



DEPARTMENT OF THE NAVY

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

N00164.AR.000630
NSWC CRANE
5090.3a

IN REPLY REFER TO:

5090
Ser 095/1111
30 MAR 2001

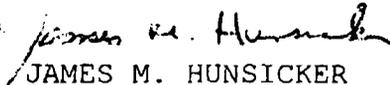
U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Illinois, Indiana, and Michigan Section
Attn: Mr. Peter Ramanauskas (DW-8J)
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center (NAVSURFWARCENDIV Crane) submits, for your approval, two copies of the replacement pages for the revised draft Quarterly Interim Progress Reports (IPR) for July 1 through September 30, 2000 as enclosure (1). Enclosure (2) is the required certification statement.

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

Sincerely,


JAMES M. HUNSICKER

Director Environmental Protection
Department
By direction
of the Commander

Encls:

- (1) 3RD Quarter 2000 IPR Replacement Pages
- (2) Certification Statement

Copy to: ~~(w/o encls)~~
Administrative Record
IDEM (D. Griffin)
SOUTHNAVFACENGCOM (Code 1864)
SOUTHNAVFACENGCOM ROICC
TOLTEST Crane

**Naval Facilities Engineering Command
Naval Surface Warfare Center
Crane, Indiana**

**Full-Scale Operations
Soil Bioremediation Facility**

**Quarterly Interim Progress Report
3rd Quarter 2000
July 1 – September 30
NSWC Crane
Crane, Indiana**

TOLTEST, INC.

QUARTERLY INTERIM PROGRESS REPORT

3rd Quarter 2000

July 1 – September 30

**FULL-SCALE OPERATIONS
SOILS BIOREMEDIATION FACILITY
NAVAL SURFACE WARFARE CENTER CRANE, INDIANA**

ENVIRONMENTAL JOB ORDER CONTRACT

CONTRACT NO. N68950-96-D-0052

TOLTEST PROJECT NUMBER 37324.01

Submitted to:

**OFFICER IN CHARGE OF NAVFAC CONTRACTS
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA**

Submitted by:

**TOLTEST, INC.
1915 NORTH 12TH STREET
P.O. BOX 2186
TOLEDO, OHIO 43603
(419) 241-7175**

**Prepared by:
Environmental Specialist**


Peter J. Chevalier 3/29/01
Date

**Approved by:
Project Manager**

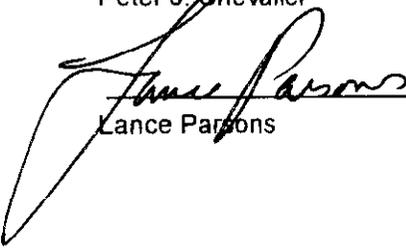

Lance Parsons 3/29/01
Date

TABLE OF CONTENTS

	<u>Page No.</u>
EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	1
2.0 EXCAVATION.....	2
2.1 <u>Pre-Excavation Sampling</u>	2
2.1.1 <u>MFA</u>	2
2.1.2 <u>MFB</u>	2
2.1.3 <u>RKY</u>	3
2.2 <u>In-Process Excavation Soil Sampling</u>	3
2.3 <u>Post-Excavation Soil Sampling</u>	3
2.3.1 <u>MFA</u>	3
2.3.2 <u>MFB</u>	3
2.4 <u>Soil Excavation and Screening</u>	4
2.4.1 <u>MFA</u>	4
2.4.2 <u>MFB</u>	4
3.0 COMPOSTING OPERATIONS.....	5
3.1 <u>Amendments</u>	5
3.2 <u>Windrow Construction and Treatment</u>	5
3.3 <u>Analytical Data Interpretation and Validation</u>	6
4.0 DISPOSITION OF TREATED SOIL AND SITE RESTORATION.....	8
5.0 STATUS OF VARIOUS REPORTS.....	9
6.0 QUALITY CONTROL	10
7.0 SAFETY AND INDUSTRIAL HYGIENE.....	11
7.1 <u>General Safety</u>	11
7.2 <u>Industrial Hygiene Sampling</u>	11
8.0 FACILITY MAINTENANCE AND REPAIRS	13
9.0 REFERENCES	14

TABLE OF CONTENTS

TABLES

Table 1.0	Full-Scale Operations Soil Excavation Quantities
Table 2.0	Windrows Process Schedule
Table 3.0	Explosive Compounds Day Last Analytical Data
Table 4.0	Average Day Last Explosive Compounds Levels

FIGURES

Windrow Location Maps, Bldgs. 166,168,171,172, & Permanent Placement Area (6 sheets total)
Post-excavation Sample Grids MFA & MFB (3 pages total)

EXECUTIVE SUMMARY

This interim progress report has been prepared by ToITest, Inc. (ToITest) for Southern Division, Naval Facilities Engineering Command. This report documents the progress at the Bioremediation Facility (Biofacility) for treatment of explosives-contaminated soil at the Naval Surface Warfare Center (NSWC) Crane, Indiana. On March 27, 1999, ToITest assumed responsibility for the excavation and treatment of contaminated soil at the Biofacility. This report summarizes the work actions performed from July 1 through September 30, 2000 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. All interim measures work actions have been performed in accordance with approved plans.

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 complete. No initial characterization sampling was completed at Mine Fill "B" (MFB) during this reporting period. In-process field screening is ongoing and post-excavation sampling for grids in MFA and MFB indicate that clean-up goals have been achieved in most grids. Contamination has been left in-place in some grids due to the presence of rock, utilities, or buildings.

A total of 210.5 tons of MFA mixed soil and gravel rejected from the screener and 537.26 tons of screened soil from MFA was transported to the Biofacility during this reporting period. A total of 1769.53 tons of screened soil from Mine Fill B was transported to the Biofacility during this reporting period.

A total of 17 new windrows were constructed during this reporting period, from windrow 174 to windrow 190. Sixteen windrows achieved Day Last status during this period: windrows 172 to 187. A total of 3713.6 tons of contaminated soil was treated during this time period: 2785.2 tons to residential cleanup levels and 928.4 tons to industrial clean up levels.

1.0 INTRODUCTION

This interim progress report has been prepared by ToITest for the Southern Division, Naval Facilities Engineering Command to document the progress of the full-scale bioremediation operation of explosives-contaminated soil at NSWC Crane, Crane, Indiana. It summarizes the work actions performed by ToITest during the period July 1 through September 30, 2000 pursuant to the requirements of the approved *Full-Scale Operational Plan* (OP) [MK, 1998a] and the *Quality Assurance Project Plan* (QAPP) [MK, 1998b]. Full-scale bioremediation operations started in April 1998. ToITest assumed responsibility on March 27, 1999 from Morrison Knudsen Corp. after the completion of their contract.

NSWC Crane, located in southwestern Indiana, provides support for equipment shipboard weapons systems, and ordnance. This site also supports Crane Army Ammunition Activity, 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 (SWMU-03/10); Rockeye Munitions Facility (RKY) - (SWMU-10/15); Mine Fill "A" (MFA) - (SWMU-12/14); and Mine Fill "B" (MFB) - (SWMU-13/14).

On-site bioremediation of the high-explosives contaminated soil utilizing a windrow composting process has been selected as the preferred treatment alternative for the Interim Measures 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, disposal of treated soil, and site restoration.

2.0 EXCAVATION

Field activities (discussed below) were conducted at MFA and MFB during this reporting period. Work activities at the excavation site included: in-process sampling, post-excitation sampling, soil excavation, soil screening, and vegetation establishment. All fieldwork activities were performed in accordance with procedures included in the *Full-Scale OP* [MK, 1998a] and the *QAPP* [MK, 1998b]. Final drawings showing grid locations, post-excitation sample locations, and extent of excavation will be included in the Interim Measures Report for Bioremediation.

