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M e m o r a n d u m

Date: 22 April 2020

To: Sherwood McKenney, District Engineer
Waste Management Disposal Services of Maine, Inc. (WMDSM)

From: Youngmin Cho, Nicholas Yafrate, P.E., and Scott Luettich, P.E.
Geosyntec Consultants (Geosyntec)

Subject: Summary of 2019 Site Wide Stability Monitoring
WMDSM – Crossroads Landfill
Norridgewock, Maine

This memorandum summarizes the site-wide stability monitoring activities performed and results obtained at the Crossroads Landfill during 2019. Monitoring was performed in general accordance with the site wide *Stability Monitoring Plan* (SMP), dated December 2016.

SUMMARY OF 2019 WASTE PLACEMENT, CONSTRUCTION ACTIVITIES, AND LEACHATE RECIRCULATION

In 2019, WMDSM placed waste in portions of Phases 8A, 8B, 8C′, and 8C″ Permit Modification (PM). Figure 1 presents a plan view of Phase 8/7/9 and the approximate locations of waste placement in 2019. Numbered areas shown on Figure 1 were used to sub-divide active locations of waste placement within these phases. Generally, waste placement activities transitioned from the central portions of Phases 8B and 8C′ (Area I) in January 2019 to the central portion of Phase 8A and southern portions of Phases 8B and 8C′ (Area II) through June 2019. Waste placement then transitioned back to the central portions of Phase 8B and 8C′ (Area I) through July and then back to the central portion of Phase 8A and southern portions of Phases 8B and 8C′ (Area II) in August. In September, waste placement transitioned to the central portions of Phases 8B and 8C′ (Area I) and Phase 8C″ (PM) and the northern portions of Phases 8B and 8C′ through December 2019 (Area III). Throughout 2019, asbestos-containing waste materials were placed in the north-central portion of Phase 8A and the southern portion of Phase 8B (Area IV). Waste was not placed in other landfill phases at Crossroads in 2019 (i.e., Phase 10, Phase 11 (Figure 2), and Phase 12 (Figure 3)).

Phase 8C″ PM was constructed between early May and 26 July 2019. Construction included installation of wick drains, removal of the southern portion of the existing Asbestos Landfill final

cap components, and construction of the Phase 8C″ PM liner system. Additionally, new geotechnical instrumentation was installed for monitoring Phase 8C″ PM.

Completion and repair of the Phase 11 final closure system was performed between 20 May 2019 and 16 July 2019. This included repair of stormwater conveyances (downchutes and drainage benches), establishment of grass vegetation on the slopes, and construction of the perimeter drainage ditch. Geotechnical instrumentation was routinely monitored at Phase 11 during this time period.

Per the SMP, WMDSM recorded the details of the waste placement activities daily. The information was summarized in tables that were periodically uploaded to a website set up for Crossroads stability monitoring[1] and organized by month. Copies of the daily activity summaries are included on a USB drive as an electronic attachment (Attachment A – Daily Activity Logs) to this memorandum.

In 2019, leachate recirculation was performed in areas of Phase 8 active waste placement (i.e. the active face) in accordance with the February 2016 *Leachate Recirculation Plan.* Leachate was primarily recirculated (sprayed) on the active face. Leachate recirculation was not performed at other landfill phases of the site.

SUMMARY OF 2019 STABILITY MONITORING

Table 1 presents a summary of the slope inclinometers, shape accelerometer arrays (SAAs), and piezometers that were monitored in 2019. Individual instrument monitoring frequencies were established based on the occurrence of "activity" within the zone of influence of each instrument. Plots of the inclinometer, SAA, and piezometer data were regularly uploaded to the project website for review by the project team and personnel from the Maine Department of Environmental Protection (MEDEP). Copies of the plots and data files generated in 2019 from readings obtained from the slope inclinometers, SAA's, and piezometers, as well as a copy of this 2019 Stability Monitoring Summary report are included on the attached USB drive.

Measurements of the inclinometers and manually read piezometers were made by WMDSM technicians and transmitted via email to WMDSM's geotechnical consultant, Mr. Richard T. Reynolds, P.E. and to Geosyntec. Measurements of SAAs and associated piezometers were recorded with data loggers and transmitted to Geosyntec by Mr. Reynolds via email.

Stability monitoring instrumentation for the Phase 8/7/9 (Figure 1), Phase 11 (Figure 2) and Phase 12 (Figure 3) landfill units was monitored at frequencies recommended in the SMP. Stability monitoring equipment is not presented for Phase 10 because monitoring of this landfill is not

[1] http://pmprojects.geosyntec.com/CrossroadsLandfillStabilityMonitoring/default.aspx

required. SAAs have been installed adjacent to active areas of the Phase 8/7/9 landfill units, next to existing inclinometers. A summary of SAA monitoring throughout 2019 is presented in Table 2. Data loggers installed at each SAA recorded the SAA data and nearby piezometer data multiple times each day. Per the SMP, inclinometers in the area of SAAs were monitored at a frequency of approximately once every two months. If an SAA had not been installed near an active area of Phase 8/7/9, the applicable inclinometer and piezometer readings were to be obtained weekly to monitor ongoing waste placement; however, waste placement did not take place in areas of Phase 8/7/9 that were not monitored by an SAA in 2019. Some instruments located away from the active areas were read monthly, bi-monthly, quarterly, or semi-annually as recommended in the SMP. Phase 11 instruments were monitored quarterly. The Phase 12 instruments were read semi-annually. The specific dates that each inclinometer and piezometer were read can be found on the cover pages of the monthly[2] inclinometer reading summaries presented in Attachment C (included on the attached USB drive).

