LANGAN

Memorandum

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
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To: Michael MacCabe - NYSDEC

From: Amanda Forsburg

Info: Stephen Martinelli, Matt Feldman, Kyle Becker, Andy Zheng, Maddie Bernadicou, Greg Etienne – CP VII 78th Street Owner, LLC
Ashley Sandve, Steven Ciambruschini – Langan

Date: 16 October 2023

Re: Bedrock Well Re-Installation and Performance Monitoring Groundwater Sampling Plan
1487 1st Avenue Redevelopment Site
New York, New York
Langan Project No.: 100963701
BCP Site No. C231152

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) has prepared this Bedrock Well Re-Installation and Performance Monitoring Groundwater Sampling Plan for the property located at 1487 1st Avenue, New York, NY. The site is enrolled in the Brownfield Cleanup Program (BCP) as Site No. C231152. The purpose of this plan is to propose the re-installation of bedrock monitoring wells that were originally installed during the Remedial Investigation (RI) and subsequently removed as a result of foundation construction, and the proposed well construction and sampling methodology for the groundwater performance monitoring following the injection of Emulsified Zero Valent Iron (EZVI) in March and April 2023 and as required by the January 2023 Interim Remedial Measures Work Plan (IRMWP) and March 2023 EZVI Injection Remediation Design.

This investigation will be conducted according to the methodologies and protocols outlined in the approved July 2022 Remedial Investigation Work Plan (RIWP), including the Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP) provided in RIWP Appendices C and D, respectively. As all soil has been removed from the Site, implementation of the Community Air Monitoring Program (CAMP) is not proposed for the remedial activities described herein.

BEDROCK WELL RE-INSTALLATION AND CONSTRUCTION

During the RI, sixteen bedrock monitoring wells were installed via rock coring a 3-inch-diameter borehole to between 48.6 (shallow wells) and 90.4 (deep wells) feet below street level (bsl). Shallow wells were constructed by installing three-inch steel casing socketed two-feet into bedrock which was encountered between 17 and 22 feet bsl and coring to between approximately 48.6 and 54.6 feet bsl. Deep wells were constructed by installing three-inch steel casing installed to a depth between 46 and 55 feet bsl. The casing and open annulus was sealed with bentonite pellets and allowed to expand prior to initiating coring, which was completed to between 81.3 and 90.4 feet bsl. All bedrock wells were constructed as three-inch open-hole wells below the steel casing. Following installation, the bedrock monitoring wells were flushed until the purge water ran clear. Bedrock well installation details and construction logs were provided in the March 2023 Remedial Investigation Report (RIR).

As documented in the September 2023 Draft Final Engineering Report (FER), the wells were removed during foundation construction for the new development. Remedial excavation of soil was completed to between 12 and 20 feet bsl; however, general excavation was completed across the majority of the Site footprint to approximately 23 feet bsl for construction of the cellar and sub-cellar, with excavation for deeper foundation elements advancing to between 31 and 42 feet bsl. The top of bedrock was encountered between 14 and 20 feet bsl across the Site footprint.

To implement performance monitoring at the site, a drilling contractor will advance ten 4-inch diameter boreholes to between 52 feet (shallow wells) and 87 feet (deep wells) bsl, corresponding to between approximately elevation (el) -15 feet and el -50 ft North American Vertical Datum 1988 (NAVD88). Following installation, the bedrock monitoring will be flushed until the purge water runs clear. Re-installation will include five shallow wells (LMW-6R-S through LMW-10R-S) and five deep wells (LMW-6R-D through LMW-10R-D). These wells were selected based on proximity to the former chlorinated solvent tank and the highest concentrations of tetrachloroethylene (PCE) and trichloroethylene (TCE) detected during the initial bedrock groundwater sampling event competed via passive diffusion bags (PDBs) in September 2022 and the baseline bedrock groundwater sampling event collected via low-flow sampling from within a straddle pack assembly in December 2022 as reported in the March 2023 EZVI Injection Remedial Design.