2.1 Pre-Excavation Sampling

Pre-excitation sampling is performed to provide initial site characterization and delineate the extent of contamination. Pre-excitation samples are analyzed for SWMU-specific compounds by an off-site analytical laboratory.

A minimum of three soil samples are 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 or other obstacles prohibited obtaining the deeper composite sample. Volatile organic compounds (VOCs) analysis are completed on grab samples obtained at 12-inches.

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

2.1.1 MFA

Pre-excitation soil sampling at MFA is complete.

2.1.2 MFB

No pre-excitation sampling was completed at MFB during this time period.

2.1.3 RKY

No pre-excavation sampling was completed at RKY during this time period.

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 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 cleanup goals. Confirmation samples are analyzed for SWMU-specific compounds by an off-site analytical laboratory.

2.3.1 MFA

Post-excavation samples were obtained from grids 23 – 26, 29, 33 – 38, 40, 131 – 133, 135, 171 - 173, and 204 - 206 at building 153 (the old soil screener site). Analytical results indicated that remaining soil contamination in these grids is less than industrial cleanup goals. Refer to the *Post-excavation Sample Grid maps* for location of these grids.

2.3.2 MFB

Post-excavation samples were obtained from grids 126, 134, 136, 178, 185, and 217 at building 171, and grids 68 – 71, 88, 89, and 144 at building 173. Analytical results indicate that contamination above industrial cleanup goals remains in grids 136, 178, and 217 due to the presence of rock at the base of the excavation which prevented the removal of all the contaminated soil. Soil contaminated above industrial levels was left

in-place in grid 217 to support overhead electrical lines. The soil contamination in the remaining grids is less than industrial cleanup goals. Refer to the Post-excavation Sample Grid maps for location of these grids.

2.4 Soil Excavation and Screening

2.4.1 MFA

Excavation of contaminated soil was completed at MFA when the remaining contaminated soil was removed from the old screener site behind building 153. The soil was transported to the screener at MFB. A total of 210.5 tons of reject soil and gravel and 537.26 tons of screened soil were transported to the Biofacility in this reporting period.

2.4.2 MFB

Soil excavation continued at MFB around Building 171 and 172. During this reporting period, a total of 1769.53 tons of soil were excavated and screened: 321.95 tons in July; 1323.09 tons in August; and 124.49 tons in September.

3.0 COMPOSTING OPERATIONS

Treatment of high-explosives contaminated soil by composting involves microbial degradation of the explosives 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 OP* [MK, 1998a].

3.1 Amendments

The compost mix used in full-scale operations consists of 25% soil, 15% chicken manure, and 60% straw by volume. A sufficient volume of straw has been delivered to satisfy the straw requirements for processing the remaining soil from MFA, MFB, and RKY. Chicken manure continues to be trucked to the Biofacility on an as-needed basis in quantities sufficient to support operations.

3.2 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.

Sixteen windrows (172 through 187) achieved Day Last status during this reporting period (i.e. analytical results were received before the end of this period). Windrows 172 and 173 were constructed in the previous reporting period and Day Last status was achieved in this period. Windrows 174 through 190 were constructed in this reporting period, however windrows 188, 189, and 190 did not achieve Day Last status in this reporting period.

All windrows reported in this period achieved residential or industrial cleanup levels for explosive compounds. Analytical data regarding windrows that achieved Day Last status during this period are discussed in Section 3.3. All windrows were composed with soil from MFB.

The average number of days between Day Zero and Day Last for this period was 13.6 days. The details of the progress of windrows are included as Table 2.0.

The total amount of soil processed in windrows 172 through 187 was 3713.6 tons (based on 232.1 tons of soil in a full size windrow).

3.3 Analytical Data Interpretation and Validation

Table 3.0 provides this quarter's laboratory analytical results for HMX, RDX, and TNT, and the regulatory cleanup goals. All windrow results represent an average of 15 individual data points (five cross sections, three sample locations per cross section). Day Last results are given for each windrow, demonstrating the effectiveness of the bio-degradation process. Day Zero samples are no longer collected on compost with soil from either MFA or MFB.

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 windrows has 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 every analytical batch. Day Last data did not show interference with spiking solutions because initial concentrations were low in comparison to the concentration of spiking

solution added to the sample. Comparing 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 4.0 provides the average explosive compound levels for Day Last for the laboratory results received this reporting period. All windrows to date have met the project objective industrial clean-up goals and seven of the windrows processed this period have meet residential clean-up objectives. Refer to Table 2 for the windrow process schedule and Table 3 for Day Last analytical data and cleanup goals.

4.0 DISPOSITION OF TREATED SOIL AND SITE RESTORATION

Treated soil (compost) has been transported back to the SWMU of origination (MFB) either to the permanent storage area or used as backfill. Disposal activity to date is shown in Table 2.0. Field-generated drawings showing backfill placement of treated compost are included as attachments in Figures. Site restoration (seeding, mulching, and watering) has been or will be implemented at all areas where ToITest has backfilled treated soil.

5.0 STATUS OF VARIOUS REPORTS

The Mine Fill A Interim Measures Report has been submitted by Morrison Knudsen Corp. (MK, now Washington Group) to the Navy and EPA. It is expected that MK will submit an addendum to this report once all remaining MFA work is completed by ToITest. This work, all of it at the old screener site behind building 153, includes completing excavation of the contaminated soil, obtaining post-excavation samples, processing the MFA soil, backfill, grading, seeding, and final surveying.

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 OP* [MK, 1998a]. Copies of all inspection records are maintained at the Biofacility office.

During this period, 108 individual items were verified and no deficiencies were identified. Immediate actions were taken to correct any minor findings observed.

7.0 SAFETY AND INDUSTRIAL HYGIENE

7.1 General Safety

During this period 7,632.0 man-hours were expended by ToITest. There were no OSHA recordable injuries. The project has a cumulative total of 48,353.5 man-hours.

Twelve 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 workers safety performance.

7.2 Industrial Hygiene Sampling

During this period 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 NIOSH exposure limits of 25 ppm (TWA). Sampling was performed on a random basis and continued whether levels were recorded under the TLV or not. The chicken manure amendment was the primary contributor to ammonia concentrations. Full-face air purifying respirators with ammonia cartridges were worn continuously during windrow formation and during composting activities. 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. Readings varied from one day to the next, resulting in a maximum ammonia level of 55 ppm. The average maximum ammonia concentrations included: Day 3 – 33 ppm; Day 8 – 20 ppm; Day 9 – 45 ppm; Day 13 – 55ppm; and Day 14 – 40 ppm.

Airborne dust sampling for explosive compounds was performed at the Biofacility. Three area samples and four personnel samples were collected over a period of four hours. All samples were below the 1.5 mg/m³ 8 hour time weighted average exposure limit.

Wipe sampling for explosive residues was performed at the Biofacility. Five area samples were collected from the laboratory trailer, shower trailer, office trailer, and

lunchroom. The explosive HMX was detected in two samples at an average of 1.9 ug/wipe, and RDX was detected in five samples at an average of 5.8 ug/wipe.

No noise monitoring was performed during this quarter. Prior monitoring has concluded that associates are required to wear hearing protection while working around heavy equipment, which is when noise levels are likely to exceed 85 dBa during a weighted network steady state, or 140 dBa impulse, regardless of the duration of exposure.

In summary, ammonia monitoring indicates respiratory protection is warranted during the entire life of the windrow cycle. Monitoring for airborne explosive compounds showed no hazards to be significant enough for concern. Wipe sample analysis indicates that personnel decontamination procedures need to be continuously stressed and adhered to. Noise monitoring indicates a need for hearing protection while working around heavy equipment at the site.