As indicated in the SMP, there are additional instruments installed at the site and shown on Figure 1 (slope inclinometers, extensometers, vibrating wire settlement plates, and piezometers) that are not monitored as part of the SMP. At the request of Mr. Reynolds, readings on some of those instruments were obtained throughout the year for use in his on-going geotechnical assessment work. The data from the additional instrument readings were transmitted to Mr. Reynolds and maintained on file.

Instrumentation Damage, Repairs and New Installations

No new damage to the instrumentation was reported or observed in 2019.

No repairs were made to the instrumentation in 2019.

New instruments were installed in 2019 for monitoring of waste filling in the newly constructed Phase 8C″ PM. The new instruments include SI-772, SAA-C14, SAA-705R, SAA-706R, SAA-720R and associated piezometers and settlement cells as indicated in Table 1.

Stability Monitoring Criteria

Inclinometers and SAAs are used to assess soil displacement and strain in the clay layer while piezometers are used to assess changes in pore water pressure in the underlying soils (i.e., clay and glacial till). Per the SMP, the inclinometer and SAA results indicate displacement (or strain) criteria established to provide a warning if excessive movement may be occurring. The alert assessment process is slightly different for inclinometers and SAAs as described below.

[2] Monthly summaries are presented only for months during which the inclinometers were monitored.

Inclinometers

Each time measurements were obtained from the inclinometers, incremental displacement values between successive readings were computed for each two-foot vertical increment of the inclinometer. Inclinometer data files and plots are provided in Attachments B and C, respectively (included on the attached USB drive). The incremental displacements within the upper 10-12 feet of the inclinometer were generally disregarded because the casings at those depths are subject to movement due to frost action and potential near-surface disturbances from ongoing site operations.

The inclinometer measurements are compared to two alert levels, referred to as yellow and red, that correspond to clay strain levels measured at discrete depths within the inclinometer casing. The strain level that triggers an alert is based on the clay strength that was used for designing the slopes in the influence zone of any given inclinometer. Originally, slopes at the site were designed using conventional consolidation clay strength analysis methods. More recently, the increased strength available from shear-induced strength gain (SISG) has been accounted for in slope design. Therefore, in these areas (SISG areas) the incremental displacement alert levels are different from non-SISG areas. Table 1 indicates which alert level applies (non-SISG or SISG) for each inclinometer. The slope designs for Phases 8/7/9 and 11 have been updated to account for SISG. The design analyses for Phases 10 and 12 did not include SISG calculations.

A yellow alert applies to positive incremental strains and displacements between successive readings. A red alert applies to positive incremental strains and displacements over a two-week period. The alert levels are defined as follows.

- Yellow Alert – Non-SISG: strains ≥ 0.10% (≥ 0.024 in. incremental displacement)
- Yellow Alert – SISG: strains ≥ 0.033% (≥ 0.0079 in. incremental displacement)
- Red Alert – Non-SISG: strains ≥ 0.25% (≥ 0.06 in. incremental displacement)
- Red Alert – SISG: strains ≥ 0.0833% (≥ 0.02 in. incremental displacement)

The alert criteria were not applied to inclinometers when an SAA was installed in an adjacent borehole. In these cases, the SAA's were used to assess alerts as described in the following section.

SAAs

Automated measurements taken with SAAs were generally recorded several times a day, which exceeds the frequency required by the SMP. The SAA data files and plots are provided in Attachments D and E, respectively (included on the attached USB drive). Sensors within each SAA are one foot apart vertically and therefore provide a greater resolution than manual inclinometers. Alerts are assessed from an average of measurements from three adjacent sensors

(e.g., sensors at depths of 39, 40, and 41 feet in any given SAA would be presented as data from 40 feet). As with inclinometers, SISG and non-SISG strength and displacement criteria are applicable to SAA measurements. The SAA measurements are compared to one alert level, referred to as a Red Alert, that corresponds to clay strain levels measured at discrete depths within the SAA casing. The strain level that triggers an alert is based on historical measurements from inclinometers and SAAs at Crossroads Landfill. The alert levels applied to SAA's are defined as follows.

- Red Alert – Non-SISG: strains ≥ 0.25% within two-week period
- Red Alert – SISG: strains ≥ 0.0833% within two-week period

As a result of obtaining multiple SAA readings each day, yellow alerts are not necessary. The software used to review and plot SAA data calculates strain directly, and it is therefore not necessary to assess incremental displacements.

Piezometers

In accordance with the SMP, pore pressure measurements from piezometers located adjacent to the slope inclinometers are obtained to provide supplemental information related to the slope inclinometer and SAA measurements. The piezometer data files and plots are provided in Attachments F and G, respectively (included on the attached USB drive). Alert levels for changes in pore pressure are not defined in the SMP. However, increases in excess pore pressure (if they occur concurrently with straining in the clay layer) may be indicative of undrained shearing. Conversely, strain that occurs in the clay without increased pore pressure is indicative of drained shear and may result in increased clay strength. Piezometer measurements are therefore used to assist with the evaluation exceedances of the displacement criteria relative to drained or undrained shearing.

