STATE OF MAINE
DEPARTMENT OF ADMINISTRATIVE & FINANCIAL SERVICES
BUREAU OF GENERAL SERVICES
BURTON M. CROSS BUILDING
4TH FLOOR, 77 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0077

PAUL R. LEPAGE
GOVERNOR

RICHARD W. ROSEN
COMMISSIONER

EDWARD A. DAHL
DIRECTOR

May 13, 2016

Ms. Kathy Tarbuck P.E.
Division of Technical Services
Bureau of Hazardous Materials & Solid Waste
Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333

Subject: Juniper Ridge Landfill Expansion Application, MEDEP #S-020700-WD-BI-N Follow-up to Department Staff's Responses to the March 4, 2016 Submittal on Staff's Review Comments as Presented in the Department's April 5, 2016 Letter

Dear Kathy:

The Maine Bureau of General Services (BGS) and NEWSME Landfill Operations, LLC (NEWSME) have reviewed Staff's follow-up comments to our March 4, 2016 submittal addressing the Staff's review comments on the Juniper Ridge Landfill Expansion (JRL) Application, DEP #S-020700-WD-BI-N, as presented in your April 5, 2016 letter[1] and the attached Technical Memoranda from Richard S. Behr, C.G. and Steve E. Farrar, P.E., both dated April 1, 2016. We understand from the review of your letter and the accompanying Technical Memoranda that, with the exception of a few additional requests for clarification, modified data presentation, and comments, we have addressed DEP's review comments on this project. Attached to this letter are our clarifications, modified data presentation, and responses to comments as requested in the Technical Memoranda and as we discussed during our May 6, 2016 meeting.

We understand from our May 6, 2016 meeting that the status of Department's technical review of the Expansion Application is complete pending the review of the information contained herein, and that no further information is required at this time. Based on your April 5, 2016 letter and accompanying Technical Memoranda, we understand the status of the Department's review of the applicable licensing criteria addressed in our March 4, 2016 submittal exhibits is as follows:

<u>Exhibit A Responses to DEP's January 22, 2016 Technical Review Letter</u>

BGS and NEWSME have satisfactorily addressed the Department's and outside agencies review comments on the Chapter 400 standards set forth in the Department's January 22, letter.

[1] MEDEP Letter dated April 5, 2016 to Mr. Michael Barden, and Don Meagher RE: Juniper Ridge Landfill Expansion Application #S-020700-WD-BI-N: Response to March, 4, 2016 Submittal on Staff's Review Comments.

PHONE: (207) 624-7314 www.Maine.gov FAX: (207) 287-4039

Exhibit B Responses to DEP's January 15, 2016 Technical Review Memorandum

Attached to this letter is the additional information requested by Mr. Behr, as well as responses to comments contained in his April 1, 2016 Technical Memorandum. The Attachment is identified as Exhibit D (continuing the labeling sequence started with our March 4, 2016 responses). We understand from Mr. Behr's memorandum and discussion during our May 6, 2016 meeting that our March 4, 2016 submittal was thorough and comprehensive, satisfactorily addressing the majority of Mr. Behr's initial comments on the Application.

Therefore, Exhibit D addresses only those comments that Mr. Behr indicated required further comment and consideration.

Exhibit C Responses to DEP's January 20, 2016 Technical Review Memorandum

In his April 1, 2016 Technical Memorandum, Mr. Farrar identified that the majority of the items contained in his original January 20, 2016 review memorandum have been adequately addressed in our responses and require no further action. In his April 1, 2016 memorandum, Mr. Farrar highlighted, in bold, a number of items which he indicated required further action, now or in the future. With the exception of items II.L.1, and II.N.10.a, these items are operational or design and construction related items for the various individual expansion cells that NEWSME will provide at the time these individual cells are developed. For item II.L.1, Mr. Farrar requested additional information addressing design criteria for the project's geocomposite nets. This information is contained in Exhibit D as Attachment SME-D8. For item II.N.10.a, we have included an updated drawing C-306 of the Expansion drawing sets in Attachment SME-D8.

Mr. Farrar also identified in his April 1 memorandum that the outstanding operational items would be addressed in an updated Operations Manual for the Site. That Operations Manual was submitted with the JRL Annual Report on April 28, 2016. Finally, we understand from our discussion with the Department on May 6, 2016 that the Department is still considering our proposed liner action plan, and that we have satisfactorily addressed Mr. Farrar's other comments.

We appreciate the opportunity to respond to these comments. Should you have any questions our enclosed responses please feel free to contact us.

Sincerely,

Edward A. Dahl
Director, Bureau of General Services

Brian Oliver
Vice-President, NEWSME Landfill Operations, LLC

cc: Service List

Attachment: Exhibit D Responses to April 1, 2016 Technical Memoranda

EXHIBIT D

BGS AND NEWSME'S RESPONSE TO MEDEP'S
APRIL 1, 2016 TECHNICAL MEMORANDA

I. April 1, 2016 Technical Memorandum Authored by Mr. Richard Behr

Below BGS and NEWSME set forth the comments in the April 1, 2016 Technical Memorandum authored by Mr. Richard Behr and follow each comment with our response.

VOLUME II, SITE ASSESSMENT REPORT

Pg 2-6, 2.6.1 Surficial Soils.

MEDEP Follow-on Response: For completeness, JRL should augment this response with a copy of the LiDAR imagery they used for their interpretations.

> Applicants' Response: The LiDAR imagery used for the interpretation was attached to your January 15, 2016 memorandum. This image is included in Attachment SME-D1.

Pg 3-18, 3.2.8 Groundwater Age-Dating

MEDEP Follow-on Response: JRL provides a thorough response to my concern regarding the groundwater age testing methodology. The description of the tests is very helpful but JRL's description of previous experience using the methodology lacks specifics. While I am aware of the client-consultant confidentiality, JRL's consultant, SME, has likely completed groundwater age estimates for some project applications that are part of the public record. If so, project specific references should be included.

> Applicants' Response: SME has used the method at the following projects:
>
> Fairchild Camera and Instrument, South Portland, Maine. Used to estimate groundwater age at TCE spill site. Used the method to confirm that the portion of the TCE plume across Western Avenue was at steady-state and retracting as opposed to continuing to expand, and to compare groundwater ages in till and bedrock to understand relative groundwater velocities.
>
> McKin Superfund Site, Gray, Maine. Used the method to estimate TCE plume travel time to Royal River. Aided in interpreting changes in groundwater TCE concentrations close to the river and estimating the time needed to achieve surface water standard.
>
> Town of Cumberland, Maine. Used to assess age of groundwater beneath a marine clay layer in which groundwater was contaminated due to salt. Used to select appropriate remedial action for a residential water supply well in the salt-impacted groundwater beneath the clay.

Lockheed Martin Electronics facility, South Plainfield, New Jersey. Used to confirm that a one mile-long TCE plume was entering a municipal water supply well system and how long remedial action implementation would take to improve water quality at wells.

Lockheed Martin Electronics aircraft manufacturing facility, Marietta, Georgia. Used to estimate groundwater travel time to surface waters impacted by TCE spill. Also used to establish groundwater and surface water monitoring frequency and schedule.

Georgia Pacific Paper Mill, Palatka, Florida. Used in the design and positioning of monitoring wells for a groundwater quality monitoring program at a paper mill waste landfill.

<u>MEDEP Follow-on Response:</u> There is one additional aspect of the response that requires further clarification. In its response, JRL includes a statement about a slight variability in the analytical data that must be recognized in applying the results. JRL should elaborate on the nature of the variability and its influence on the results.

<u>Applicants' Response</u>: When estimating recharge temperature using inert gas concentrations, a least-squares fitting technique is used to calculate helium concentrations in equilibrium with the atmosphere at the time of recharge. There is some potential error introduced in this fitting procedure. The atmospheric helium estimate affects the calculation of Helium-3 attributable to the decay of tritium. The method also uses an estimate of the terrigenic Helium-3 content of the water sample based on published values for various rock types. This non-site-specific terrigenic Helium-3 estimate introduces some error. Clark and Fritz, 1997 refer to an error of around 15 percent with good test procedures. Our experience with the method suggests, for instance, that an age estimate of 10 years would have an error range of plus or minus 2 years. This magnitude of possible error range does not alter our conclusions, recommendations or design in any way.

<u>MEDEP Follow-on Response</u>: It would also be instructive for JRL to provide a table summarizing the velocity estimates obtained from the various methods used at this site.

<u>Applicants' Response</u>: The table provided as Attachment SME-D2 summarizes the groundwater velocities presented in the Application, the methods used to calculate the velocities, and sections of the Application where the estimates are presented. The velocities presented in the table are based on specific conditions, and input parameters as presented in the referenced sections of the Application.

<u>Pg 4-4, 4.1.1 Basal Till</u>

<u>MEDEP Follow-on Response</u>: JRL's response appears to dismiss the importance of differentiating the depositional environment of the sand and gravel deposits. Accurately describing the mode of formation of surficial deposits is important as the physical characteristics of the deposit may differ significantly. This is particularly important as they often control important hydraulic properties of the surficial sediments. As an

example, the physical and hydraulic properties of a basal till versus an ablation till often differ significantly.

> Applicants' Response: We concur that the composition is important, that is why we wanted to clarify the two different sand and gravel types. We were pointing out the fact that the LiDAR mapping inferred two types of sand and gravel deposits (i.e., outwash and esker) not just the esker the MEDEP's question referred to.

Pg 7-1, 7.0 Travel Time Analysis

MEDEP Follow-on Response: We have discussed JRL's concerns about the submission of the Excel spreadsheets with Cindy Bertocci who, in turn, has discussed the matter with Ms. Sauer and Ms. Green. They are in agreement that neither the Board's procedural order nor statements at the conference regarding filings with the board or responses to agency review comments prevents JRL from providing data in whatever form is useful, that staff need to review the application.

I appreciate JRL's concerns about providing the spreadsheets to the Department. Further I understand SME would like to review the spreadsheets with the Department before providing the Department with a copy of spreadsheets. Therefore, I will plan to schedule an appointment to review the worksheets and accompanying calculations with SME.

> Applicants' Response: As we indicated during our May 6, 2016 meeting, SME is available to review, and would look forward to reviewing the spreadsheet and the accompanying calculations with Mr. Behr either at SME's or the MEDEP's office. We understand from that meeting that Mr. Behr has already reviewed the time of travel calculations and is in agreement with the calculations as presented in the Application. Once the review is completed, SME is willing to provide the MEDEP with a copy of the spreadsheet with limited functionality, such as allowing only changes to input parameters but not proprietary equations (i.e., Macros) contained in the spreadsheet, and acceptance of the terms and conditions for use as stated in the spreadsheet which SME will review with the Department when we meet. These terms and conditions are as recommended by SME's professional liability insurance carrier.

MEDEP Follow-on Response: As requested, JRL has created the schematics I recommended. In my view, the schematics provide a very useful means for a reviewer to visualize each of the time of transport scenarios included in the analysis.

> Applicants' Response: Comment noted.

APPENDIX U

Pg 25, 5.0 Pump Test Proof of Bedrock Interconnectivity

MEDEP Follow-on Response: My original comment included a request for figures to illustrate the observed drawdowns in monitoring wells screened in the till. JRL's

response did not include the requested figures. I continue to assert that a graphic depiction of locations where the till is hydraulically connected to the underlying bedrock is important and may assist in locating wells for long term monitoring and extraction wells in the unlikely event a significant leachate release were to occur.

> Applicants' Response: Included in Attachment SME-D3 are ten figures augmenting Figures U-14 and U-15 included in Appendix U of Volume II of the Application. These figures show monitoring wells and piezometers where drawdowns were measured during the pumping tests. For each pumping test two figures, one showing the drawdown in the bedrock, and one showing the drawdown in the till, have been prepared. On the figures showing the drawdowns in the till the locations where the instrument screen is located within five feet of the bedrock surface are identified.
>
> As shown on these figures the till locations screened within five feet of the bedrock surface generally register greater drawdowns during the pumping tests. This is as expected and typically observed during a pump test in similar geologic settings. The drawdown of groundwater potentiometric levels in bedrock fractures locally affect groundwater levels at the base of the overlying till before the drawdowns affect groundwater levels at higher elevations within the till. The drawdown effect must propagate into the till starting at the bottom and moving upward. At equilibrium, which wasn't reached in these pump tests, the greatest drawdown effect in the till aquitard will be seen at the base of the till and the effect will decrease more or less linearly (depending on the heterogeneity of the till) upwards to the water table. In some cases (not here), the water table can be lowered. The till leakage drains into the underlying bedrock, and acts as a source of recharge to bedrock (as stated in the Application). This drainage from the till aquitard can stabilize further water level drawdowns in the bedrock.
>
> The amount of drawdown of groundwater levels at the base of the till reflects the local permeability of the till. Where drawdowns are greater, than in other locations, the till permeability is greater. It is likely that, at such locations the groundwater in the till drains into the bedrock more easily and this more permeable till "attracts" groundwater from the surrounding till. Bedrock monitoring wells in such locations will therefore monitor a greater area of groundwater than where the less permeable till is in contact with the bedrock. So we concur, that such locations where drawdowns are greater at the base of the till, are favorable shallow bedrock monitoring locations.

Pg 6-1, 6.1 Expansion Water Quality Monitoring Locations

MEDEP Follow-on Response: Based on the comments outlined my January 15, 2016 review memorandum and subsequent technical discussions with JRL and its consultant, JRL submitted a draft work plan (MEDEP - Attachment A) to address my concerns. I carefully reviewed the draft work plan and prepared a review memorandum[1] (MEDEP -

[1] Technical Review Memorandum from Richard S. Behr to Kathy Tarbuck, February 25, 2016, Draft Work Plan for Refining Locations of Monitoring Wells at the Juniper Ridge Landfill Expansion Old Town, Maine – Prepared for Bureau of General Services and NEWSME Landfill Operations, LLC – Prepared by Sevee & Maher Engineers, Inc., February 2016.

Attachment B) with the understanding that the work plan would be presented for formal review through this submittal. The revised work plan, included as an attachment to JRL's responses, has satisfactorily addressed my comments.

Applicants' Response: Comment noted.

Pg 6-2, 6.1.1 Leachate Monitoring for the Expansion

MEDEP Follow-on Response: JRL has agreed with the Department's request to characterize the leachate generated by Cell 11 during the first year of operation. The resulting data from Cell 11 will be compared to the leachate generated by the existing facility. Depending on the outcome of the comparison, the Department may ask JRL to continue to characterize both leachate streams for an extended period.

Applicants' Response: Comment noted.

Pg 7-8, 7.4 Calculated Travel Time to Site Identified Sensitive Receptors

MEDEP Follow-on Response: In addition to making the correction I pointed out in my comment, JRL identified another minor error in Tables 7-3 and 7-4. It is related to the offset credit for Cell 11 Southern End to the Southern Sandy Zone. The revised Tables now include the corrected Offset Credits for the two landfill nodes (Cell 11 Southern End & Cell 13 Leachate Sump), but the totals in the column for the Total Travel Times were not corrected. JRL should make these final revisions.

Applicants' Response: The revised Tables 7-3 and 7-4 are in Attachment SME-D4.

Pg 7-12, 7.5 Sensitivity Analysis

MEDEP Follow-on Response: I understand JRL's reluctance to perform the additional sensitivity analyses I outlined. Their reluctance relates to completing sensitivity runs while varying two parameters at the same time and inserting conservative input values that are unlikely to occur simultaneously. I do however appreciate their willingness to conduct the additional analysis. The additional sensitivity runs calculated travel times in both the till and bedrock using the upper confidence limits for hydraulic conductivity and lower confidence limits for porosity. The resulting total travel times are summarized in Appendix SME-3. As expected, the shortest travel times are produced when using a combination of the lowest estimates of porosity along with the highest estimates of hydraulic conductivity. Despite the use of the presumed conservative input values, the majority of the calculated travel times continue to exceed the six year time of travel to sensitive receptors. These results provide additional data demonstrating the suitability of the proposed expansion.

Applicants' Response: Comment noted. The BGS, NEWSME and SME concur that the site is suitable for the proposed expansion and that the proposed Expansion design meets the Travel Time Performance and Siting Criteria contained in Chapter 401.1.C.1.c and d.

APPENDIX H – FIELD-SCALE BEDROCK TRACER TEST RESULTS

MEDEP Follow-on Response: My primary concern regarding JRL's response relates to the last sentence in their response about the need for nested wells. The additional evaluation outlined in the work plan will undoubtedly increase our understanding of groundwater flow at this site. However, in my view no further justification for multilevel monitoring wells is necessary. A robust and defensible groundwater monitoring program for the expansion must include multilevel monitoring wells.

Applicants' Response: Comment noted and we agree with the use of multilevel monitoring wells for the Expansion.

APPENDIX I – HELIUM-TRITIUM GROUNDWATER AGE DATING RESULTS

MEDEP Follow-on comment: JRL states the chain of custody forms are not available for the helium-tritium sampling. Did JRL contact the University of Rochester's Noble Gas Laboratory or only review SME's records? The validity of laboratory analyses is in large part dependent on proper documentation including the applicable chain of custody records.

Applicants' Response: SME recently tried to contact the laboratory where the analyses were performed in 2005. There is a new lab director and like previous attempts over the years, no reply was received by the time of this response. The field sheets, provided in our March 4, 2016 response to this item, demonstrate that the samples were collected and the data reports reference the same samples. The missing COC is not a valid reason to disregard the data; however, if the data is disregarded that would not change the groundwater velocities used in travel time or contaminant transport analyses completed for the Expansion.

APPENDIX J – MW-06-02 GROUNDWATER PUMPING TEST RESULTS

MEDEP – Follow-on Response: In response to the first part of my comment about water level recovering in 0W-06-08, JRL states, in part, drawdowns decreased in response to the reduction in pumping rates. This isn't correct as the pumping rates actually increased between 200 and 300 minutes (SME – Attachment B, Semi-Log Time vs. Pump Rate). Therefore, while pumping rates remained stable or increased, drawdowns measured in OW-06-08 were decreasing (SME – Attachment C, Semi-Log Time vs. Drawdowns). A similar recovery in water levels occurred in OW-06-09 during this time frame. I therefore ask JRL to reexamine the data and provide plausible explanations for the observed water levels.

Applicants' Response: Average pumping rates decreased throughout the test as we adjusted the rate to avoid dewatering the pumping well. Regardless of the pumping rate, the objective of the test was to observe where drawdowns could be observed, and to get a sense of the degree of bedrock fracture interconnectivity. Prior to performing this pump test, information on the fracture interconnectivity was estimated based on outcrop mapping and bedrock cores. This pump test demonstrated that in directions where there were observation wells, drawdowns could be observed confirming our previous interpretation that the bedrock fractures were relatively well interconnected.

In response to your question, the pump rate decreased throughout the test causing water levels in the pumping well to increase. The observation wells responded to these changes by decreasing the amount of drawdown in these wells. It also began raining somewhere around 200 minutes into the test. The rainfall also caused decrease in drawdowns due to pressure loading on the groundwater system. The rainfall appeared to impact the drawdown pattern in some wells more than others; where total drawdown was greater, the effect was less evident than in the wells with less total drawdown. Observation wells that fully recovered after the end of pumping showed about 0.07 to 0.10 foot decrease in drawdown due to the rain. Thus, a well that had a drawdown after 200 minutes of say of 0.1 feet, graphically showed a significant impact, whereas a well with 1 foot of drawdown, graphically showed less relative impact.

Our interpretation of the drawdown behavior after two hundred minutes is that the decrease in water levels in some observation wells has to do with the non-linear response of the variable fracture system due to diminishing pumping rates throughout the test as well as the precipitation that occurred after 200 minutes. Because the bedrock is heterogeneous, some fractures continued to drawdown even with diminishing pumping rates, others like OW-06-08 showed diminishing drawdowns. This erratic behavior is not untypical of bedrock pump test responses due to the complex, heterogeneous interconnections of the bedrock fractures.

Because of the difficulty in resolving the drawdown behaviors after the start of the rain, our analysis of the drawdown data for estimating transmissivities and anisotropy was restricted to the portion of the drawdown responses before the rain event began, that is, before 200 minutes into the pumping tests. The behavior of the test after the start of the rain is inconsequential to our interpretations and calculations.

Also see our response to Ms. Lipfert's Comment 4.

APPENDIX M – HYDRAULIC ANALYSIS OF DATA FROM LONG-TERM BEDROCK PUMP TEST AT PW-08-01

<u>Pg 3, 3.0 Pump Test Analysis</u>

<u>MEDEP – Follow-on Response</u>: The referenced figures were included in the original application but they do not differentiate the till wells from the bedrock wells. I continue to believe JRL should produce figures that depict the till wells where drawdowns were observed during the long-term pumping tests. These figures may help in the evaluation of long term monitoring well locations.

Applicants' Response: See previous response to the comment regarding Appendix U, Pg 25, 5.0 Pump Test Proof of Bedrock Interconnectivity. These figures are contained in Attachment SME-D3.

