MFB) – (SWMU-13/14).

On-site bioremediation of the explosive-compounds contaminated soil utilizing a windrow composting process has been selected as the preferred treatment alternative for the Interim Measures (IM) at these four SWMUs.

The scope of work includes initial site characterization by sampling and analysis, excavation and screening of explosives-contaminated soil, transportation of screened soil for treatment at the Biofacility, process monitoring, confirmatory sampling, and disposal of treated soil.

## 2.0 EXCAVATION

During this reporting period fieldwork activities were conducted at MFA and MFB. Work activities at the excavation site included: in-process sampling, post-excavation sampling, soil excavation, and screening. Specifics for each SWMU site are discussed below.

All fieldwork activities were performed in accordance with procedures included in the *Full-Scale Operational Plan* [MK, 1998a] and the *Quality Assurance Project Plan (QAPP)* [MK, 1998b].

Drawings showing the sampling and excavation grids of various locations were provided in the third quarterly report. Final drawings will be included in the Interim Measures Report for Bioremediation.

### 2.1 Pre-Excavation Sampling

Pre-excavation sampling is performed to provide initial site characterization to delineate excavation efforts and to establish that clean-up goals have been achieved if no excavation is required. Pre-excavation samples are analyzed for SWMU-specific compounds by an off-site analytical laboratory.

A minimum of three soil samples is normally obtained from each grid for characterization of the soil prior to excavation. Explosive compounds and metals analyses were completed on composite samples obtained from zero to 12-inches in depth and 24 to 36-inches in depth. On occasion, the presence of rock prohibited obtaining the deeper composite sample. Volatile organic compounds (VOCs) analysis were completed on grab samples obtained at 12-inches. Additional samples were obtained for VOCs analysis based on photoionization detector (PID) screening.

The horizontal boundaries of explosive constituents have been delineated by buildings, roads, railroad tracks, and grids with either no detectable levels of the respective constituent or levels that are below the clean-up action. To date, no metals or VOCs have been detected above clean-up action levels in any sample.

#### 2.1.1 Mine Fill "A"

There has been no change in the status of pre-excavation soil sampling for MFA this quarter. No additional pre-excavation samples were collected this quarter.

#### 2.1.2 Mine Fill "B"

Pre-excavation sampling has been completed in nine grids at Building No. 166. Explosives compounds were detected as follows: HMX ranged from non-detect to 62

ppm, RDX ranged from non-detect to 600 ppm, and TNT ranged from non-detect to 174 ppm.

Pre-excavation sampling has been completed in six grids at Building No. 168. Explosives compounds were detected as follows: HMX ranged from non-detect to 92 ppm, RDX ranged from non-detect to 10,400 ppm, and TNT ranged from non-detect to 16,600 ppm.

Pre-excavation sampling has been completed in six grids at Building No. 171. Explosives compounds were detected as follows: HMX ranged from non-detect to 33 ppm, RDX ranged from non-detect to 18 ppm, and TNT ranged from non-detect to 3230 ppm.

Pre-excavation sampling has been completed in thirty grids at Building No. 173. Explosives compounds were detected as follows: HMX ranged from non-detect to 618 ppm, RDX ranged from non-detect to 11,600 ppm, and TNT ranged from non-detect to 1,750 ppm.

Pre-excavation sampling has been completed in eight grids at Building No. 2501. Explosives compounds were detected as follows: HMX ranged from non-detect to 250 ppm, RDX ranged from non-detect to 6490 ppm, and TNT ranged from non-detect to 1 ppm.

## **2.2 In-Process Excavation Soil Sampling**

In-process excavation soil sampling is performed to assist the field crew in planning excavation activities. Field screening test kits are used for testing TNT and RDX levels in the in-process soil samples to provide quick analytical results.

All grids from which post-excavation samples were obtained (discussed in section 2.3 below) were first sampled and screened for RDX. When RDX screening indicates that remaining contamination is below industrial levels, then post-excavation samples are obtained.

## **2.3 Post-Excavation Soil Sampling**

Post-excavation soil sampling (i.e., confirmation samples) is performed to provide confirmation that the excavation meets established industrial clean-up goals. Confirmation samples are analyzed for SWMU-specific compounds by an off-site analytical laboratory.

### 2.3.1 Mine Fill "A"

Post-excavation samples were obtained from grids: 78, 82 – 84, 90, and 92 at Building 152; 27, 28, 30, 31, 32, 37, and 39 at Building 153; 96 – 109, 112, 114, 117, and 185 at Building 157; and 60 at Building 158. Analytical results indicated that remaining soil contamination in all grids is less than industrial cleanup levels except as follows:

#### Building 153

- Grid 27 and 28 where contaminated soil was left in-place to support a steam line;
- Grid 37 where contaminated soil was excavated to level grade, exposing the blast wall footer.

#### Building 157

- Grid 103 where the NSWC Crane ECOTR halted further soil excavation after 10 feet of contaminated soil had already been removed;
- Grid 106 where excavation of contaminated soil was halted after the footers for the overhead conveyor were exposed.

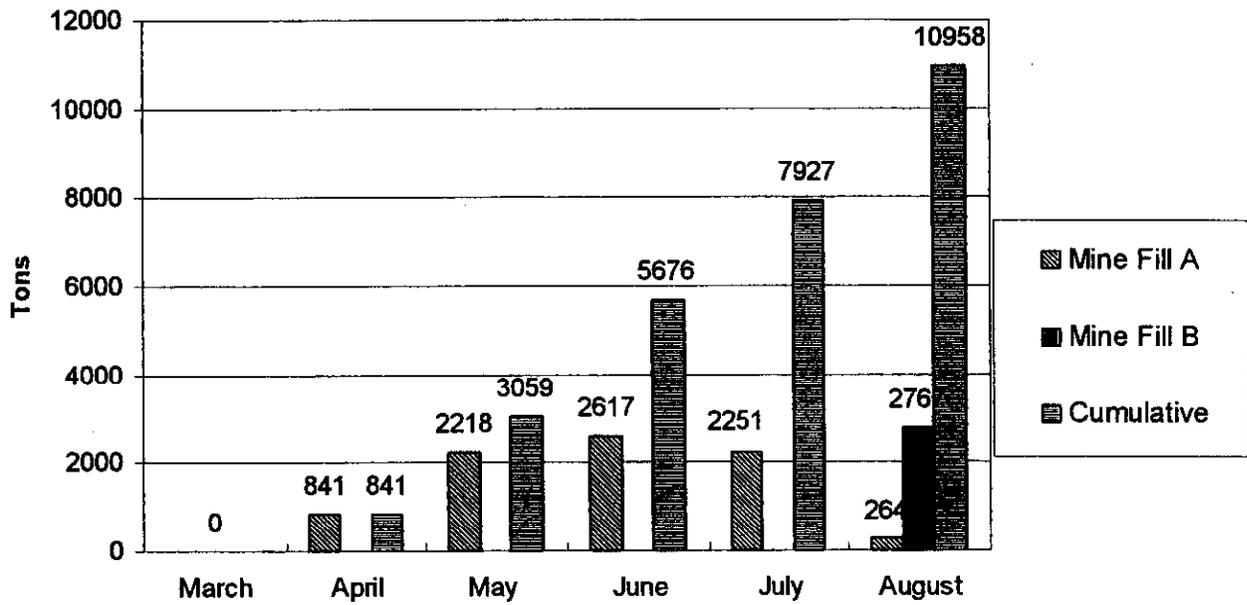
### 2.3.2 Mine Fill "B"

Post-excavation samples were obtained from grids 75 – 79, and 84 at Building 173. Analytical results indicated that remaining soil contamination in all grids is less than industrial cleanup levels except in grid 79 which will require further excavation and re-sampling.

## 2.4 **Soil Excavation and Screening**

Soil excavation continued at MFA around Buildings 152, 153/154, 158/159, and at Mine Fill B around Building 173. For the period 3/27/99 – 8/31/99, 10,958 tons of soil have been excavated and screened. The new screener continues to process soil at a higher rate than originally scheduled. The actual quantities of screened soil from Mine Fill A and Mine Fill B are listed in Table 1.0 and are shown in Graph 1.0.

**GRAPH 1.0**  
**NSWC CRANE**  
**SOIL EXCAVATION AND SCREENING VOLUMES**



### 3.0 COMPOSTING OPERATIONS

Treatment of explosive-compounds contaminated soil by composting involves microbial degradation of explosive-compounds by optimizing the availability of organic material, temperature, moisture content, pH, and oxygen. The composting operation process description is provided in Section 5.0 of the approved *Full-Scale Operational Plan* [MK, 1998a].

This section provides details of procurement and delivery of amendments, quantity of amendments used in the treatment operations, construction and treatment of windrows, and analytical data interpretation.

#### 3.1 Amendments

The compost mix used in full-scale operations consists of 25% soil, 15% chicken manure, and 60% straw by volume.

Straw deliveries have been received by the project satisfying all of the bulk straw order. A large stockpile of straw is available to satisfy composting needs into winter.

Chicken manure continues to be trucked to the Biofacility on an as-needed basis. Contract quantities of chicken manure are sufficient to support operations.

#### 3.2 Quantity of Amendments Used

The following summarizes the amendments received during this reporting period.

- Chicken manure received this period: 4,691.25 tons  
Cumulative received for full-scale: 10,018.25 tons
- Straw received this period: 2,612.4 tons  
Cumulative received for full-scale: 5,588.4 tons

#### 3.3 Windrow Construction and Treatment

Field screening has been performed at least weekly to monitor RDX levels within each windrow. Field screening of treated compost for TNT is not completed since RDX is a better indicator of contaminant degradation than TNT. Final compost samples are collected once the field test kits indicated RDX levels are below industrial clean-up goals. The day that final compost samples are collected for off-site laboratory confirmation analysis is referred to as Day Last.

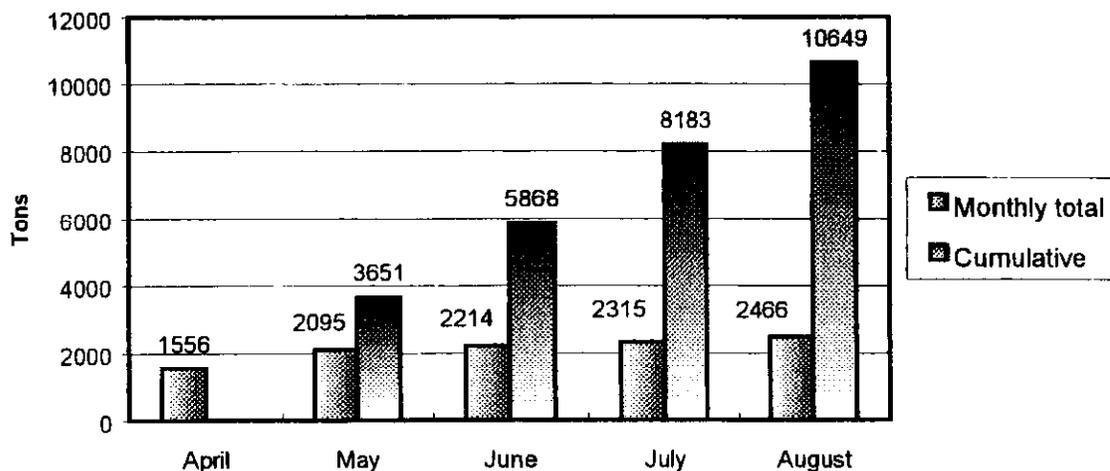
Fifty-four windrows (windrows 47 through 100) achieved Day Last status during this quarter (i.e. analytical results were received before the end of the quarter). Windrows 47 through 50 were constructed by Morrison Knudsen prior to this quarter and reached

Day Last status in this quarter. Windrows 51 through 106 were constructed in this quarter by ToITest, but Day Last status was only reached in this quarter through windrow 100. All windrows reported in this quarter achieved residential or industrial clean-up levels for explosive compounds. Analytical data regarding windrows that achieved Day Last status during this period are discussed in Section 3.4. All windrows up through windrow 101 were composed with soil from Mine Fill A. Windrow N-102 contained 14 loads of Mine Fill A soil and 3 loads of Mine Fill B soil. Windrow S-103 was the first windrow to contain all Mine Fill B soil.

Actual performance of remediation continues to be significantly ahead of the originally planned schedule. This is primarily due to the relatively short bio-degradation period. The average number of days between Day Zero and Day Last for this quarter was 8 days. The details of the progress of windrows are included as Table 2.0.

The total amount of soil processed in windrows 51 through 100 was 10,649 tons (based on 232 tons of soil in a full size windrow). Graph 2.0 charts the progress of composting operations.

**GRAPH 2.0**  
**NSWC CRANE BIOFACILITY SOIL PROCESSED VOLUMES**



### 3.4 Analytical Data Interpretation and Validation

Table 3 provides this quarter's laboratory analytical results for HMX, RDX, and TNT. All windrow results represent an average of 15 individual data points (five cross sections, three sample locations per cross section). Day Zero and Day Last results are given for each windrow, demonstrating the effectiveness of the bio-degradation process.

All data associated with windrow monitoring was verified, and at least 10% of the samples were validated, and compared with field and laboratory quality control (QC) sample data to assess the data's usability for supporting full-scale operations. Data was verified by reviewing chain-of-custody forms, sample preservation records, analytical holding times, requested turnaround times, sample data in comparison to QC data, and reporting requirements. In addition, more than 10% of the data was validated using the validation procedures specified in Section 9.2.2 of the QAPP.

Analytical results for the trip blanks, field blanks, equipment rinsates, and field duplicates were evaluated to identify potential sources of error introduced during sampling, transportation and storage. Field QC performed with the monitoring of Windrow No. 47 through Windrow No. 100 during this quarter have been performed according to the requirements defined in the QAPP.

Laboratory QC consists of method blank, sample matrix spike (MS), sample matrix spike duplicate (MSD), surrogate, laboratory control sample (LCS), and laboratory control sample duplicate (LCSD) analyses to evaluate laboratory accuracy and precision. Laboratory quality control was performed consistent with the requirements of the QAPP. Method blanks, LCS, LCSD, and surrogates were acceptable in almost every analytical batch. MS and MSD data was generally acceptable. In some of the Day Zero data, consistent elevated MS and MSD recoveries of RDX and HMX are often seen in the analytical data because of the high levels of these compounds initially present in the sample. The Day Zero samples often require dilutions to bring the concentration of RDX and HMX to a quantifiable level. This dilution which occurs after spiking of the sample, dilutes the concentration of the spiking solution to a low level which cannot often be distinguished from the variability of the sample itself. Day Last data did not show similar interferences because initial concentrations were low in comparison to the concentration of spiking solution added to the sample. Other MS and MSD recoveries, which did not meet the established criteria in the QAPP, include recoveries for tetryl. This compound often suffers from degradation, which results in low recovery of the compound in the MS and MSD. However, based upon the undetectable levels of tetryl found in these samples and the relation of the analytical reporting limits to the industrial and residential clean-up levels, the data is determined to be acceptable to show that clean-up goals have been successfully met.