8.0 FACILITY MAINTENANCE AND REPAIRS

- Repaired a hydraulic leak on the skid-steer loader.
- Replaced the hydraulic motor on the SCARAB.
- Obtained a Flame Tool/Hot Work Permit and removed one of two cross braces from the tunnel in building 171.
- Placed black plastic and felt around the shower trailer area and covered it with 2" of rock.
- Installed a new broom on the sweeper.
- Hauled the Ford tractor to Reeds Tractor and had a leak repaired.
- Obtained a Flame Tool/Hot Work Permit from Joe Deckard of the fire department, and contracted K & S Welding to repair tub grinder #2.
- Took a skid-steer loader tire to Tieman Tire for repair.
- Completed maintenance of the hydraulic system on the SCARAB. Approximately 10 gallons of hydraulic oil was spilled on the asphalt pavement during repair of the SCARAB. Oil dry was placed on the spill to soak it up. EPD was contacted about the issue and provided us with guidance on the disposal of the waste.
- Reset the linkage on the John Deere tractor hydraulics.
- Replaced the shock absorbers on the skid-steer loader.
- Replaced the cut off switch on the SCARAB.
- A tub grinder tire was taken to Tieman's for repair.

TABLES

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.

TABLE 1.0
FULL-SCALE OPERATIONS SOIL EXCAVATION QUANTITIES
July through September 2000
Quantity (Tons)

Period	Mine Fill A	Mine Fill B	Rockeye	Cumulative
Previously reported	20,239.11	17,689.51	0.00	37,928.62
July	0.00	321.95	0.00	38,250.57
August	210.50	1,323.09	0.00	39,784.16
September	537.26	124.49	0.00	40,445.91
Reporting Period Total	747.76	1,769.53	0.00	2,517.29
Site Total	20,986.87	19,459.04	0.00	

**TABLE 2.0
 WINDROW PROCESS SCHEDULE**

Windrow #	Start Date	Day Zero	Day Last	Lab Results Received	Complete Unload	Ton Processed	Soil Qty Ton Processed	Processed to Residential or Industrial Levels	Compost Disposal Location	Grid Disposal Locations
M-172	6/23/00	6/23/00	7/5/00	7/11/00	7/11/00	232.1	25967.514	Residential	PPA	na
M-173	6/29/00	6/30/00	7/10/00	7/17/00	7/17/00	232.1	26199.614	Residential	PPA	na
S-174	7/6/00	7/7/00	7/17/00	7/23/00	7/24/00	232.1	26431.714	Residential	PPA	na
S-175	7/6/00	7/7/00	7/19/00	7/25/00	7/25/00	232.1	26663.814	Residential	PPA	na
M-176	7/11/00	7/12/00	7/24/00	7/31/00	7/31/00	232.1	26895.914	Residential	PPA	na
M-177	7/17/00	7/18/00	8/2/00	8/8/00	8/9/00	232.1	27128.014	Industrial	B-171	122-124,131
S-178	7/24/00	7/25/00	8/4/00	8/10/00	8/10/00	232.1	27360.114	Residential	B-166&171	122-124,131 137,138,276
S-179	7/25/00	7/26/00	8/11/00	8/17/00	8/17/00	232.1	27592.214	Residential	B-166	103,115, 227,228
M-180	7/31/00	8/1/00	8/18/00	8/24/00	8/24/00	232.1	27824.314	Residential	PPA,B-168	25,29-32,38
M-181	8/8/00	8/9/00	8/24/00	8/30/00	8/30/00	232.1	28056.414	Industrial	TSA	na
S-182	8/10/00	8/11/00	8/25/00	8/31/00	8/31/00	232.1	28288.514	Residential	PPA,B-171	126,134, 136,178
S-183	8/17/00	8/18/00	8/30/00	9/5/00	9/5/00	232.1	28520.614	Industrial	B-172	88,89,144
M-184	8/24/00	8/25/00	9/7/00	9/13/00	9/13/00	232.1	28752.714	Residential	B-172	70
M-185	8/30/00	8/30/00	9/15/00	9/21/00	9/21/00	232.1	28984.814	Industrial	TSA	na
S-186	8/31/00	8/31/00	9/15/00	9/25/00	9/25/00	232.1	29216.914	Residential	PPA	na
S-187	9/5/00	9/6/00	9/25/00	10/2/00	10/2/00	232.1	29449.014	Residential	PPA,B-168	26-28

PPA = Permanent Placement Area

TSA = Temporary Storage Area

na = not applicable

TABLE 3.0				
EXPLOSIVE COMPOUNDS DAY LAST ANALYTICAL DATA (ppm)				
WINDROW #	DAY #	HMX	RDX	TNT
172	12	0.4	0.7	0.5
173	10	0.4	0.4	0.4
174	10	0.6	0.5	0.5
175	12	1.1	1.2	0.5
176	12	0.8	0.7	0.5
177	15	1.6	4.2	0.5
178	10	0.9	2.7	0.5
179	16	1.0	3.8	1.9
180	17	1.4	1.9	0.5
181	15	1.3	5.8	0.5
182	14	1.2	2.0	0.6
183	12	3.1	8.7	0.5
184	13	1.9	3.3	0.5
185	16	2.3	8.6	1.1
186	15	0.8	0.8	0.5
187	19	1.1	1.6	0.5
CLEAN166UP GOALS	Residential	3,300	4	15
	Industrial	34,000	17	64