APPENDIX U – BEDROCK FRACTURE INTERCONNECTIVITY

Pg 25, Figures U-14 and U-15

MEDEP – Follow-on Response: JRL's response to my comments about Figures U-14 and U-15 do not adequately address my comments. Additional figures are needed to properly illustrate the data collected during each of the five pumping tests. To further enhance the results of the pumping test data, it is necessary to include all of the drawdown data obtained during each test. Again, I contend it is important to differentiate between bedrock and till wells. As an example, the figure (Figure U-14) illustrating the 26.5 hour pumping test performed on PW-08-04, uses graduated symbols to depict the range of observed drawdowns for only 20 of the 53 wells where water levels were observed. There are also apparent inaccuracies on the existing figures. The text on page 26 states six wells (5 bedrock and 1 till) experienced between 0.1 and 1.0 foot of drawdown although Figure U-14 only depicts three wells in this range. The figure (Figure U-15) depicting the drawdowns observed during the long-term pumping tests at PW-08-01 and PW-08-02 also requires revisions as only a fraction of the drawdown data is depicted on this figure. Although JRL collected drawdown data for 53 wells during the tests, Figure U-15 only depicts data for 21 wells.

To address these comments, I recommend JRL display all of the drawdown data for each pumping test on appropriately scaled figures. I also ask JRL to augment the drawdown data included in Appendix M with a table summarizing the total drawdown observed in all wells during each of the pumping tests. This table would include those wells instrumented with pressure traducers and those where manual water levels were made. I am certain JRL has previously compiled this data to complete the pumping tests analyses. I also request that JRL also provide the Department with an electronic copy of the spreadsheet.

Applicants' Response: See previous response to the comment regarding Appendix U, Pg 25, 5.0 Pump Test Proof of Bedrock Interconnectivity. The augmented U-14 and U-15 figures are contained in Attachment SME-D3.

The requested figures, displaying the drawdown data for each pumping test, are included in Attachment SME-D5 and the tables of total drawdown at each monitored location, for each of the five pump tests are provided in Attachment SME-D6. This data is also being supplied to the Department in an electronic format.

EXHIBIT D

<u>Pg 30, 6.0 Theoretical Confirmation of Bedrock Fracture Interconnectivity</u>

<u>MEDEP – Follow-on Response</u>: JRL has provided a thorough explanation about the degree to which the bedrock fracture network is interconnected. Their explanation does include a misleading statement regarding drawdowns. While collectively the five pumping tests produced a population of drawdowns that encompassed all azimuths, results from an individual pumping test did not yield drawdowns in all directions as the text implies. In fact, Appendix U (Page 28) explicitly states that monitoring wells were not available in all radial directions from any one pumping well.

> <u>Applicants' Response</u>: Our response was not intended to be misleading. For the individual pumping tests we were referring only to locations where there are observation wells.

APPENDIX V – GROUNDWATER SIMULATION JUNIPER RIDGE LANDFILL EXPANSION OLD TOWN, MAINE JULY 2015

<u>MEDEP – Follow-on Response</u>: JRL has responded to my request to model the pre and post equipotential heads and groundwater flow directions. The resulting post development modelled head data indicate the average head will decrease 23 feet. More importantly, post development modelling indicates groundwater flow directions are expected to change significantly once recharge is reduced to zero over the developed landfill area. For example, modeled results for the pre-expansion conditions (April 2009) depict groundwater flow in a northerly direction along the northern boundary of the proposed expansion (Figure V-5). Importantly, the modelled results are consistent with the interpreted phreatic surface data included in the application (Figure 5-1). In contrast, once recharge is reduced to zero, the groundwater high now present within the proposed expansion will move northward (see Figure V6S). As a result, projected future flow directions will be in a southerly direction. This represents a complete reversal in groundwater flow directions in the vicinity of the northern boundary of the proposed expansion. These results demonstrate the usefulness of modelling to estimate future conditions. The expected altered groundwater flow directions are particularly important in regard to the development of the facility's long-term groundwater monitoring program.

In recognition that groundwater flow directions are anticipated to change significantly with landfill buildout, JRL should revise the facility's Environmental Monitoring Plan/Operations Manual to include a section providing for the periodic analysis of groundwater flow directions.

> <u>Applicants' Response</u>: The post-development flow directions were also shown on Figure V-6 in Appendix V of Volume II of the Application. We agree that throughout the life of the JRL site, groundwater flow directions should be characterized. Included in the updated Operations Manual for the JRL (submitted to the MEDEP on April 28) is an updated Environmental Monitoring Plan (EMP). The EMP identifies that an evaluation of historical changes in water levels around the site and recommendations for any proposed changes (e.g., locations…) will be submitted to the MEDEP annually. The review of

changes in water levels around the site will continue during the development of the Expansion cells as outlined in the EMP.

RECOMMENDED MONITORING ALTERNATIVES FOR EVALUATION

MEDEP Follow-on Response: I understand and concur with JRL's desire to discuss the potential for an alternative monitoring program independent of the expansion application. In view of JRL's response I would like to arrange a meeting with JRL and its consultant to discuss potential modifications to the current monitoring program. I am particularly interested to have JRL characterize the tritium activity of the existing leachate.

Applicants' Response: Comment noted and as indicated in our response to the initial round of application review comments, BGS and NEWSME are not opposed to discussing alternate sampling programs including the inclusion of tritium sampling independent of the Expansion's permitting process.

DEP RECOMMENDATION #3

MEDEP Follow-on Response: I have further discussed JRL's proposed liner leakage action plan with Steve Farrar, the department's project engineer. We concur that JRL's proposal for incorporating both flow and specific conductance data appears to create an overly complicated trigger for evaluating liner performance. Further discussion is necessary.

Applicants' Response: We have briefly discussed the proposed liner leakage action plan (LLAP) with Steve Farrar in preparing responses to his comments on this subject and are willing to discuss the plan further. As we discussed with Steve, it would be helpful to have specific questions on our approach in advance of future discussions, and/or insight on concerns using a flow and specific conductance based standard for the LLAP.

ATTACHMENT C TO MR. BEHR's REVIEW MEMORANDUM

January 14, 2016 Memorandum from Gail Lipfert Re: Juniper Ridge Landfill Pumping and Tracer Test Evaluation.

Comment 2 a.

MEDEP Follow-on comment: Please consult the following papers on aquifer test analysis of fractured rock to better understand the methods I am referring to:

Applicants' Response: We appreciate the suggested scientific references and have reviewed them. There is sufficient drawdown recordings during the pump test to demonstrate groundwater level drawdowns were occurring during the test in various directions away from the pumping well, which was the original objective of the test. Because we didn't know if any wells would drawdown (or if all of them would) before running the pump test, we did not design the test to get frequent early drawdown data.

Instead, we wanted to get sufficient data to demonstrate drawdowns. The test was performed to confirm that the bedrock fractures over a broad area were interconnected as suggested by the numerous fractures and fracture strikes observed in the downhole geophysical logging of OW-06-02, as well as in bedrock outcrops. There was sufficient data collected to demonstrate that goal and more data would not have altered our conclusion that the bedrock fractures around OW-06-02 are hydraulically interconnected since drawdowns were observed in all six observation wells. After the test was completed, because of the drawdown responses observed, we also concluded there was sufficient data collected before 200 minutes into the test (i.e., the approximate start of rainfall) to analyze the collected data for bedrock transmissivity and storativity. We concur that if the objective had been to evaluate whether there is individual fracture control near the pumping well, more frequent early time data would be required.

Comment 2 e.

MEDEP Follow-on comment: We respectively disagree; prior water elevation data is always necessary. If water levels are decreasing at one well and not the others, it would appear that there was a response at that well even if it wasn't responding to the pumping well. For example, in the third paragraph in Section 4.0, there is uncertainty about the drawdown at OW-06-06; "The maximum drawdown reading during the pump test was approximately 0.16 feet. This may merely be natural fluctuation in the groundwater elevation as there is no apparent recovery from the pump test." If you had monitored water elevations prior to the pumping test, this may have helped assess the response at this well.

Applicants' Response: We have been unsuccessful in finding water level measurements a day or two before the pump test. We did, however, find in our electronic data base, water levels measured at three wells (MW-06-02, OW-06-05 and OW-06-10) over the spring and summer at approximately one month intervals. A graph of these water level measurements is in SME-D7 and shows an average water level decline of about 0.03 foot per day during the July period. This decline rate amounts to a correction of less than a 0.005 foot during the first 200 minutes of the test (i.e., before the rain event) and about 0.01 foot for the entire eight hour pump test. Data from the first 200 minutes was the only part of the drawdown record used to calculate bedrock transmissivity and storativity. This magnitude of correction is inconsequential to our transmissivity results and, most importantly, does not alter our conclusions about the interconnectivity of the bedrock fractures at this site.

Comment 2 f.

MEDEP Follow-on comment: In the second paragraph of Section 3.0, it states: "It should be noted that at approximately 200 to 300 minutes into the pump test, a significant thunder shower passed over the pump test site. The effects are particularly evident at OW-06-08, OW-06-09, and OW-06-10." There is no mention of this being due to lower pump rates. Another explanation other than poorly-constructed

wells for causing short-circuiting at those wells, could be fractures that are allowing for a direct connection between the well and shallow groundwater.

Applicants' Response: As a result of your comments, we had a technician inspect the observation wells in question on May 5, 2016. Recognizing that the pump test was performed ten years ago, the well casings showed no signs of cracks or openings that would allow water into the observation wells. The stand pipes were not loose and could not be moved. There were no signs of cavities or "sinkholes" forming around the well casings. We also dumped approximately five gallons of water around the well casings to see if it would change the water levels in the wells. No change in the water levels in these wells was observed as a result of this local recharge. Thus, there is no evidence to conclude that rainfall runoff entered the borehole around the well casings during the July 10, 2006 rain event.

As we stated in response to Mr. Behr's comment, the increase in water levels in our opinion is the combined result of decreasing pump rates throughout the pump test and the rain event that occurred around 200 minutes into the test. At some locations there may have also been some drainage from the overlying till that flattened the drawdown curves. Also see our response to Mr. Behr's comment concerning: Appendix J – MW-06-02 Groundwater Pumping Test Results.

Drawdown data after the rain began at around 200 minutes into the pump test was not used in any of our calculations and is inconsequential to our results and conclusions. The drawdown data curves after 200 minutes were not relied on in our conclusions about fracture interconnectivity.

Comment 4.

MEDEP Follow-on comment: But the document states: "OW-06-07 is best aligned with the secondary northeast/southwest striking fracture set" and "This secondary fracture set aligns with the steeper gradients." According to Figure H-1, the groundwater flow pattern is rather convoluted, but we judge the average flow direction to also be to the northwest, not the east. This means that OW-06-07 is aligned with a predominant flow direction, the steepest groundwater gradient, *and* one of the two predominant fracture orientation, but the arrival time is longer than other orientations. The evidence just does not support your assertion that the measured predominant fracture sets are controlling plume direction at this well.

Applicants' Response: Reference to the groundwater gradient being to the "east" is an obvious typographical error; Figure J-1 of Appendix J of Volume II clearly shows the gradient is primarily to the west although it's somewhat variable over a range of azimuths from the northwest to the southwest. As we began to analyze the pump test data, we observed that the fastest drawdown response was in OW-06-09, as indicated by the t_o value of 9 minutes, which was the lowest value for all the observation wells. (See the drawdown response curves in Appendix J of Volume II). This observation well is west/southwest of the pumping well. OW-06-10, located southwest of the pumping well, had the next shortest response time. The time of greatest response (t_o=150 minutes) was observed for OW-06-06 which is northwest from the pumping well. These drawdown response times suggested to us that the bedrock's greatest average hydraulic conductivity azimuth is southwesterly and the least hydraulic conductivity azimuth is northwesterly. These findings were consistent with our inferred hydraulic conductivity anisotropy based on measured bedrock fracture patterns. The manuscript by Gernand and Heidtman, 1997 that you suggested in Comment 2a, addresses the importance of bedrock fracture mapping (structure) in designing and interpreting pump tests in bedrock.

The observed responses to the pumping of well OW-06-02 suggested analyzing the drawdown data to estimate the anisotropy ratio and directions. Such an analysis in practice is approximate at best since even in relatively homogenous geologic deposits the drawdown data can be erratic due to local property variations. In bedrock, with its inherent heterogeneous character, such an analysis is often difficult. But when bedrock shows relative dense fracturing, such as with the foliated phyllite at this landfill site, further analysis can be insightful. The Papadopoulos, 1965 method utilized, (see Appendix J of Volume II) indicated the azimuth of greatest hydraulic conductivity to be southwesterly and the least conductivity azimuth to be northwesterly. The consistency of this result is primarily driven by the behaviors of OW-06-06, OW-06-09 and OW-06-010. The result of this more detailed analysis of the pump test data provided support to the drawdown response times and our interpretation of bedrock fracture patterns.

This interpreted bedrock hydraulic conductivity anisotropy was further characterized in the bedrock tracer test (Appendix H). The test shows the tracer plume spread over a broad angle but with quickest time-of-travel to the west/southwest (OW-06-09). This is the same observation well with the quickest drawdown response time. The greatest time-of-travel for the tracer was to OW-06-06 to the northwest of the pumping well, which is also the well with the greatest drawdown response time.

These results indicate that the bedrock fractures are interconnected on the scale of the pumping test and tracer test. The demonstrated fracture interconnectivity is a benefit to being able to monitor the bedrock at this landfill site because if a limited size leak occurs in the landfill's containment system, the tracer test suggests the leak will spread over a broader distance than just the leak, making detection easier with a finite number of monitoring wells. As with our discussion with MEDEP, larger fracture features also play a role in selecting monitoring well locations.

Comment 6

MEDEP Follow-on comment: We agree that drawdowns were observed at all the observation wells, but our point was that they were very irregular and their pattern does not match the dominant fracture orientations. Your response did not address our comment.

Applicants' Response: As we indicated above in our response to Comment 4, we recognize the inherent heterogeneity of the bedrock and its impact on varying drawdown responses. We chose not to use the drawdown data after 200 minutes into the test when several phenomena were potentially interacting to complicate the drawdown behavior in the observation wells. Even though the individual observation well responses show some bedrock fracture heterogeneity, there are also overriding patterns that can be observed in the data, as pointed out above.

II. April 1, 2016 Technical Memorandum Authored by Mr. Steve Farrar

Below BGS and NEWSME set forth the comments in the April 1, 2016 Technical Memorandum authored by Mr. Steve Farrar and follow each comment with our response.

Applicants' General Response: In his April 1, 2016 Technical Memorandum Mr. Farrar stated that the majority of the items contained in his original January 20, 2016 review memorandum have been adequately addressed in our responses and require no further action. In the April 1, 2016 memorandum, Mr. Farrar highlighted, in bold, a number of items which he indicated required further action now or in the future. With the exception of two items (i.e., II.L.1, II.N.10.a.), these items are either operational or design and construction related items for the various individual expansion cells that NEWSME will provide at the time these individual cells are developed. We also understand from conversation with the Department on May 6, 2016, that the Department is still considering our proposed liner leakage action plan and that we are to discuss our approach further, as mentioned previously.

MEDEP Follow-on comment II.L.1: Appropriate references justifying the reduction factors for chemical clogging, biological clogging, and intrusion have been provided. Reference is made to SIM testing completed by TRI that concluded that a reduction factor for creep as low as 1.1 is justified at normal loads of 15,000 psf. We request a summary of the referenced testing program.

Applicants' Response: Included in Attachment SME-D8 is a summary of the reference testing program.

MEDEP Follow-on comment II.N.10.a: The inlet invert elevation of Culvert C-2BA has been correctly revised. The slope has been revised to read 0.08% but should be 0.008% according to Table 7-1.

Applicants' Response: Included in Attachment SME-D8 is a revised Drawing C-306 showing the corrected slope.

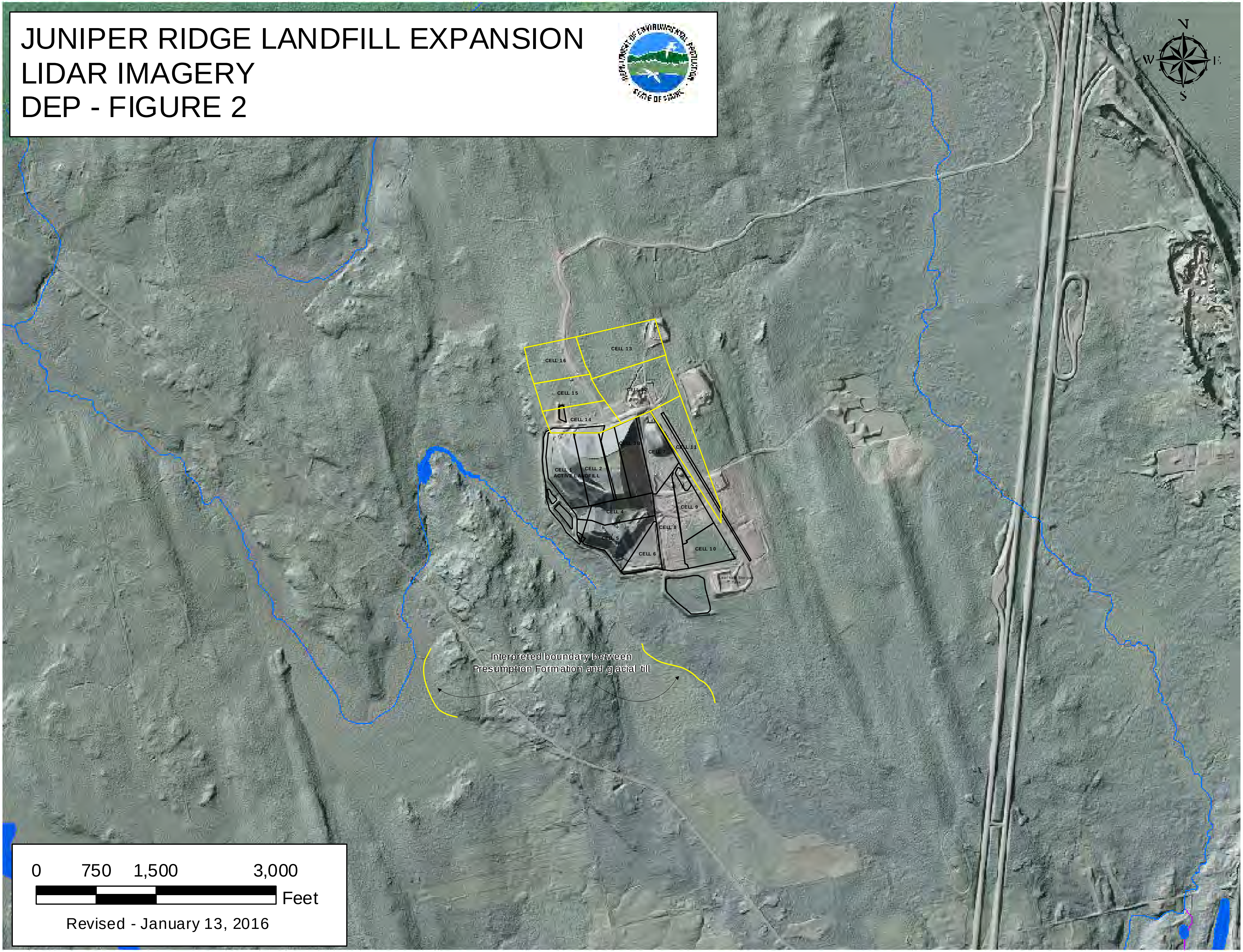
REFERENCES:

Ian Clark and Peter Fritz 1997, Environmental Isotopes in Hydrogeology, Lewis Publishing, 1997, pg. 188

ATTACHMENT SME-D1

LiDAR IMAGERY

JUNIPER RIDGE LANDFILL EXPANSION
LIDAR IMAGERY
DEP - FIGURE 2



Revised - January 13, 2016

ATTACHMENT SME-D2

TABLE SUMMARY OF GROUNDWATER VELOCITIES

SUMMARY OF GROUNDWATER VELOCITIES
JUNIPER RIDGE LANDFILL EXPANSION

Formation, and Direction of Velocity	Velocity Estimates	Method Used to Determine Velocity (See Notes)	Reference Application Section
Till, Vertical	0.05 to 0.3 ft/yr	C	Volume II, Section 5.1.4, pg. 5-13.
	2 ft/yr	A (Till)	Volume II, Section 5.1.4, pg. 5-13.
	Time of Travel or Contaminant Transport Analysis		
	0.41 to 17.4, avg. of 6.6 ft/yr	C	Volume II, Section 7.4 Travel Time Analysis; and Appendix X, Existing Conditions.
	0.0008 to 0.002 ft/yr	C	Volume III, Section 4.0 Contaminant Transport Analysis Scenario 2; and Appendix J
	54 to 156 ft/yr	C	Volume III, Section 4.0 Contaminant Transport Analysis Scenario 3
Till, Horizontal	11 ft/yr	T (Till)	Volume II, Section 3.2.6; and Appendix G, pg. 5.
	10 to 24 ft/yr	C, T	Volume II, Section 5.1.4, pg. 5-12.
	1 to 2 ft/yr	C	Volume II, Section 5.1.4, pg. 5-12.
	Time of Travel or Contaminant Transport Analysis		
	36.5 ft/yr	C	Volume III, Section 4.2 Contaminant Transport Analysis, pg. 4-5; and Appendix J, All Scenarios.
Bedrock	5 ft/day	T (Bedrock)	Volume II, Section 3.2.7, Appendix H
	0.4 ft/day	C, A	Volume II, Section 3.2.8, pg. 3-19.
	2 to 6 ft/day	C	Volume II, Section 5.2.4, pg. 5-21.
	Time of Travel or Contaminant Transport Analysis		
	1.7 to 15.4, avg. of 6.4 ft/day	C	Volume II, Section 7.4 Travel Time Analysis; Appendix X, Existing Conditions.
	5 to 10 ft/day	C, T	Volume III, Section 4.0 Contaminant Transport Analysis, pg. 4-5; and Appendix J, All Scenarios.