Based on technical review of the field and laboratory QC data, analyses were performed within acceptable accuracy and precision requirements specified in the QAPP. The confirmation data meets the project's data quality objectives and are therefore considered usable to support full-scale operations. Table 4 provides the average explosive compound levels for Day Zero and Day Last for the laboratory results received this quarter. Table 5 lists the clean up goals for HMX, RDX and TNT. All windrows to date have met the project objective industrial clean-up goals and 41 of the windrows processed this quarter have meet residential clean-up objectives.

#### **4.0 DISPOSITION OF TREATED SOIL AND SITE RESTORATION**

Treated soil (compost) has been transported back to the SWMU of origination (Mine Fill A) either to the temporary staging area or used as backfill. Disposal activity to date is shown in Table 2.0. Field-generated drawings showing backfill placement are included in under Figures. Windrows 92, 93, 98, 101, and 102 are currently staged awaiting final disposition. One load of decontaminated rocks (rejected from the soil screening operation) was placed in grid 96 at Bldg. 157 in the bottom of the excavation. Site restoration (seeding, mulching, and watering) has been or will be implemented at all areas where TolTest has backfilled treated soil.

## 5.0 STATUS OF VARIOUS REPORTS

Various reports have been drafted and are undergoing review and approval as discussed below.

### A. Toxicity Report

The report concludes that treated compost is suitable for use as a top dressing for general land application and does not contain leachable contaminants. The Microtox® and earthworm toxicity results conclude that bioremediated explosive compounds-contaminated soil is no more toxic than non-contaminated soil, which has been subjected to similar windrow composting activities. This report is currently being reviewed by the USEPA Region V.

### B. Full-Scale QAPP Revision No. 3

This revision incorporates the standard operating procedures of the next proposed off-site laboratory. This document has been approved by the USEPA.

### C. Rockeye Soil Excavation Plan

This plan, which is an appendix to the Full Scale Operations Plan for the Soils Bioremediation Facility describes sampling and excavation activities for the Rockeye site. This plan is currently under review by the USEPA Region V.

## 6.0 QUALITY CONTROL

Quality control inspections included excavation site operations, composting operations, sampling activities, field test kit analyses, and facility maintenance. Quality control checks were performed at required intervals using the field inspection checklists provided in Appendix F of the approved *Full-Scale Operational Plan* [MK, 1998a]. Copies of all inspection records are maintained at the Biofacility office.

During this quarter 982 individual items were verified and 3 deficiencies were identified. One deficiency is minor, retention pond level with less than two feet freeboard remaining immediately after a major rain event. This deficiency has been corrected satisfactorily. Two other deficiencies have not yet been corrected and have been reported to the Navy. Hairline cracks in process building floor and a water line leak below the asphalt in the process area. ToITest will repair the cracks during warmer weather periods.

## **7.0 SAFETY AND INDUSTRIAL HYGIENE**

### **7.1 General Safety**

During this period 14,600.9 man-hours were expended by TolTest. There were no OSHA recordable injuries. The project has a cumulative total of 161,789.9 man-hours.

Twenty-three formal safety inspections were performed during this quarter. No significant findings of an imminent or serious nature were found. Immediate actions were taken to correct any minor findings observed. Daily informal walk-around safety inspections reinforced and improved the worker safety performance.

### **7.2 Industrial Hygiene Sampling**

During this period total dust, airborne explosive compounds, and ammonia monitoring were performed. Ammonia samples were taken at the Biofacility by colorimetric methods. Sampling indicated ammonia levels greater than the occupational exposure limits of 50 ppm permissible exposure limit (PEL) and 25 ppm (TLV). Samples were taken beginning with the windrow construction and until the levels were below 25 ppm (TLV). The chicken manure amendment was the primary contributor to ammonia concentrations. Full-face air purifying respirators with ammonia cartridges were worn during windrow formation and during composting activities when ammonia levels were above 25 ppm (TLV). Ammonia was localized near each pile and was significantly affected by natural ventilation of the building, moisture in the windrow, and turning of the windrow. The maximum ammonia level detected was 300 ppm. The average maximum ammonia concentration during construction and on Day 0 was 103 ppm; Day 1 was 79 ppm; Day 2 was 33 ppm; and Day 3 was 39 ppm.

Ammonia samples were also collected by Passive Dosimeter Tubes. These tubes were placed on individuals and concentrations were calculated according to the amount of time worn. The highest concentration recorded was 24 ppm/hr. The average was 7.9 ppm/hr.

Airborne dust sampling for explosive compounds was also performed at the Biofacility. Three area samples and four personnel samples were taken. The explosives compound 4-ADNT was detected in one of the samples at 0.770 $\mu$ g.

A total of ten wipe samples were taken to identify any spread of explosive compounds contamination outside of the work zones. Samples were taken in the shower trailer, laboratory, office, and lunch areas. No occupational exposure limit exists for explosive compounds contamination. However, an administration control level of 1 ppm has been established. Sample results indicate that explosives were tracked outside of the exclusion zone. The explosive compound RDX was detected in the personnel shower

trailer at 0.888  $\mu\text{g/wipe}$ , and in the laboratory at 0.69  $\mu\text{g/wipe}$ . A more aggressive housekeeping practice, coupled with worker training, has been instituted to prevent reoccurrence.

Nuisance dust measurements were obtained, using a laser dust monitor, during activities that have the greatest potential to generate dust. During these activities, water is used to prevent and suppress any dust that could be generated. The average dust level detected was 0.2  $\text{mg/m}^3$ . The maximum dust level detected was 0.5  $\text{mg/m}^3$ . All dust samples were below the 10  $\text{mg/m}^3$  non-respirable limit and the 3  $\text{mg/m}^3$  respirable limit.

Noise monitoring was performed using an Audio Dosimeter. The highest time-weighted average level of exposure was 90.6 decibels (dBa), the average was 82.6 dBa. The highest one second average sound level recorded was 127.3 dBa, the average was 111.7 dBa. Associates are required to wear hearing protection when noise levels exceed 85 dBa during a weighted network steady state, or 140 dBa impulse, regardless of the duration of exposure.

In summary, monitoring during this period indicates no airborne explosive compounds hazard were present and adequate dust control measures are in place. Ammonia monitoring indicates respiratory protection is warranted during the first three to five days of the windrow life cycle. Noise monitoring indicates a requirement for noise protection. Wipe sampling for explosive compounds indicates that aggressive housekeeping activities are required to prevent any detectable spread of explosive compounds outside the work zones.

## **8.0 FACILITY MAINTENANCE AND REPAIRS**

Minor damage was caused to the bed of a dump truck when the bed was raised while unloading soil in the North building. No damage was done to the roof of the building and only slight damage was done to the bed of the truck, which was promptly repaired. Seven panels on the south side of the North building were damaged after being hit by the discharge chute of a tub grinder. All seven panels were subsequently replaced. The passenger side door of the Mule (used to pull a water wagon around the facility) was bent after it came open and struck a guard post. The door has been repaired. Routine maintenance and housekeeping activities were performed including filling in cracks in the floors of the three compost buildings.

## 9.0 REFERENCES

- MK, 1998a. *Full-Scale Operational Plan for Soils Bioremediation Facility, NSWC Crane, Crane, Indiana*. Delivery Order Number 0009, Contract Number N62467-93-D-1106. Prepared by Morrison Knudsen Corporation, Environmental Services Group. Revision 2, March 12, 1998.
- MK, 1998b. *Quality Assurance Project Plan for Full-Scale Operations, Soils Bioremediation Facility, NSWC Crane, Crane, Indiana*. Delivery Order Number 0009, Contract Number N62467-93-D-1106. Prepared by Morrison Knudsen Corporation, Environmental Services Group. Revision 2, March 12, 1998.

## **TABLES**

**TABLE 1.0**  
**FULL-SCALE OPERATIONS SOIL EXCAVATION QUANTITIES**  
**April through August 1999**  
**Quantity (Tons)**

<b>Period</b>	<b>Mine Fill A</b>	<b>Mine Fill B</b>	<b>Rockeye</b>	<b>Cumulative</b>
Previously reported	12,047.00	0.00	0.00	12,047.00
April	841.09	0.00	0.00	12,888.09
May	2,218.01	0.00	0.00	15,106.10
June	2,617.37	0.00	0.00	17,723.47
July	2,251.34	0.00	0.00	19,974.81
August	264.30	2,766.81	0.00	<b>23,005.92</b>
Reporting Period Total	8,192.11	2,766.81	0.00	10,958.92
Site Total	20,239.11	2,766.81	0.00	

**TABLE 2.0  
WINDROW SCHEDULE**

<b>Windrow #</b>	<b>Start Date</b>	<b>Day Zero</b>	<b>Day Last</b>	<b>Lab Results Received</b>	<b>Complete Unload</b>	<b>Tons Processed</b>	<b>Soil Processed, Cumulative</b>	<b>Processed to Residential or Industrial</b>	<b>Compost Disposal Location</b>
S-51	3/27/99	3/29/99	4/12/99	4/17/99	4/17/99	232.1	232.1	Residential	S side bldg. 152
M-52	3/30/99	4/2/99	4/13/99	4/19/99	4/19/99	232.1	464.2	Residential	Storage area
S-53	4/8/99	4/10/99	4/21/99	4/26/99	4/26/99	232.1	696.3	Industrial	SE side bldg. 157
M-54	4/12/99	4/14/99	4/26/99	4/30/99	4/30/99	232.1	928.4	Residential	Storage area
S-55	4/19/99	4/21/99	4/30/99	5/6/99	5/7/99	232.1	1160.5	Residential	Storage area
M-56	4/21/99	4/23/99	4/30/99	5/6/99	5/8/99	232.1	1392.6	Residential	Storage area
N-057	4/23/99	4/24/99	5/3/99	5/8/99	5/10/99	81.62	1474.22	Residential	Storage area
N-058	4/27/99	4/28/99	5/7/99	5/13/99	5/14/99	81.62	1555.84	Residential	Storage area
M-059	5/1/99	5/3/99	5/12/99	5/17/99	5/17/99	232.1	1787.94	Residential	E side bldg 154
S-060	5/3/99	5/6/99	5/13/99	5/19/99	5/20/99	232.1	2020.04	Industrial	SW side bldg 157
S-061	5/7/99	5/11/99	5/19/99	5/25/99	5/26/99	232.1	2252.14	Residential	E side bldg 154
M-062	5/12/99	5/14/99	5/20/99	5/26/99	5/27/99	232.1	2484.24	Industrial	NW side bldg 157
N-063	5/15/99	5/17/99	5/25/99	6/1/99	6/1/99	110.77	2595.01	Residential	S side bldg 157
M-064	5/18/99	5/19/99	5/27/99	6/2/99	6/3/99	232.1	2827.11	Industrial	NE side bldg 157
N-065	5/19/99	5/20/99	5/28/99	6/3/99	6/4/99	127.655	2954.765	Industrial	NW side bldg 157
S-066	5/20/99	5/21/99	6/2/99	6/7/99	6/8/99	232.1	3186.865	Residential	E side bldg 154
S-067	5/26/99	5/27/99	6/3/99	6/9/99	6/10/99	232.1	3418.965	Industrial	NW side bldg 157
M-068	5/27/99	5/28/99	6/7/99	6/13/99	6/14/99	232.1	3651.065	Residential	E side of bldg 154
N-69	6/1/99	6/2/99	6/9/99	6/15/99	6/16/99	98.643	3749.708	Industrial	NE side bldg 157
M-070	6/3/99	6/4/99	6/11/99	6/21/99	6/21/99	232.1	3848.351	Residential	E side bldg 154
N-071	6/4/99	6/5/99	6/14/99	6/21/99	6/21/99	98.643	4080.451	Industrial	NE side bldg 157
S-072	6/8/99	6/9/99	6/16/99	6/22/99	6/23/99	232.1	4312.551	Residential	E side bldg 154
S-073	6/11/99	6/12/99	6/18/99	6/24/99	6/25/99	232.1	4544.651	Residential	E side bldg 154

**TABLE 2.0 (Continued)  
WINDROW SCHEDULE**

Windrow #	Start Date	Day Zero	Day Last	Lab Results Received	Complete Unload	Tons Processed	Soil Processed, Cumulative	Processed to Residential or Industrial	Compost Disposal Location
M-074	6/14/99	6/15/99	6/23/99	6/29/99	6/30/99	232.1	4776.751	Residential	E side bldg 154
N-075	6/16/99	6/17/99	6/25/99	7/2/99	7/3/99	81.235	4857.986	Residential	E side of bldg 154
M-076	6/22/99	6/22/99	6/29/99	7/6/99	7/6/99	232.1	5090.086	Industrial	N side of bldg 152
S-077	6/23/99	6/24/99	7/2/99	7/9/99	7/10/99	232.1	5403.421	Industrial	S side bldg 152
N-078	6/24/99	6/25/99	7/1/99	7/8/99	7/9/99	81.235	5171.321	Industrial	S side bldg 152
S-079	6/25/99	6/26/99	7/6/99	7/12/99	7/13/99	232.1	5635.521	Residential	E side bldg 154
M-080	6/30/99	7/1/99	7/8/99	7/14/99	7/15/99	232.1	5867.621	Residential	E side bldg 154
N-081	7/3/99	7/3/99	7/9/99	7/15/99	7/16/99	98.648	5966.269	Residential	E side bldg 154
M-082	7/6/99	7/8/99	7/14/99	7/20/99	7/20/99	232.1	6198.369	Residential	E side bldg 154
N-083	7/9/99	7/9/99	7/15/99	7/21/99		98.648	6297.017	Residential	E side bldg 154
S-084	7/10/99	7/10/99	7/16/99	7/24/99	7/24/99	232.1	6529.117	Residential	E side bldg 154
S-085	7/13/99	7/13/99	7/20/99	7/26/99	7/27/99	232.1	6761.217	Residential	E side bldg 154
M-086	7/15/99	7/15/99	7/21/99	7/27/99	7/27/99	232.1	6993.317	Residential	E side bldg 154
N-087	7/16/99	7/16/99	7/22/99	7/28/99	7/28/99	81.235	7074.552	Residential	E side bldg 154
M-088	7/21/99	7/21/99	7/27/99	8/2/99	8/2/99	232.1	7306.652	Residential	E side bldg 154
N-089	7/22/99	7/22/99	7/28/99	8/3/99	8/3/99	98.648	7405.3	Residential	E side bldg 154
S-090	7/24/99	7/24/99	7/29/99	8/4/99	8/4/99	232.1	7637.4	Residential	E side bldg 154
S-091	7/27/99	7/27/99	8/2/99	8/9/99	8/9/99	232.1	7869.5	Residential	E side bldg 154
M-092	7/28/99	7/28/99	8/3/99	8/9/99	8/9/99	232.1	8101.6	Industrial	Staging area
N-093	7/29/99	7/29/99	8/4/99	8/11/99	8/11/99	81.235	8182.835	Industrial	Staging area
N-094	8/3/99	8/3/99	8/9/99	8/16/99	8/16/99	232.1	8414.935	Residential	E side bldg 154
N-095	8/4/99	8/4/99	8/12/99	8/18/99	8/18/99	81.235	8496.17	Residential	E side bldg 154