Results of Stability Monitoring

A general discussion of the results of the stability monitoring performed in 2019 is summarized for each landfill phase in the sections below. A summary of the maximum cumulative strain measured at the end of 2019 in each inclinometer (and for reference, also at the end of 2018) is presented in Table 3. The cumulative strain represents the maximum deformation measured since the inclinometer casing was installed. A similar summary table for cumulative strains measured with SAAs was not included because the SAAs are installed for discrete time periods at the various monitoring locations; and because they are moved from one location to another, cumulative SAA strain plots would not represent the total cumulative strain since loading began. Summaries of the specific dates that each inclinometer was read, and a detailed description of alerts and the resulting actions taken, if any, are provided on the cover pages of the individual monthly summary of

inclinometer readings uploaded to the project website (see Attachment C included on the attached USB drive).

In 2019 instrumentation measurements occasionally indicated exceedances of the alert criteria. In accordance with the SMP, the data related to each exceedance were promptly reviewed by Geosyntec and/or Mr. Reynolds, and subsequent readings (re-reads) were taken when necessary. Upon careful review, the exceedances measured in 2019 were not found to represent stability problems because the cumulative strain is within acceptable ranges, the rate of strain slowed after measurement of the exceedance, and/or the apparent exceedance was attributed to the measurement fluctuation.

Phase 8/7/9

Stability monitoring in the Phase 8/7/9 areas was performed at the frequency set forth in the SMP during 2019.

Phase 8A – east: Strain measurements in SAA-F12 indicated exceedances of the red alert criteria in August; however, measurements taken before and after the apparent exceedances with the nearby inclinometer SI-761 on 5 June 2019 and 28 August 2019 did not corroborate the exceedances. Measurements in the nearby piezometer, PZ-859, did not indicate a significant increase in pore pressure at the time of the apparent red alert measurements. Because the apparent red alert measurements were not corroborated by the inclinometer or piezometer, they were not considered indicative of slope instability

Phase 9A – west: Yellow alert exceedances were observed in SI-745 during the 11 March and 28 August readings at a depth of 39 ft. Negative measurements (i.e. towards the landfill) of similar magnitude have been recorded at the same depth on several other occasions in recent years including 20 November 2019 and 20 December 2018. Pore pressure measurements in the nearby piezometer, PZ-830, were typical for this time of the year and not indicative of shear induced pore pressures. Additionally, landfill activity did not occur in the influence zone of SI-745 in 2019. The exceedance was therefore attributed to measurement fluctuation and is not considered indicative of slope instability.

During 2019 the piezometer readings in the Phase 8/7/9 showed similar trends to historic data in these areas. In areas where significant waste placement occurred, increases in pore pressure were observed. The pore pressure dissipated after waste placement was complete in these areas.

Phase 11

Stability monitoring of Phase 11 was performed quarterly.

Phase 11B – west: A yellow alert exceedance was observed in SI-737 during the 20 March 2019 readings at a depth of 27 ft. A negative displacement (i.e. towards the landfill) of similar magnitude was recorded at the same depth during the subsequent measurement on 19 June 2019. Pore pressure measurements in the nearby piezometer, PZ-819, were typical for this time of the year and not indicative of shear induced pore pressures. The exceedances were therefore attributed to measurement fluctuation and are not considered indicative of slope instability.

Phase 11C – west: Significant measurement fluctuation was observed in SI-739R during the 20 March 2019 readings, including exceedances of the yellow alert criteria at depths of 39 ft, 43 ft, and 51 ft. Subsequent readings measured on 18 April 2019 did not show any yellow alert exceedances. Pore pressure measurements in the nearby piezometer, PZ-822, were typical for this time of the year and not indicative of shear induced pore pressures. The exceedances were therefore attributed to measurement fluctuation and are not considered indicative of slope instability.

Phase 11 – multiple locations: Measurement fluctuation was observed during the 16 December 2019 measurement round at several locations including SI-733, SI-736, SI-737, SI-739R, SI-740, SI-741R. Pore pressure measurements in the nearby piezometers were typical for this time of the year and not indicative of shear induced pore pressures. The slope inclinometers will be reread and evaluated in 2020.

No additional exceedances of the yellow or red alert criteria or spikes in excess pore water pressure associated with undrained shearing in the clay were observed with the Phase 11 inclinometers and piezometers in 2019.

Phase 12

Phase 12 was permanently closed in 2016, and therefore WMDSM did not place waste in Phase 12 during 2019. The instrumentation was monitored on 23 May and 29 November 2019.

No exceedances of the yellow or red alert criteria or spikes in excess pore water pressure associated with undrained shearing in the clay were observed with the Phase 12 inclinometers and piezometers in 2019.

SUMMARY AND CONCLUSIONS

Stability monitoring activities at the Crossroads Landfill in 2019 were performed at the locations summarized in Table 1. The maximum cumulative strain levels recorded in the inclinometers in 2019 are summarized in Table 3.

Although yellow alert exceedances were observed in one Phase 8/7/9 inclinometer and several Phase 11 inclinometers and a red alert exceedance was observed in a Phase 8 SAA during 2019, the measurements are not considered indicative of potential slope instability because they were not

corroborated by measurements from adjacent instruments (i.e., nearby inclinometers and piezometers), visual observations by WMDSM do not indicate significant changes in conditions, the total cumulative clay deformations were within acceptable ranges, the rate of deformations slowed after measurement of the exceedances, and/or the apparent exceedances were attributed to measurement fluctuation assessed by re-reading the instruments. Clay deformations in other areas associated with waste placement in 2019 were within expected ranges and did not require extended periods of increased monitoring frequency.