NOTES:

A: Age-dating groundwater method as described in Section 3.2.8 of Volume II of the Application.

C: Calculated average linear velocities, typically using the standard groundwater flow equation Velocity = (hydraulic conductivity x hydraulic gradient)/ effective porosity; or Velocity = flow length / travel time. See reference for specific input parameters.

T: Tracer test method, by formation: Bedrock, as described in Section 3.2.6; or Till, as described in Section 3.2.7 of Volume II of the Application.

ATTACHMENT SME-D3

AUGMENTED PUMPS TEST FIGURES

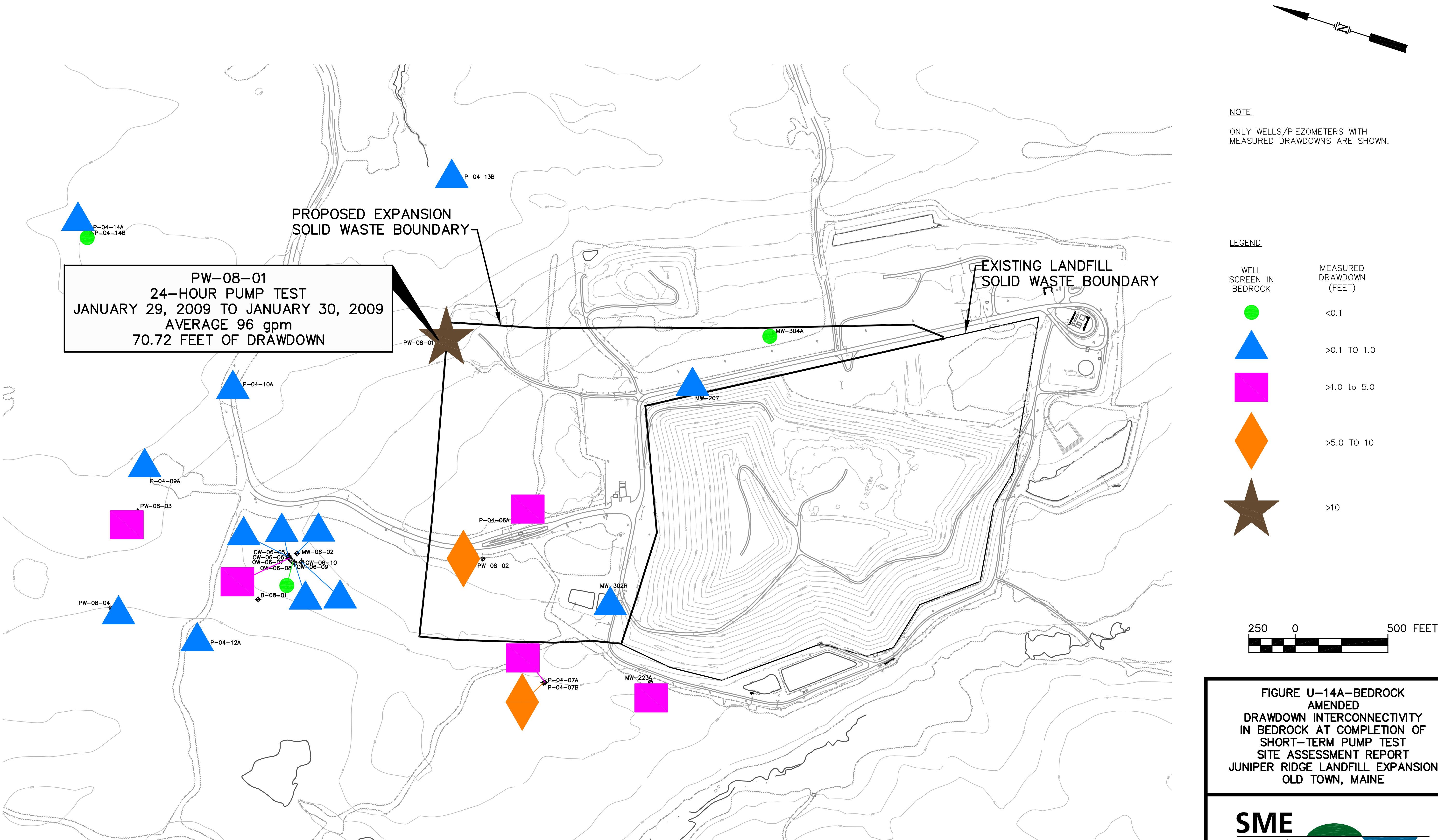


FIGURE U-14A-BEDROCK
AMENDED
DRAWDOWN INTERCONNECTIVITY
IN BEDROCK AT COMPLETION OF
SHORT-TERM PUMP TEST
SITE ASSESSMENT REPORT
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG:PumpTests-BR-TILL LMN:PT-14A BEDROCK CTB: PumpTests REV: 5/10/16

\\nserver\CFS\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Project Regulatory Review\Acad\Figures\PumpTests-BR-TILL.dwg, 5/11/2016 12:17:28 PM, paf

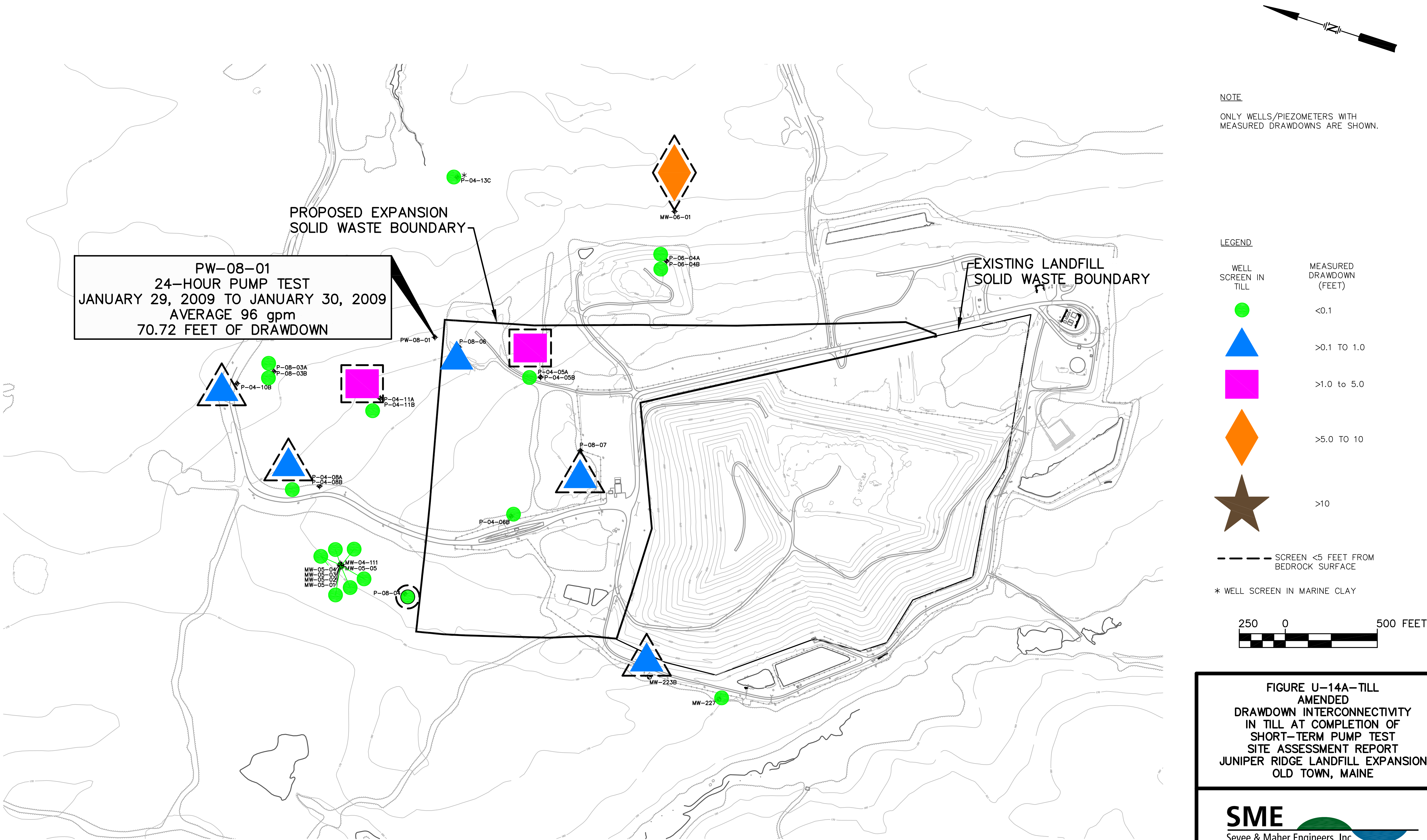


FIGURE U-14A-TILL
AMENDED
DRAWDOWN INTERCONNECTIVITY
IN TILL AT COMPLETION OF
SHORT-TERM PUMP TEST
SITE ASSESSMENT REPORT
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG:PumpTests-BR-TILL LMN:PT-14A TILL CTB: PumpTests REV: 5/10/16

\\Nserver\cls\Casella\OldTownLandfillExpansion\9.35MCY-Expansion\Project Regulatory Review\Acad\Figures\PumpTests-BR-TILL.dwg, 5/11/2016 1:46:07 PM, jrl

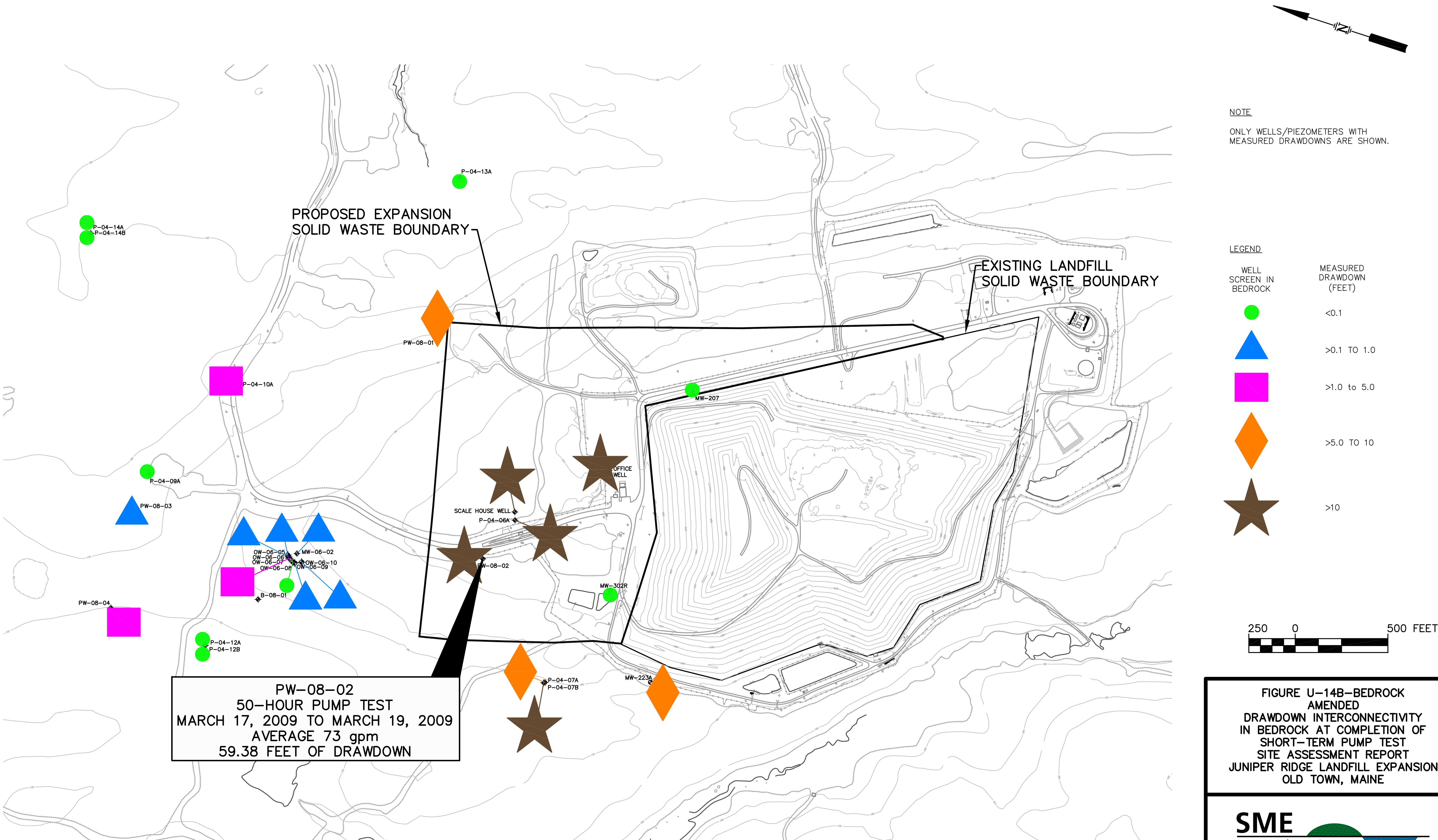
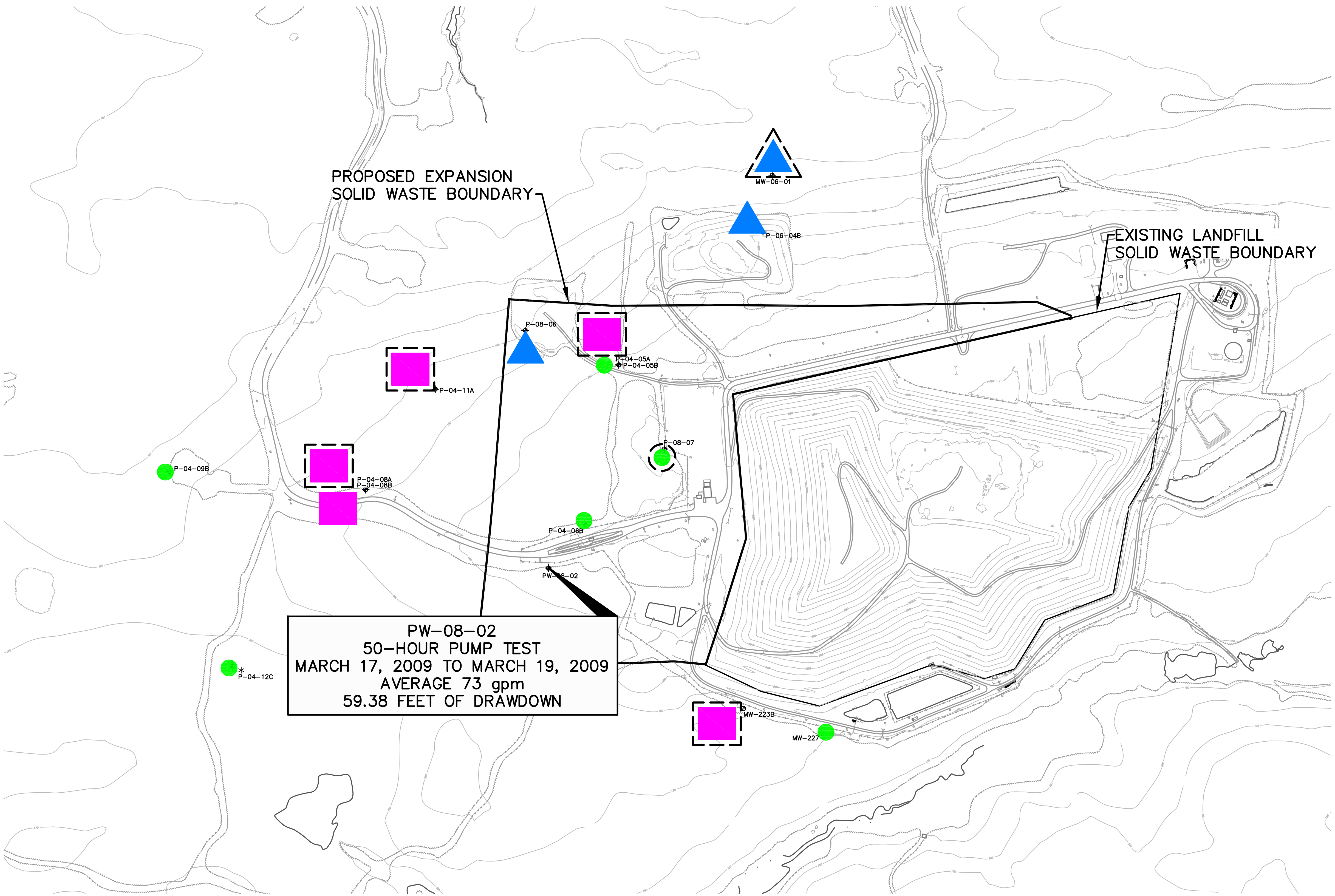


FIGURE U-14B-BEDROCK
AMENDED
DRAWDOWN INTERCONNECTIVITY
IN BEDROCK AT COMPLETION OF
SHORT-TERM PUMP TEST
SITE ASSESSMENT REPORT
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG:PumpTests-BR-TILL LMN:PT-14B BEDROCK CTB: PumpTests REV: 5/10/16

\\nserver\CFS\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Project Regulatory Review\Acad\Figures\PumpTests-BR-TILL.dwg, 5/11/2016 12:23:17 PM, paf



NOTE

ONLY WELLS/PIEZOMETERS WITH MEASURED DRAWDOWNS ARE SHOWN.

LEGEND

WELL SCREEN IN TILL	MEASURED DRAWDOWN (FEET)
Green circle	<0.1
Blue triangle	>0.1 TO 1.0
Magenta square	>1.0 to 5.0
Orange diamond	>5.0 TO 10
Brown star	>10

- - - SCREEN <5 FEET FROM BEDROCK SURFACE

* WELL SCREEN IN MARINE CLAY

250 0 500 FEET

FIGURE U-14B-TILL
AMENDED
DRAWDOWN INTERCONNECTIVITY
IN TILL AT COMPLETION OF
SHORT-TERM PUMP TEST
SITE ASSESSMENT REPORT
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG:PumpTests-BR-TILL LMN:PT-14B TILL CTB: PumpTests REV: 5/10/16