**TABLE 2.0 (Continued)  
WINDROW SCHEDULE**

<b>Windrow #</b>	<b>Start Date</b>	<b>Day Zero</b>	<b>Day Last</b>	<b>Lab Results Received</b>	<b>Complete Unload</b>	<b>Tons Processed</b>	<b>Soil Processed, Cumulative</b>	<b>Processed to Residential or Industrial</b>	<b>Compost Disposal Location</b>
S-096	8/5/99	8/5/99	8/11/99	8/17/99	8/17/99	232.1	8728.27	Residential	E side bldg 154
S-097	8/9/99	8/9/99	8/16/99	8/23/99	8/23/99	232.1	8960.37	Residential	E side bldg 154
M-098	8/10/99	8/10/99	8/17/99	8/25/99	8/25/99	232.1	9192.47	Industrial	Staging area
N-099	8/11/99	8/11/99	8/20/99	8/27/99	8/27/99	98.648	9291.118	Residential	E side bldg 154
M-100	8/16/99	8/16/99	8/23/99	8/29/99	8/29/99	232.1	9523.218	Residential	E side bldg 154

**TABLE 3.0  
EXPLOSIVE COMPOUNDS ANALYTICAL DATA**

	Windrow No. 47		Windrow No. 48		Windrow No. 49		Windrow No. 50	
	Day 0	Day 13	Day 0	Day 17	Day 0	Day 10	Day 0	Day 9
HMX	8.28	2.13	14.1	2.37	9.51	2.1	15.7	2.6
RDX	49.6	1.46	88.2	2.15	50.9	1.4	97.7	2.8
TNT	2.74	0.27	6.32	0.28	3.65	0.32	6.47	0.25

	Windrow No. 51		Windrow No. 52		Windrow No. 53		Windrow No. 54	
	Day 0	Day 14	Day 0	Day 11	Day 0	Day 11	Day 0	Day 12
HMX	19	2.2	20	3	8	3	24	2.1
RDX	142	1.2	111	2	60	7.7	172	1.1
TNT	8	0.25	1.4	0.3	20	5.8	8	0.2

	Windrow No.55		Windrow No.56		Windrow No.57		Windrow No.58	
	Day 0	Day 9	Day 0	Day 7	Day 0	Day 9	Day 0	Day 9
HMX	11	2.1	7	2	11	2.2	9	2.1
RDX	76	1.4	45	2.6	58	1.9	57	1
TNT	9	0.3	5	6.9	16	4.3	8	0.3

	Windrow No.59		Windrow No.60		Windrow No.61		Windrow No.62	
	Day 0	Day 8	Day 0	Day 8	Day 0	Day 8	Day 0	Day 6
HMX	5	2	4.1	2.1	5	2.1	5	2.2
RDX	49	2.8	44	4.9	48	3.5	43	6.5
TNT	18	0.4	27	0.4	15	4.2	24	0.8

	Windrow No.63		Windrow No.64		Windrow No.65		Windrow No.66	
	Day 0	Day 8	Day 0	Day 8	Day 0	Day 8	Day 0	Day 11
HMX	3	2.2	4	2.6	4	2.1	3	2
RDX	23	3.4	40	12.1	35	4.9	29	1.9
TNT	63	1.6	14	1.7	7	1.2	11	0.3

	Windrow No.67		Windrow No.68		Windrow No.69		Windrow No.70	
	Day 0	Day 7	Day 0	Day 10	Day 0	Day 7	Day 0	Day 7
HMX	4	2.1	6	2.2	4	2.2	4	2.2
RDX	32	4.2	48	2.9	18	6.9	34	3.2
TNT	8	1.4	9	3.8	7	2	5	0.4

	Windrow No.71		Windrow No.72		Windrow No.73		Windrow No.74	
	Day 0	Day 9	Day 0	Day 8	Day 0	Day 6	Day 0	Day 8
HMX	17	2.2		2.2		2.3		2.1
RDX	102	0.9		1.8		2.9		1.4
TNT	48	22.5		0.3		5.9		0.4

**TABLE 3.0 (Continued)  
EXPLOSIVE COMPOUNDS ANALYTICAL DATA**

	Windrow No.75		Windrow No.76		Windrow No.77		Windrow No.78	
	Day 0	Day 6	Day 0	Day 7	Day 0	Day 8	Day 0	Day 6
HMX		1.9		2		3.7		3.6
RDX		2.7		4		7.9		7.4
TNT		0.2		0.3		0.5		0.8

	Windrow No.79		Windrow No.80		Windrow No.81		Windrow No.82	
	Day 0	Day 10	Day 0	Day 7	Day 0	Day 6	Day 0	Day 6
HMX		2.4		2.2		2.1		2.6
RDX		3.9		3.2		1.7		1.7
TNT		0.2		0.5		0.2		0.2

	Windrow No.83		Windrow No.84		Windrow No.85		Windrow No.86	
	Day 0	Day 6	Day 0	Day 6	Day 0	Day 7	Day 0	Day 6
HMX		2		2.7		2.4		2.1
RDX		2.2		1.8		2.8		1.6
TNT		0.7		0.2		0.4		0.2

	Windrow No.87		Windrow No.88		Windrow No.89		Windrow No.90	
	Day 0	Day 6						
HMX		2.4	4.2	2.6	18	2.2		2.4
RDX		2.2	18.5	1.9	66	1.4		3.2
TNT		0.4	0.6	0.3	2	0.7		0.3

	Windrow No.91		Windrow No.92		Windrow No.93		Windrow No.94	
	Day 0	Day 6						
HMX		2.2		2.4	4	3.3		2.8
RDX		1.1		4.3	16	5.2		2.1
TNT		0.3		0.3	0.6	0.5		0.2

	Windrow No.95		Windrow No.96		Windrow No.97		Windrow No.98	
	Day 0	Day 8	Day 0	Day 6	Day 0	Day 7	Day 0	Day 7
HMX		2.1		2.5		0.8	7	2.2
RDX		1.2		1.4		2.4	26	4.9
TNT		0.2		0.3		1.7	29	0.3

	Windrow No.99		Windrow No.100	
	Day 0	Day 9	Day 0	Day 7
HMX	8	1.4	9	1.6
RDX	23	0.7	31	1.9
TNT	1.3	1	9	0.2

**NOTES:** All results in ppm

**TABLE 4.0**  
**AVERAGE EXPLOSIVE COMPOUNDS LEVELS**

	<b>Day 0</b>	<b>Day Last</b>
<b>HMX</b>	8	2.3
<b>RDX</b>	41	3.0
<b>TNT</b>	9	1.4

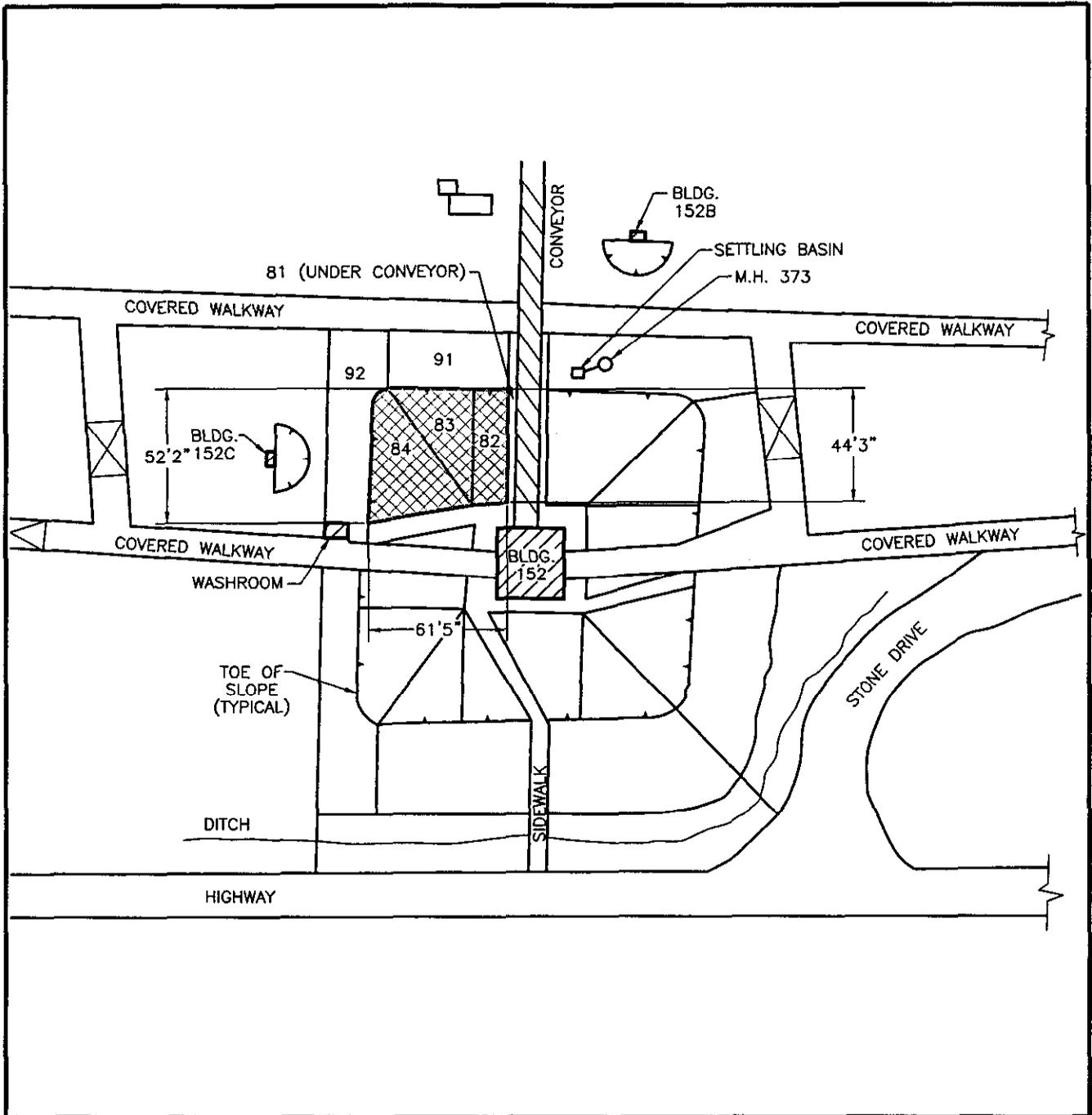
(All results in ppm)

**TABLE 5.0**  
**EXPLOSIVE COMPOUNDS CLEAN-UP LEVELS**

	<b>Clean-Up Goals (ppm)</b>	
	<b>Residential</b>	<b>Industrial</b>
<b>HMX</b>	3,300	34,000
<b>RDX</b>	4	17
<b>TNT</b>	15	64

**FIGURES**  
**WINDROW PLACEMENT SITE MAPS**  
**MINE FILL A**

SOUTHEAST CORNER OF BUILDING 152



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
GRIDS: #82, 83, 84  
WINDROWS: #64, 78, 77, 50, 51, 63  
NAVAL SURFACE WARFARE CENTER  
BUILDING 152 (SE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

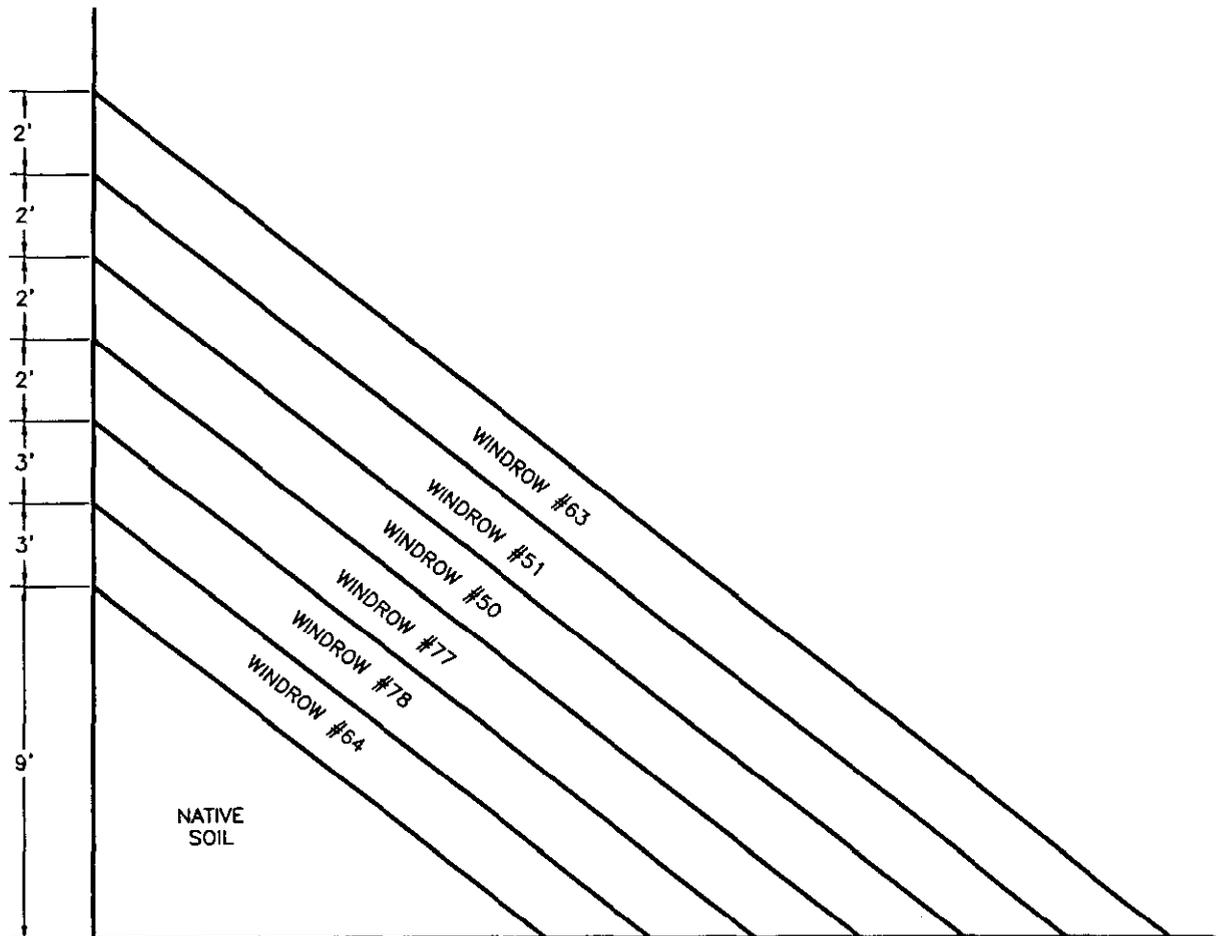
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SHEET NUMBER