TABLE 4.0
AVERAGE DAY LAST EXPLOSIVE COMPOUNDS LEVELS

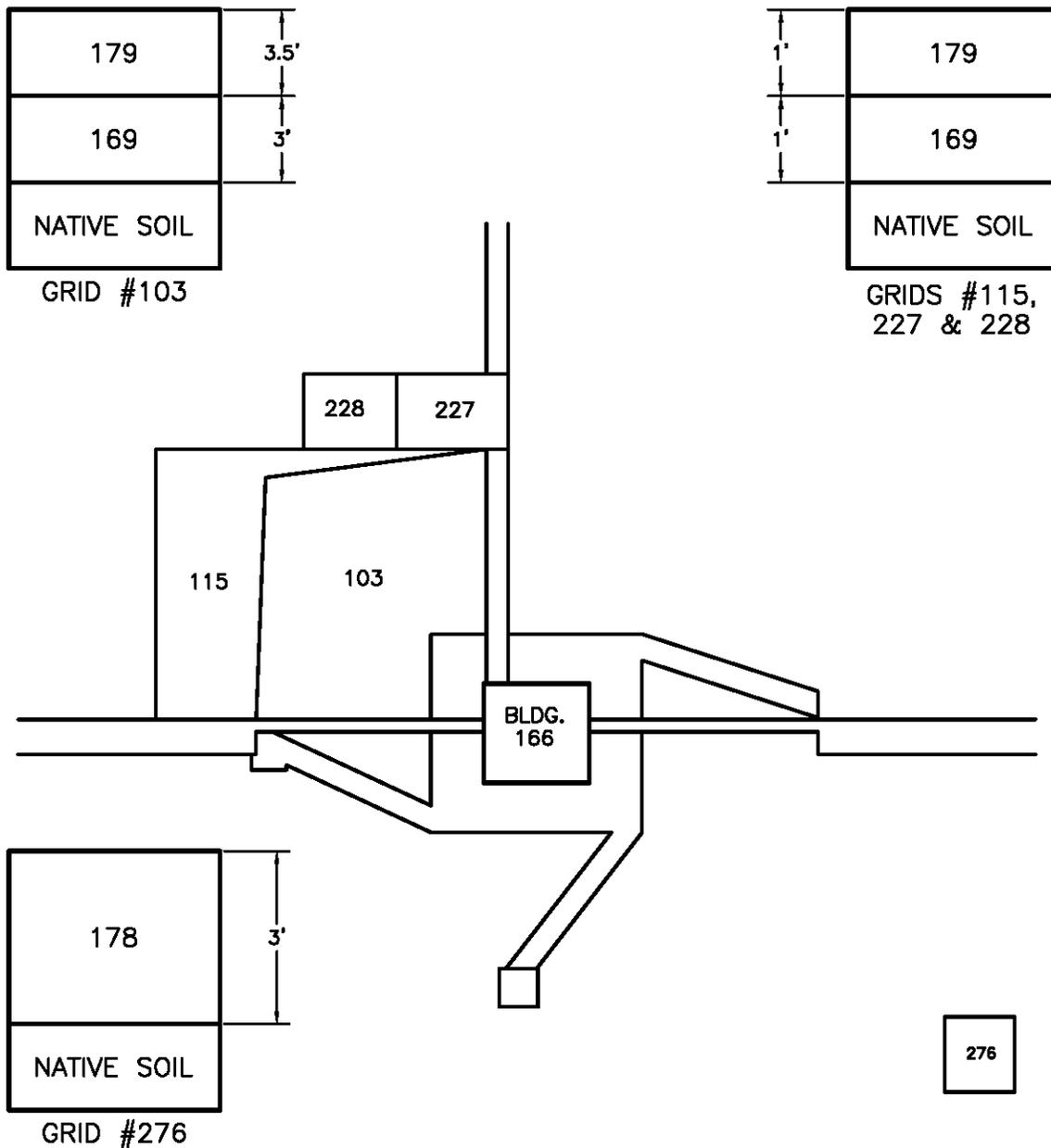
	ppm
HMX	1.2
RDX	2.9
TNT	0.6

Day 0 samples are no longer collected for compost containing MFA or MFB soil.

FIGURES:

**WINDROW LOCATION MAPS
and
POST-EXCAVATION SAMPLE GRIDS**

BUILDING 166



MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE



WINDROW LOCATION MAP

070100-093000 QUARTERLY REPORT
BACKFILL OPERATIONS

GRIDS: #103, 115, 227, 228, 276

WINDROWS: #169, 178, 179

NAVAL SURFACE WARFARE CENTER

BUILDING 166, MINE FILL B

CRANE, INDIANA

PREPARED FOR

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

DRAWN MRC\11-27-00

CHECKED

REVISED

APPROVED

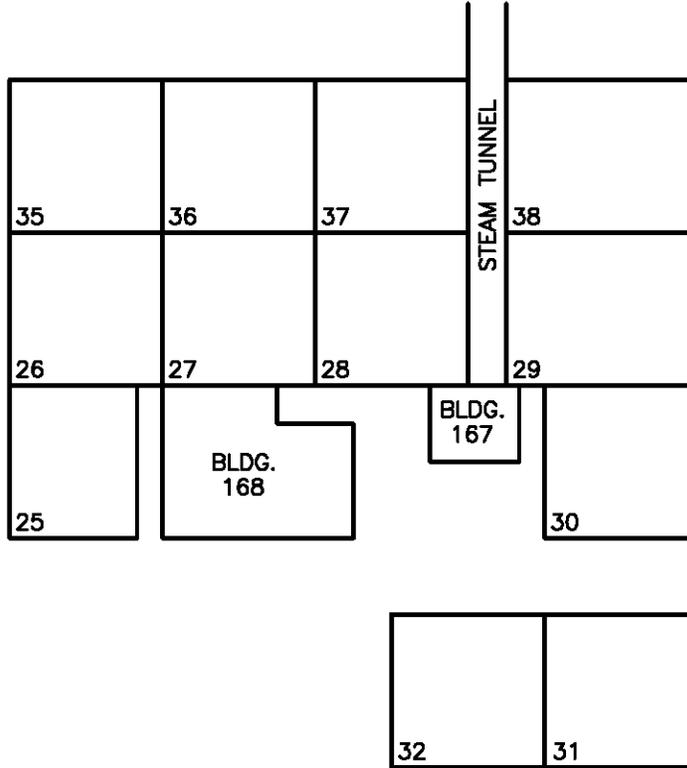
JOB NO.: 37324.01

SHEET NUMBER

1 of 1

TOUEST, INC.

NORTHEAST CORNER OF BUILDING 168



MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE

R = RESIDENTIAL
I = INDUSTRIAL



WINDROW LOCATION MAP

BACKFILL OPERATIONS
GRIDS: #25, 26, 27, 28, 29, 30, 31, 35, 36, 37, 38
WINDROWS: #120(R), 126(I), 137(R), 138(R), 188(R), 141(R),
1/12 180(R), 1/2 187(R)
NAVAL SURFACE WARFARE CENTER
NORTHEAST CORNER OF BUILDING 168, MINE FILL B
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\01-03-01

CHECKED

REVISED

APPROVED

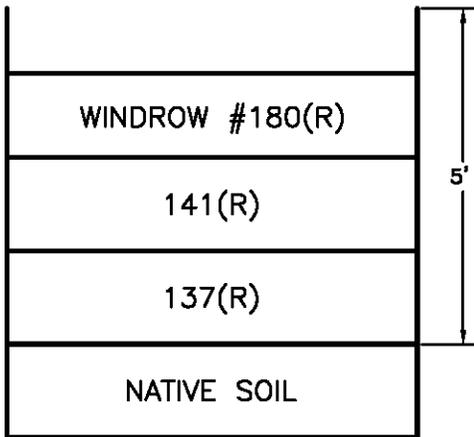
JOB NO.: 37324.01

SHEET NUMBER

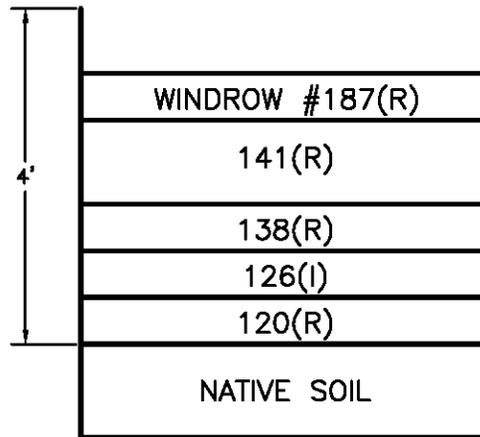
1 of 3



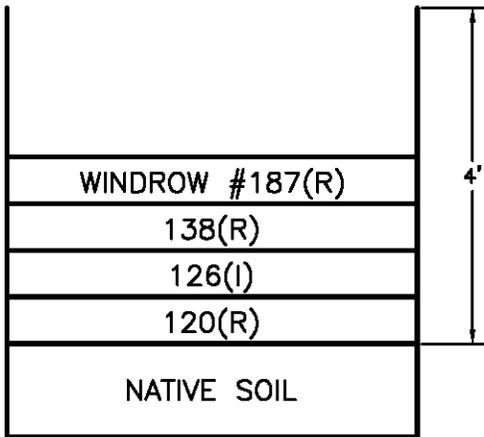
NORTHEAST CORNER OF BUILDING 168



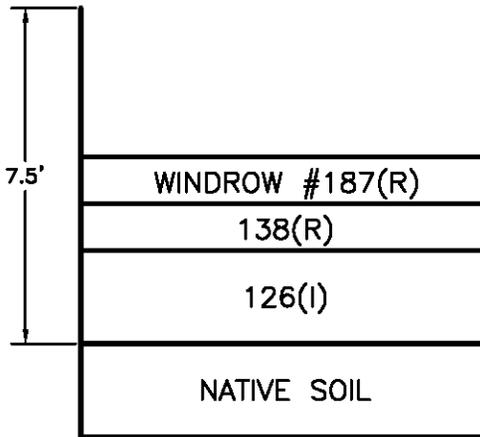
GRID #25



GRID #26



GRID #27



GRID #28

MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE

R = RESIDENTIAL
I = INDUSTRIAL



SIDE VIEW

BACKFILL OPERATIONS
GRIDS: #25, 26, 27, 28
WINDROWS: #120(R), 126(I), 137(R), 138(R), 141(R),
1/12 180(R), 1/2 187(R)
NAVAL SURFACE WARFARE CENTER
NORTHEAST CORNER OF BUILDING 168, MINE FILL B
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\01-03-01