Re-installed wells will be placed as close to the original well locations as practicable based on the design and location of deep foundation elements and interior architectural structures, and no greater than approximately 10 feet from the originally-installed location. The original bedrock well locations and the proposed re-installation locations are presented on Figure 1. Wells will be fitted with hydraulically-inflated packers within or immediately below the steel casing to prevent water from rising into the future building and will be completed with flush-mounted manholes in the building sub-cellar slab at elevation 14.75 NAVD88.

BEDROCK WELL SAMPLING METHODOLOGY AND ANALYSIS

Down-hole geophysical logging will be performed in all five pairs of bedrock monitoring wells to characterize the bedrock water-bearing fractures, verify the previously targeted sampling intervals, and finalize the well sampling system design (discussed below). The geophysical analysis will include fluid temperature, fluid conductivity, fluid resistivity, caliper, natural gamma, single-point resistance, optical and acoustic televiewer, and, if required, heat pulse flow meter logs.

All ten bedrock monitoring wells be fitted with a custom-designed Westbay System fixed multi-level monitoring equipment. The Westbay System allows for the vertical isolation of discrete water-bearing zones in a continuous assembly that can be deployed in a single borehole. The proposed design consists of a vertically separated series of hydraulically-inflated packers connected with central access casing to provide engineered seals between discrete monitoring zones, which enables the sampler to obtain detailed vertical profiles of water quality via mechanical sampling ports in each monitoring zone. Field quality control procedures to enable verification of the quality of the well installation will include evaluating the central access casing for rising water levels as an indicator of leaks in the System construction and checking pressure in the measurement ports before and after packer inflation.

Seventeen sampling zones ranging in length from five to seven feet will be isolated between packers across the ten wells. Each sampling zone will overlap with a well interval previously sampled as part of the initial September 2022 sampling event or December 2022 baseline sampling event. A subsurface profile presenting the proposed monitoring zones, fracture intervals, and groundwater sample analytical results for locations at which the proposed monitoring zones overlap with the 2022 initial and baseline groundwater sampling depths is provided as Figure 2.

Langan groundwater samplers will be trained in sample collection techniques by a Westbay specialist. Groundwater samples will be collected a minimum of one week following installation of the Westbay System to allow the monitoring zones to equilibrate and stabilize. Valved ports within each monitoring zone provide access for discrete groundwater sample collection. Purging is not required with the Westbay System due to the isolated nature of each five- to seven-foot-long monitoring zone. Vertical mixing in the borehole is minimized, if not eliminated, as is contact with the atmosphere. The natural hydraulic gradient is maintained within each monitoring zone, allowing groundwater to continuously move from the aquifer into the monitored zone and then return to the aquifer. The groundwater samples are collected at the monitored zone in a container that is sealed before being brought to the surface. These features of the Westbay System allows for representative samples to be collected from each targeted sampling interval.

Performance monitoring samples will be collected by lowering between one and four 250 milliliter (ml) sample containers through the central access casing to the designated sampling zone. The number of sample containers lowered at one time will depend on the length of the specific sampling zone. The sample container(s) will release a sampling valve on the central access casing to allow water from within the isolated packered monitoring zone to fill the sample container(s). The sample container(s) is pulled to the surface so the collected sample can be placed in laboratory-provided bottleware. One to three groundwater samples will be collected from each of the ten wells, corresponding to a minimum of three groundwater samples collected from each of the five shallow/deep well pairs (for an overall total of seventeen groundwater samples), plus quality assurance/quality control (QA/QC) samples.

Samples will be collected in laboratory-supplied containers and will be sealed, labeled, and placed in an ice-chilled cooler (to maintain a temperature of about 4° C) for delivery to a NYSDOH ELAP-certified laboratory. All groundwater samples will be analyzed for volatile organic compound (VOC) analysis. Additional analytical parameters including metals (iron, calcium, manganese, and magnesium), anions (chloride, sulfate, and nitrate), total organic carbon, dissolved organic carbon, alkalinity, hardness, and microbial genes (for total bacteria and Dehalococcoides), will be analyzed in up to five of the seventeen samples.