1 of 4



SOUTHEAST CORNER OF BUILDING 152



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE

**SIDE VIEW**

BACKFILL OPERATIONS  
GRIDS: #82, 83, 84  
WINDROWS: #64, 78, 77, 50, 51, 63  
NAVAL SURFACE WARFARE CENTER  
BUILDING 152 (SE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND  
NSWC CRANE, IN**

DRAWN MRC\11-8-99 CHECKED

REVISED APPROVED

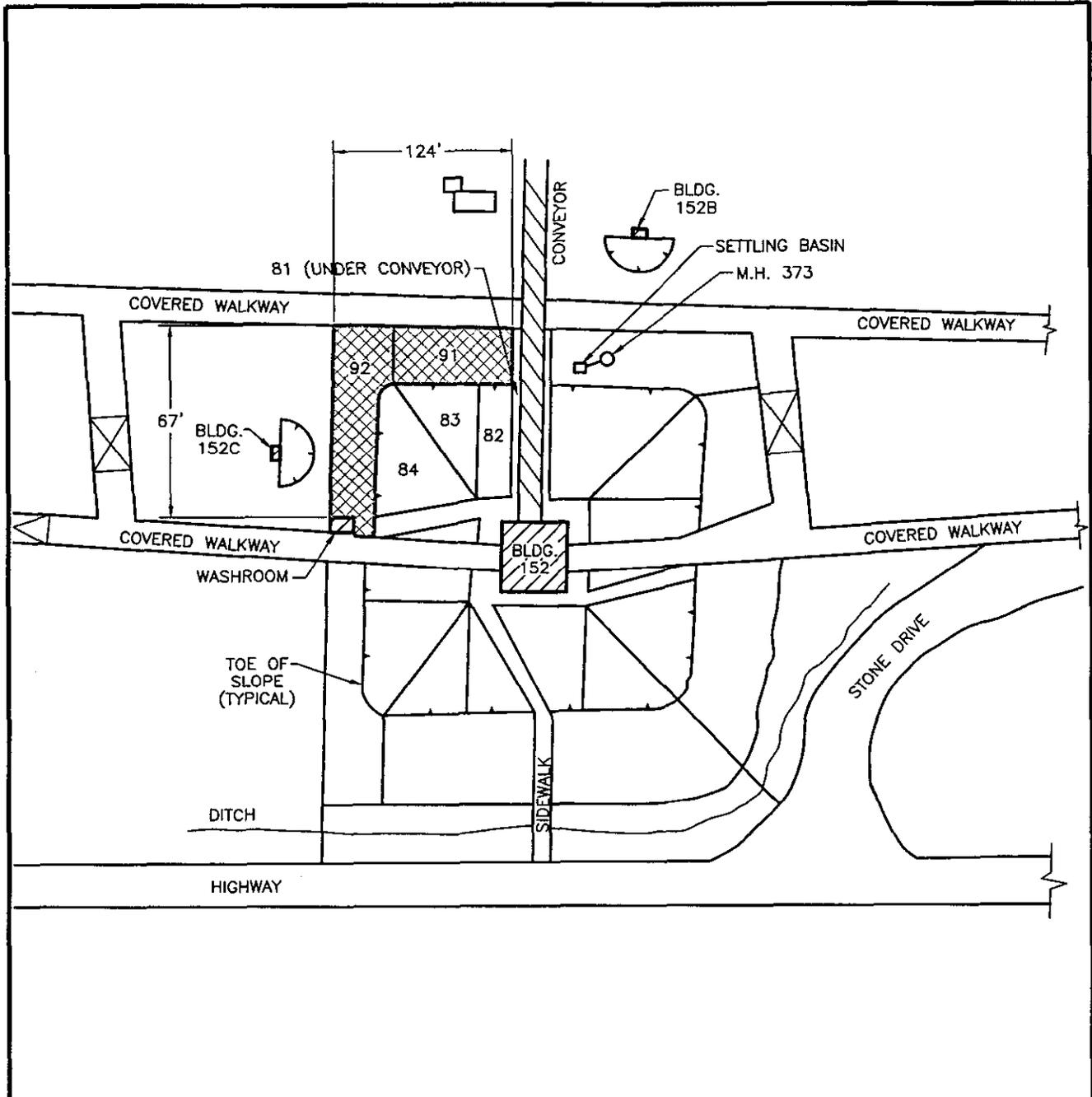
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2 of 4

**TOLLEST, INC.**

SOUTHEAST CORNER OF BUILDING 152



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
GRIDS: #91, 92  
WINDROW: #63  
NAVAL SURFACE WARFARE CENTER  
BUILDING 152 (SE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

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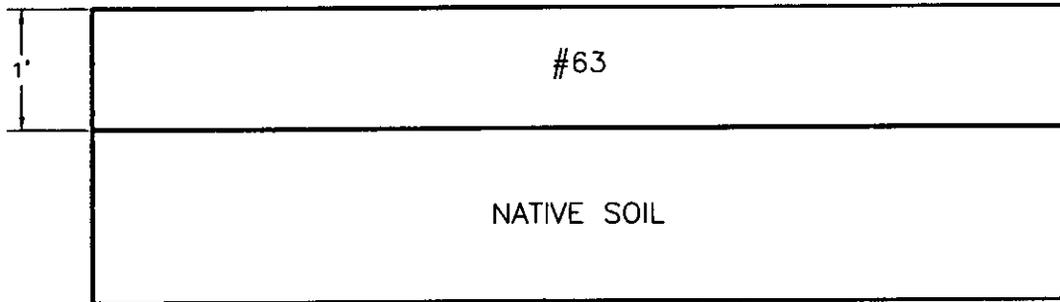
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SHEET NUMBER

3 of 4

**TOLLEST, INC.**

SOUTHEAST CORNER OF BUILDING 152



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE

**SIDE VIEW**  
BACKFILL OPERATIONS  
GRIDS: #91, 92  
WINDROW: #63  
NAVAL SURFACE WARFARE CENTER  
BUILDING 152 (SE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99 CHECKED

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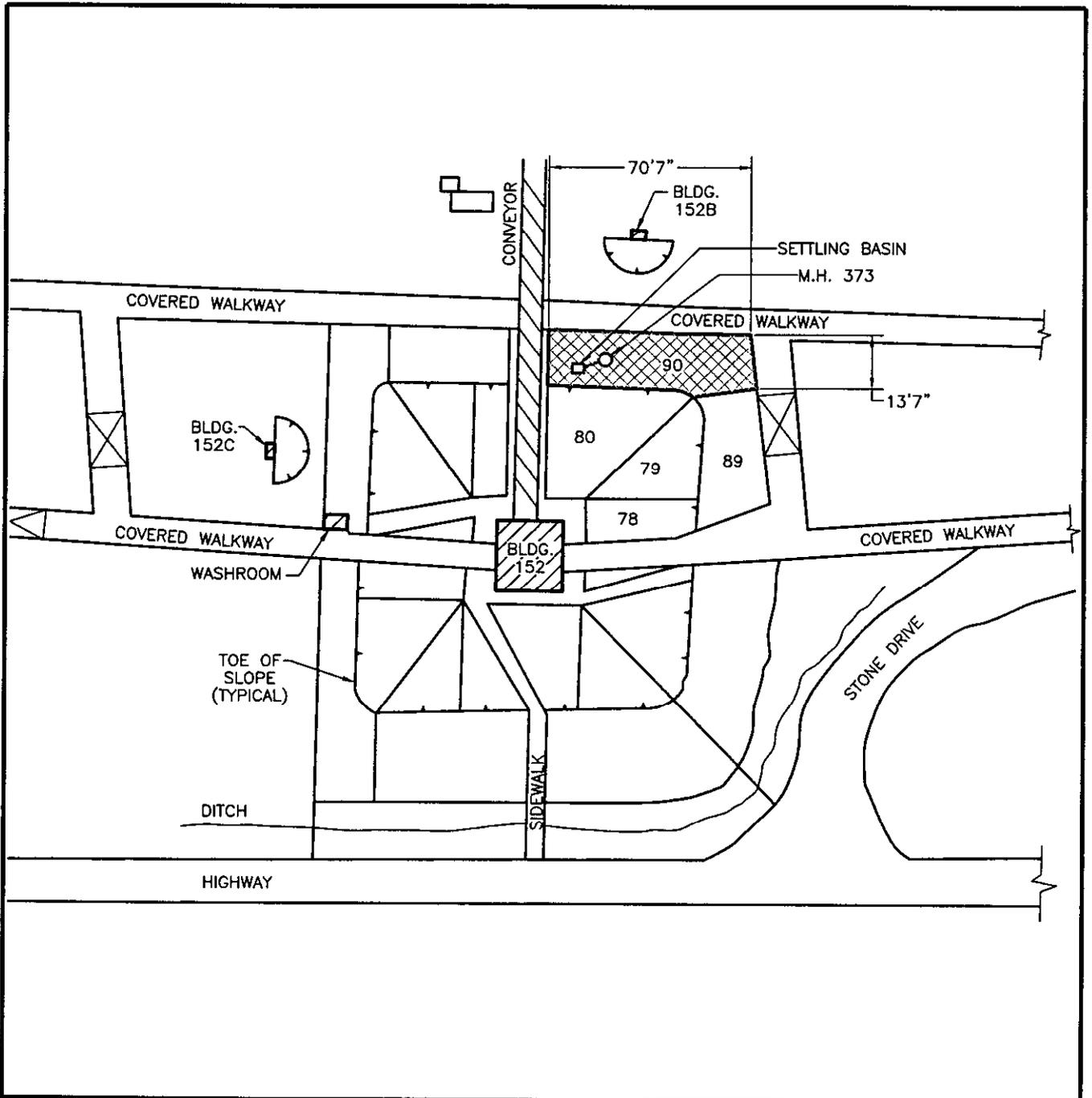
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4 of 4

**TOLLEST, INC.**

SOUTHWEST CORNER OF BUILDING 152



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
GRID: #90  
WINDROW: #49  
NAVAL SURFACE WARFARE CENTER  
BUILDING 152 (SW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

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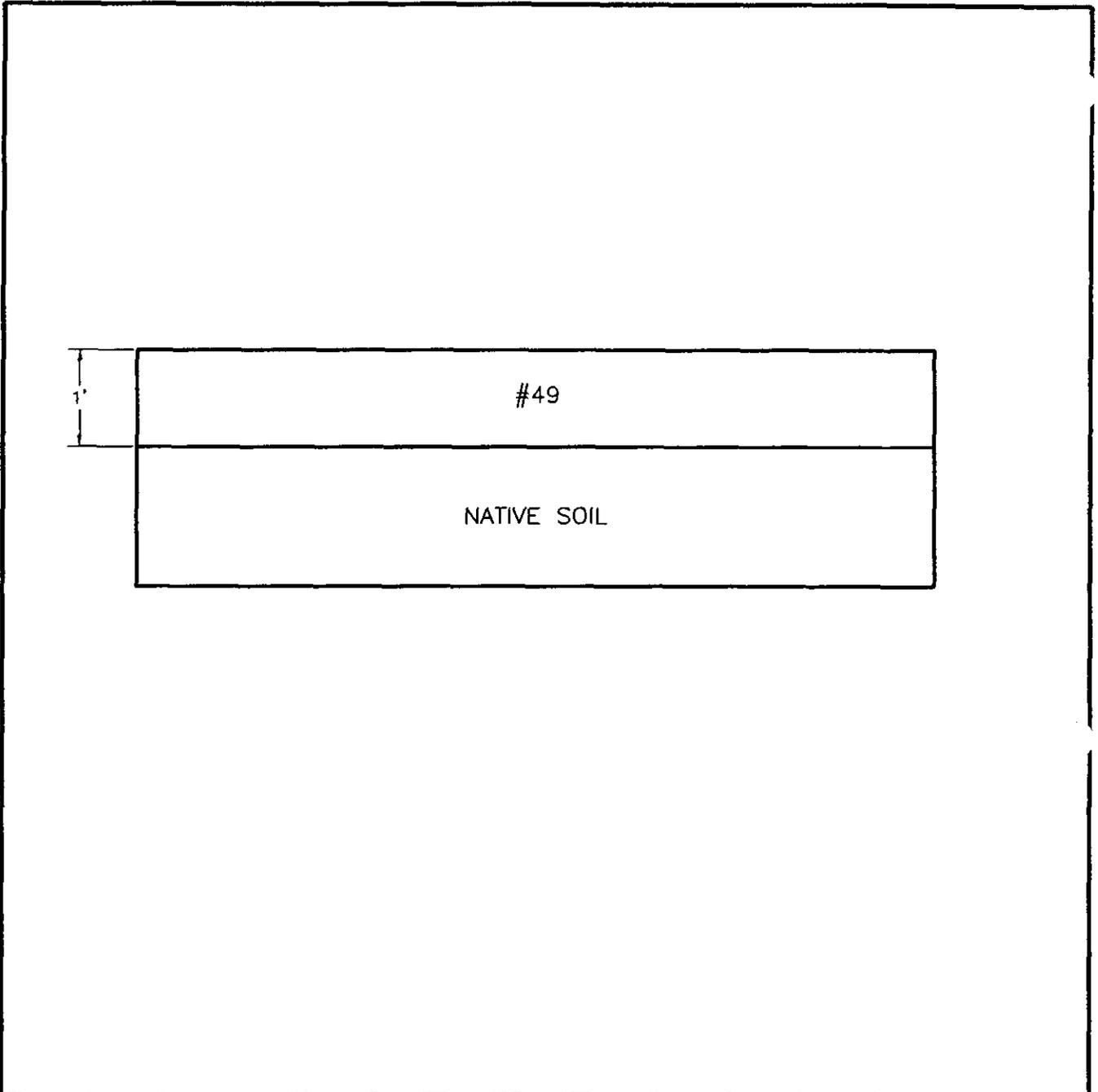
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SHEET NUMBER

1 of 4



SOUTHWEST CORNER OF BUILDING 152



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE

**SIDE VIEW**  
BACKFILL OPERATIONS  
GRID: #90  
WINDROW: #49  
NAVAL SURFACE WARFARE CENTER  
BUILDING 152 (SW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
NAVAL FACILITIES ENGINEERING COMMAND  
NSWC CRANE, IN