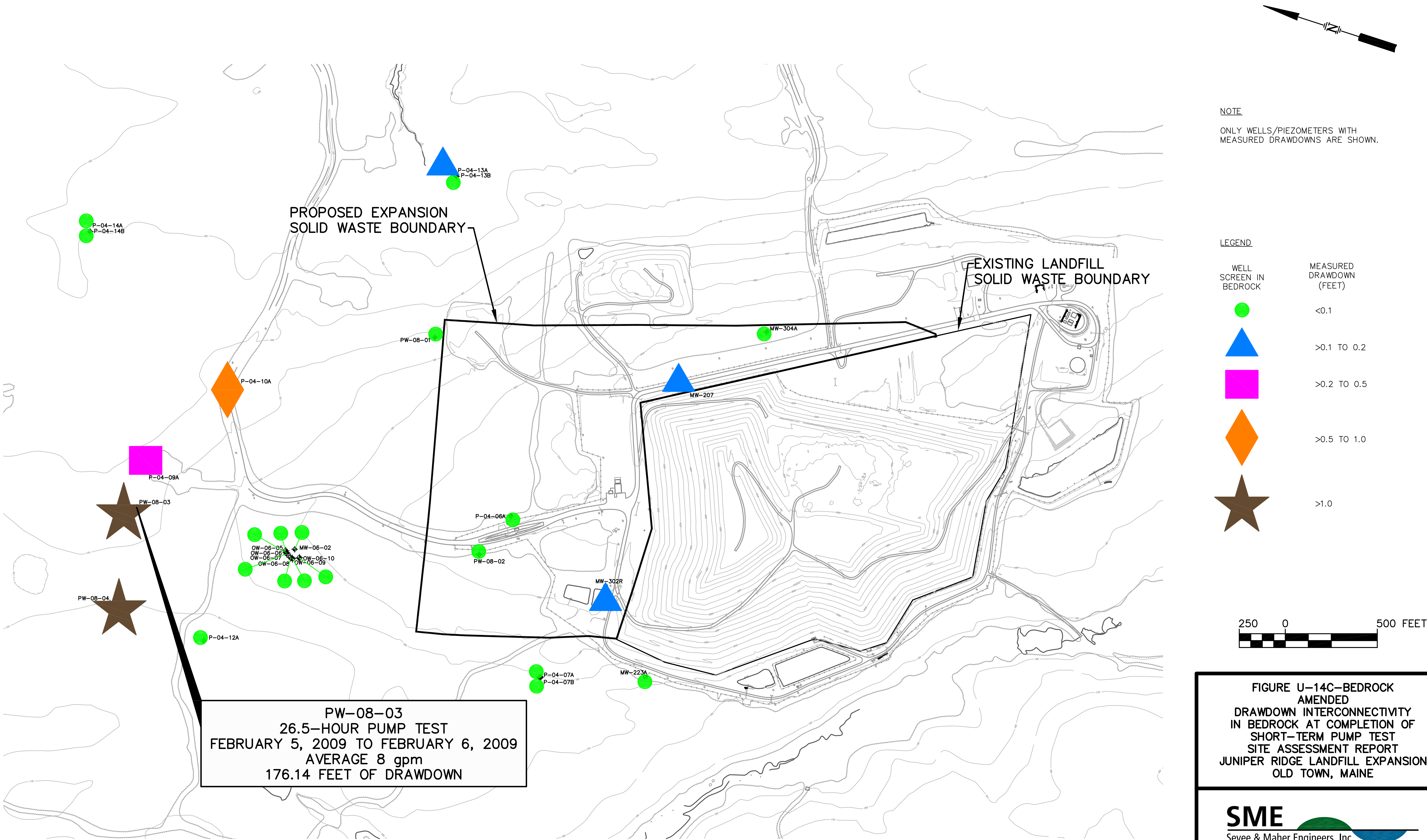
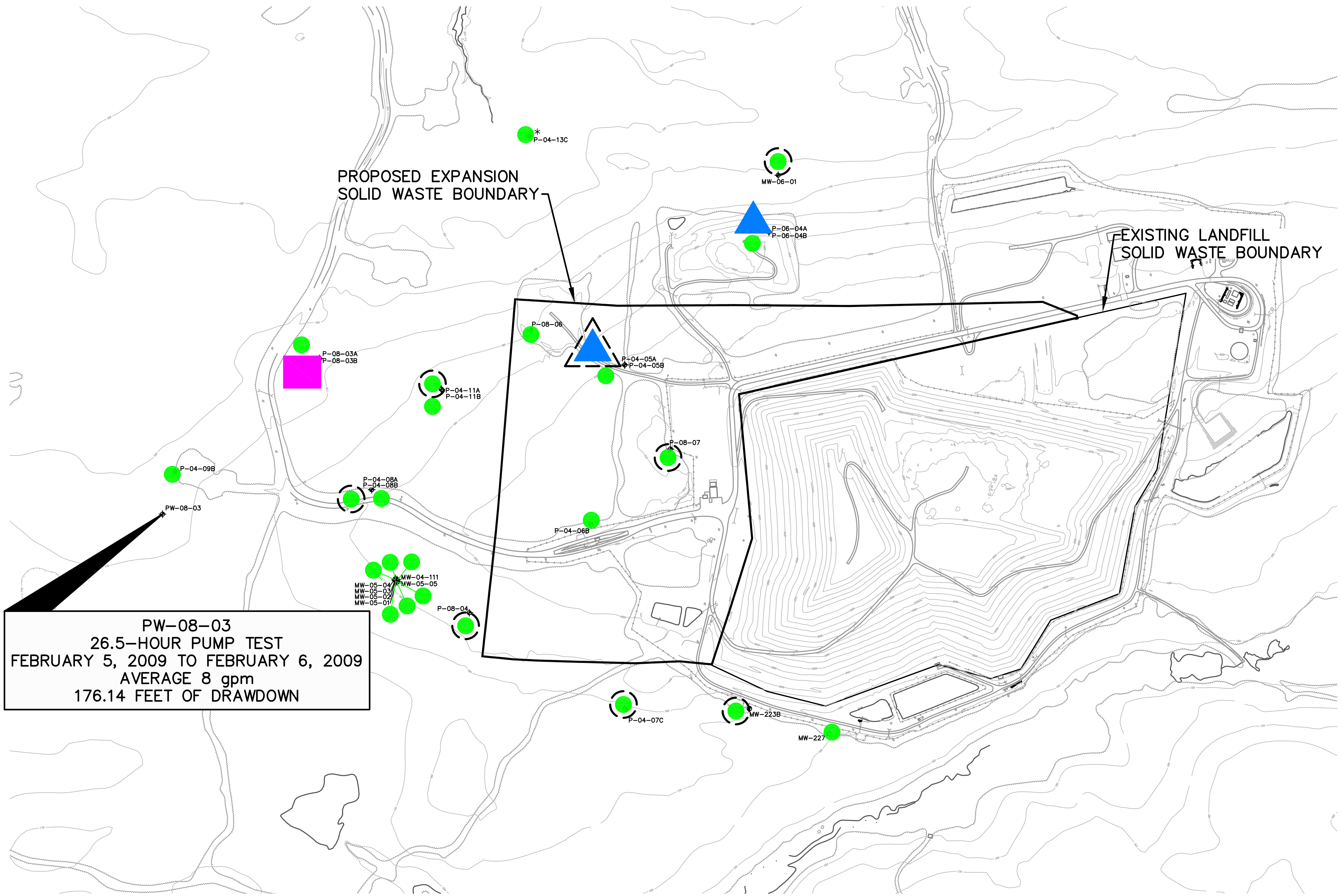


FIGURE U-14C-BEDROCK
AMENDED
DRAWDOWN INTERCONNECTIVITY
IN BEDROCK AT COMPLETION OF
SHORT-TERM PUMP TEST
SITE ASSESSMENT REPORT
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG:PumpTests-BR-TILL LMN:PT-14C BEDROCK CTB: PumpTests REV: 5/10/16

\\Nserver\cls\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Project Regulatory Review\Acad\Figures\PumpTests-BR-TILL.dwg, 5/11/2016 1:48:36 PM, jrl



N

NOTE

ONLY WELLS/PIEZOMETERS WITH MEASURED DRAWDOWNS ARE SHOWN.

LEGEND

WELL SCREEN IN TILL	MEASURED DRAWDOWN (FEET)
green circle	<0.1
blue triangle	>0.1 TO 0.2
magenta square	>0.2 TO 0.5
orange diamond	>0.5 TO 1.0
brown star	>1.0

— — — SCREEN <5 FEET FROM BEDROCK SURFACE

* WELL SCREEN IN MARINE CLAY

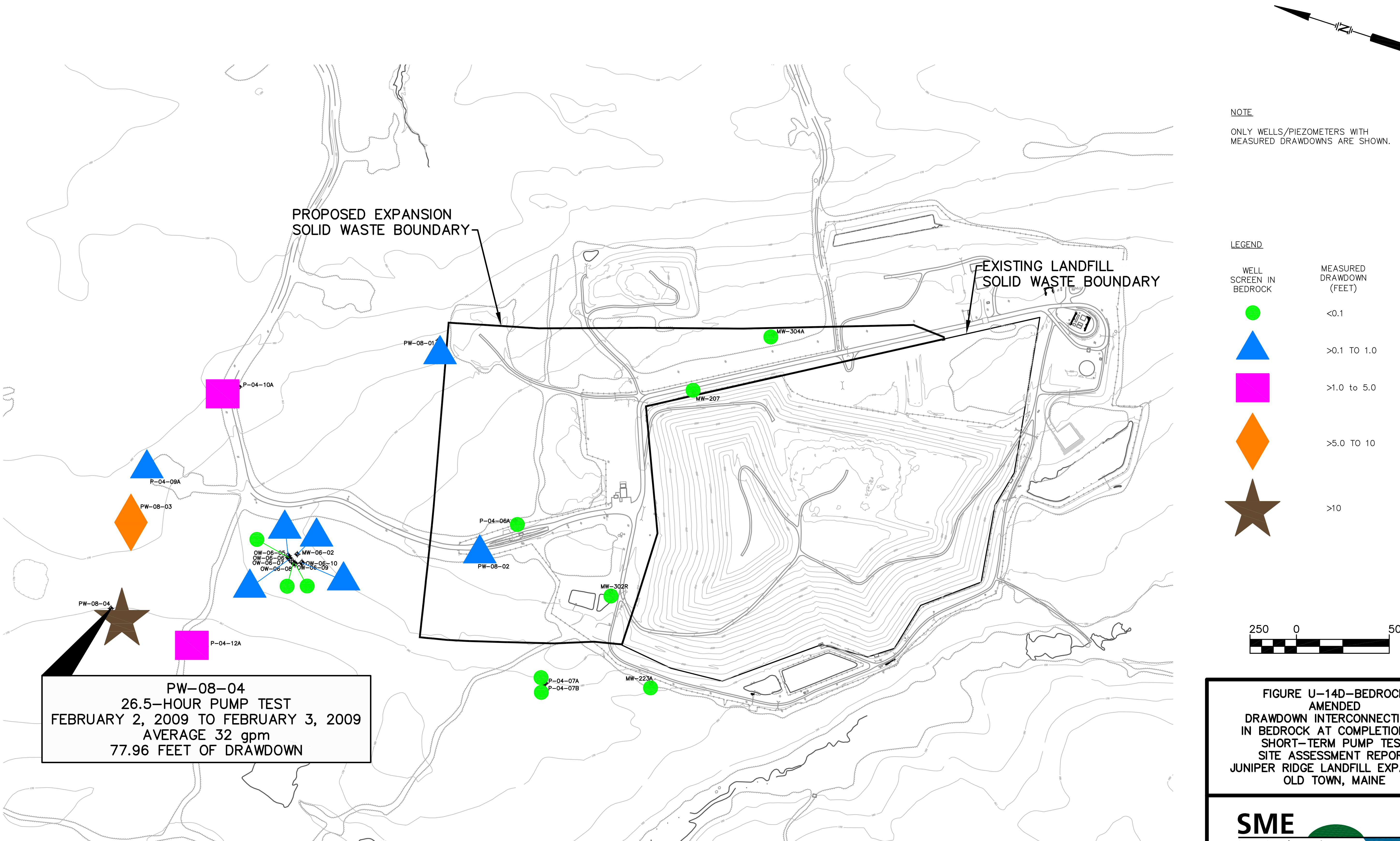
250 0 500 FEET

FIGURE U-14C-TILL
AMENDED
DRAWDOWN INTERCONNECTIVITY
IN TILL AT COMPLETION OF
SHORT-TERM PUMP TEST
SITE ASSESSMENT REPORT
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG:PumpTests-BR-TILL LMN:PT-14C TILL CTB: PumpTests REV: 5/10/16

\\nserver\CFS\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Project Regulatory Review\Acad\Figures\PumpTests\PumpTests-BR-TILL.dwg, 5/11/2016 12:51:43 PM, paf



NOTE

ONLY WELLS/PIEZOMETERS WITH MEASURED DRAWDOWNS ARE SHOWN.

LEGEND

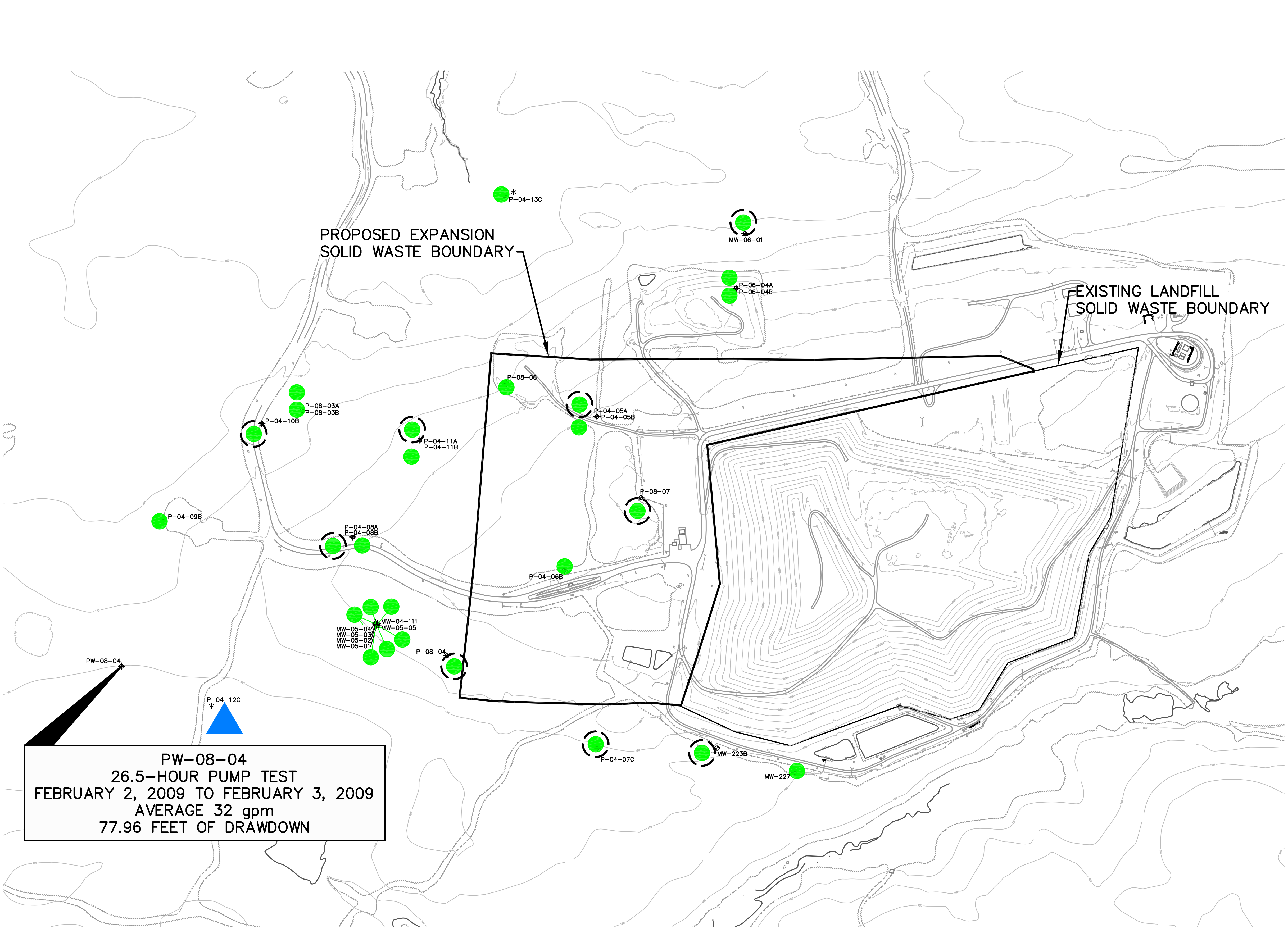
WELL SCREEN IN BEDROCK	MEASURED DRAWDOWN (FEET)
green circle	<0.1
blue triangle	>0.1 TO 1.0
magenta square	>1.0 to 5.0
orange diamond	>5.0 TO 10
brown star	>10

FIGURE U-14D-BEDROCK
AMENDED
DRAWDOWN INTERCONNECTIVITY
IN BEDROCK AT COMPLETION OF
SHORT-TERM PUMP TEST
SITE ASSESSMENT REPORT
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG:PumpTests-BR-TILL LMN:PT-14D BEDROCK CTB: PumpTests REV: 5/10/16

\\nserver\CFS\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Project Regulatory Review\Acad\Figures\PumpTests-BR-TILL.dwg, 5/11/2016 12:31:18 PM, paf



NOTE

ONLY WELLS/PIEZOMETERS WITH MEASURED DRAWDOWNS ARE SHOWN.

LEGEND

WELL SCREEN IN TILL	MEASURED DRAWDOWN (FEET)
green circle	<0.1
blue triangle	>0.1 TO 1.0
magenta square	>1.0 TO 5.0
orange diamond	>5.0 TO 10
brown star	>10

— — — SCREEN <5 FEET FROM BEDROCK SURFACE

* WELL SCREEN IN MARINE CLAY

250 0 500 FEET

FIGURE U-14D-TILL
AMENDED
DRAWDOWN INTERCONNECTIVITY
IN TILL AT COMPLETION OF
SHORT-TERM PUMP TEST
SITE ASSESSMENT REPORT
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG:PumpTests-BR-TILL LMN:PT-14D TILL CTB: PumpTests REV: 5/10/16

\\nserver\CFS\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Project Regulatory Review\Acad\Figures\PumpTests-BR-TILL.dwg, 5/11/2016 12:56:50 PM, paf

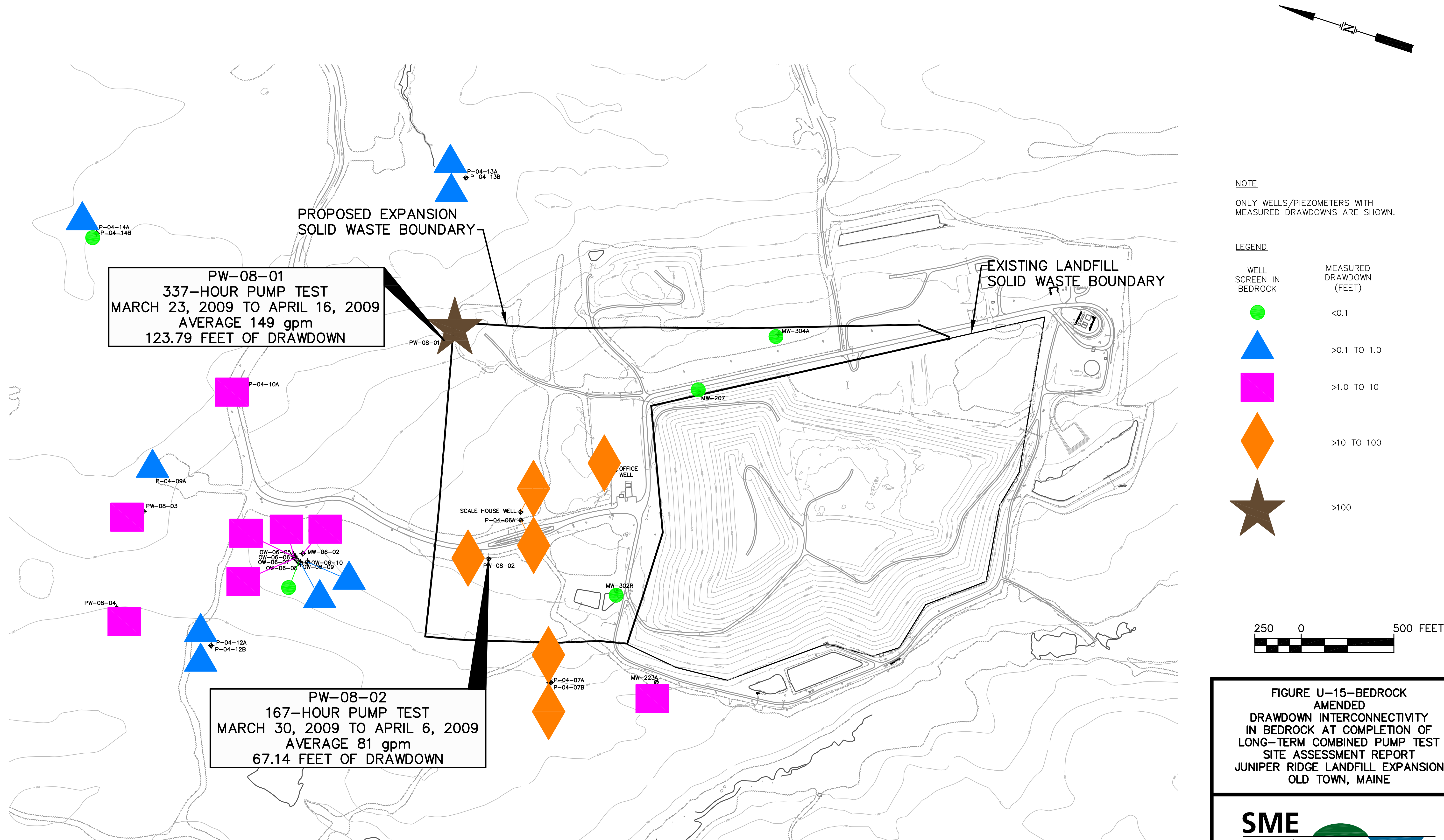
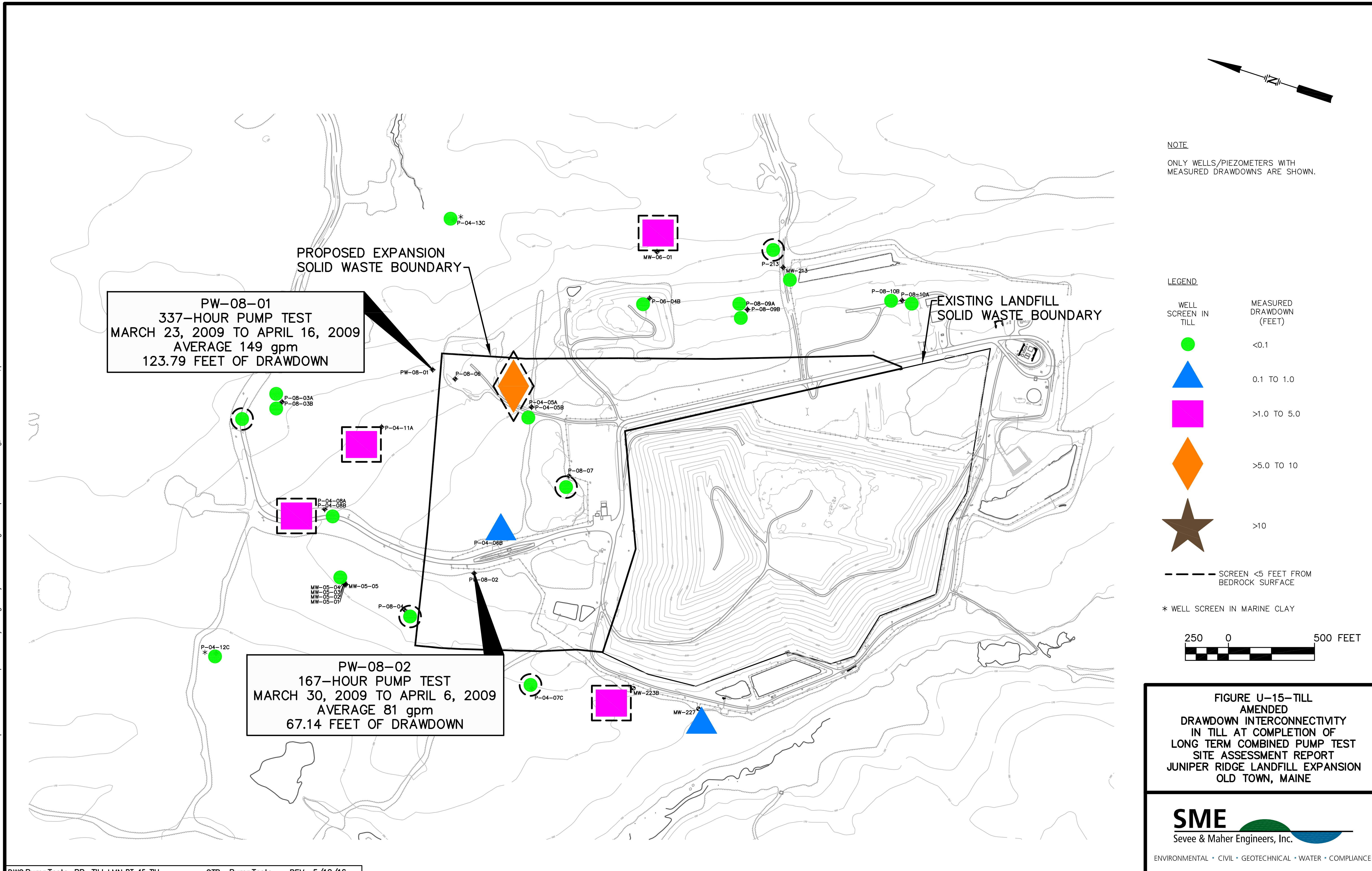