CHECKED

REVISED

APPROVED

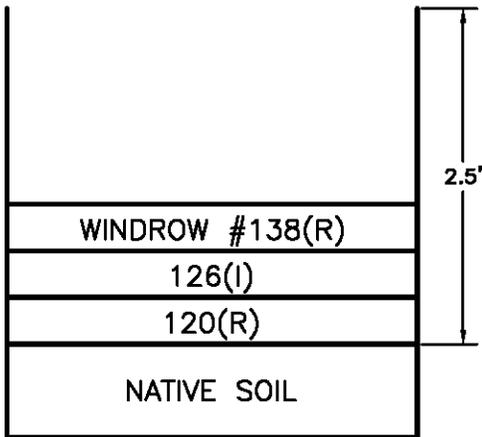
JOB NO.: 37324.01

SHEET NUMBER

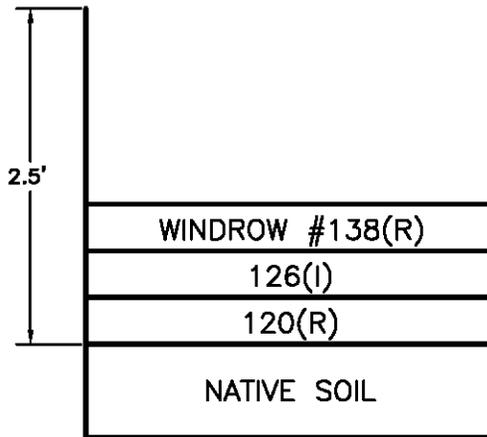
2 of 3



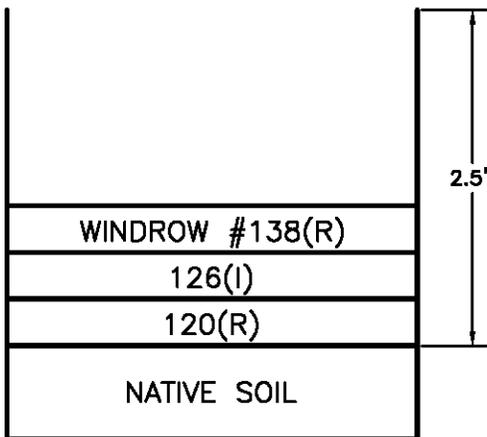
NORTHEAST CORNER OF BUILDING 168



GRID #35



GRID #36



GRID #37

MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE

R = RESIDENTIAL
I = INDUSTRIAL



SIDE VIEW

BACKFILL OPERATIONS
GRIDS: #35, 36, 37
WINDROWS: #120(R), 126(I), 138(R)
NAVAL SURFACE WARFARE CENTER
NORTHEAST CORNER OF BUILDING 168, MINE FILL B
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\01-03-01

CHECKED

REVISED

APPROVED

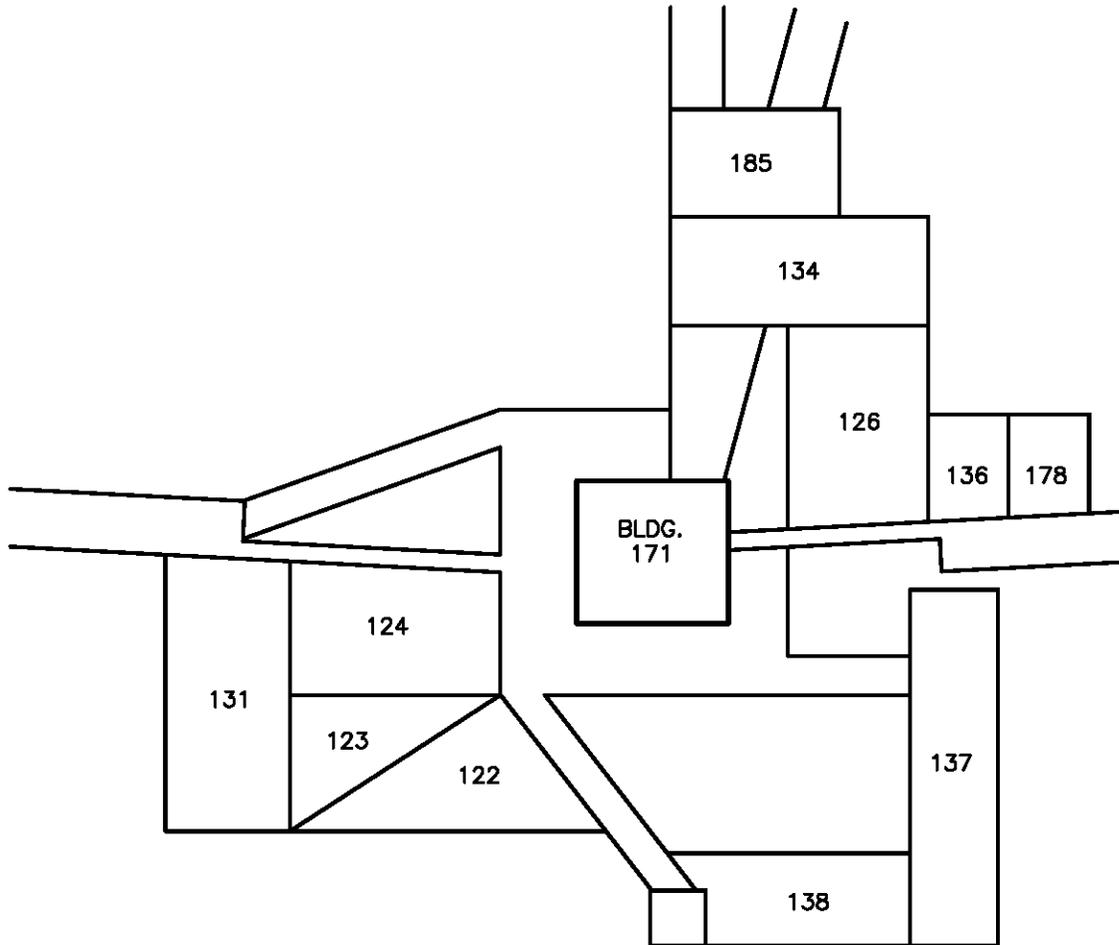
JOB NO.: 37324.01

SHEET NUMBER

3 of 3



BUILDING 171



MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE



WINDROW LOCATION MAP
070100-093000 QUARTERLY REPORT
BACKFILL OPERATIONS
GRIDS: #122, 123, 124, 126, 131, 134, 136, 137, 138, 175, 185
WINDROWS: 177, 178, 182, 189
NAVAL SURFACE WARFARE CENTER
BUILDING 171, MINE FILL B
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\11-27-00

CHECKED

REVISED

APPROVED

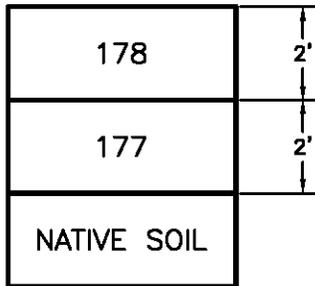
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SHEET NUMBER

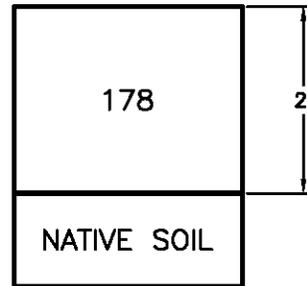
1 of 2

TOWEST, INC.