REPORTING

Well installation and construction details and the performance monitoring groundwater analytical results will be reported in the Final Engineering Report and/or a separate Groundwater Monitoring Report. Category B deliverables will be requested from the laboratory and a DUSR will be prepared. VOC analytical results in groundwater will be reviewed to assess reductions from the initial and

baseline pre-remediation concentrations and the additional parameters will be reviewed to assess the potential for further reductions resulting from the March/April 2023 remedial injections.

Attachments: Figure 1 – Monitoring Well Location Plan
Figure 2 – Proposed Well Construction and Monitoring Zones on Subsurface Profile B-B'

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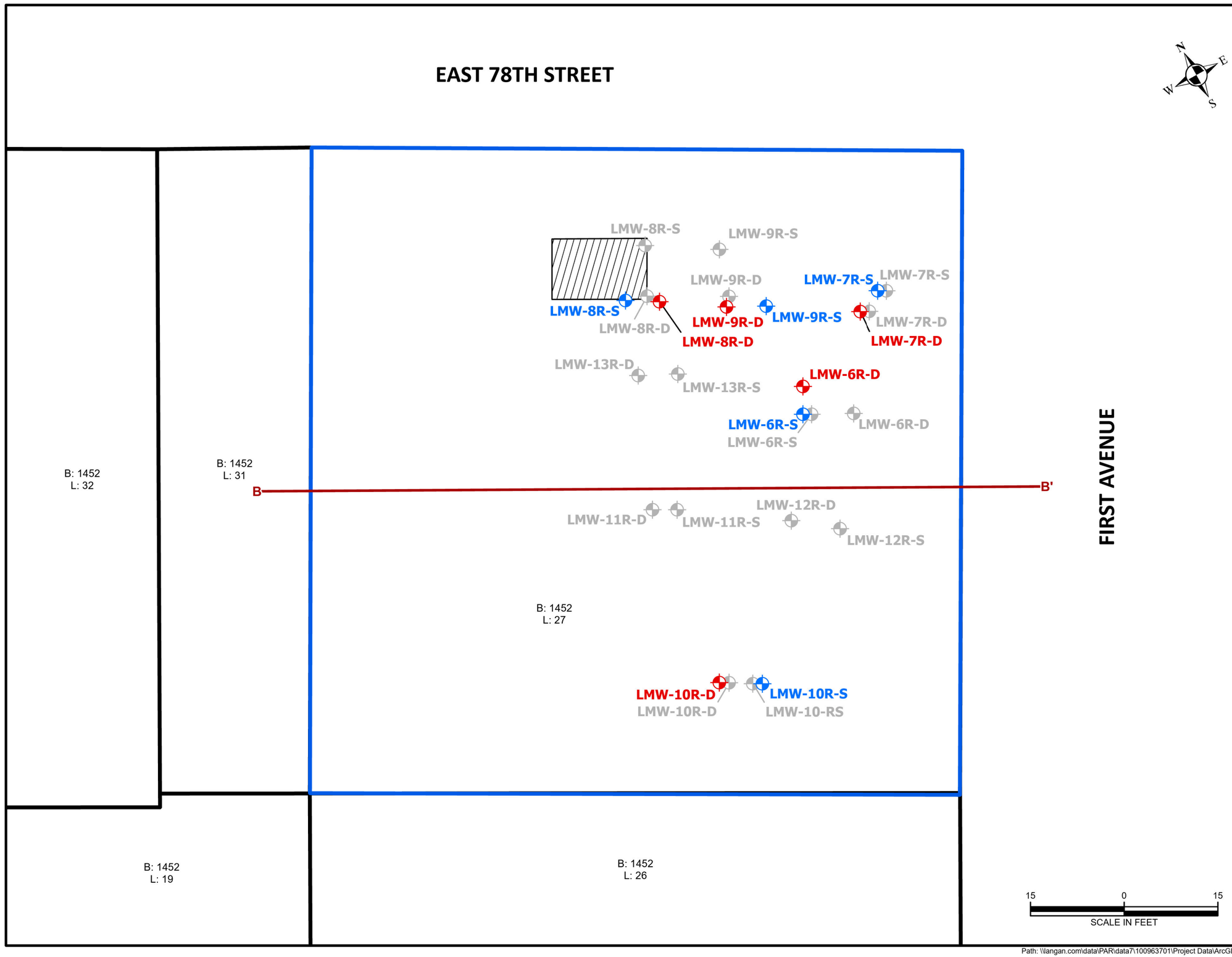