DRAWN MRC\11-8-99      CHECKED

REVISED      APPROVED

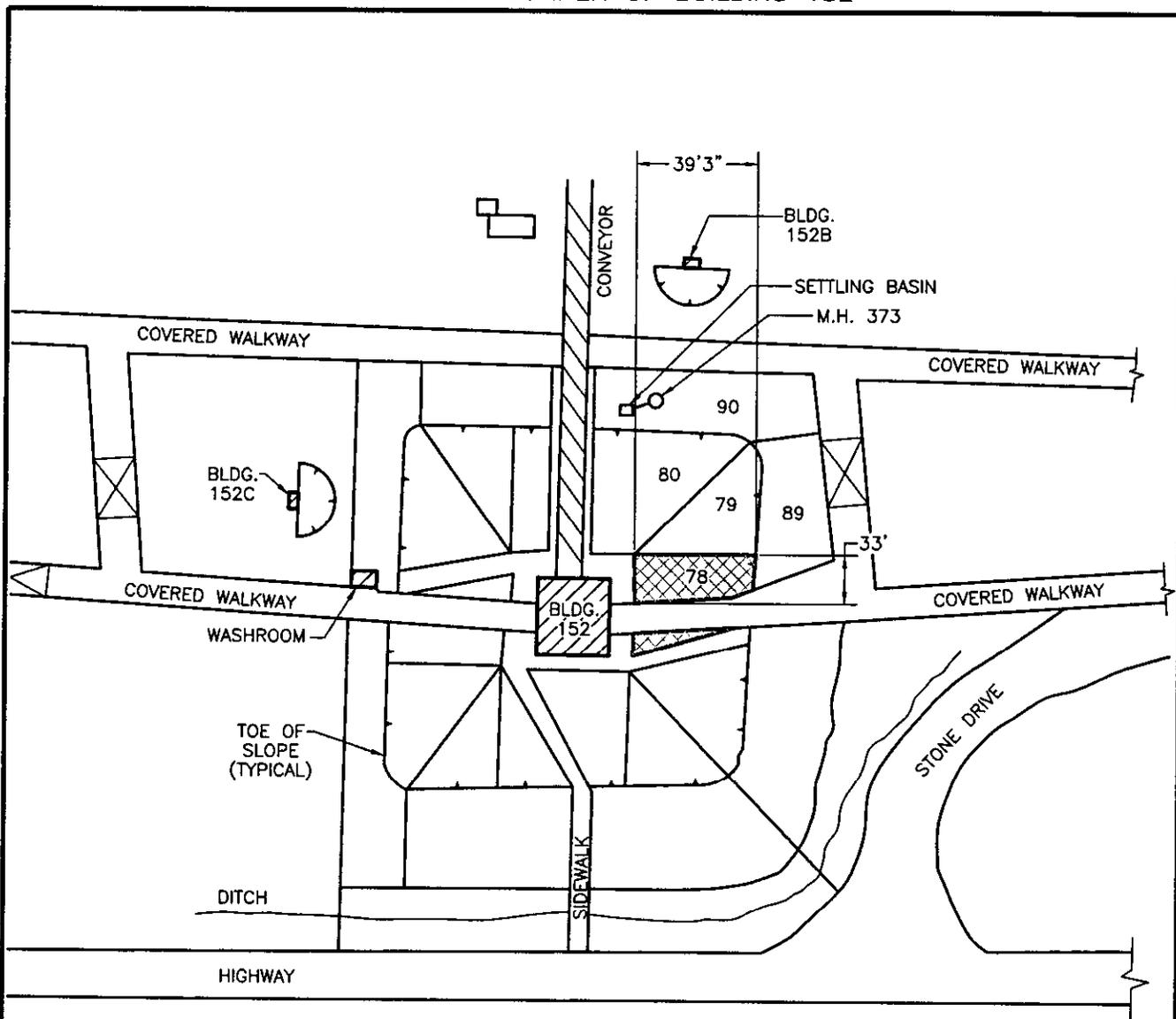
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SHEET NUMBER

2 of 4

**TOWEST, INC.**

SOUTHWEST CORNER OF BUILDING 152



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
GRID: #78  
WINDROWS: #77, 78, 50, 51, 63, 76  
NAVAL SURFACE WARFARE CENTER  
BUILDING 152 (SW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

CHECKED

REVISED

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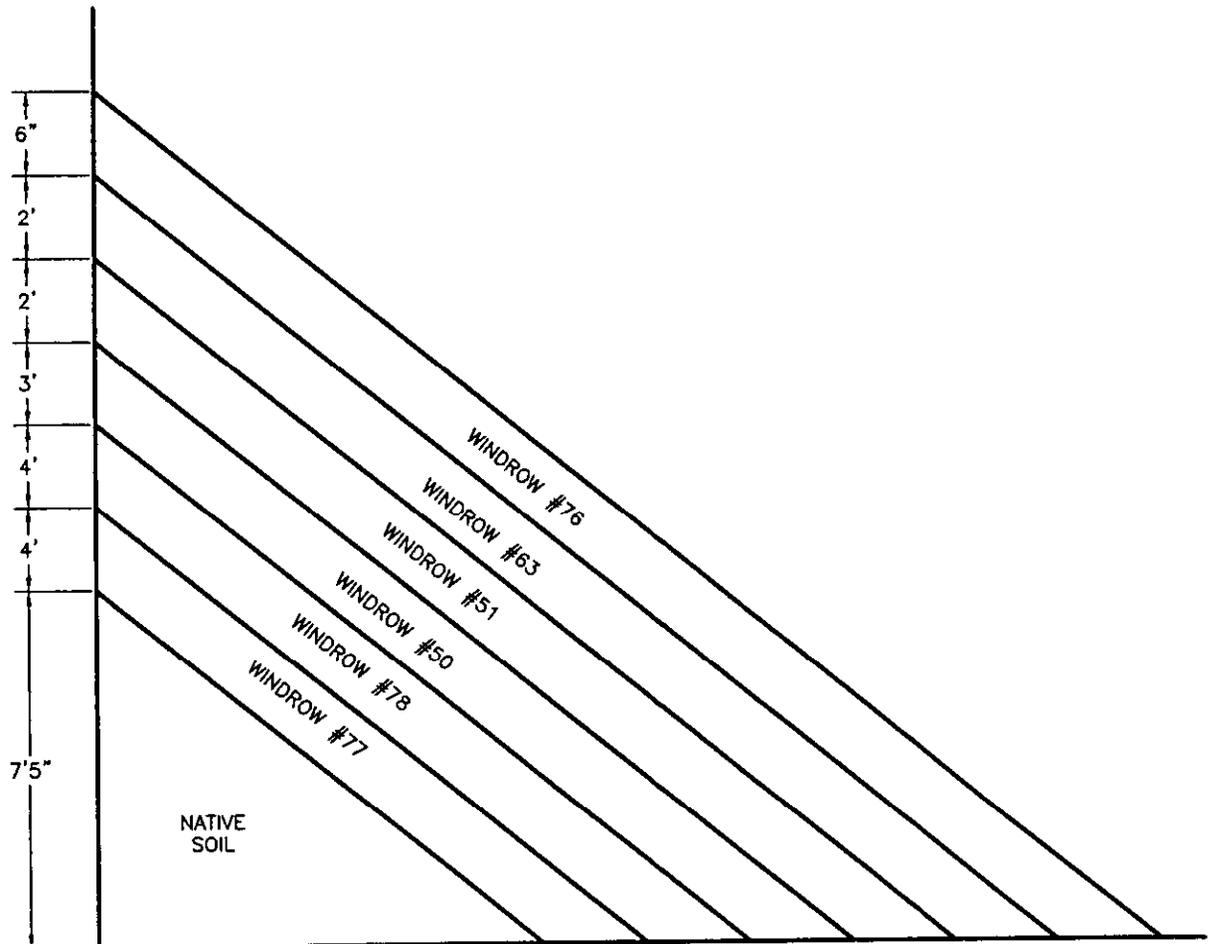
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SHEET NUMBER

3 of 4

**TOWEST, INC.**

SOUTHWEST CORNER OF BUILDING 152



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE

**SIDE VIEW**

BACKFILL OPERATIONS  
GRID: #78  
WINDROWS: #77, 78, 50, 51, 76, 63  
NAVAL SURFACE WARFARE CENTER  
BUILDING 152 (SW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

CHECKED

REVISED

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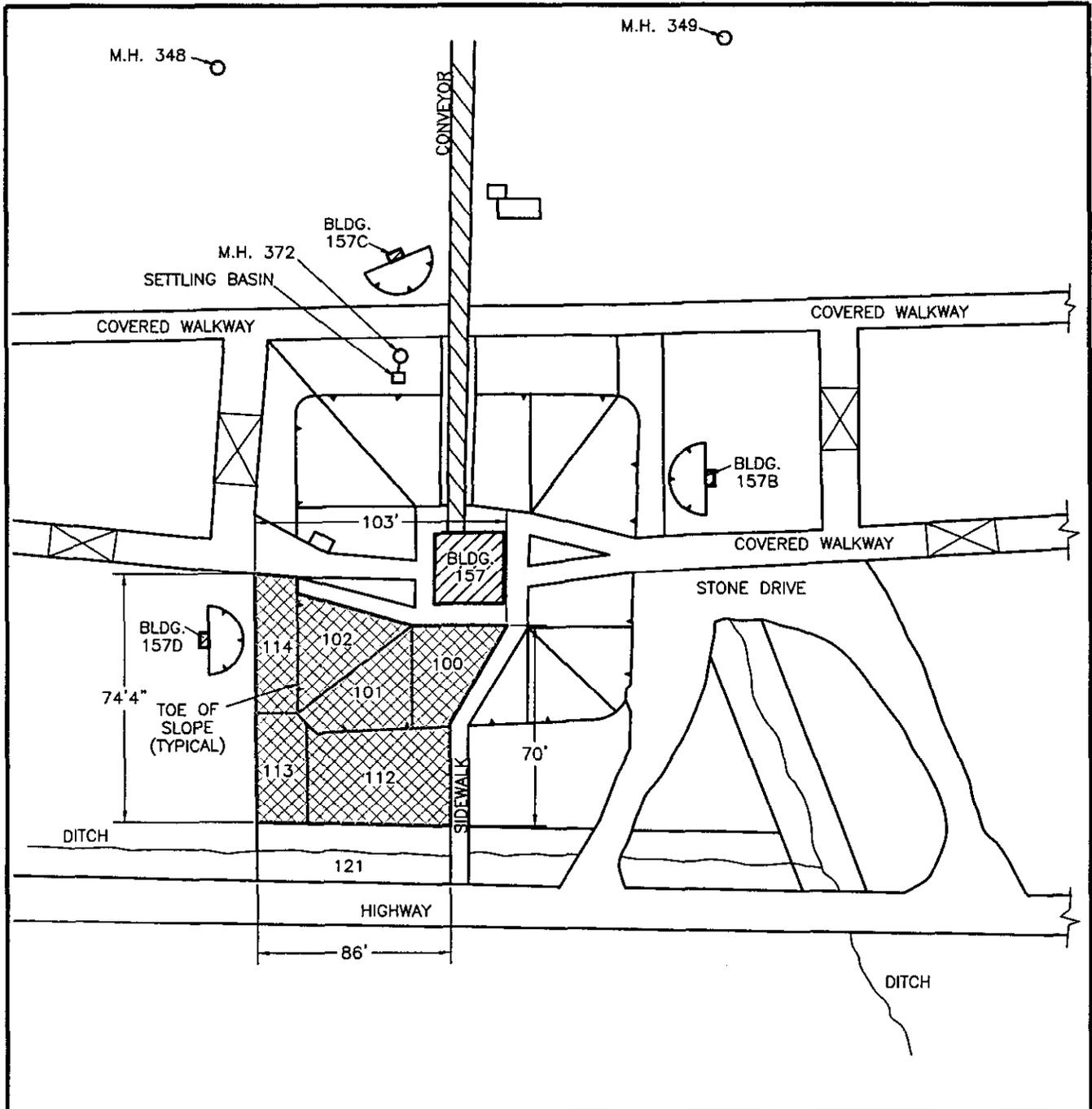
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SHEET NUMBER

4 of 4

***TOLLEST, INC.***

NORTHEAST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
GRIDS: #100, 101, 102, 112, 113, 114  
WINDROWS: #48, 47, 69, 71, 49, 50  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (NE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

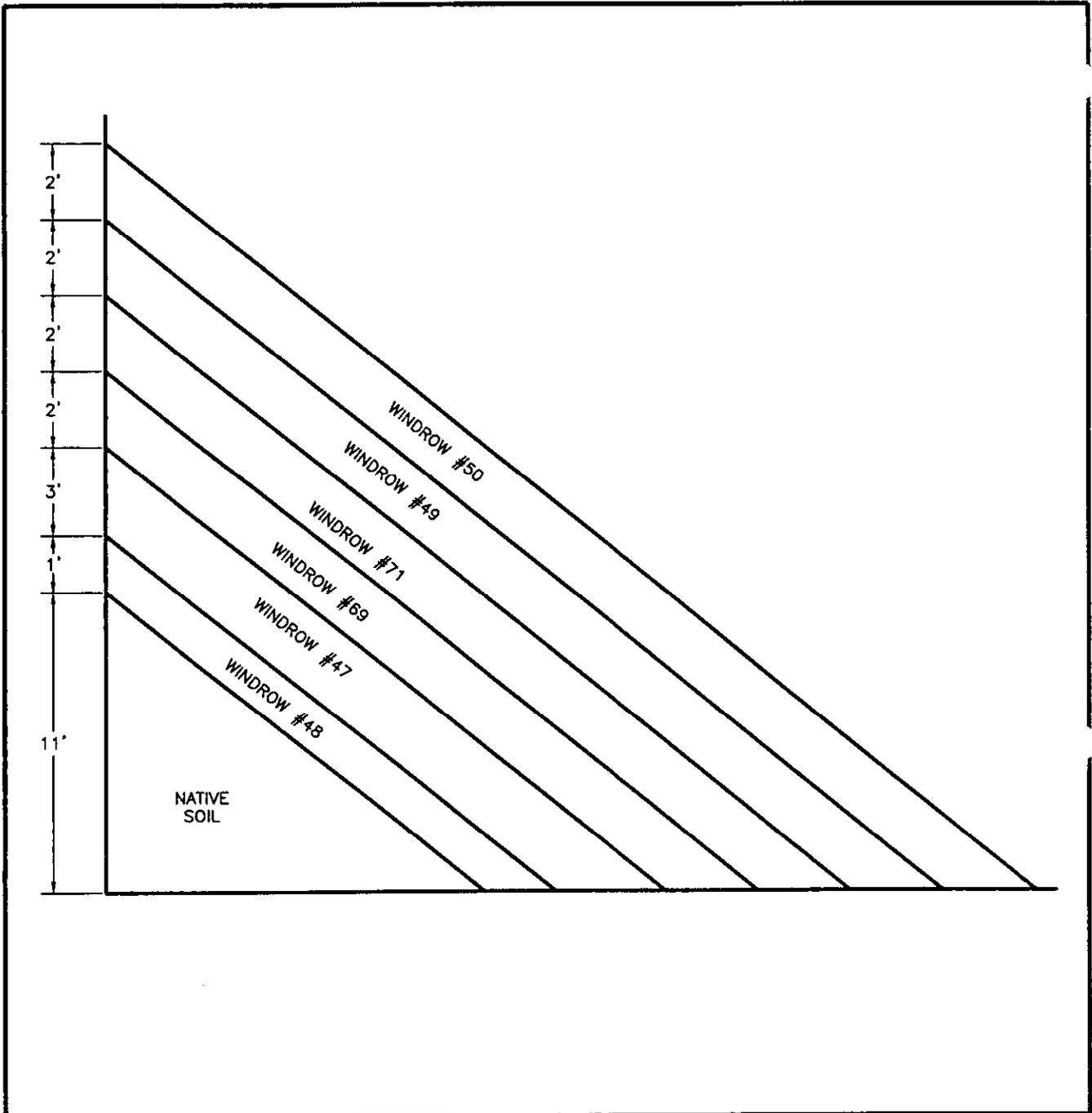
JOB NO.: 37324.01

SHEET NUMBER

1 of 2



NORTHEAST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**SIDE VIEW**

BACKFILL OPERATIONS  
GRIDS: #100, 101, 102, 112, 113, 114  
WINDROWS: #48, 47, 69, 71, 49, 50  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (NE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