FIGURE U-15-BEDROCK
AMENDED
DRAWDOWN INTERCONNECTIVITY
IN BEDROCK AT COMPLETION OF
LONG-TERM COMBINED PUMP TEST
SITE ASSESSMENT REPORT
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG:PumpTests-BR-TILL LMN:PT-15 BEDROCK CTB: PumpTests REV: 5/10/16

\\Nserver\cds\Casella\OldTownLandfillExpansion\9.35MCY-Expansion\Project Regulatory Review\Acad\Figures\PumpTests-BR-TILL.dwg, 5/11/2016 2:03:43 PM, sjm



\\nserver\CFS\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Project Regulatory Review\Acad\Figures\PumpTests-BR-TILL.dwg, 5/11/2016 1:01:29 PM, paf

ATTACHMENT SME-D4

UPDATED APPLICATION TABLES 7-3 AND 7-4

TABLE 7-3

CALCULATED TRAVEL TIME TO SITE SENSITIVE RECEPTORS – EXISTING CONDITIONS

Landfill Node	Site Sensitive Receptors	Offset Credits (Yrs)	Imported Soils (Yrs)	Calculated Travel Time In Soil And Bedrock (Yrs)	Total Travel Time (Yrs)
Cell 11 Southern End	Point A	3	3	10.5	16.5
Center of Cell 11	Point B	2	3	3.9	8.9
Center of Cell 12	Point C	2	3	11.3	16.3
Center of Cell 13	Point C	2	3	11.0	16.0
Cell 13 Leachate Sump	Point C	2	3	35.8	40.8
Center of Cell 14	Point D	3	3	47.7	53.7
Center of Cell 14	Point E	3	3	3.3	9.3
Center of Cell 15	Point F	2	3	1.2	6.2
Center of Cell 16	Point G	2	3	4.7	9.7
Cell 16 Leachate Sump.	Point G	3	3	10.3	16.3

TABLE 7-4

CALCULATED TRAVEL TIMES TO SITE SENSITIVE RECEPTORS – FUTURE CONDITIONS

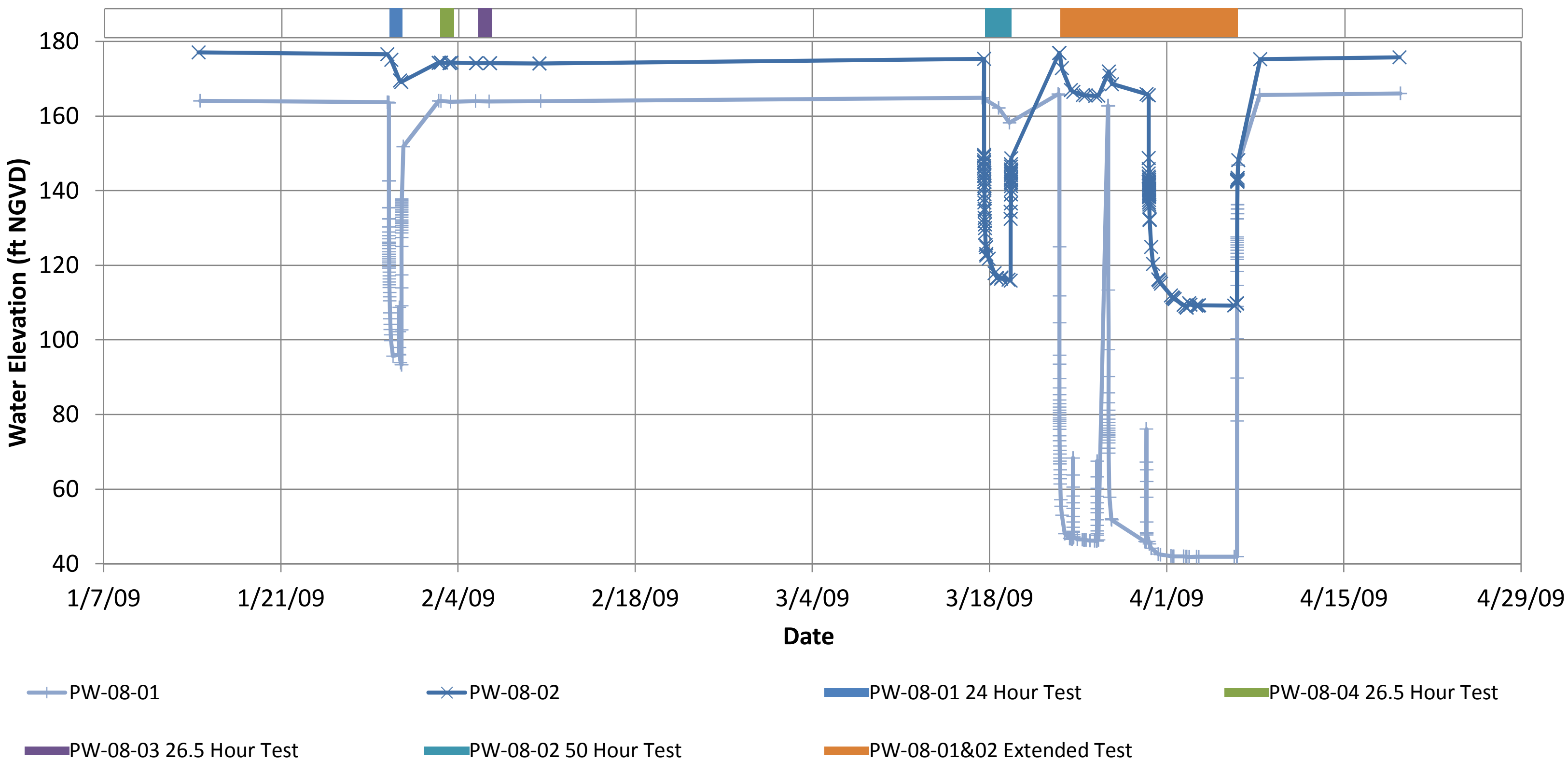
Landfill Location Of Origin	Site Sensitive Receptors	Offset Credits (Yrs)	Imported Soils (Yrs)	Calculated Travel Time In Soil And Bedrock (Yrs)	Total Travel Time (Yrs)
Cell 11 Southern End	Point A	3	3	10.5	16.5
Center of Cell 11	Point B	2	3	3.9	8.9
Center of Cell 12	Point C	2	3	11.4	16.4
Center of Cell 13	Point C	2	3	11.2	16.2
Cell 13 Leachate Sump	Point C	2	3	36.1	41.1
Center of Cell 14	Point D	3	3	62.2	68.2
Center of Cell 14	Point E	3	3	17.7	23.7
Center of Cell 15	Point F	2	3	1.4	6.4
Center of Cell 16	Point G	2	3	5.3	10.3
Cell 16 Leachate Sump.	Point G	3	3	10.3	16.3

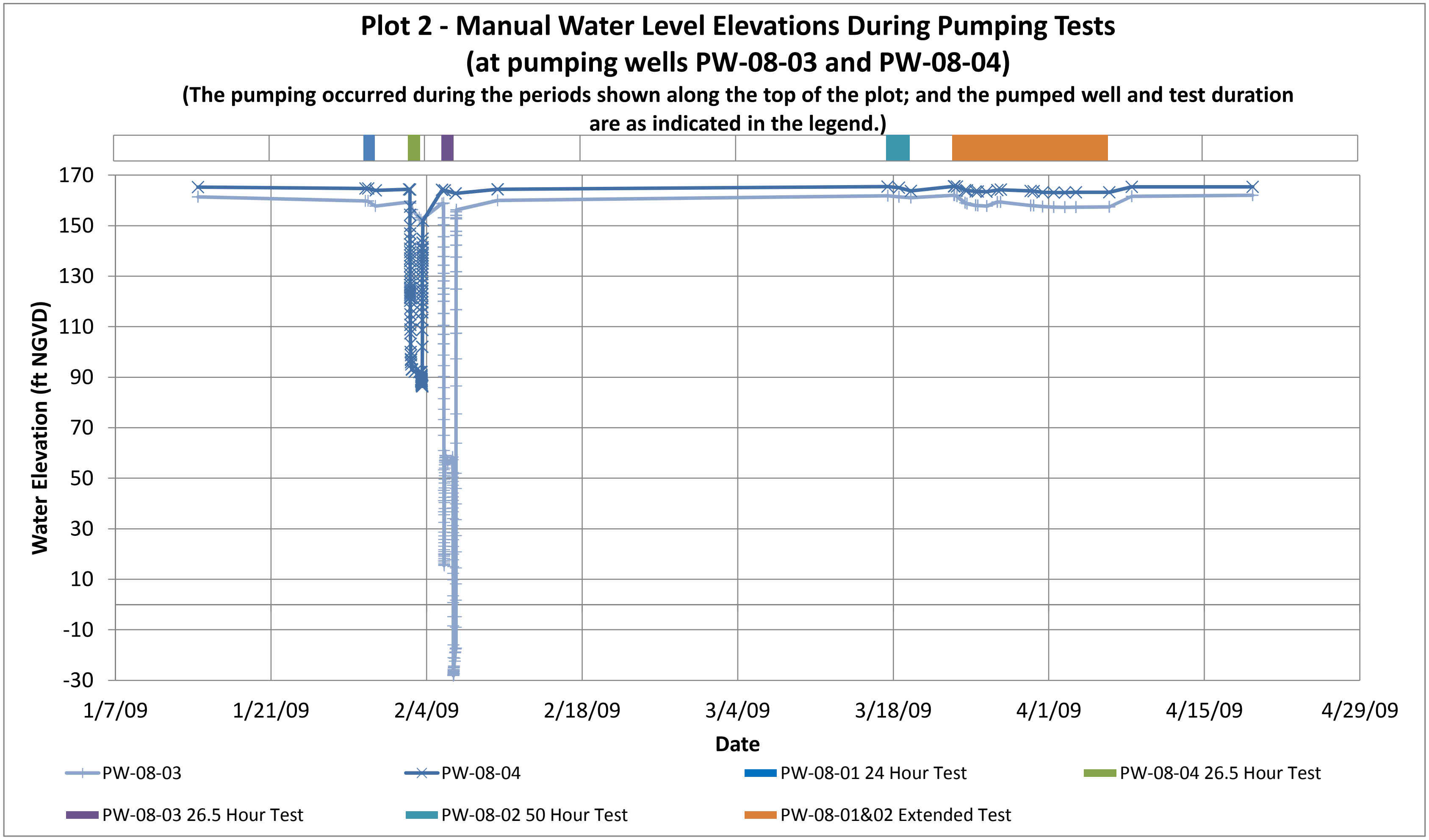
ATTACHMENT SME-D5

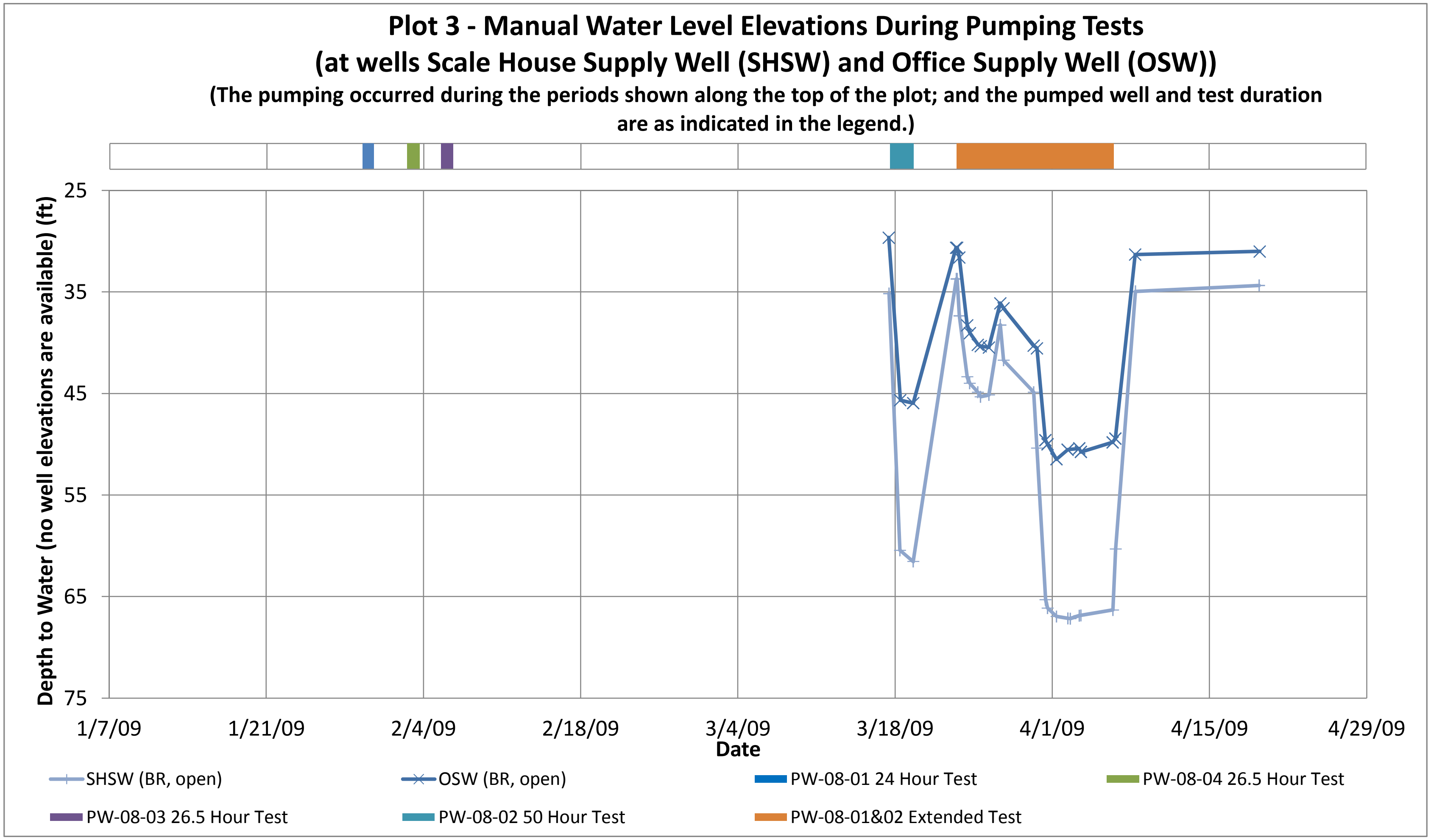
MANUAL DRAWDOWN PLOTS DURING PUMPING TESTS

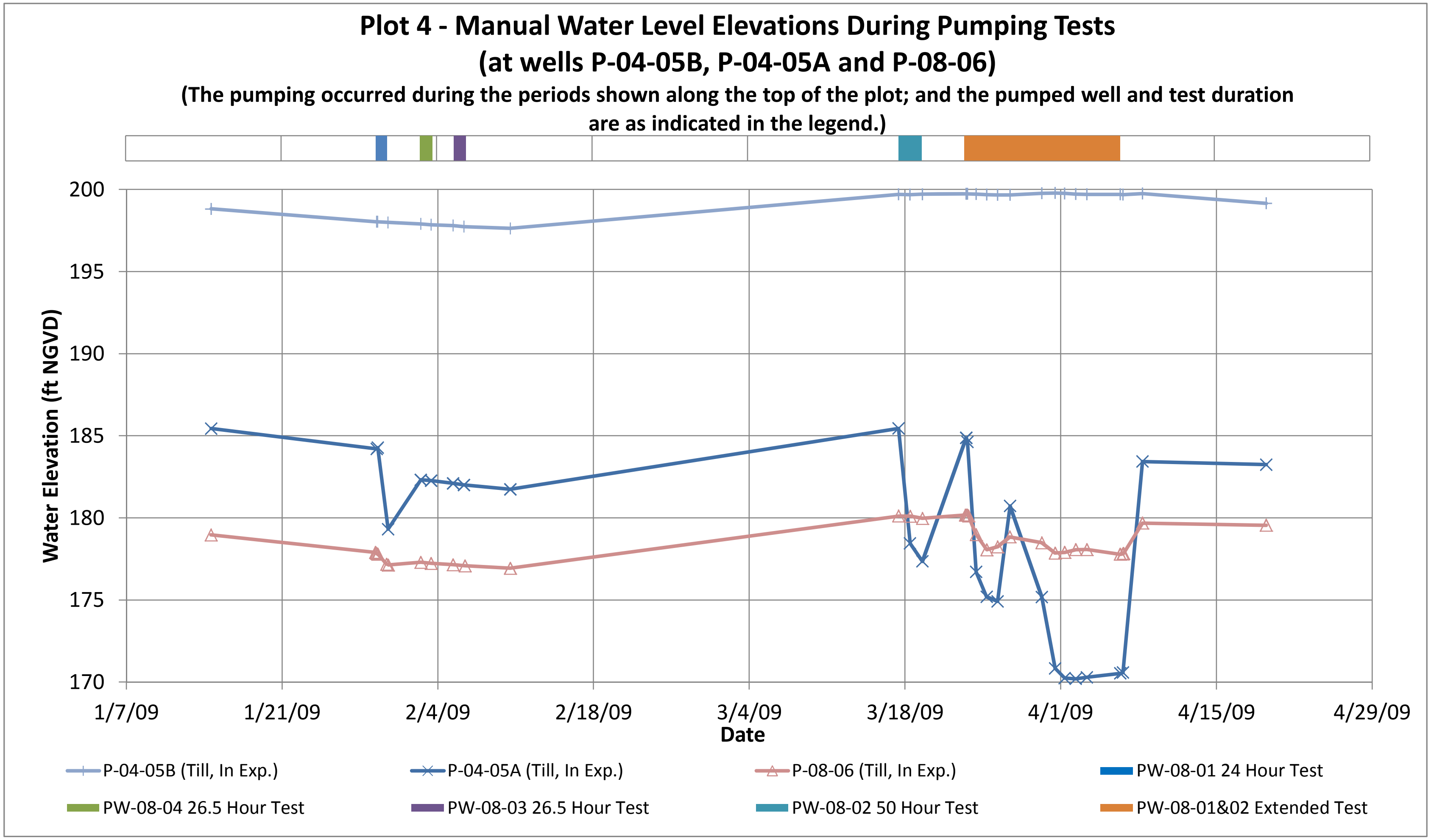
Plot 1 - Manual Water Level Elevations During Pumping Tests (at pumping wells PW-08-01 and PW-08-02)