Pore pressure fluctuations recorded by the piezometers were consistent with overall waste heights, recent loading (if any), and duration of inactivity near the instrument clusters. The piezometer readings also reflect background fluctuations due to climatic changes in ground-water levels, temperature, and barometric pressure.

Overall, the slope inclinometer and SAA monitoring data throughout 2019, when evaluated in conjunction with pore-pressure readings, were not indicative of landfill slope or foundation soil instability.

* * * * *

Table 1A. Summary of Phase 8/7/9 Instrumentation Monitored in 2019

INCLINOMETER (SI) & SAA [1]			PIEZOMETER (PZ)		STRENGTH TYPE[2]	INSTALLED IN 2019
SI	SAA[3]	LOCATION	NAME	LOCATION		
W2-SI	SAA-F13	Phase 7 – northwest	W2-VWP	adjacent to W2-SI	SISG	-
SI-745	SAA-F14	Phase 9A – west	PZ – 830	adjacent to SI-745	SISG	-
SI-746	SAA-F3	Phase 9B – north	PZ – 833	adjacent to SI-746	SISG	-
SI-747	SAA-F2	Phase 9B – east	PZ – 836	adjacent to SI-747	SISG	-
SI-760	SAA-F5	Phase 8A – south	PZ – 854	adjacent to SI-760	SISG	-
SI-761	SAA-F12	Phase 8A – east (Phase 1)	PZ – 859	adjacent to SI-761	SISG	-
-	-	Phase 8A – north	PZ – 863	under former access ramp	SISG	-
SI-765R	SAA-F4	Phase 8A – west	PZ – 864	adjacent to SI-765	SISG	-
SI-767	-	Phase 8B – north	PZ – 871	adjacent to SI-767	SISG	-
-	-	Phase 8B – east	PZ – 872	Phase 8B/C′ division berm	SISG	-
-	-	Phase 8B – east	PZ – 866	600 ft west of SI-769	SISG	-
SI-769	SAA-F7R	Phase 8C′ – southeast	PZ – 877	adjacent to SI-769	SISG	-
-	-	Phase 8C′ – southeast	PZ - 893	Adjacent to SAA-F7R	SISG	-
-	SAA-F15	Phase 8C′ – southeast	PZ – 892	adjacent to SAA-F15	SISG	-
-	-	Phase 8C′	PZ – 875	200 ft west of SI-769	SISG	-
SI-770	SAA-F8	Phase 8C′ – northeast	PZ – 880	adjacent to SI-770	SISG	-
-	-	Phase 8C′ – northeast	PZ – 878	290 ft west of SI-770	SISG	-
SI-772	SAA-10R	Phase 8C″ PM west	PZ – 885	Adjacent to SI-772	SISG	X
-	-	-	PZ – 884	Phase 8C″ west-central	SISG	X
SI-773	SAA-F6	Phase 8A – southeast	PZ – 889	adjacent to SI-773	SISG	-
-	-	Phase 8A – southeast	PZ – 891	adjacent to SI-773/SAA-F6	SISG	-
	SAA-C14	Phase 8C″ PM north	PZ – 894	Adjacent to SAA-C14	SISG	X
-	-	-	PZ – 888	Ph 8CLF Berm	SISG	X
-	-	-	PZ – 890	Phase 8C″ - central	SISG	X
-	-	-	PZ – 883	Phase 8C″ - central	SISG	X
-	SAA-705R	Asbestos LF - east	-	-	SISG	X
-	SAA-706R	Asbestos LF - north	PZ – 06BR	Adjacent to SAA-706R	SISG	X
-	SAA-720R	Asbestos LF - west	-	-	SISG	X

Notes:
1. SAA represents Slope Accelerometer Array.
2. SISG represents Shear-Induced Strength Gain.
3. SAAs were not used to for Phase 11 and 12 monitoring in 2019. The SAA monitoring status in 2019 is summarized in Table 2.

Table 1B. Summary of Phases 11 and 12 Instrumentation Monitored in 2019

INCLINOMETER (SI) & SAA [1]			PIEZOMETER (PZ)		STRENGTH TYPE[2]
SI	SAA[3]	LOCATION	NAME	LOCATION	
SI-733	-	Phase 11A - south	PZ-813	adjacent to SI-733	SISG
SI-734	-	Phase 11A - west	PZ-814	adjacent to SI-734	SISG
SI-735	-	Phase 11A - southeast	PZ-821	adjacent to SI-735	SISG
SI-736	-	Phase 11B - east	PZ-815	adjacent to SI-736	SISG
SI-737	-	Phase 11B - west	PZ-819	adjacent to SI-737	SISG
SI-739R	-	Phase 11C - west	PZ-822	adjacent to SI-739R	SISG
SI-740	-	Phase 11C - north	PZ-824	adjacent to SI-740	SISG
SI-741R	-	Phase 11C - east	PZ-825	adjacent to SI-741R	SISG
SI-755	-	Phase 12A - west	PZ-845	adjacent to SI-755	Non-SISG
SI-756	-	Phase 12A - north	PZ-847	adjacent to SI-756	Non-SISG
SI-757	-	Phase 12B - east	PZ-852	adjacent to SI-757	Non-SISG
SI-758	-	Phase 12B - west	PZ-849	adjacent to SI-758	Non-SISG
SI-759	-	Phase 12B - south	PZ-853	adjacent to SI-759	Non-SISG

Notes:
1. SAA represents Slope Accelerometer Array.
2. SISG represents Shear-Induced Strength Gain.
3. SAAs were not used to for Phase 11 and 12 monitoring in 2019. The SAA monitoring status in 2019 is summarized in Table 2.