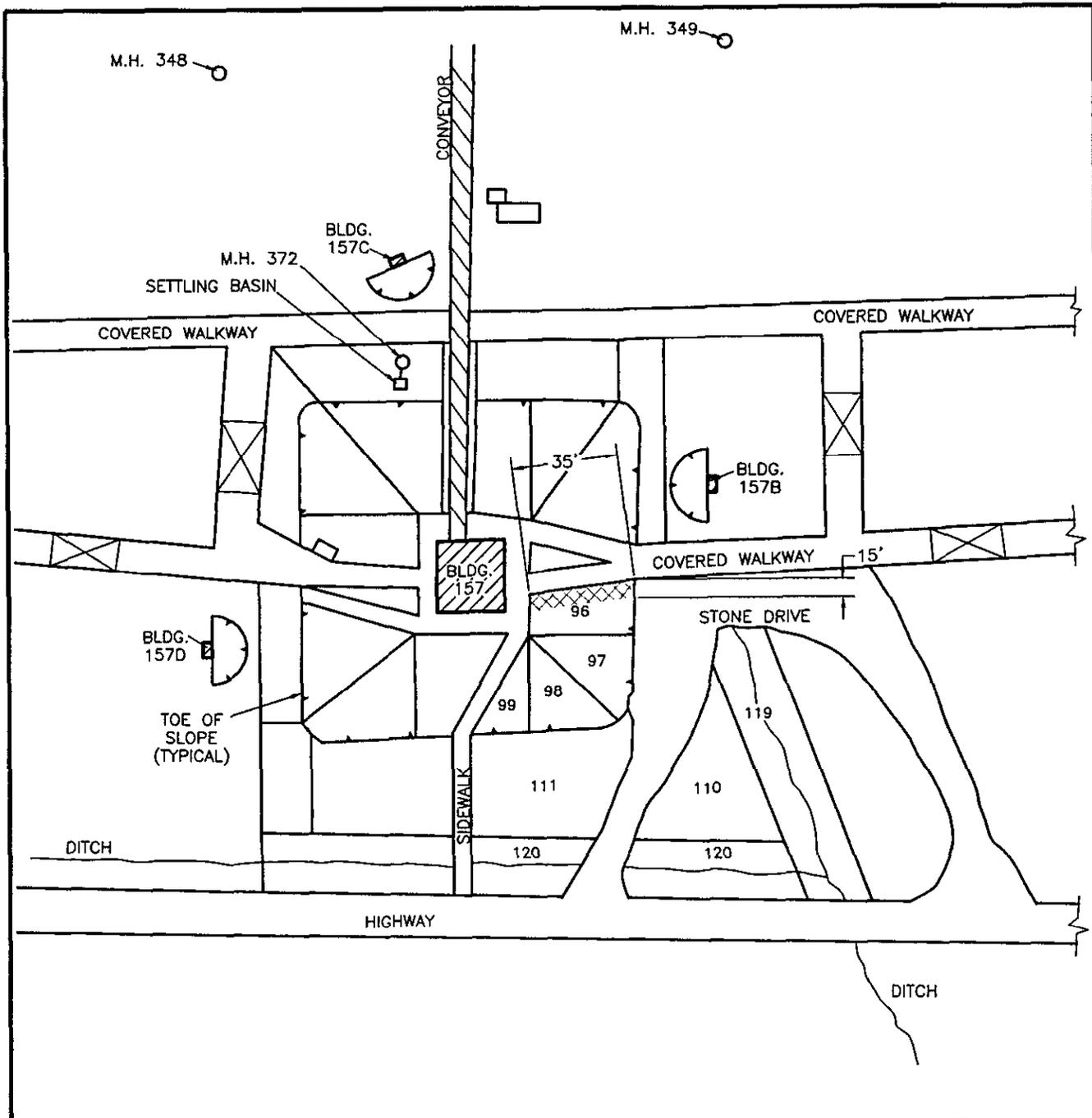
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SHEET NUMBER

2 of 2

**TOLLEST, INC.**

NORTHWEST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



WINDROW LOCATION MAP

BACKFILL OPERATIONS  
DECON ROCKS, 5.37 TONS  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (NW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
NAVAL FACILITIES ENGINEERING COMMAND  
NSWC CRANE, IN

DRAWN MRC\11-8-99 CHECKED

REVISED APPROVED

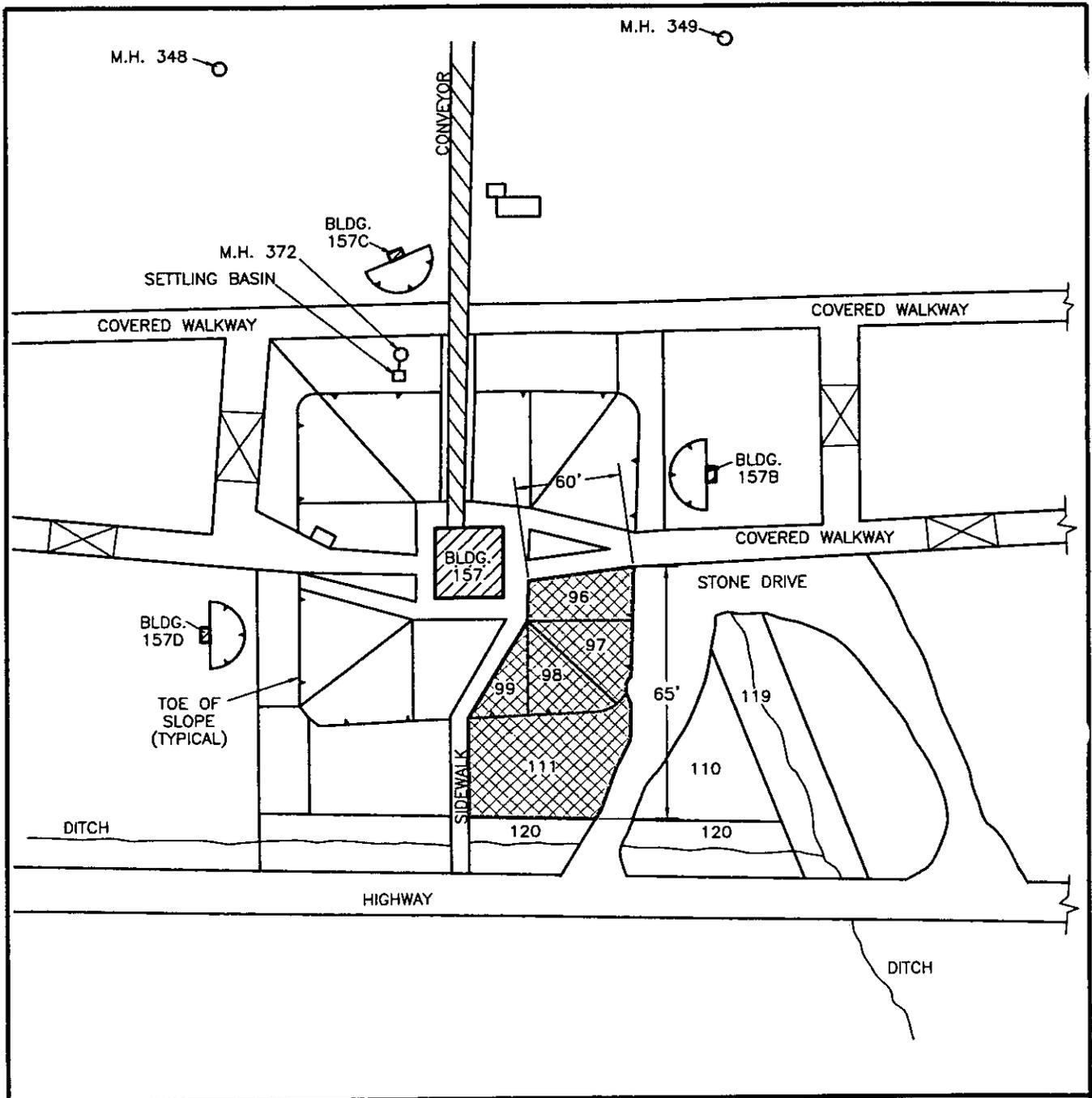
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SHEET NUMBER

1 of 4



NORTHWEST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
GRIDS: #96, 97, 98, 99, 111  
WINDROWS: #65, 62, 67  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (NW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

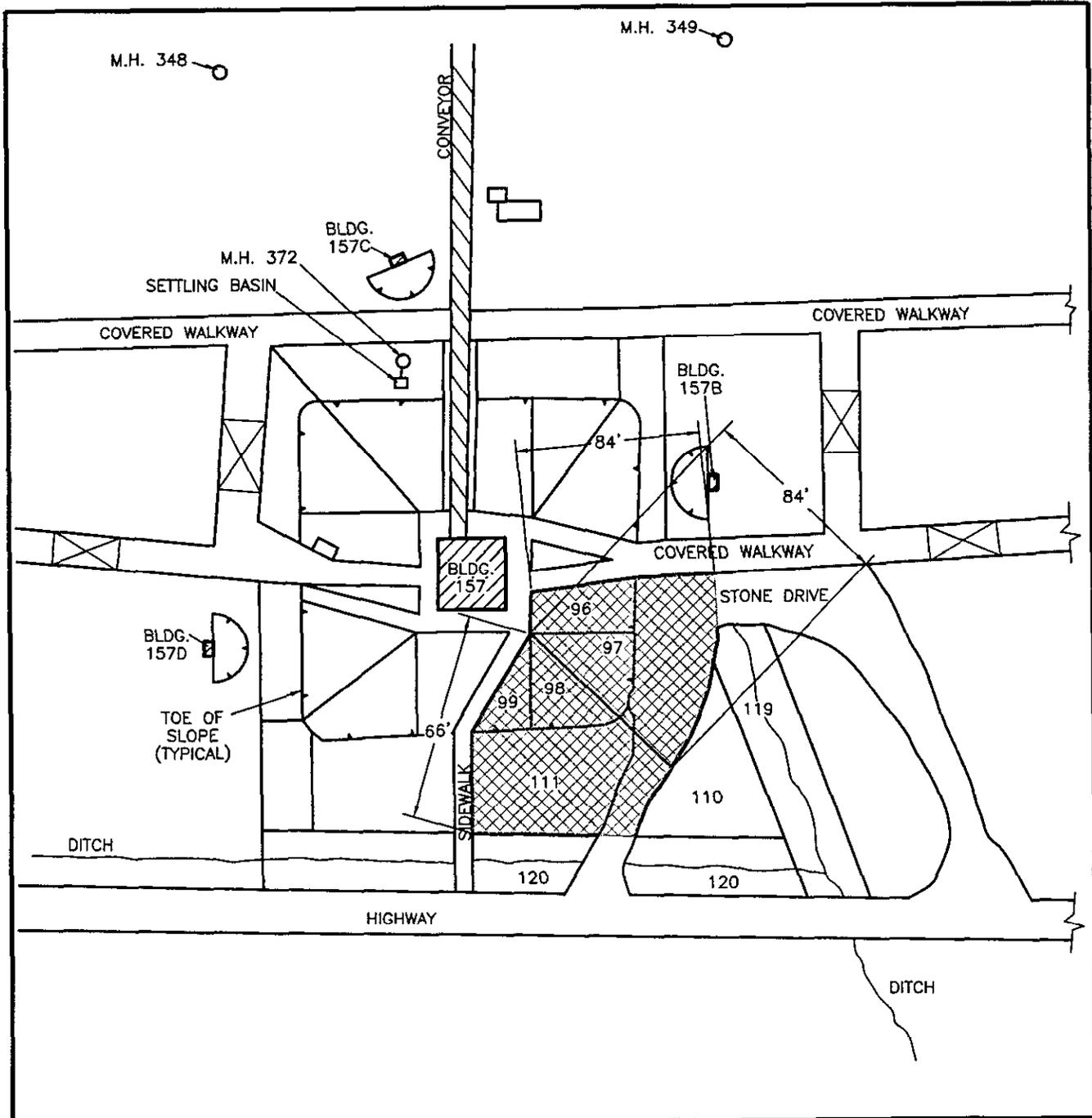
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SHEET NUMBER

2 of 4



NORTHWEST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
GRIDS: #96, 97, 98, 99, 111  
WINDROW: #48  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (NW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
NSWC CRANE, IN