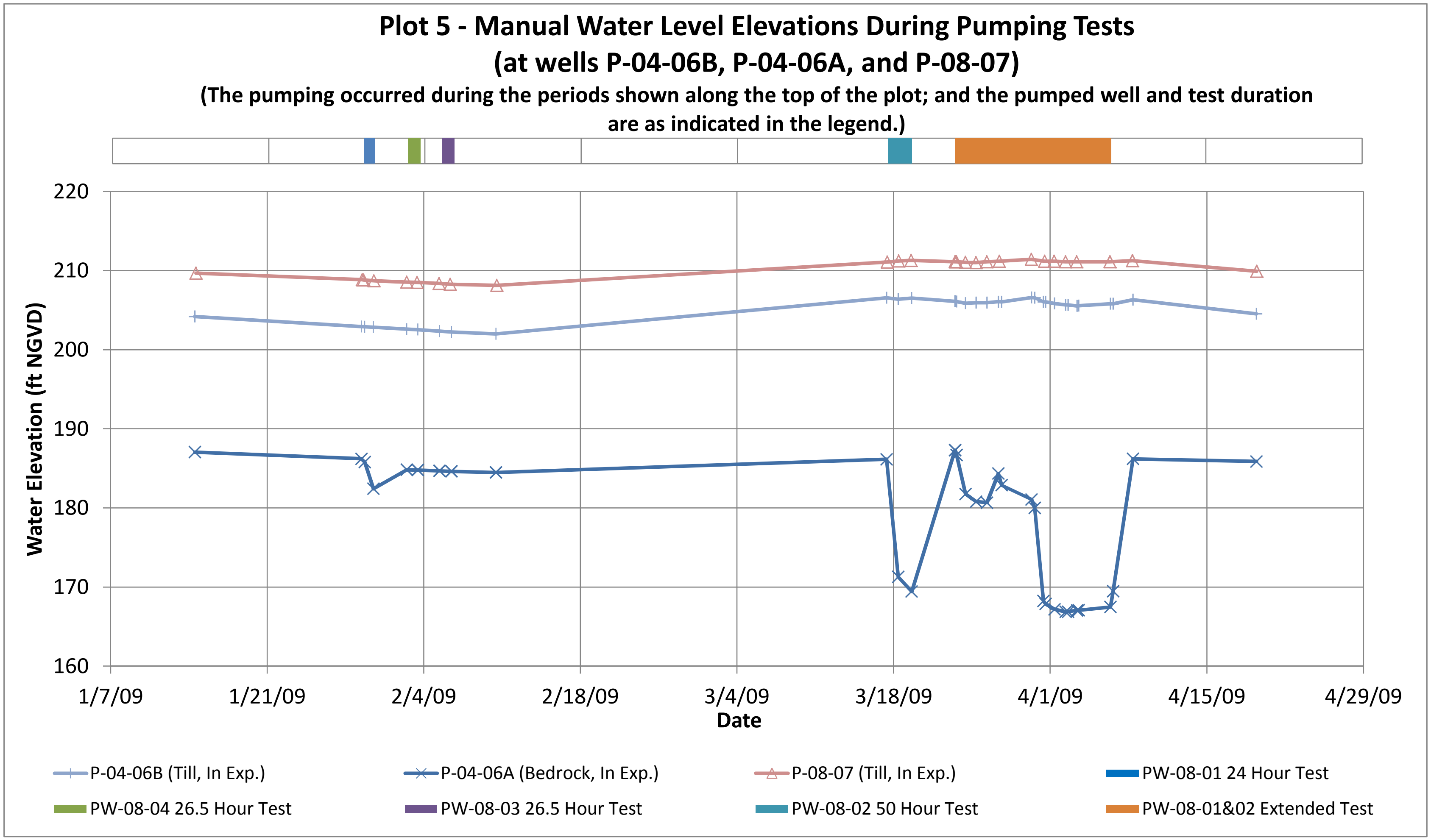
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)




Plot 2 - Manual Water Level Elevations During Pumping Tests
(at pumping wells PW-08-03 and PW-08-04)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
170
150
130
110
90
70
50
30
10
-10
-30
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
PW-08-03
PW-08-04
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test

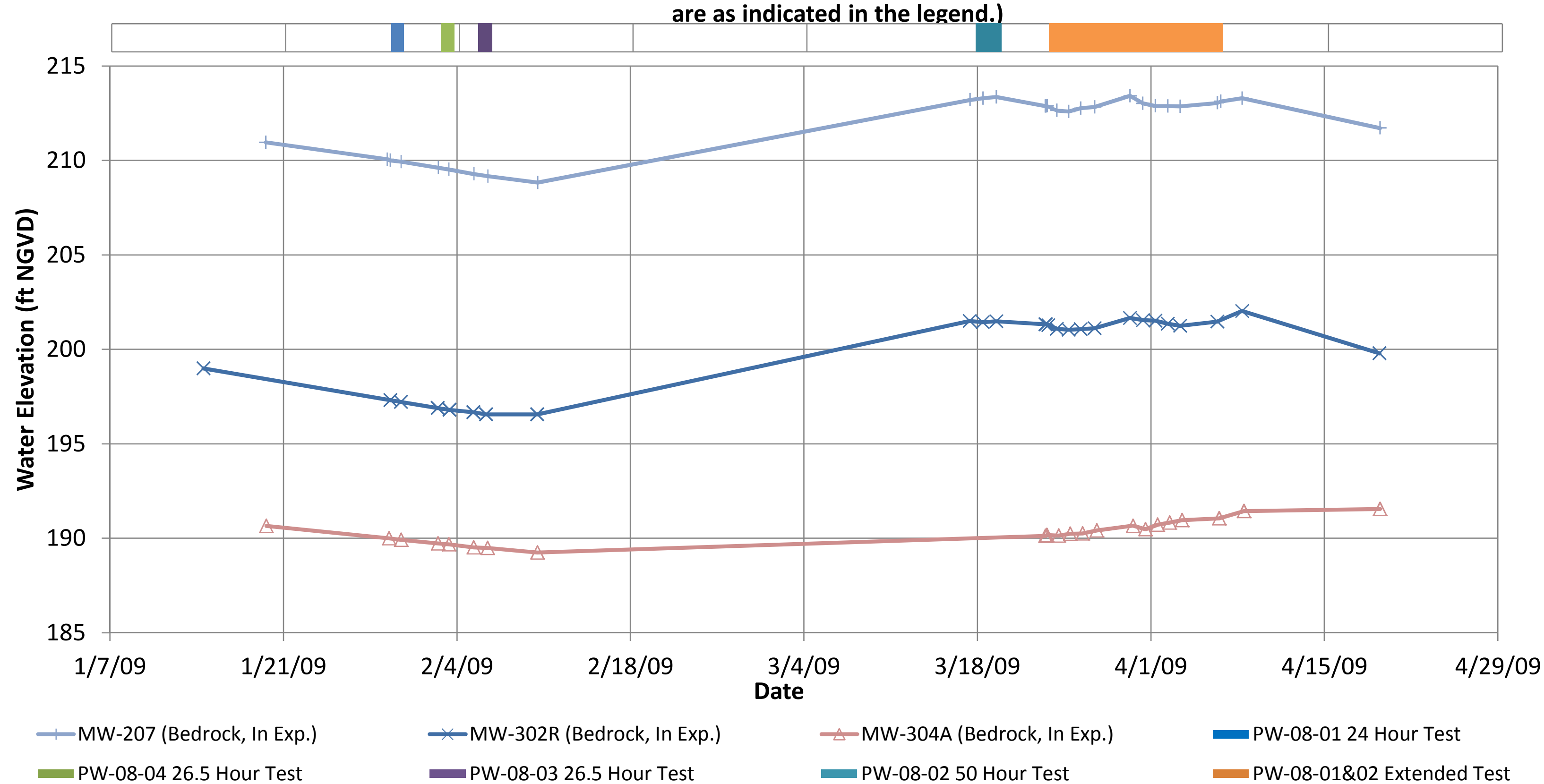

Plot 3 - Manual Water Level Elevations During Pumping Tests
(at wells Scale House Supply Well (SHSW) and Office Supply Well (OSW))
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Depth to Water (no well elevations are available) (ft)
25
35
45
55
65
75
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
SHSW (BR, open)
OSW (BR, open)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test

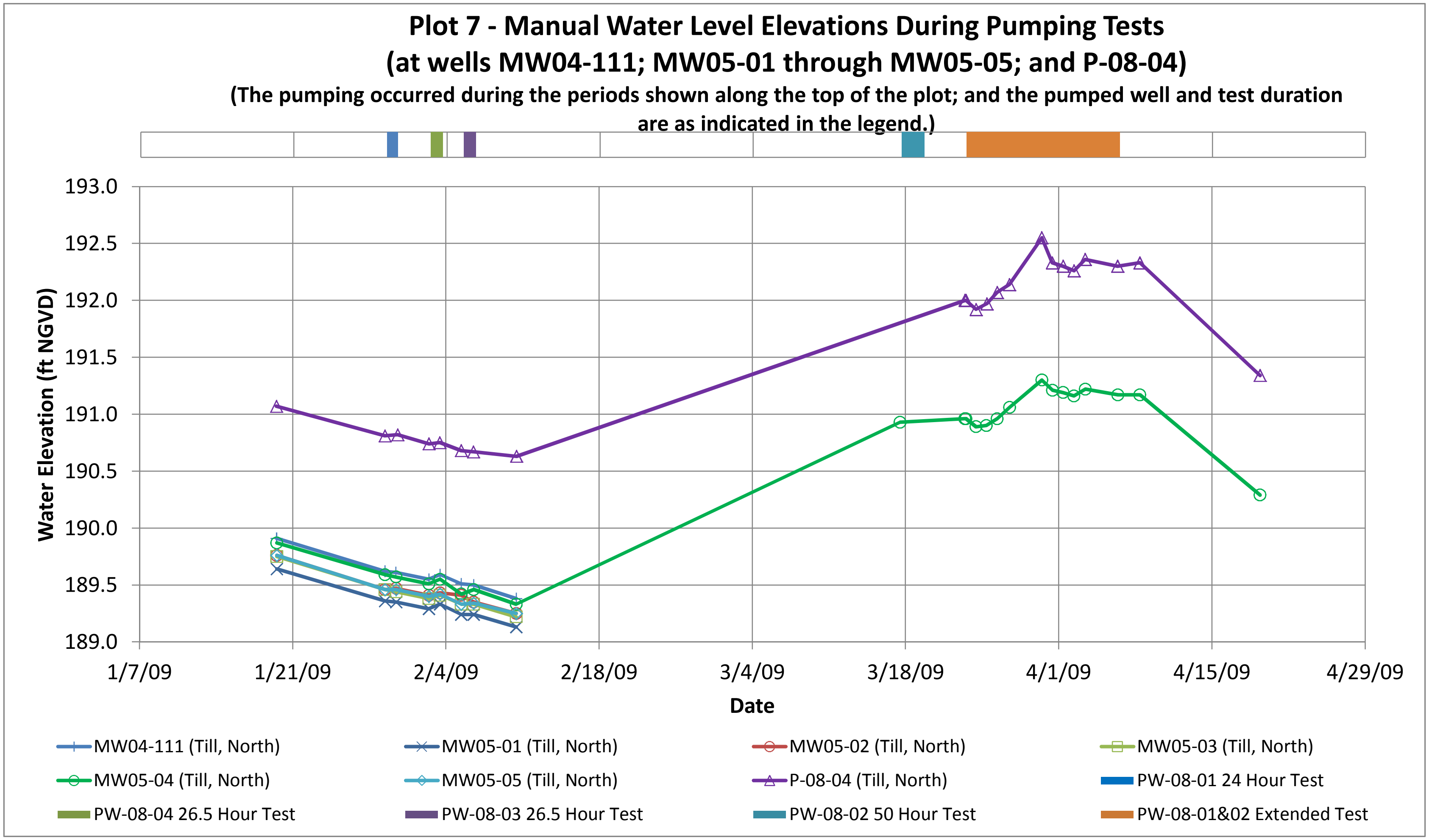

Plot 4 - Manual Water Level Elevations During Pumping Tests
(at wells P-04-05B, P-04-05A and P-08-06)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
200
195
190
185
180
175
170
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-05B (Till, In Exp.)
P-04-05A (Till, In Exp.)
P-08-06 (Till, In Exp.)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test

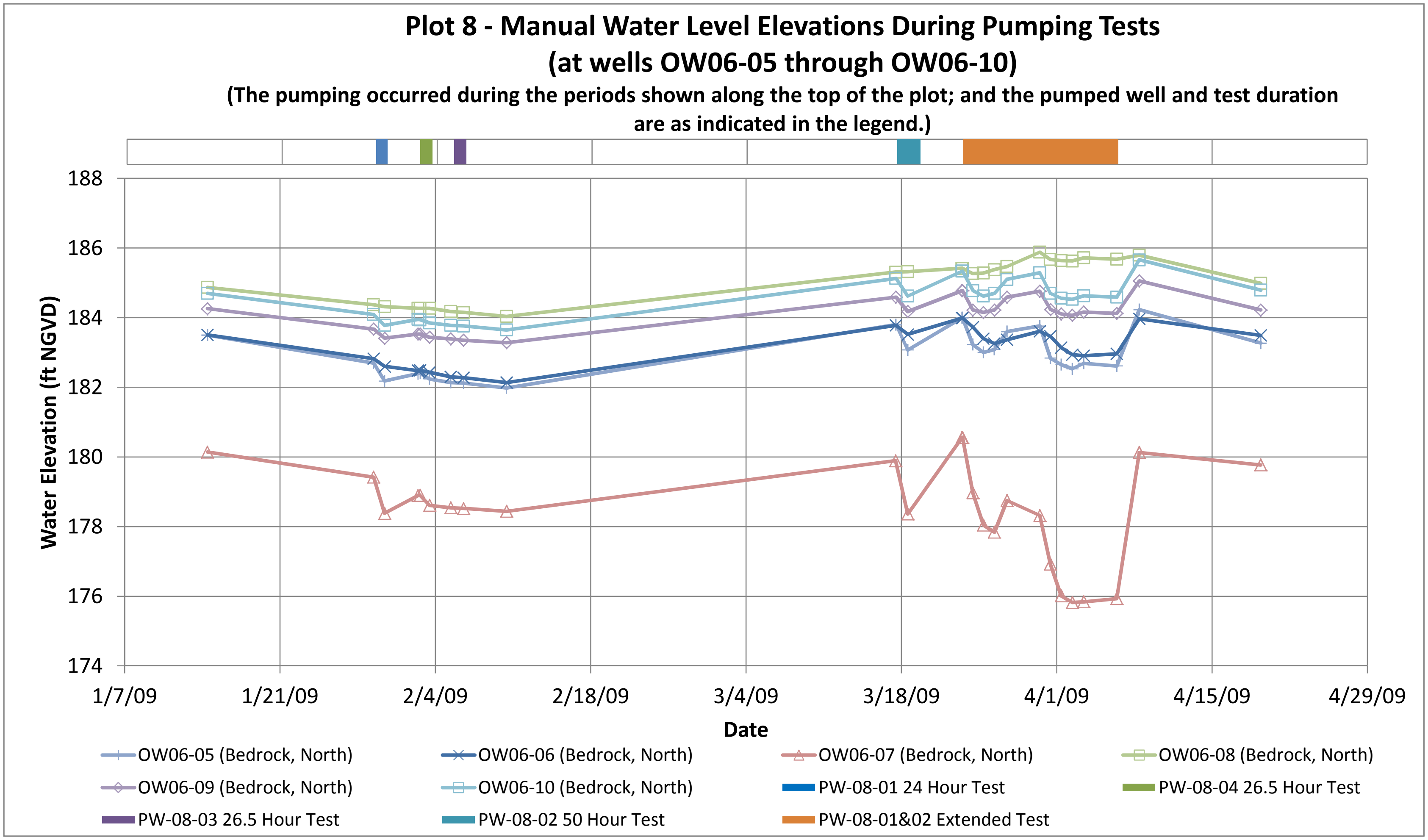

Plot 5 - Manual Water Level Elevations During Pumping Tests
(at wells P-04-06B, P-04-06A, and P-08-07)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
220
210
200
190
180
170
160
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-06B (Till, In Exp.)
P-04-06A (Bedrock, In Exp.)
P-08-07 (Till, In Exp.)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test

Plot 6 - Manual Water Level Elevations During Pumping Tests
(at wells MW-207, MW-302R, and MW-304A)

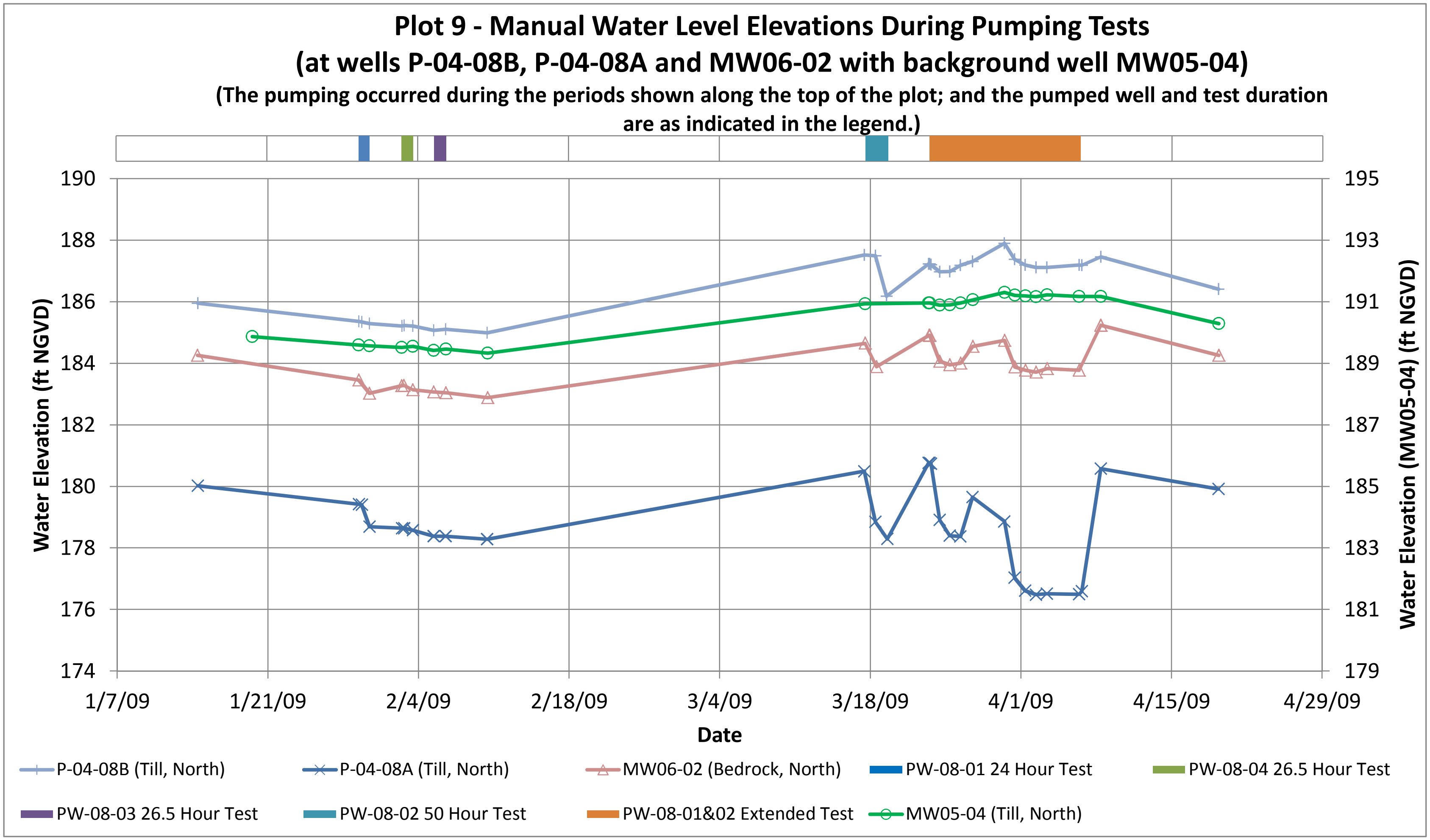
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)

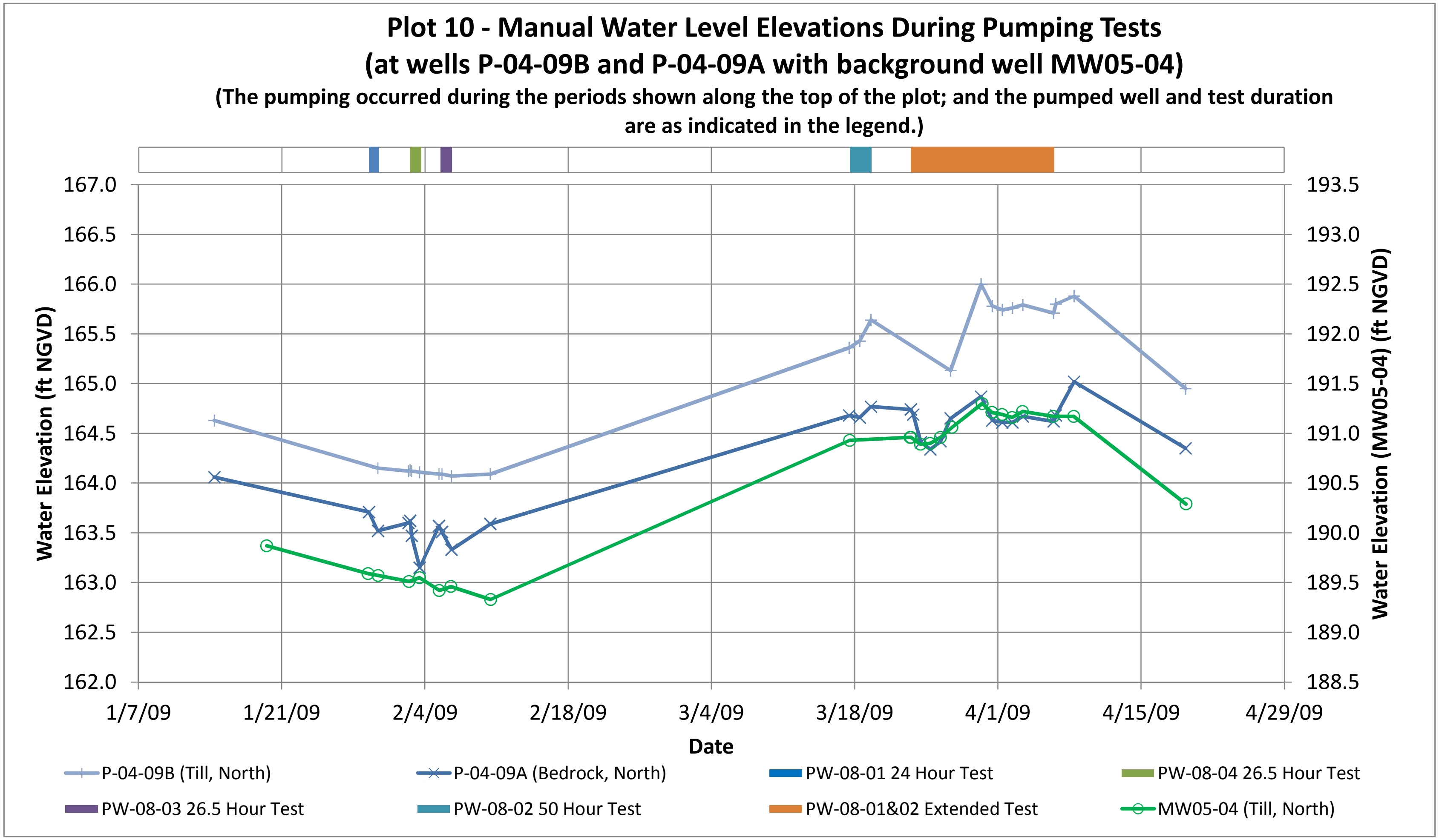



Plot 7 - Manual Water Level Elevations During Pumping Tests
(at wells MW04-111; MW05-01 through MW05-05; and P-08-04)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
193.0
192.5
192.0
191.5
191.0
190.5
190.0
189.5
189.0
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
MW04-111 (Till, North)
MW05-01 (Till, North)
MW05-02 (Till, North)
MW05-03 (Till, North)
MW05-04 (Till, North)
MW05-05 (Till, North)
P-08-04 (Till, North)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test