LEGEND

- SITE BOUNDARY
- TAX LOT BOUNDARY
- AOC-2: FORMER SOLVENT TANK
- CROSS SECTION
- PROPOSED DEEP BEDROCK WELL RE-INSALLATION LOCATION
- PROPOSED SHALLOW BEDROCK WELL RE-INSALLATION LOCATION
- SHALLOW AND DEEP BEDROCK MONITORING WELLS INSTALLED DURING THE 2022 RI

NOTES:
1. TAX PARCEL DATA PROVIDED BY THE NEW YORK CITY DEPARTMENT OF CITY PLANNING, MAPPLUTO 23V2.
2. MONITORING WELL LOCATIONS ARE BASED ON THE WELL AS-BUILT SURVEY PREPARED BY TRUE NORTH SURVEYORS, INC. DATED 21 OCTOBER 2022.

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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

1487 FIRST AVENUE REDEVELOPMENT SITE

BLOCK No. 1452, LOT No. 27

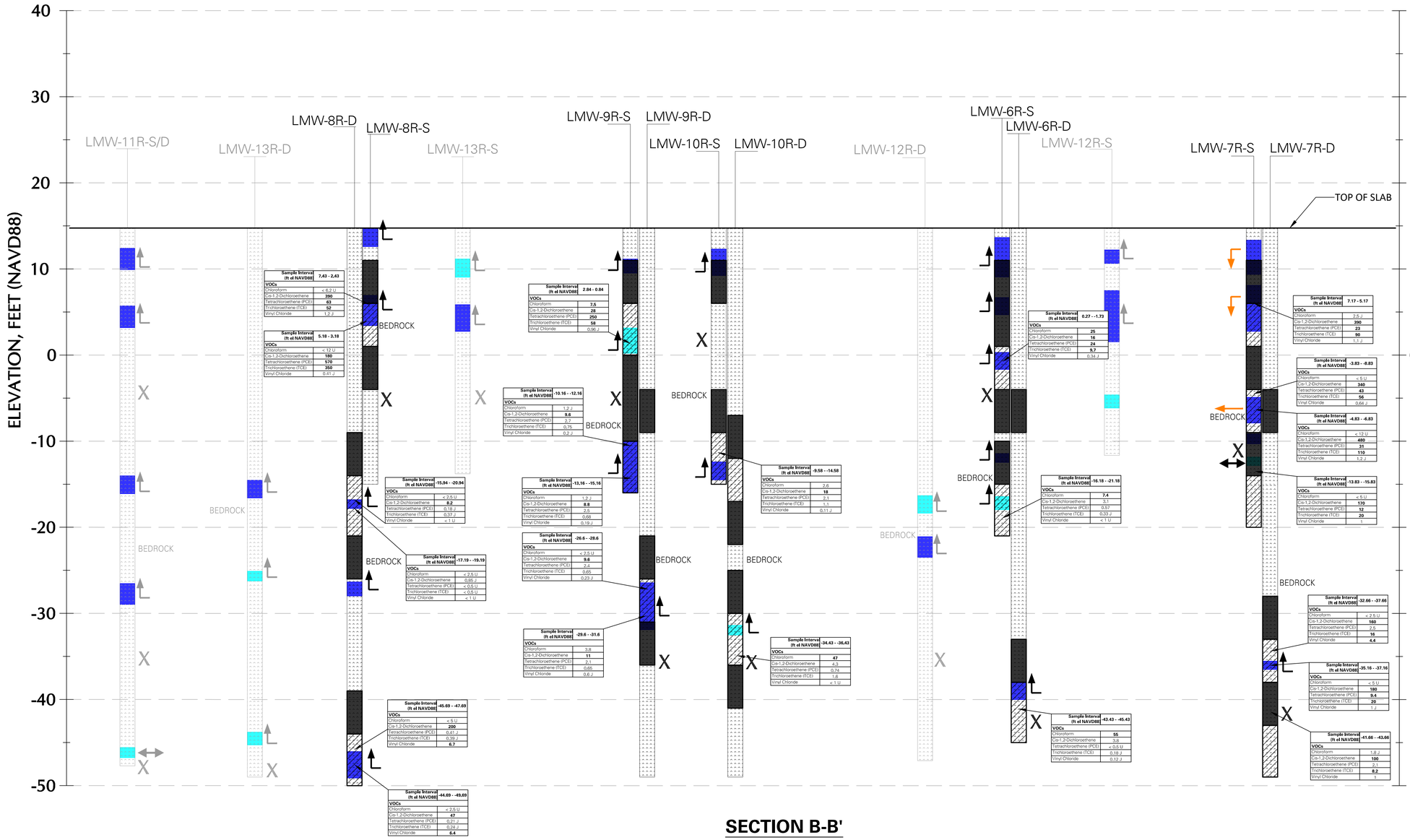
MANHATTAN

NEW YORK NEW YORK

Drawing Title

PROPOSED BEDROCK WELL LOCATION PLAN

Project No.	Figure
100963701	1
Date: 10/6/2023	
Scale: 1"=15'	
Drawn By: SH	



SECTION B-B'

VERTICAL SCALE: 1" = 6'
HORIZONTAL SCALE: N.T.S.

WELL KEY:

LMW-X

NOTES:

1. THIS PROFILE SHOWS GENERALIZED SUBSURFACE CONDITIONS AT THE RESPECTIVE PROPOSED WELL LOCATIONS. VARIATIONS IN SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN WELLS. FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED IN THE WELLS INSTALLED DURING THE REMEDIAL INVESTIGATION, SEE BORING LOGS INCLUDED IN APPENDIX A OF THE REMEDIAL INVESTIGATION REPORT.
2. THE ELEVATIONS FOR THE TOP OF SLAB IS TAKEN FROM FO-100.0 FOUNDATION PLAN BY MCNAMARA SALVIA, DATED 7 SEPTEMBER 2022.