Table 2. Summary of SAA Monitoring in 2019

SAA	LOCATION	DATE MONITORING STARTED	DATE MONITORING ENDED[1]
SAA-C14	Phase 8C″ north	July 2019	Ongoing
SAA-F2	Phase 9B – east	Not Monitored	Not Monitored
SAA-F3	Phase 9B – north	Prior to 1 January 2019	Ongoing
SAA-F4	Phase 8A – west	Prior to 1 January 2019	Ongoing
SAA-F5	Phase 8A – south	Not Monitored	Not Monitored
SAA-F6	Phase 8A – southeast (Phase 2)	Not Monitored	Not Monitored
SAA-F7R	Phase 8C′ – southeast	Prior to 1 January 2019	Ongoing
SAA-F8	Phase 8C′ – northeast	June 2019	Ongoing
SAA-F10R	Phase 8C″ PM - west	June 2019	Ongoing
SAA-F12	Phase 8A – east (Phase 1)	Prior to 1 January 2019	Ongoing
SAA-F13	Phase 7 – northwest	Prior to 1 January 2019	Ongoing
SAA-F14	Phase 9A – west	Not Monitored	Not Monitored
SAA-F15	Phase 8C′ - southeast	Prior to 1 January 2019	Ongoing
SAA-705R	Asbestos LF - east	August 2019	Ongoing
SAA-706R	Asbestos LF - north	August 2019	Ongoing
SAA-720R	Asbestos LF - west	August 2019	Ongoing

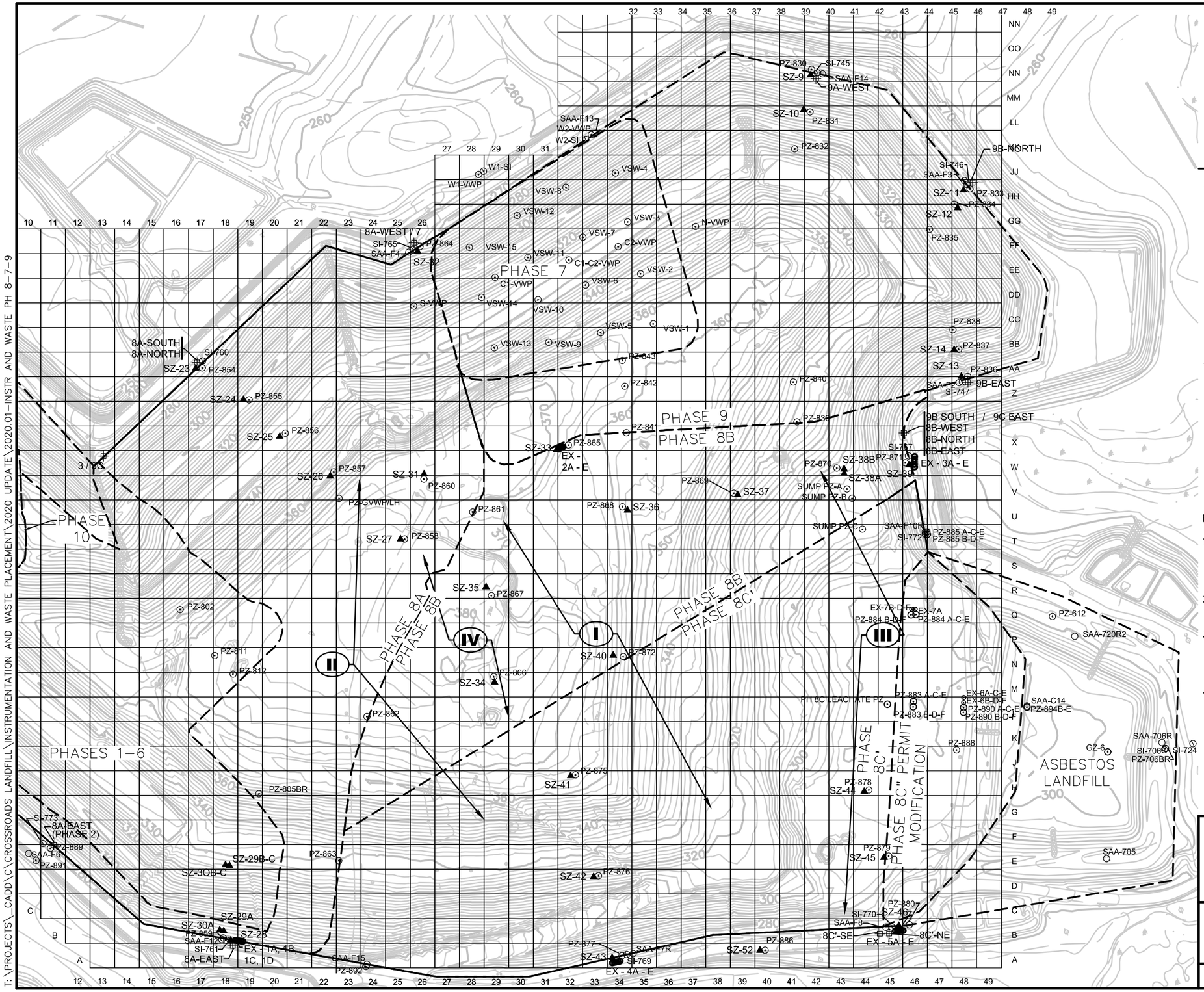
Notes:
1. Ongoing indicates monitoring in the SAA continued through the end of 2019.