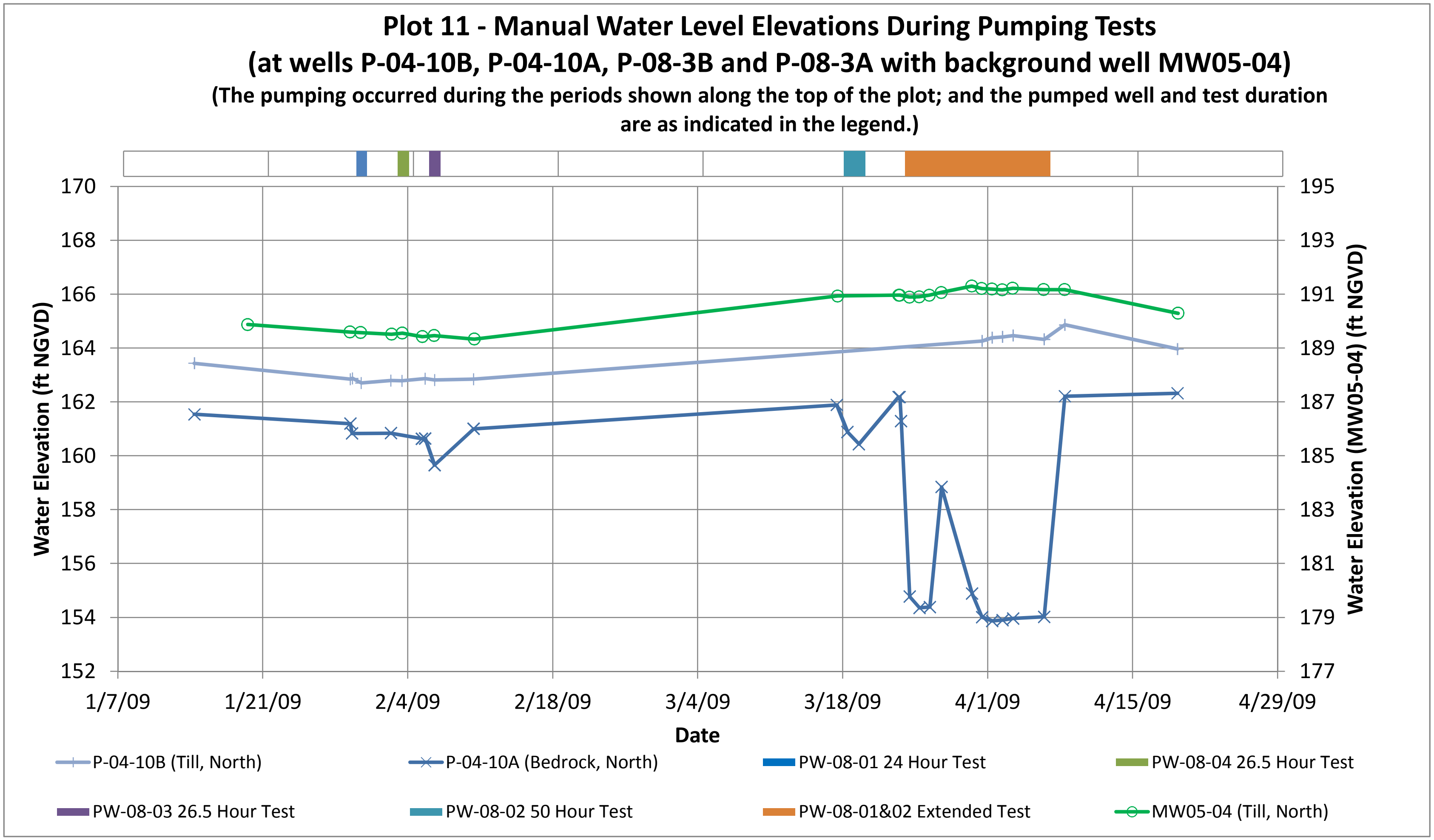


Plot 8 - Manual Water Level Elevations During Pumping Tests
(at wells OW06-05 through OW06-10)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
188
186
184
182
180
178
176
174
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
OW06-05 (Bedrock, North)
OW06-06 (Bedrock, North)
OW06-07 (Bedrock, North)
OW06-08 (Bedrock, North)
OW06-09 (Bedrock, North)
OW06-10 (Bedrock, North)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test

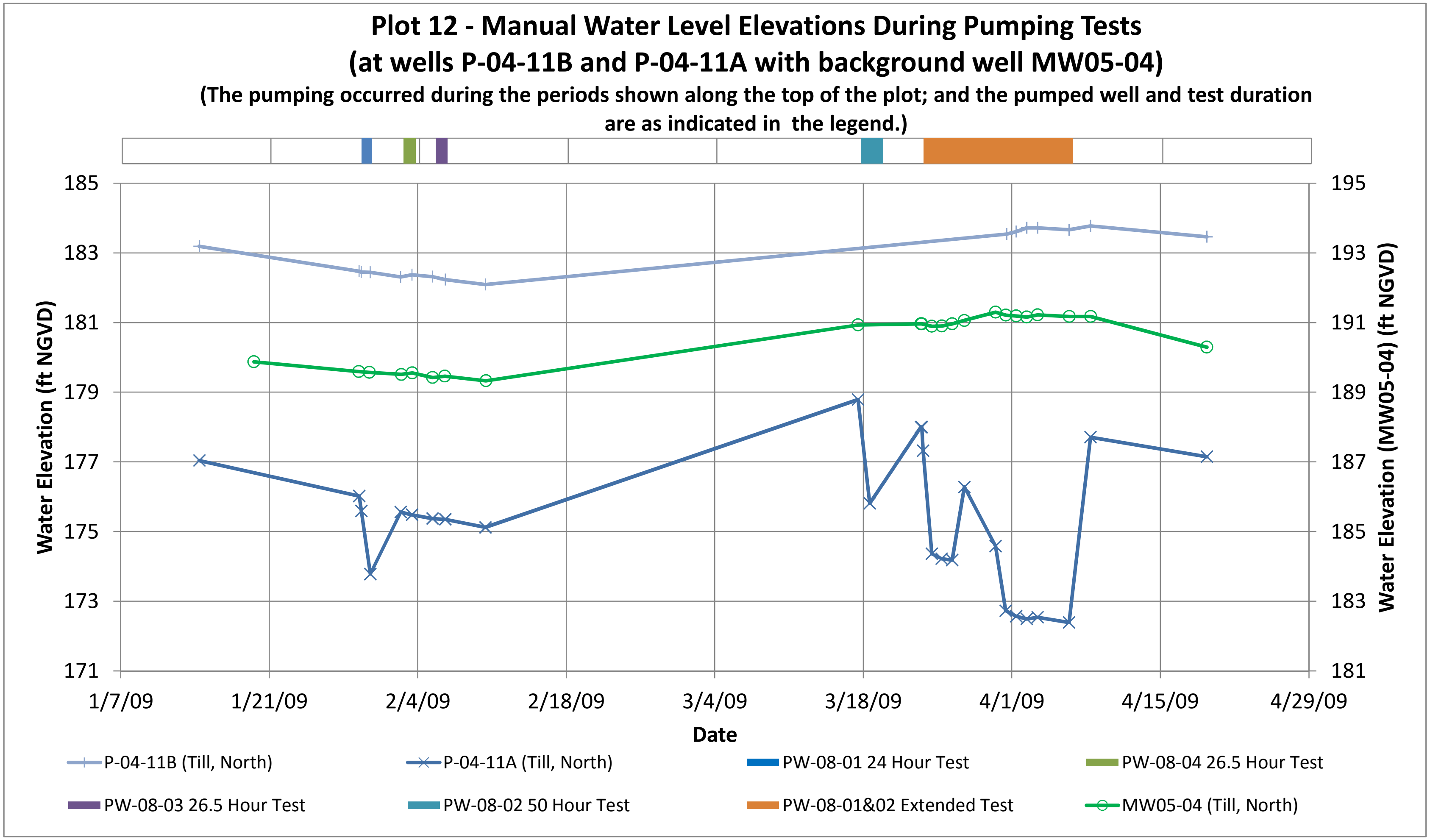

Plot 9 - Manual Water Level Elevations During Pumping Tests
(at wells P-04-08B, P-04-08A and MW06-02 with background well MW05-04)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
Water Elevation (MW05-04) (ft NGVD)
190
188
186
184
182
180
178
176
174
195
193
191
189
187
185
183
181
179
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-08B (Till, North)
P-04-08A (Till, North)
MW06-02 (Bedrock, North)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test
MW05-04 (Till, North)



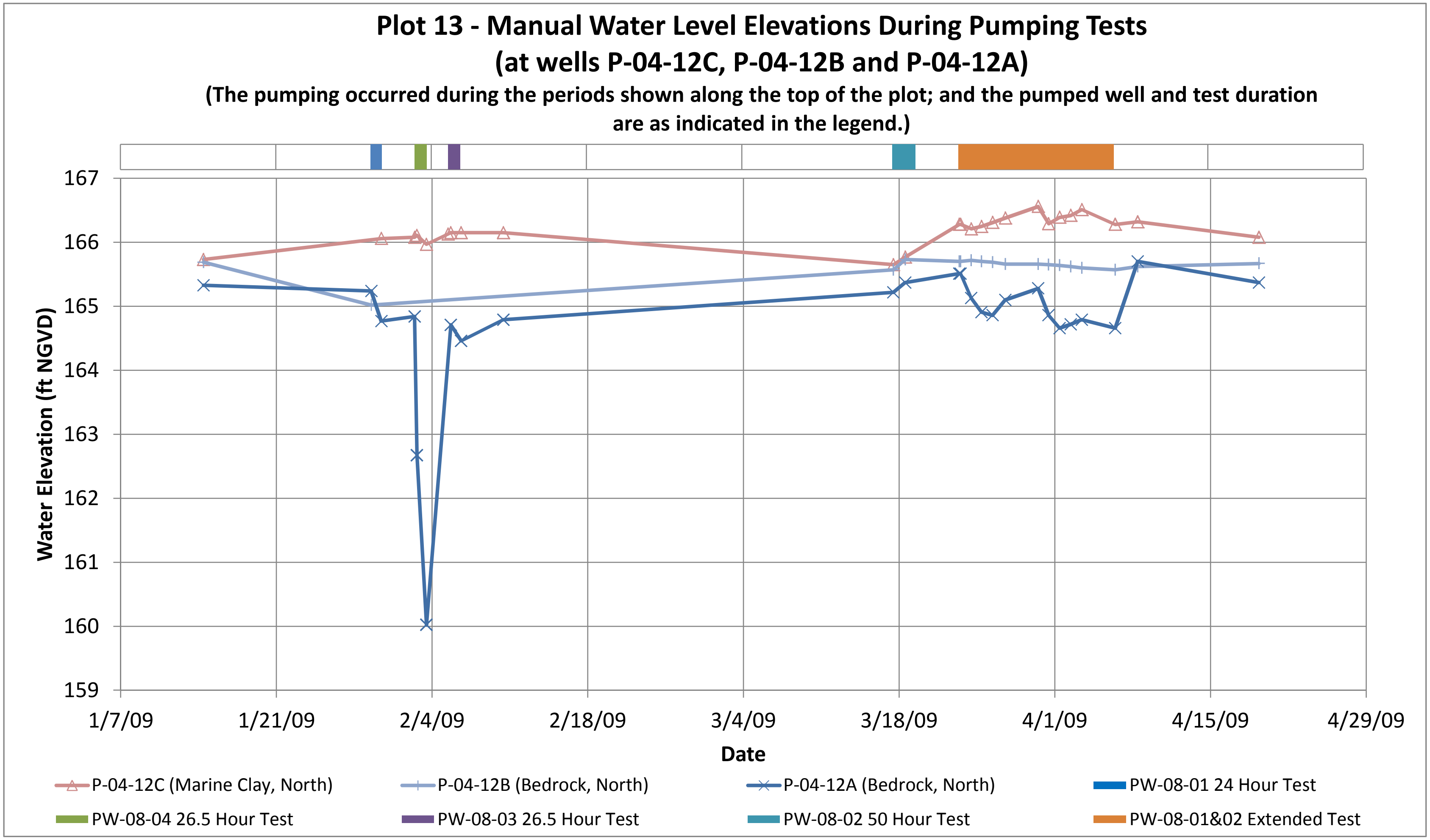
Plot 10 - Manual Water Level Elevations During Pumping Tests
(at wells P-04-09B and P-04-09A with background well MW05-04)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
167.0
166.5
166.0
165.5
165.0
164.5
164.0
163.5
163.0
162.5
162.0
Water Elevation (MW05-04) (ft NGVD)
193.5
193.0
192.5
192.0
191.5
191.0
190.5
190.0
189.5
189.0
188.5
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-09B (Till, North)
P-04-09A (Bedrock, North)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test
MW05-04 (Till, North)

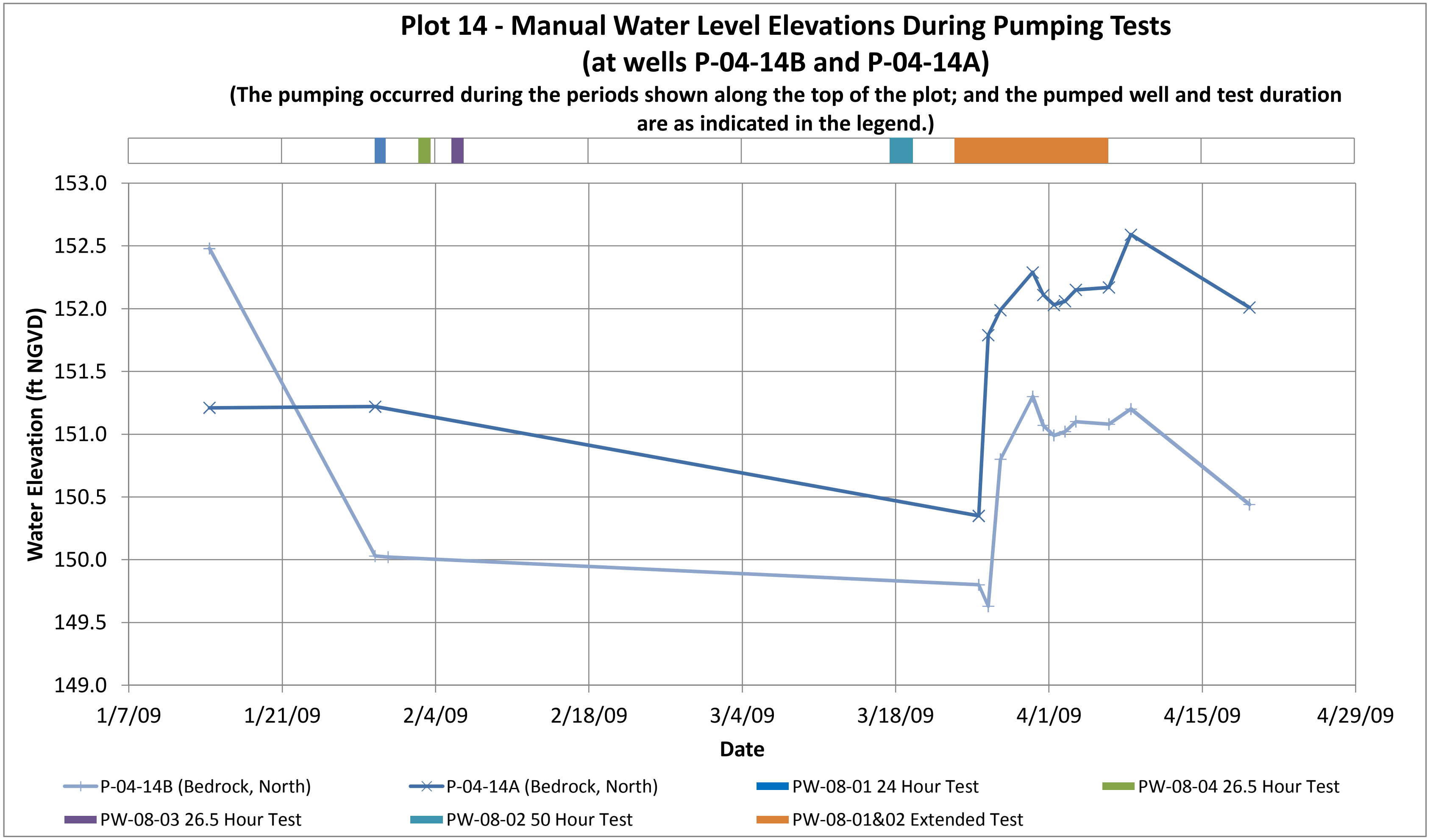


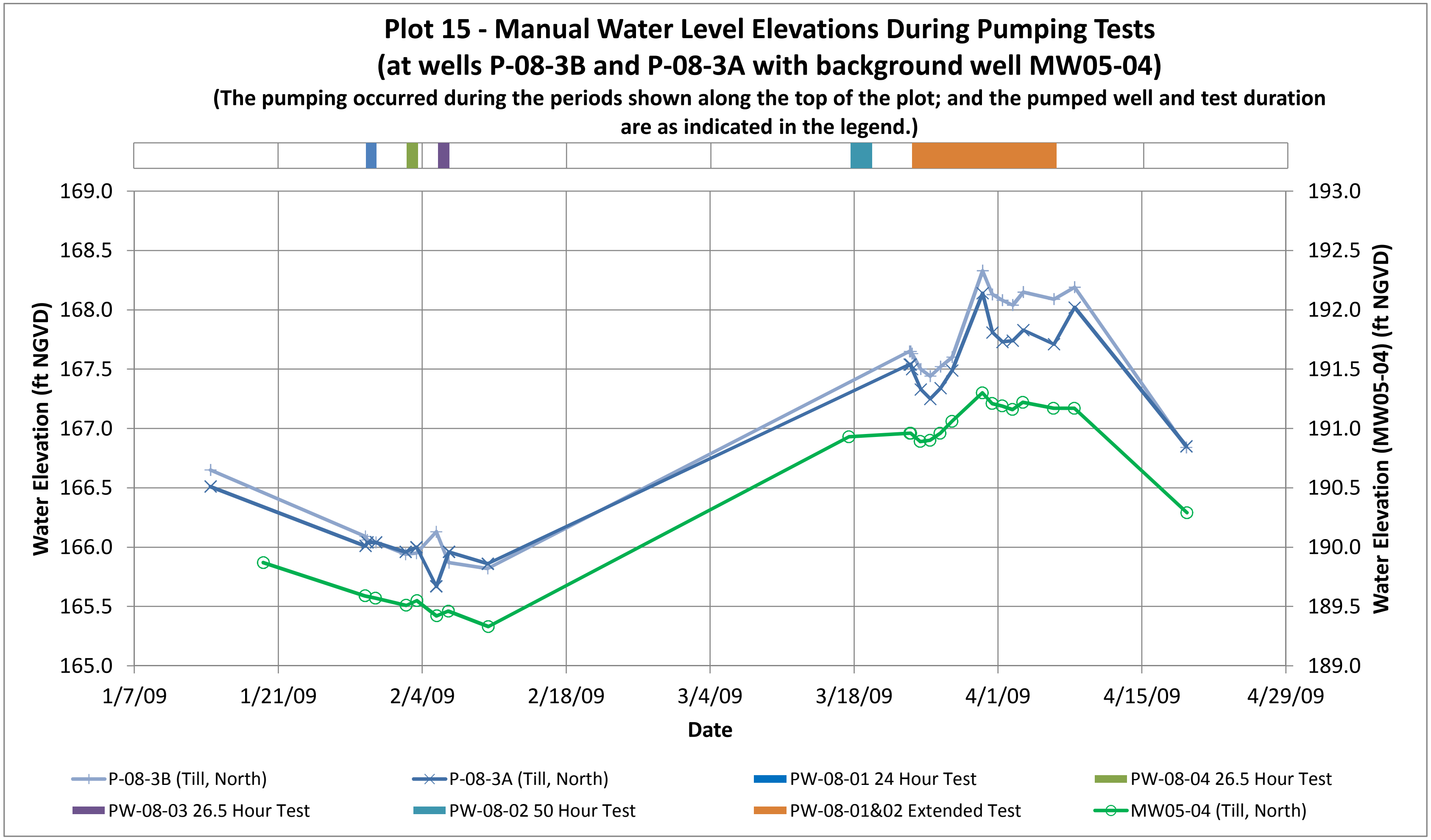
Plot 11 - Manual Water Level Elevations During Pumping Tests
(at wells P-04-10B, P-04-10A, P-08-3B and P-08-3A with background well MW05-04)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
170
168
166
164
162
160
158
156
154
152
Water Elevation (MW05-04) (ft NGVD)
195
193
191
189
187
185
183
181
179
177
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-10B (Till, North)
P-04-10A (Bedrock, North)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test
MW05-04 (Till, North)