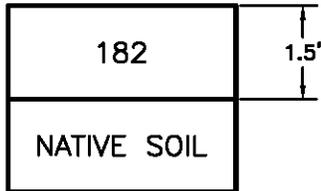
BUILDING 171



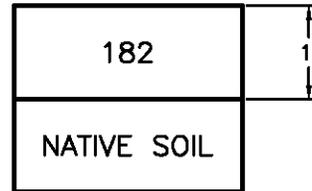
GRIDS #122,
123, 124 & 131



GRIDS #137 & 138



GRID #126



GRIDS #134,
136, 178 & 185

MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE



WINDROW LOCATION MAP

070100-093000 QUARTERLY REPORT
BACKFILL OPERATIONS
GRIDS: #122, 123, 124, 126, 131, 134, 136, 137, 138, 175, 185
WINDROWS: 177, 178, 182
NAVAL SURFACE WARFARE CENTER
BUILDING 171, MINE FILL B
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\11-27-00

CHECKED

REVISED

APPROVED

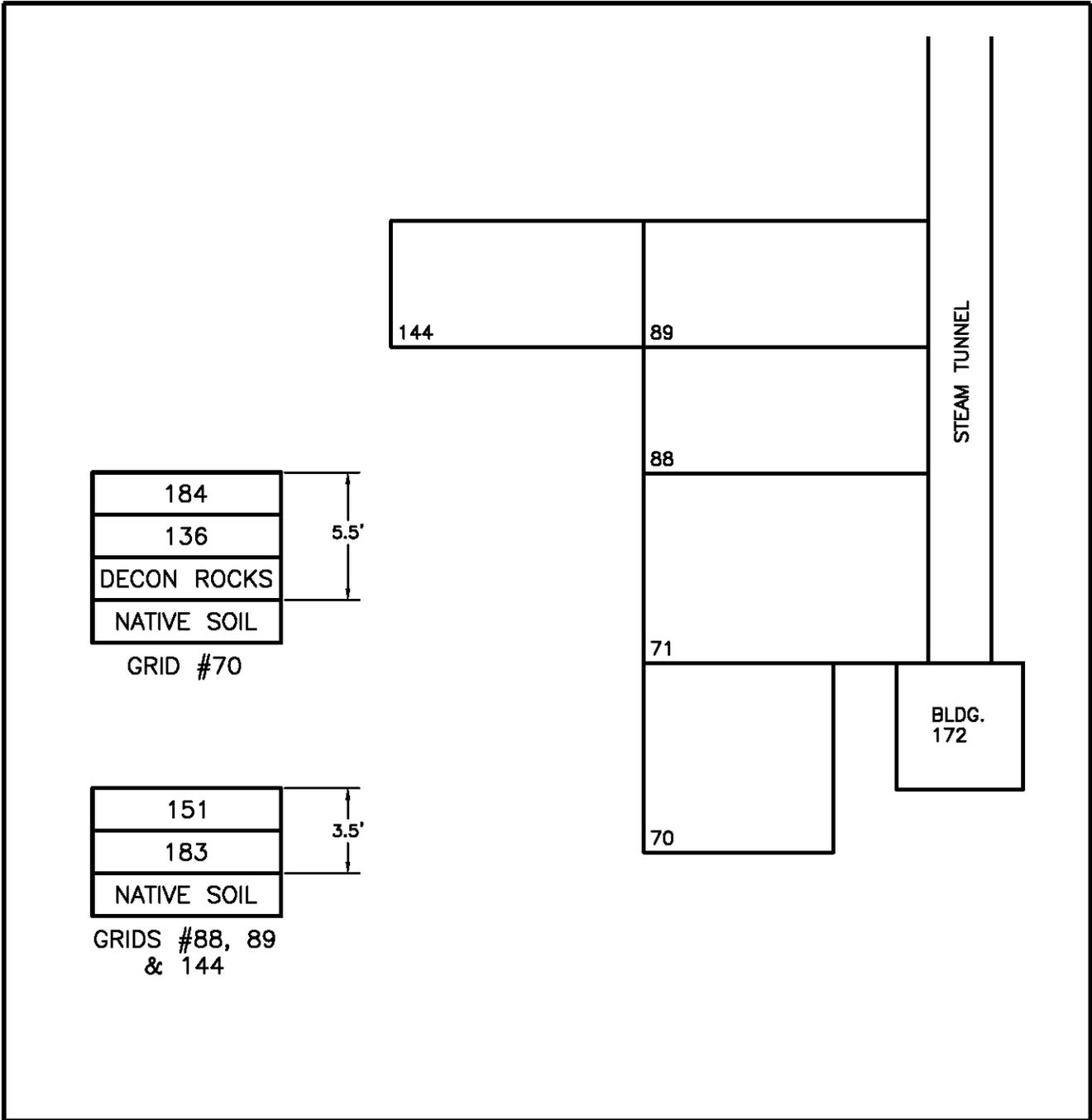
JOB NO.: 37324.01

SHEET NUMBER

2 of 2

TOUEST, INC.

NORTHEAST CORNER OF BUILDING 172



MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE



WINDROW LOCATION MAP
070100-093000 QUARTERLY REPORT
BACKFILL OPERATIONS
GRIDS: #70, 71, 88, 89, 144
WINDROWS: DECON ROCKS, #136, 151, 183, 184
NAVAL SURFACE WARFARE CENTER
NORTHEAST CORNER OF BUILDING 172, MINE FILL B
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\11-27-00