Table 3. Summary of Maximum Strain Observed at Each Slope Inclinometer

INCLINOMETER	LOCATION	2018 MAXIMUM STRAIN (%)[1]	2018 DEPTH OF MAXIMUM STRAIN (FT)[2]	2019 MAXIMUM STRAIN (%)[1]	2019 DEPTH OF MAXIMUM STRAIN (FT)[2]
ACTIVE PHASE 8/7/9 LANDFILL					
W2-SI	Phase 7 – northwest	2.62	47	2.64	47
SI-745	Phase 9A – west	1.26	45	1.29	45
SI-746	Phase 9B – north	1.86	59	1.87	59
SI-747	Phase 9B – east	1.72	69	1.73	69
SI-760	Phase 8A – south	2.80	50	2.81	50
SI-761	Phase 8A – east (Ph 1)	1.48	52	1.53	52
SI-765R[3]	Phase 8A – west	0.09	64	0.11	44
SI-767	Phase 8B – north	0.73	48	0.73	48
SI-769	Phase 8C′ – southeast	0.50	57	0.65	71
SI-770	Phase 8C′ – northeast	0.08	32	0.08	34
SI-772	Phase 8C″ PM – west	Note 5	Note 5	Note 5	Note 5
SI-773	Phase 8A – southeast (Ph 2)	1.89	40	1.91	40
PHASES 11 AND 12 LANDFILLS					
SI-733	Phase 11A - south	0.91	53	0.95	53
SI-734	Phase 11A - west	1.68	54	1.71	54
SI-735	Phase 11A - southeast	0.21	48	0.24	48
SI-736	Phase 11B - east	1.89	47	1.90	47
SI-737	Phase 11B - west	2.03	51	2.06	51
SI-739R[3]	Phase 11C - west	0.59	45	0.61	45
SI-740	Phase 11C - north	1.20	49	1.23	51
SI-741R[3]	Phase 11C - east	0.20	44	0.25	42
SI-755[4]	Phase 12A - west	0.60	43	0.61	43
SI-756	Phase 12A - north	0.43	37	0.46	37
SI-757[4]	Phase 12B - east	0.55	37	0.52	37
SI-758	Phase 12B - west	1.80	41	1.81	41
SI-759	Phase 12B - south	0.13	47	0.16	47

Notes:

1. Values of positive strain (away from the waste mass and approximately perpendicular to limit of waste) were rounded to the nearest 1/100th of a percent.
2. Maximum strain values were computed for elevations within the clay layer and below approximately 20 feet to avoid the influence of surface effects such as freeze and thaw and impacts from vehicles or equipment.
3. Strain observed since inclinometer repair.
4. The reduction in maximum strain from 2018 to 2019 is likely the result of instrument variability/fluctuation rather than an indication of actual soil displacement.
5. SI-772 was installed in 2019 and an initial measurement was taken in 2019.



NOTES:

1. EXISTING GROUND SURFACE AND FEATURES OBTAINED FROM TOPOGRAPHIC SURVEYS, DATED 30 SEPT 2018 IN SURROUNDING AREAS, AND 15 DEC 2019 IN THE ACTIVE PHASE 8 AREA, PROVIDED BY BOYNTON & PICKETT LLC.
2. VERTICAL DATUM IS 1.47 FT BELOW NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. INSTRUMENT LOCATIONS REPRESENT AS–BUILT LOCATIONS AS DETERMINED BY SACKETT & BRAKE SURVEY, INC. OF SKOWHEGAN, MAINE AND SURVEY WORKS, INC. OF LEWISTON, MAINE AND BOYNTON & PICKETT LLC OF SKOWHEGAN MAINE.
4. DETAILED DESCRIPTIONS OF WHERE AND WHEN WASTE FILLING TOOK PLACE IN ACTIVE AREAS ARE PROVIDED IN REPORT TEXT AND ATTACHMENT A.