DRAWN MRC\11-8-99 CHECKED

REVISED APPROVED

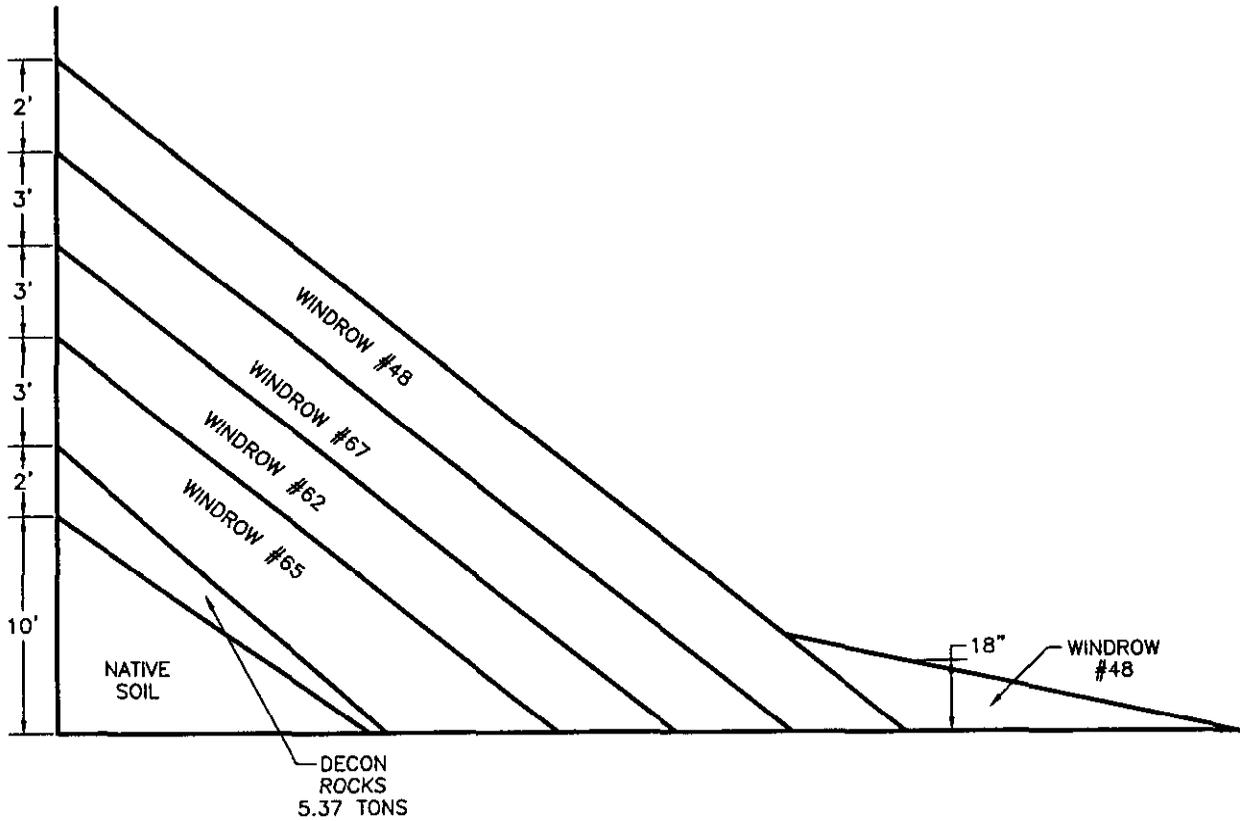
JOB NO.: 37324.01

SHEET NUMBER

3 of 4

**TOWEST, INC.**

NORTHWEST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE

**SIDE VIEW**  
BACKFILL OPERATIONS  
GRIDS: #96, 97, 98, 99, 111  
WINDROWS: #65, 62, 67, 1/2 #48  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (NW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
NAVAL FACILITIES ENGINEERING COMMAND  
NSWC CRANE, IN

DRAWN MRC\11-8-99 CHECKED

REVISED APPROVED

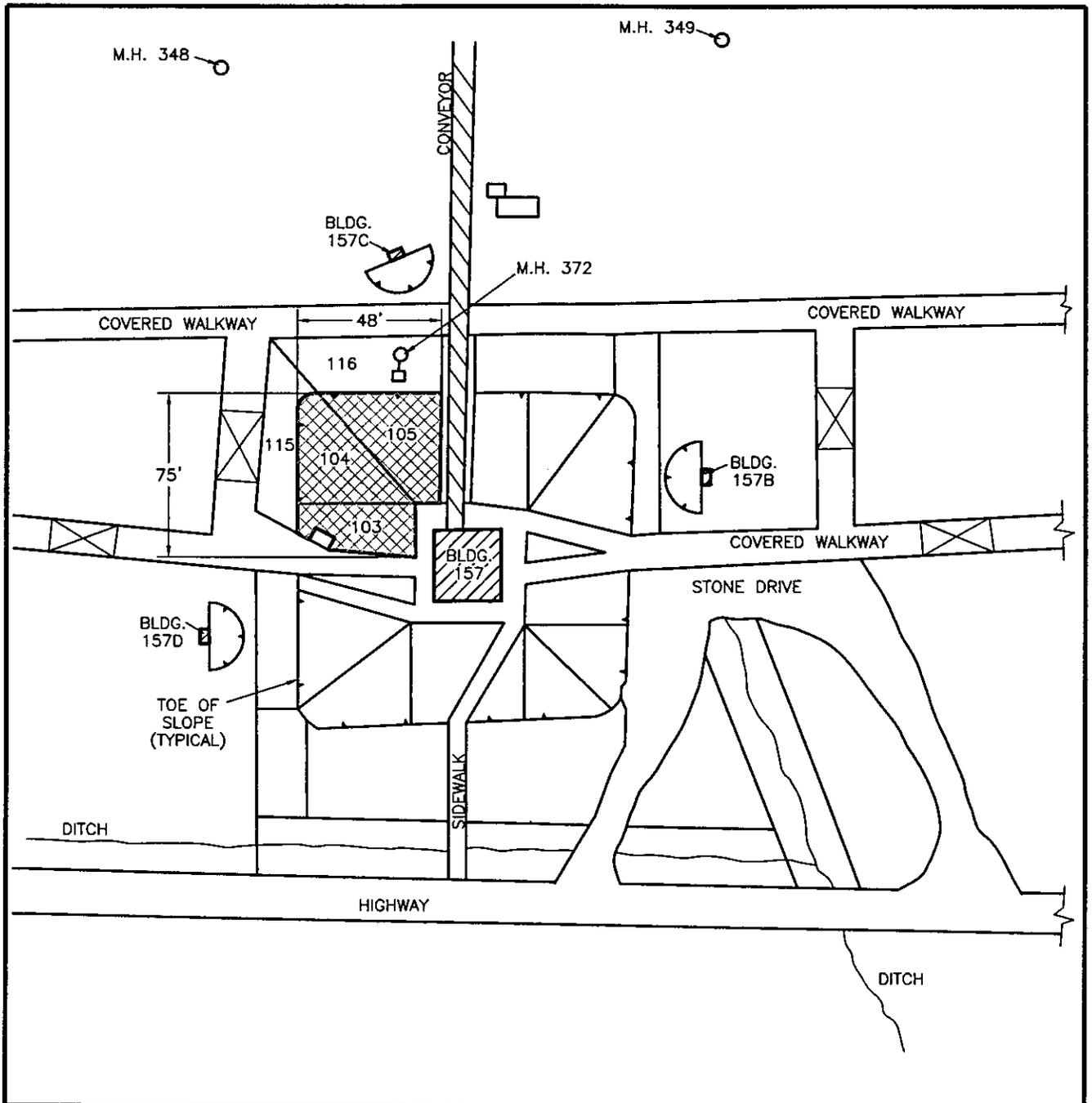
JOB NO.: 37324.01

SHEET NUMBER

4 of 4

**TOLUESI, INC.**

SOUTHEAST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
GRIDS: #103, 104, 105, 115, 116  
WINDROWS: #53, 5  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (SE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

JOB NO.: 37324.01

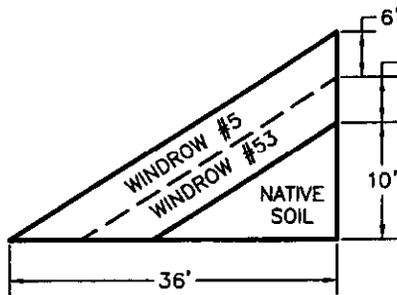
SHEET NUMBER

1 of 4

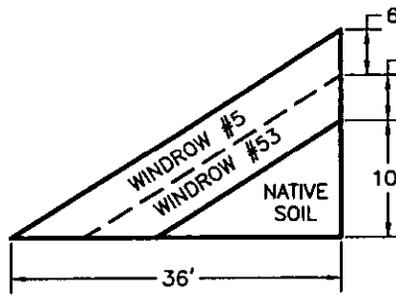


SOUTHEAST CORNER OF BUILDING 157

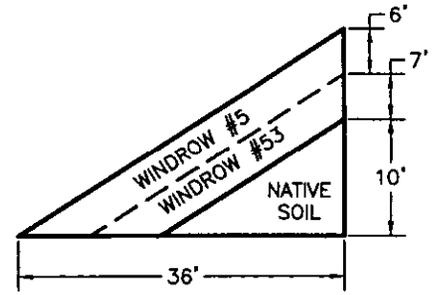
GRID #103  
SLOPE 1.56':1'



GRID #104  
SLOPE 1.56':1'



GRID #105  
SLOPE 1.56':1'



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**SIDE VIEW**

BACKFILL OPERATIONS  
GRIDS: #103, 104, 105, 115, 116  
WINDROWS: #53, 5  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (SE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
NAVAL FACILITIES ENGINEERING COMMAND  
NSWC CRANE, IN

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

JOB NO.: 37324.01

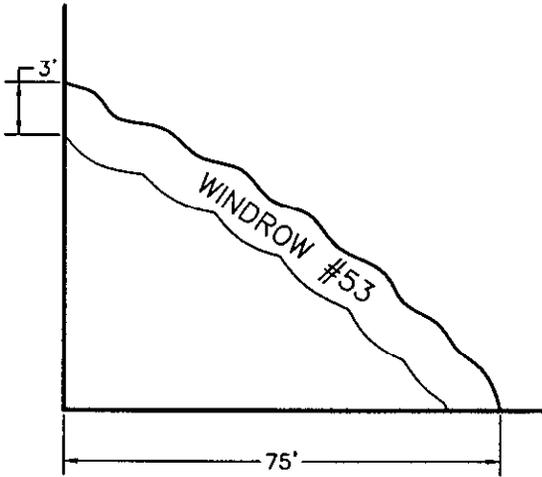
SHEET NUMBER

2 of 4

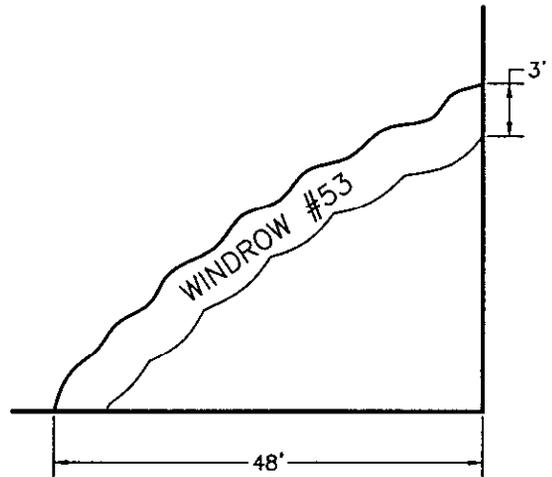
***TOULIST, INC.***

SOUTHEAST CORNER OF BUILDING 157

GRID #105



GRID #104



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**SIDE VIEW**

BACKFILL OPERATIONS  
GRIDS: #104, 105  
WINDROW: #53  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (SE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
NAVAL FACILITIES ENGINEERING COMMAND  
NSWC CRANE, IN

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

JOB NO.: 37324.01

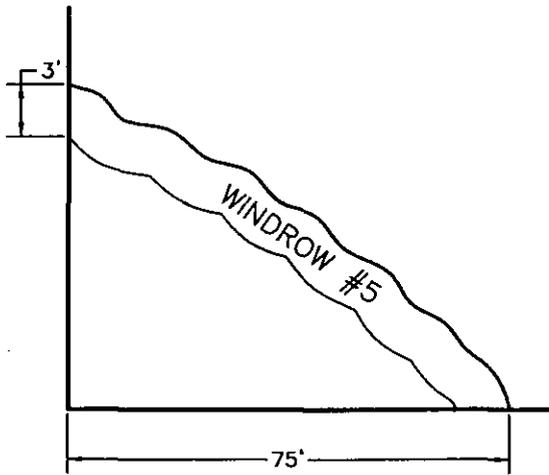
SHEET NUMBER

3 of 4

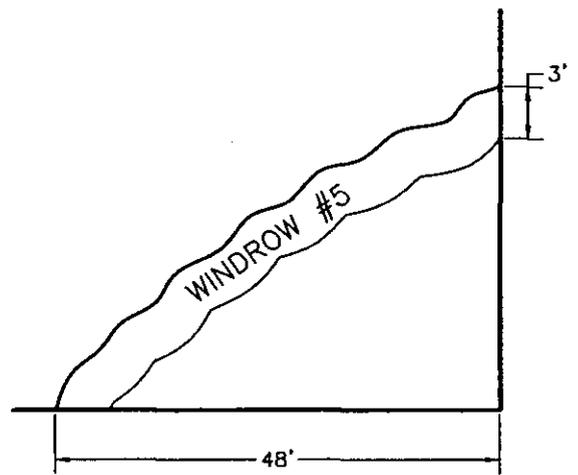
**TOLUESI, INC.**

SOUTHEAST CORNER OF BUILDING 157

GRID #105



GRID #104



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



SIDE VIEW

BACKFILL OPERATIONS  
GRIDS: #104, 105  
WINDROW: #5  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (SE SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
NAVAL FACILITIES ENGINEERING COMMAND  
NSWC CRANE, IN