CHECKED

REVISED

APPROVED

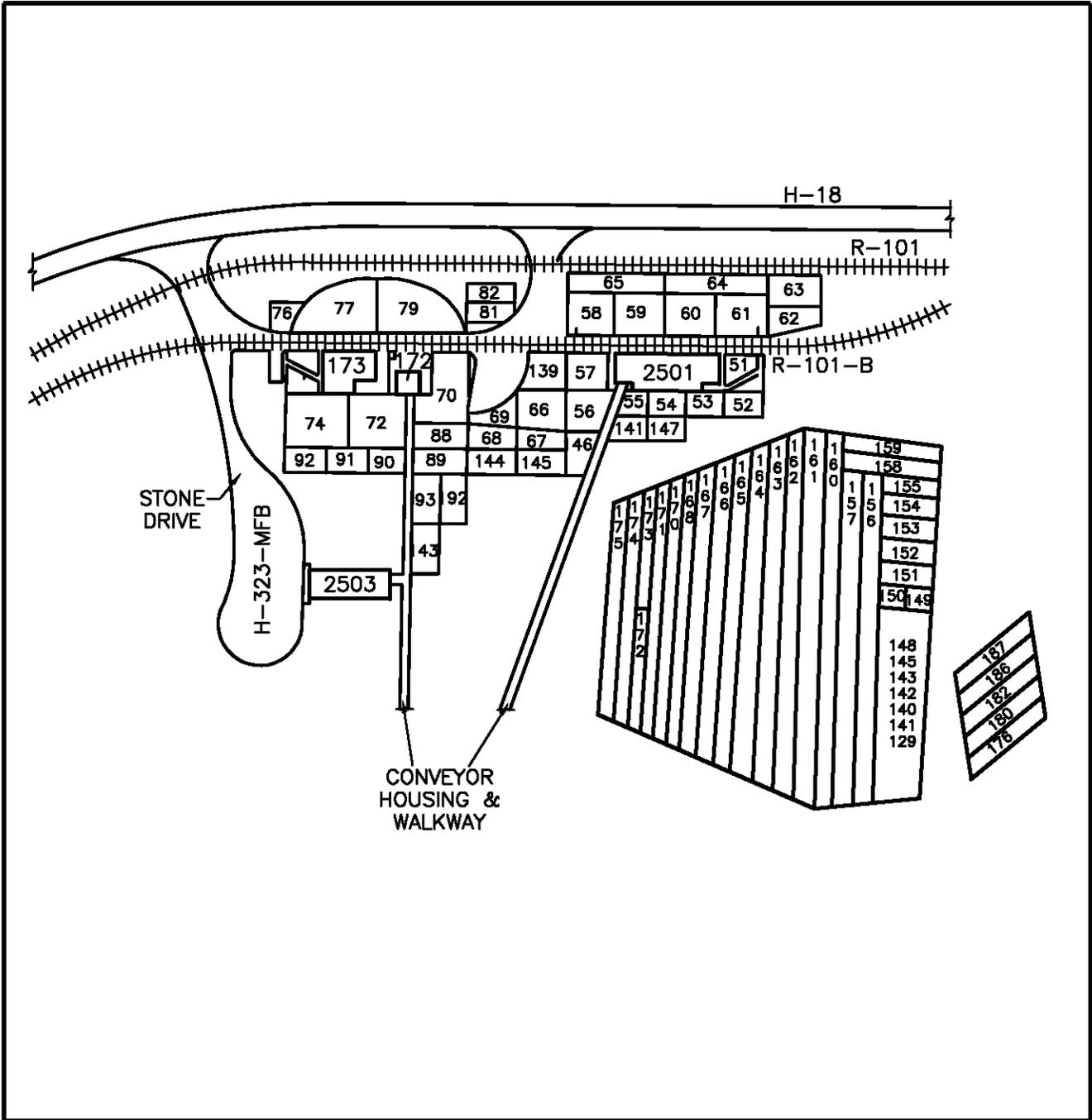
JOB NO.: 37324.01

SHEET NUMBER

1 of 1

TOWERS, INC.

MINE FILL B - PERMANENT PLACEMENT AREA



MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE

R = RESIDENTIAL



WINDROW LOCATION MAP

070100-093000 QUARTERLY REPORT
BACKFILL OPERATIONS
WINDROWS: #172-176, 180, 182, 186 + 187
NAVAL SURFACE WARFARE CENTER
MINE FILL B - PERMANENT PLACEMENT AREA
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\11-27-00

CHECKED

REVISED

APPROVED

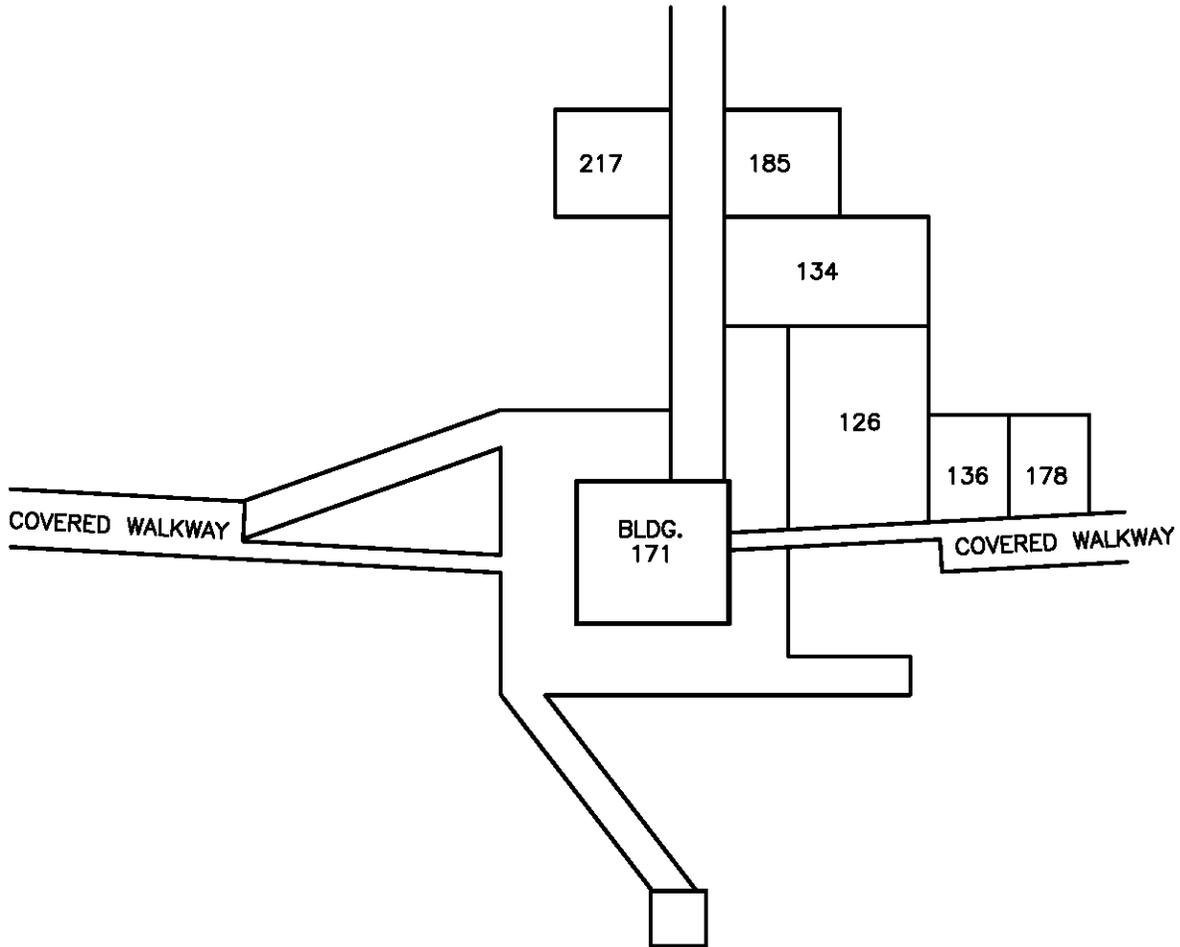
JOB NO.: 37324.01

SHEET NUMBER

1 of 1



BUILDING 171



MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE



POST EXCAVATION SAMPLE GRIDS

070100-093000 QUARTERLY REPORT
NAVAL SURFACE WARFARE CENTER
BUILDING 171, MINE FILL B
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\11-29-00