INSTRUMENTATION AND WASTE PLACEMENT IN 2019

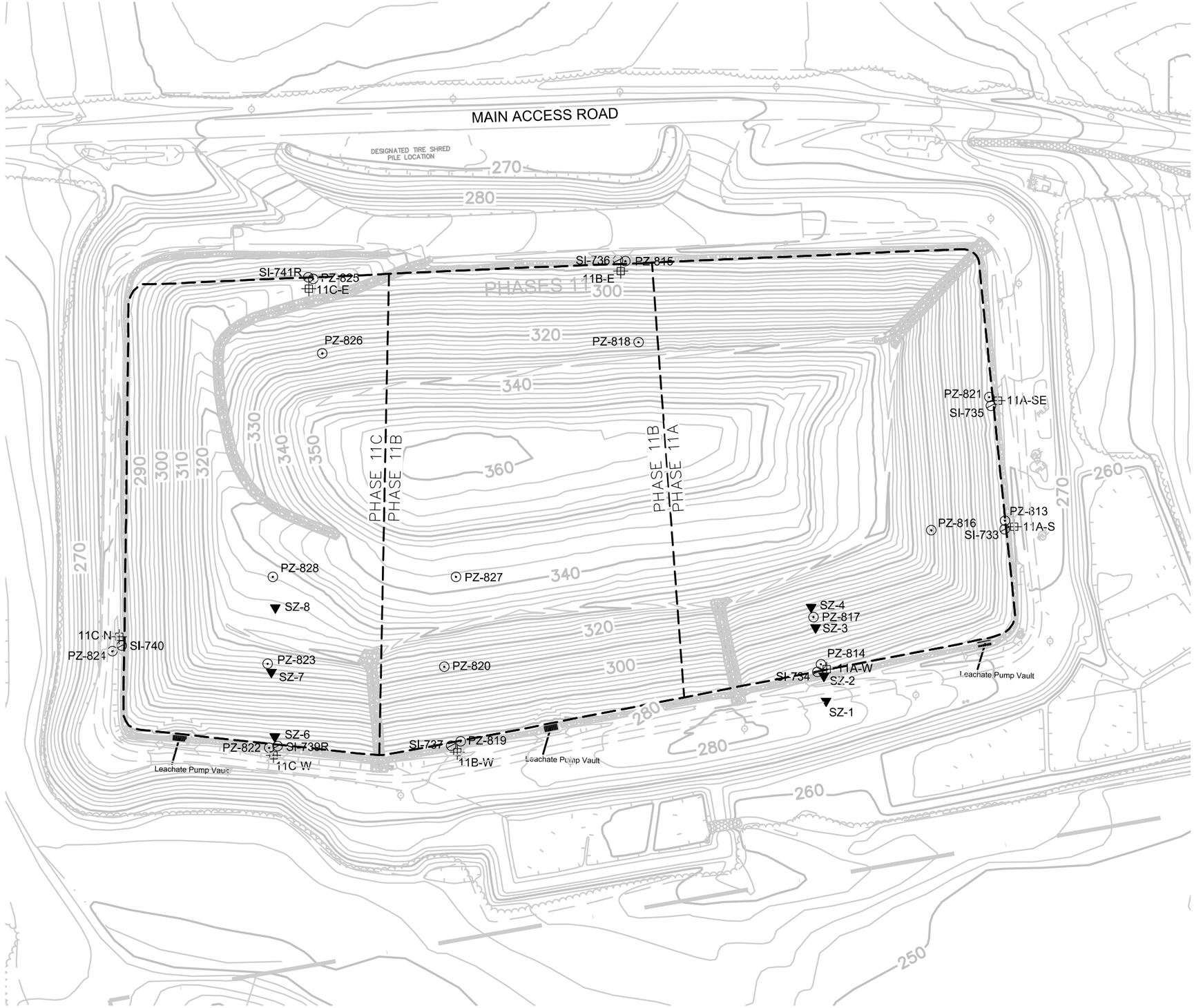
PHASE 8, 7, AND 9
CROSSROADS LANDFILL
NORRIDGEWOCK, MAINE

Geosyntec consultants

Acton, MA | APRIL 2020

Figure: 1

T:\PROJECTS_CADD\C\CROSSROADS LANDFILL\INSTRUMENTATION AND WASTE PLACEMENT\2020 UPDATE\2020.01-INSTR AND WASTE PH 8-7-9



NORTH

LEGEND

- 336 — MAJOR TOP OF FINAL CAP CONTOUR
- MINOR TOP OF FINAL CAP CONTOUR
- PHASE BOUNDARIES
- PZ-891, VSW-2, W1-VWP — NESTED PIEZOMETER
- SZ-24 — SETTLEMENT PLATE
- SI-767, W1-SI — INCLINOMETER
- 9A-WEST — TERMINAL BOX

NOTES:

1. EXISTING GROUND SURFACE AND FEATURES OBTAINED FROM TOPOGRAPHIC SURVEYS, DATED 30 SEPT 2018 IN SURROUNDING AREAS, AND SEPT 2019 IN THE ACTIVE PHASE 11 AREA (FINAL COVER GRADES), PROVIDED BY BOYNTON & PICKETT LLC.
2. VERTICAL DATUM IS 1.47 FT BELOW NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88). HORIZONTAL DATUM IS ESTABLISHED SITE DATUM.
3. ALL INTERIOR CELL BOUNDARIES, INSTRUMENTS, AND INSTRUMENT BOX LOCATIONS WERE DIGITIZED AND ARE APPROXIMATE.
4. SETTLEMENT PLATE SZ-5 LOCATION IS UNAVAILABLE AND THEREFORE NOT SHOWN.