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

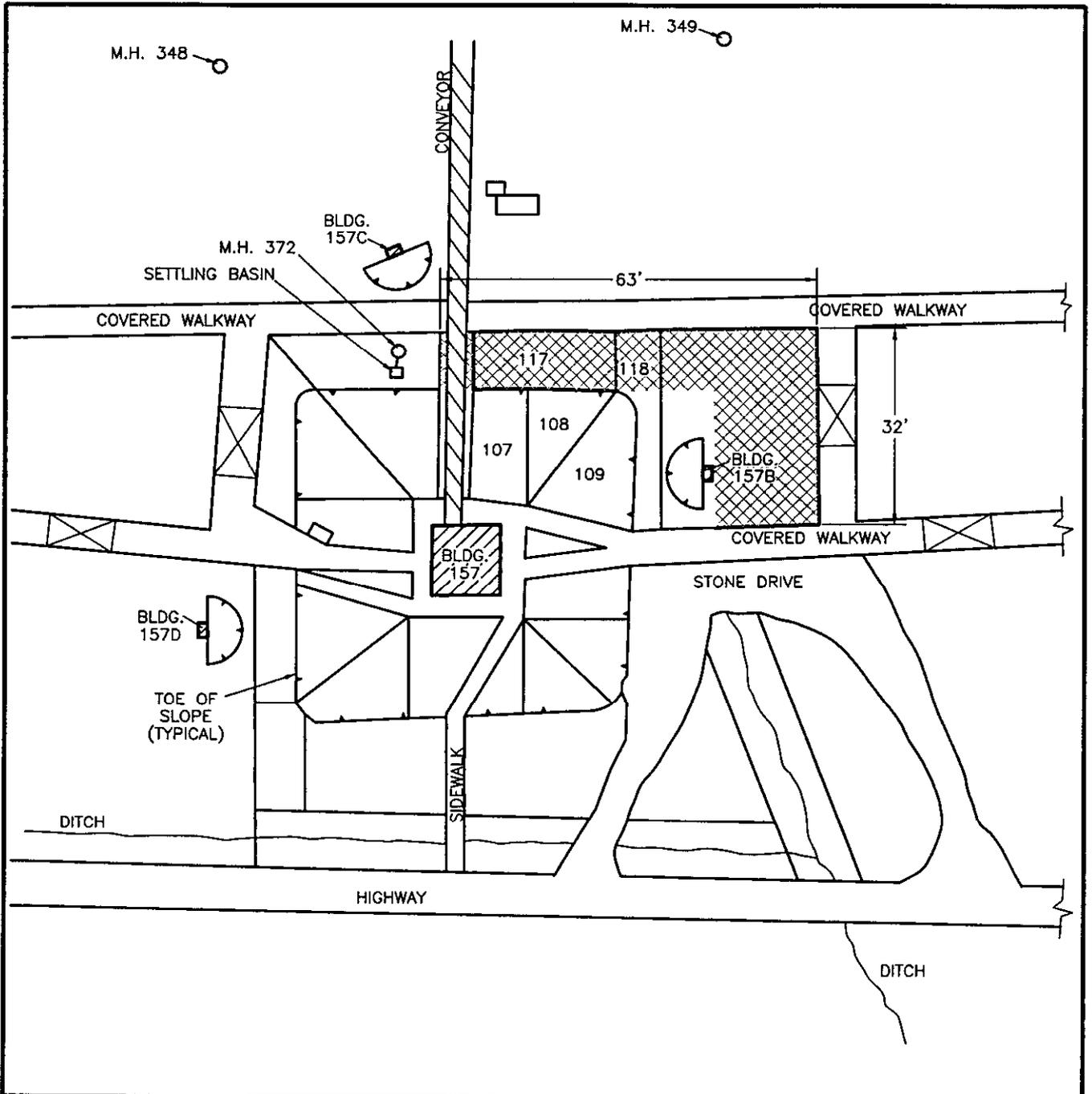
JOB NO.: 37324.01

SHEET NUMBER

4 of 4



SOUTHWEST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
GRIDS: #117, 118, 116  
WINDROW: #49  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (SW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

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REVISED

APPROVED

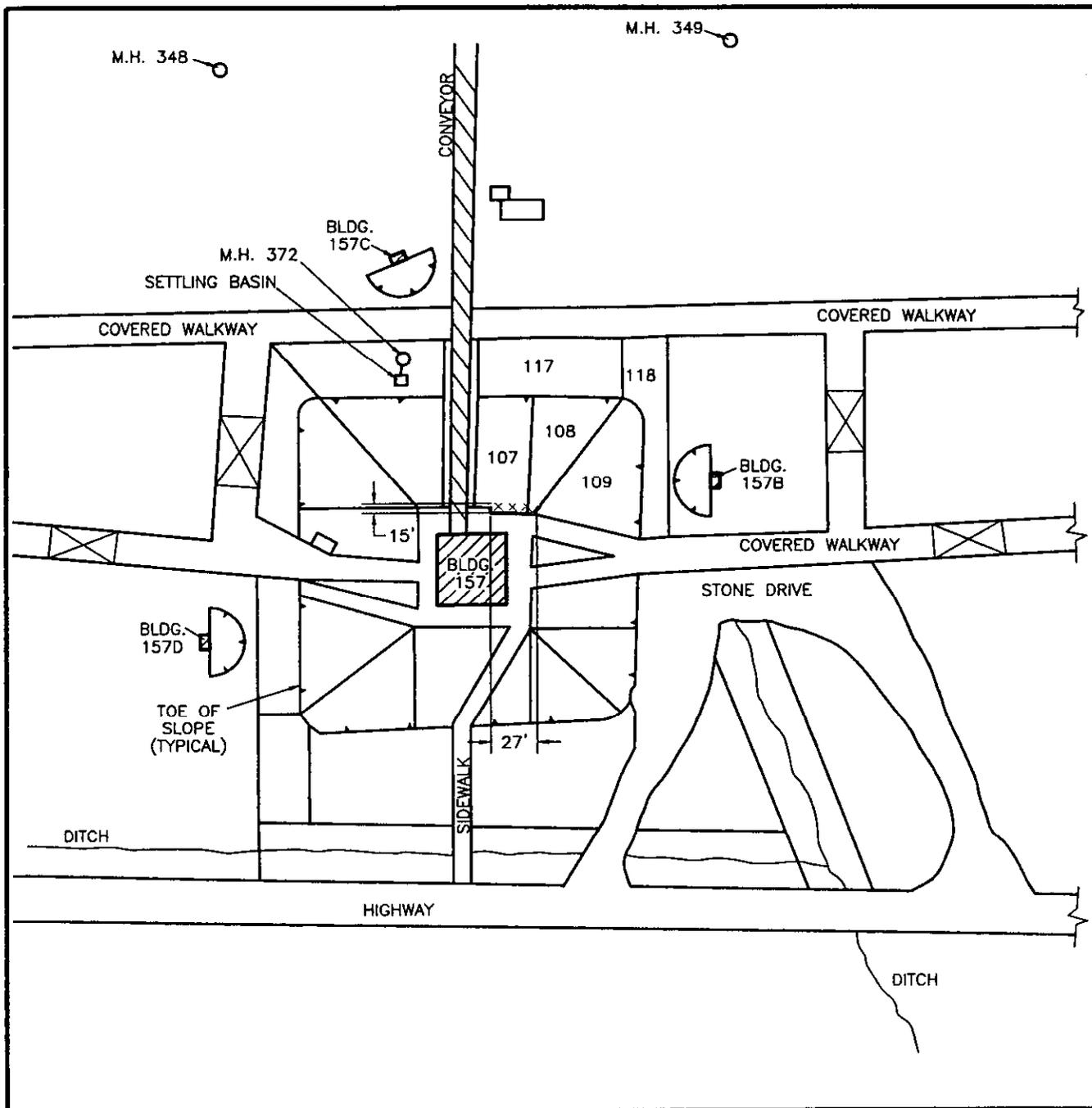
JOB NO.: 37324.01

SHEET NUMBER

1 of 3

**TOLLEST, INC.**

SOUTHWEST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



WINDROW LOCATION MAP

BACKFILL OPERATIONS  
DECON ROCKS 30.75 TONS  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (SW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
NAVAL FACILITIES ENGINEERING COMMAND  
NSWC CRANE, IN

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

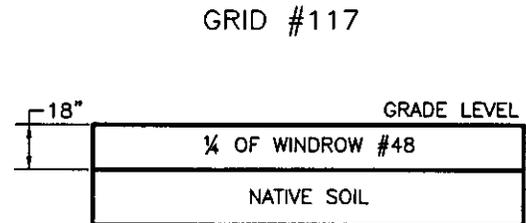
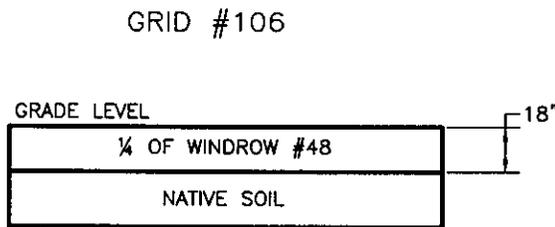
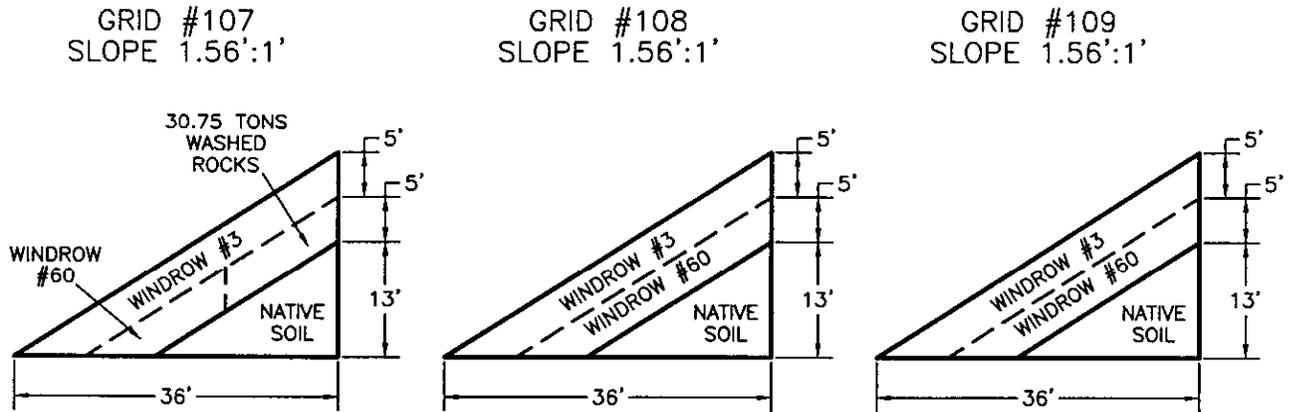
JOB NO.: 37324.01

SHEET NUMBER

2 of 3

**TOLLEST, INC.**

SOUTHWEST CORNER OF BUILDING 157



MEASUREMENTS ARE APPROXIMATE  
NOT TO SCALE



SIDE VIEW

BACKFILL OPERATIONS  
GRIDS: #117, 118, 116, 107, 108, 109  
WINDROW: #60, 3, 48  
NAVAL SURFACE WARFARE CENTER  
BUILDING 157 (SW SIDE), MINE FILL A  
CRANE, INDIANA

PREPARED FOR  
NAVAL FACILITIES ENGINEERING COMMAND  
NSWC CRANE, IN

DRAWN MRC\11-8-99

CHECKED

REVISED

APPROVED

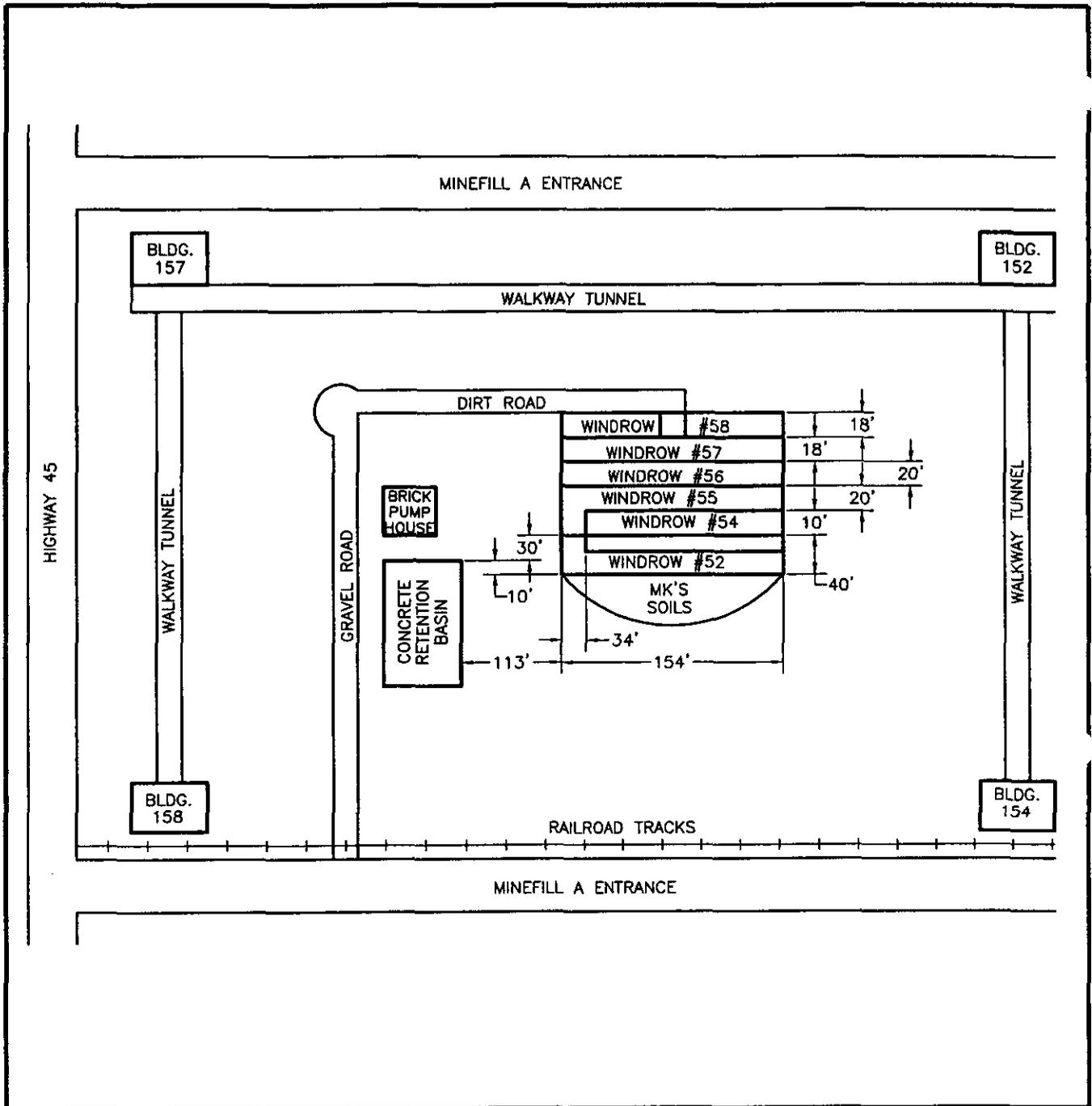
JOB NO.: 37324.01

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**TOWERS, INC.**

STAGING AREA



WINDROW #54 OVERLAPS #52  
 MEASUREMENTS ARE APPROXIMATE  
 DRAWING NOT TO SCALE



**WINDROW LOCATION MAP**

BACKFILL OPERATIONS  
 PERMANENT PLACEMENT AT STAGING AREA  
 WINDROWS: #52, 54, 55, 56, 57, 58  
 NAVAL SURFACE WARFARE CENTER  
 MINE FILL A  
 CRANE, INDIANA

PREPARED FOR  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**NSWC CRANE, IN**

DRAWN MRC\11-8-99

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REVISED

APPROVED

JOB NO.: 37324.01

SHEET NUMBER

1 of 1



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James M. Hummel  
SIGNATURE

DIRECTOR, ENVIRONMENTAL PROTECTION DEPARTMENT  
BY DIRECTION OF THE COMMANDER  
TITLE

12/8/99  
DATE