CHECKED

REVISED

APPROVED

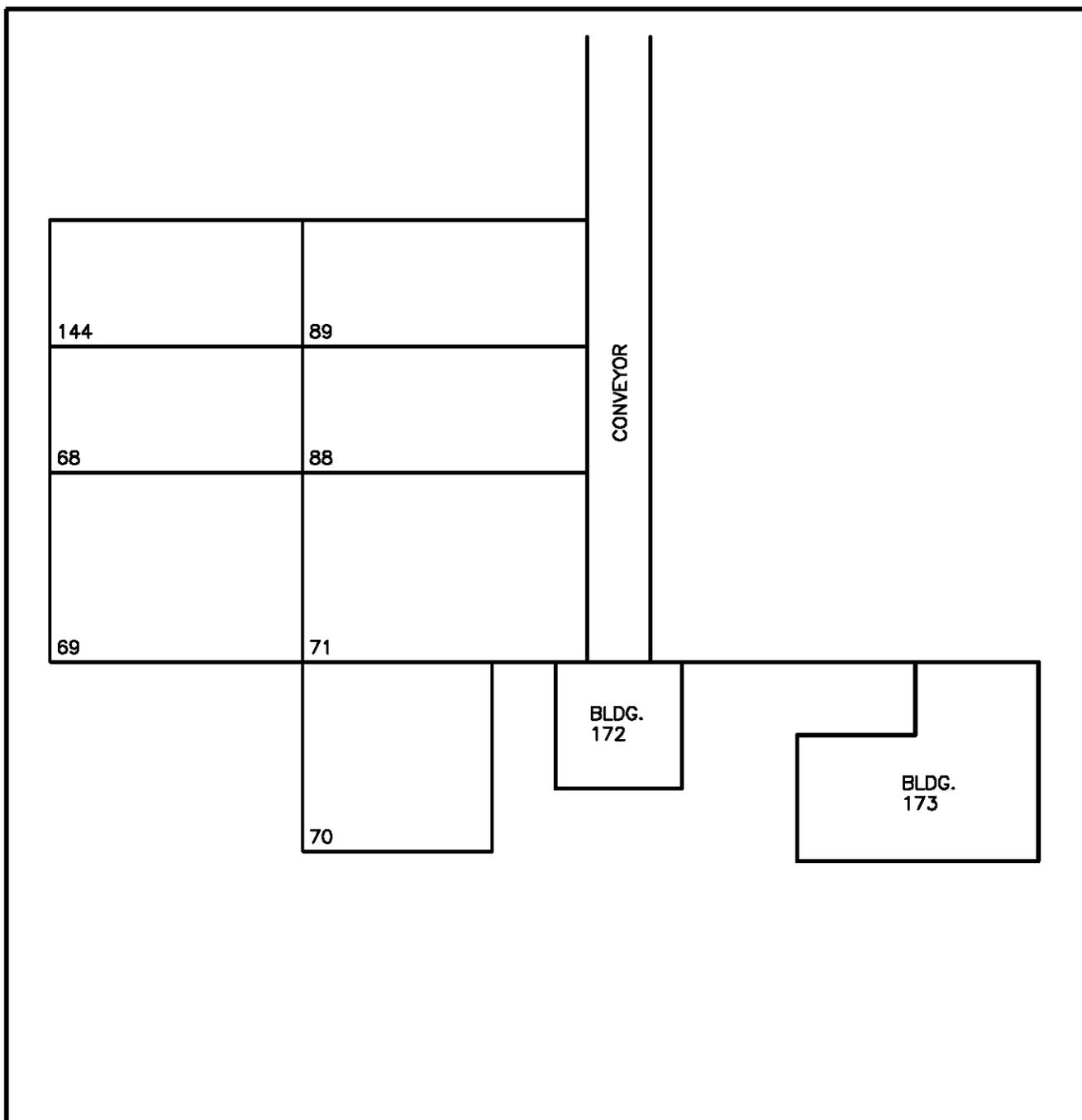
JOB NO.: 37324.01

SHEET NUMBER

1 of 3

TOWEST, INC.

BUILDING 173



MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE



POST EXCAVATION SAMPLE GRIDS

070100-093000 QUARTERLY REPORT
NAVAL SURFACE WARFARE CENTER
BUILDING 173, MINE FILL B
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\11-29-00

CHECKED

REVISED

APPROVED

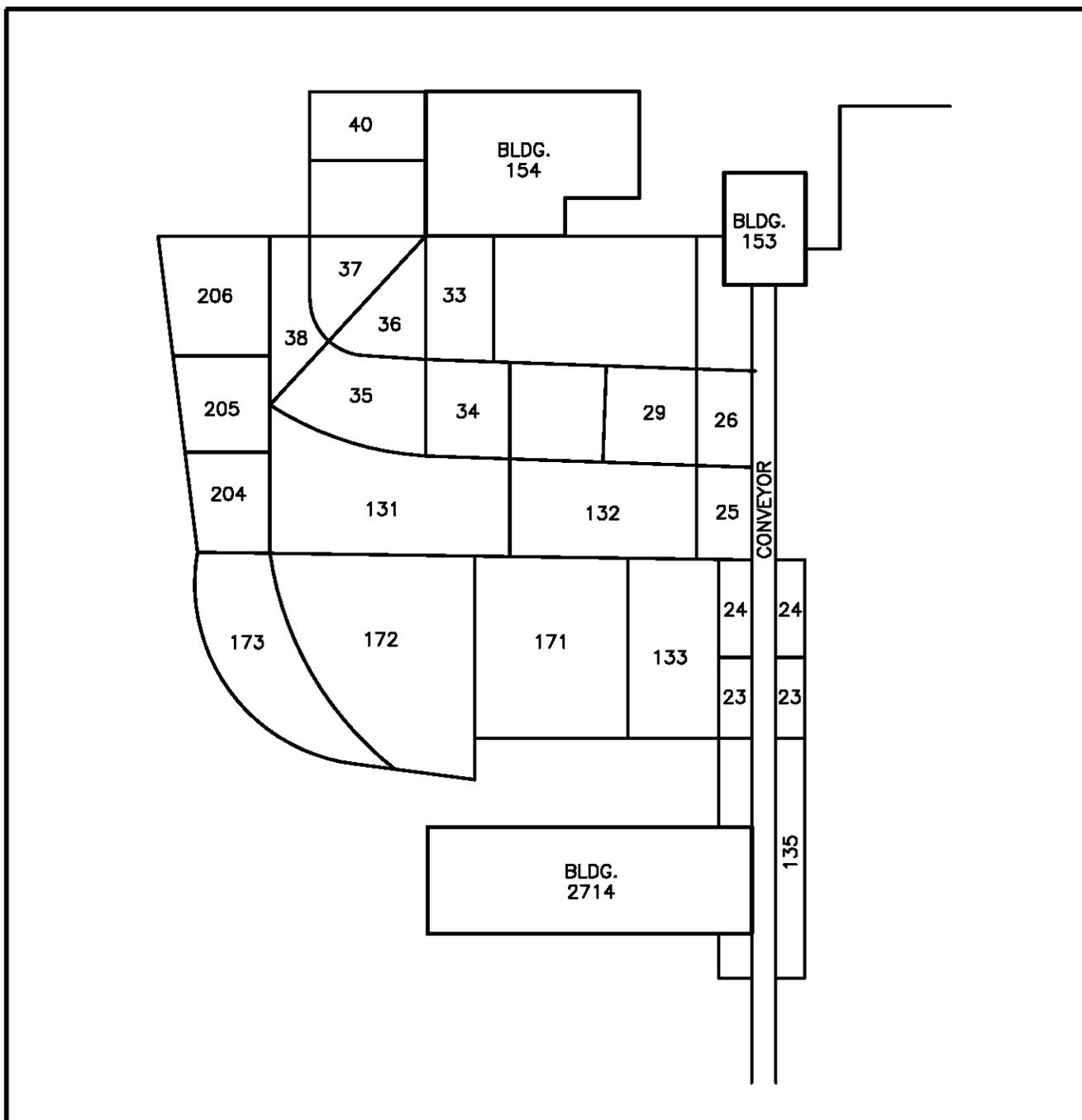
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SHEET NUMBER

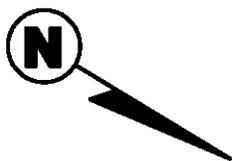
2 of 3

TOWEST, INC.

BUILDING 153



MEASUREMENTS ARE APPROXIMATE
NOT TO SCALE



POST EXCAVATION SAMPLE GRIDS

070100-093000 QUARTERLY REPORT
NAVAL SURFACE WARFARE CENTER
BUILDING 153, MINE FILL A
CRANE, INDIANA

PREPARED FOR
NAVAL FACILITIES ENGINEERING COMMAND
NSWC CRANE, IN

DRAWN MRC\11-29-00

CHECKED

REVISED

APPROVED

JOB NO.: 37324.01

SHEET NUMBER

3 of 3

TOWEST, INC.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



SIGNATURE

DIRECTOR, ENVIRONMENTAL PROTECTION DEPARTMENT
BY DIRECTION OF THE COMMANDER

TITLE

3/30/01
DATE