150 75 0 150

SCALE IN FEET

INSTRUMENT LOCATION PLAN

PHASE 11
CROSSROADS LANDFILL
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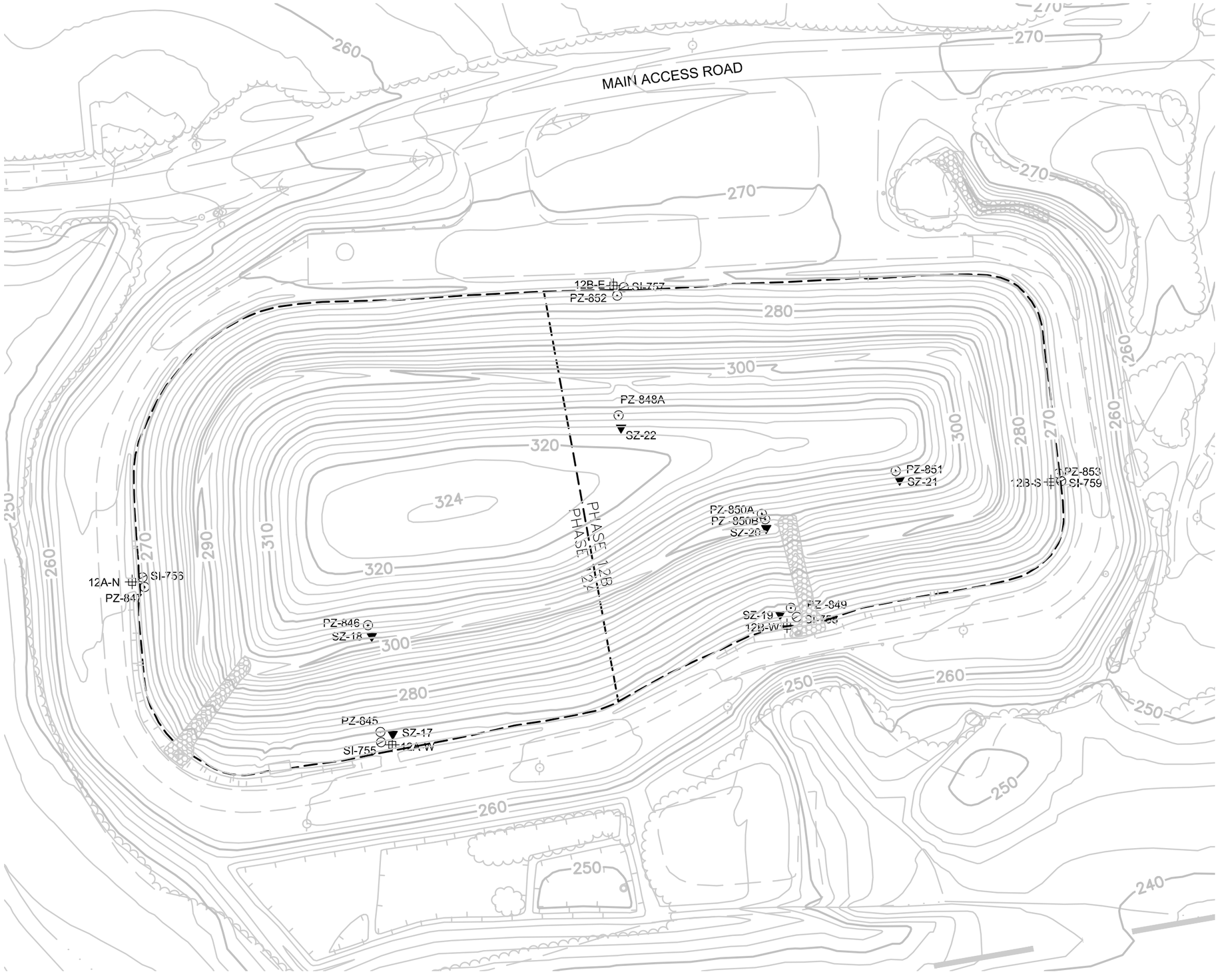
FIGURE 2

T:\PROJECTS_CADD\C\CROSSROADS LANDFILL\INSTRUMENTATION AND WASTE PLACEMENT\2020 UPDATE\2020.01-INSTR AND WASTE PH 11



NORTH

LEGEND

- 320 — MAJOR TOP OF FINAL CAP CONTOUR
- MINOR TOP OF FINAL CAP CONTOUR
- PHASE BOUNDARIES
- PZ-891 — NESTED PIEZOMETER
- SZ-24 — SETTLEMENT PLATE
- SI-767, W1-SI — VERTICAL SLOPE INCLINOMETER
- 9A-WEST — TERMINAL BOX

NOTES:

1. BASE PLAN IS FROM AERIAL SURVEYS ON 30 SEPT 2018, AND 12 DECEMBER 2018 PROVIDED BY BOYNTON & PICKETT LLC.
2. VERTICAL DATUM IS 1.47 FT BELOW NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88). HORIZONTAL DATUM IS MAINE WEST STATE PLANE (NAD83).
3. INTRAPHASE BOUNDARY AND ALL INSTRUMENTS AND INSTRUMENT BOX LOCATIONS WERE DIGITIZED AND ARE APPROXIMATE.

100 50 0 100
SCALE IN FEET

INSTRUMENT LOCATION PLAN

PHASE 12
CROSSROADS LANDFILL
NORRIDGEWOCK, MAINE

Geosyntec consultants

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FIGURE 3

T:\PROJECTS_CADD\C\CROSSROADS LANDFILL\INSTRUMENTATION AND WASTE PLACEMENT\2020 UPDATE\2020-INSTR AND WASTE PH 12

ATTACHMENTS

(Electronic Attachment presented on a USB drive)

A – Daily Activity Logs

B – Inclinometer Data Files

C – Inclinometer Plots

D – SAA Data Files

E – SAA Plots

F – Piezometer Data Files

G – Piezometer Plots