3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88, WHICH IS 1.1 FEET ABOVE THE NATIONAL GEODETIC VERTICAL DATUM OF 1929, NGVD29, PER THE UNITED STATES GEOLOGIC SURVEY, USGS.
4. BOREHOLE FLOW AND WATER PRODUCING LOGGING INTERVALS DERIVED FROM THE BOREHOLE GEOPHYSICAL LOGGING DATA REPORT PREPARED BY HAGER-RIGHTER GEOSCIENCE, INC. DATED NOVEMBER 2022.

FLOW UNDER PUMPING CONDITIONS WITHIN BOREHOLE:

- FLOW INTO & UP BOREHOLE
- POSSIBLE FLOW IN OR OUT OF BOREHOLE
- X NO FLOW DETECTED

FLOW UNDER AMBIENT (NON-PUMPING) CONDITIONS WITHIN BOREHOLE:

- FLOW INTO & DOWN BOREHOLE
- FLOW OUT OF BOREHOLE

*NO FLOW WAS DETECTED UNDER AMBIENT CONDITIONS AT ANY WELL EXCEPT LMW-7R-S

- GROUNDWATER PRODUCING INTERVAL
- MINOR GROUNDWATER PRODUCING INTERVAL
- PROPOSED PACKER INTERVAL
- PROPOSED MONITORING ZONE

6 0 3 6
VERTICAL SCALE: 1 INCH = 6 FEET

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

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NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
1487 1ST AVENUE REDEVELOPMENT SITE
MANHATTAN NEW YORK

Drawing Title
PROPOSED WELL CONSTRUCTION AND PERFORMANCE MONITORING ZONES

Project No. 100963701
Date 10/16/2023
Drawn By AR
Checked By CR
Drawing No. 2

Filename: \\langan.com\data\PAR\data7\100963701\Project Data\ArcGIS\CAD\FG06-100963701-0201-B\201-0101.dwg Date: 10/16/2023 Time: 15:43 User: aruane Style Table: Langan.stb Layout: PROPOSED WELL

LANGAN PROJECT NO. 100963701