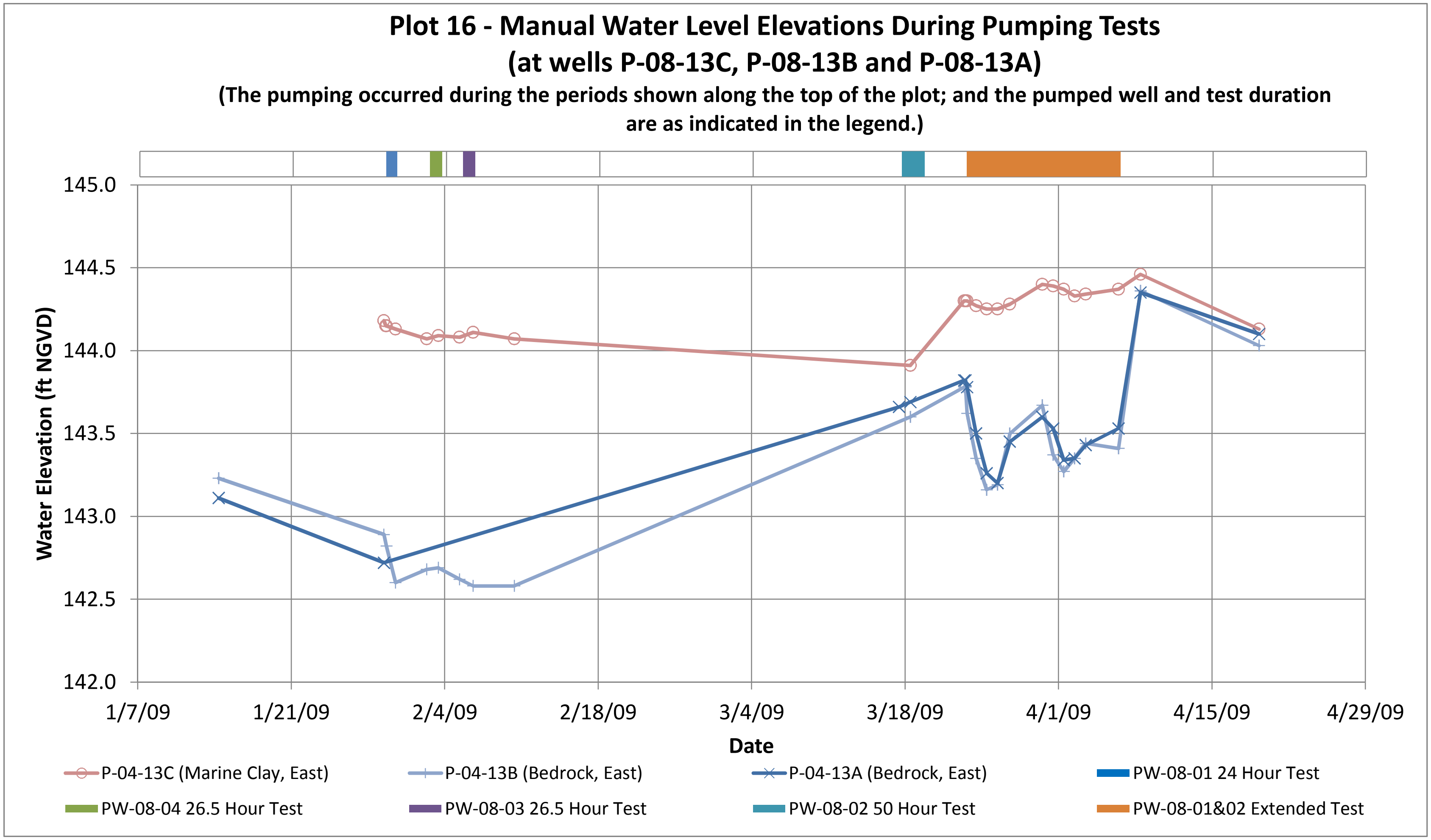


Plot 12 - Manual Water Level Elevations During Pumping Tests
(at wells P-04-11B and P-04-11A with background well MW05-04)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
Water Elevation (MW05-04) (ft NGVD)
185
183
181
179
177
175
173
171
195
193
191
189
187
185
183
181
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-11B (Till, North)
P-04-11A (Till, North)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test
MW05-04 (Till, North)

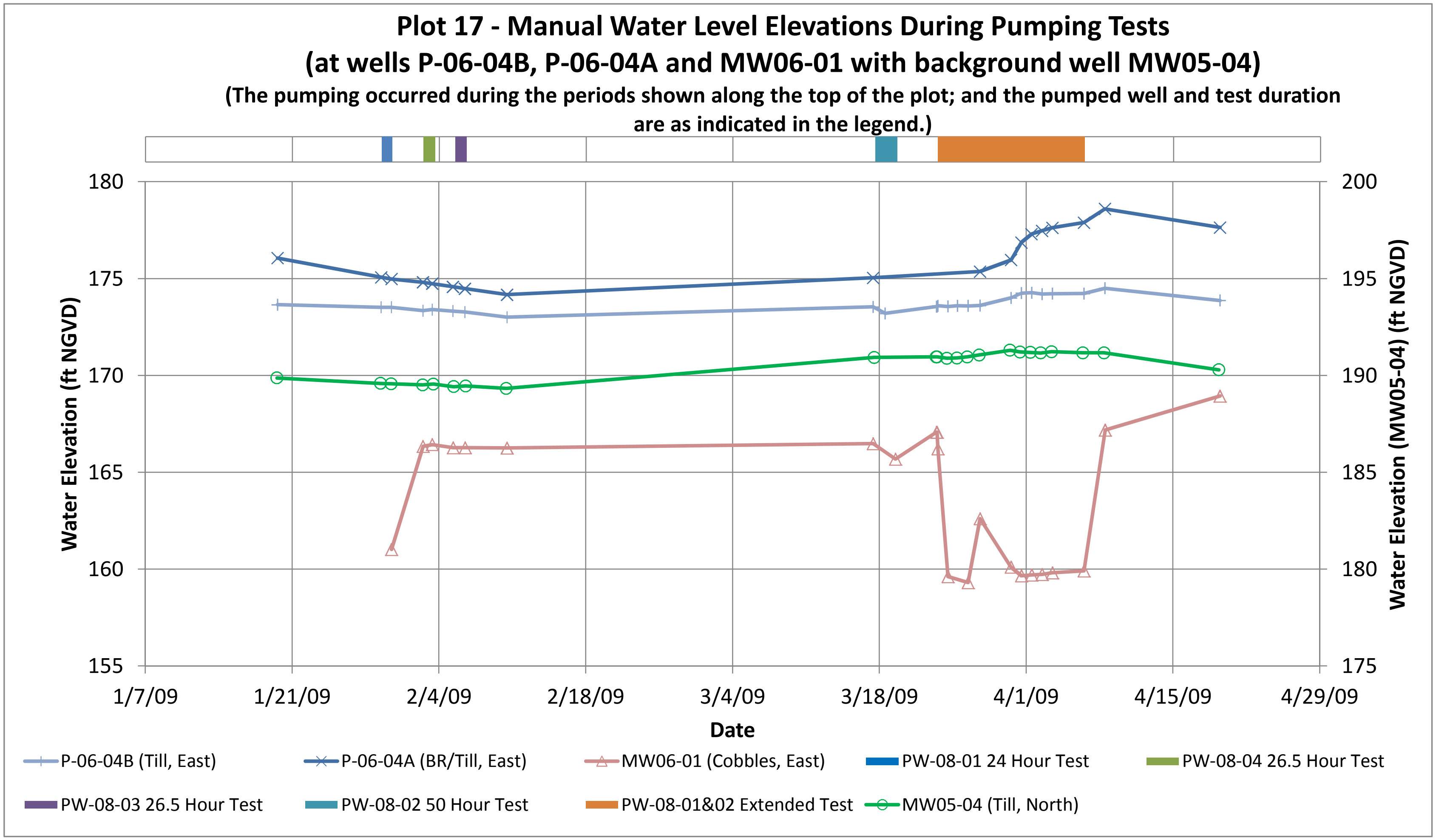

Plot 13 - Manual Water Level Elevations During Pumping Tests
(at wells P-04-12C, P-04-12B and P-04-12A)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
167
166
165
164
163
162
161
160
159
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-12C (Marine Clay, North)
P-04-12B (Bedrock, North)
P-04-12A (Bedrock, North)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test


Plot 14 - Manual Water Level Elevations During Pumping Tests
(at wells P-04-14B and P-04-14A)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
153.0
152.5
152.0
151.5
151.0
150.5
150.0
149.5
149.0
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-14B (Bedrock, North)
P-04-14A (Bedrock, North)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test

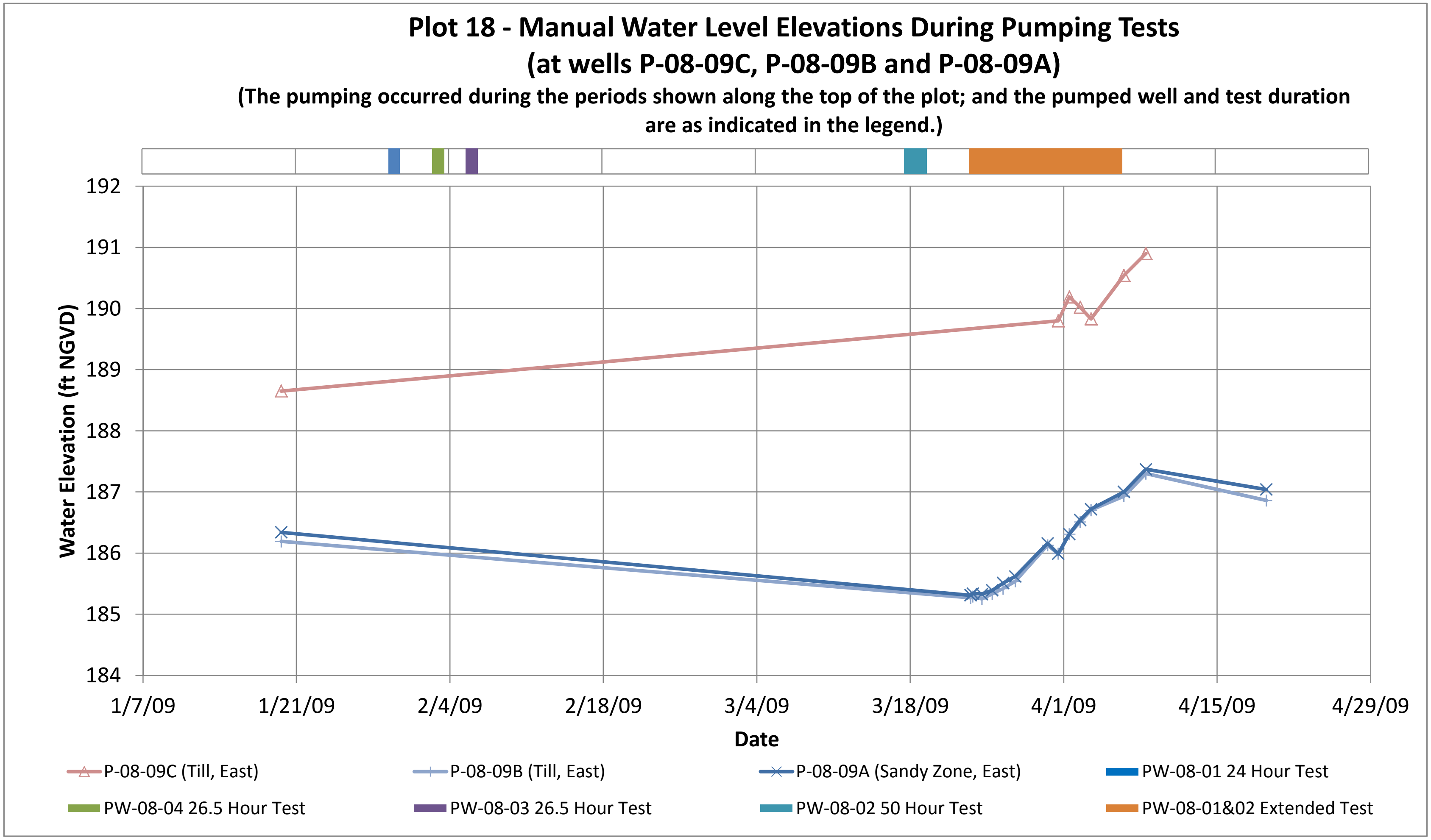

Plot 15 - Manual Water Level Elevations During Pumping Tests
(at wells P-08-3B and P-08-3A with background well MW05-04)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
169.0
168.5
168.0
167.5
167.0
166.5
166.0
165.5
165.0
Water Elevation (MW05-04) (ft NGVD)
193.0
192.5
192.0
191.5
191.0
190.5
190.0
189.5
189.0
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-08-3B (Till, North)
P-08-3A (Till, North)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test
MW05-04 (Till, North)



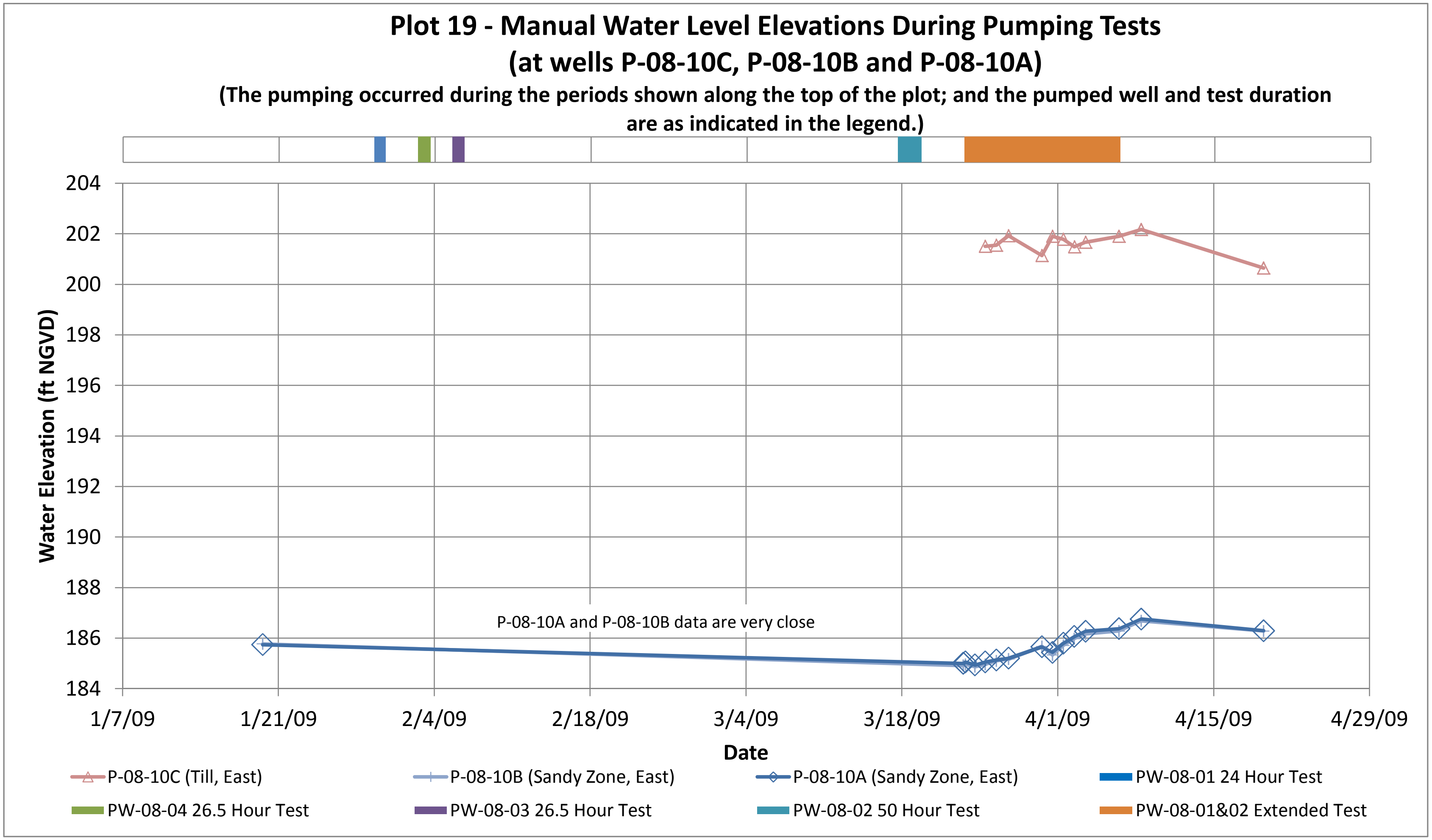
Plot 16 - Manual Water Level Elevations During Pumping Tests
(at wells P-08-13C, P-08-13B and P-08-13A)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
145.0
144.5
144.0
143.5
143.0
142.5
142.0
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-13C (Marine Clay, East)
P-04-13B (Bedrock, East)
P-04-13A (Bedrock, East)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test

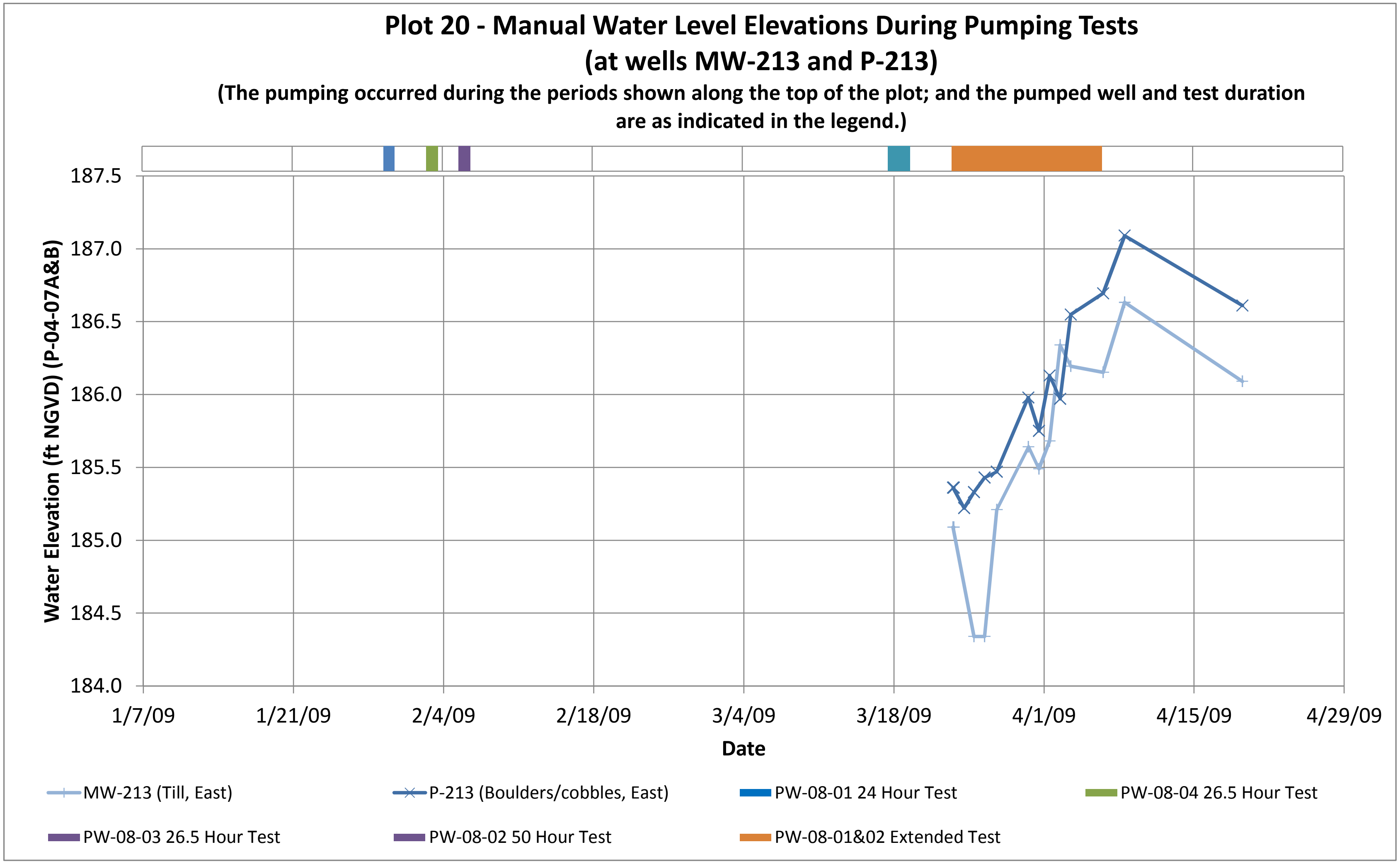


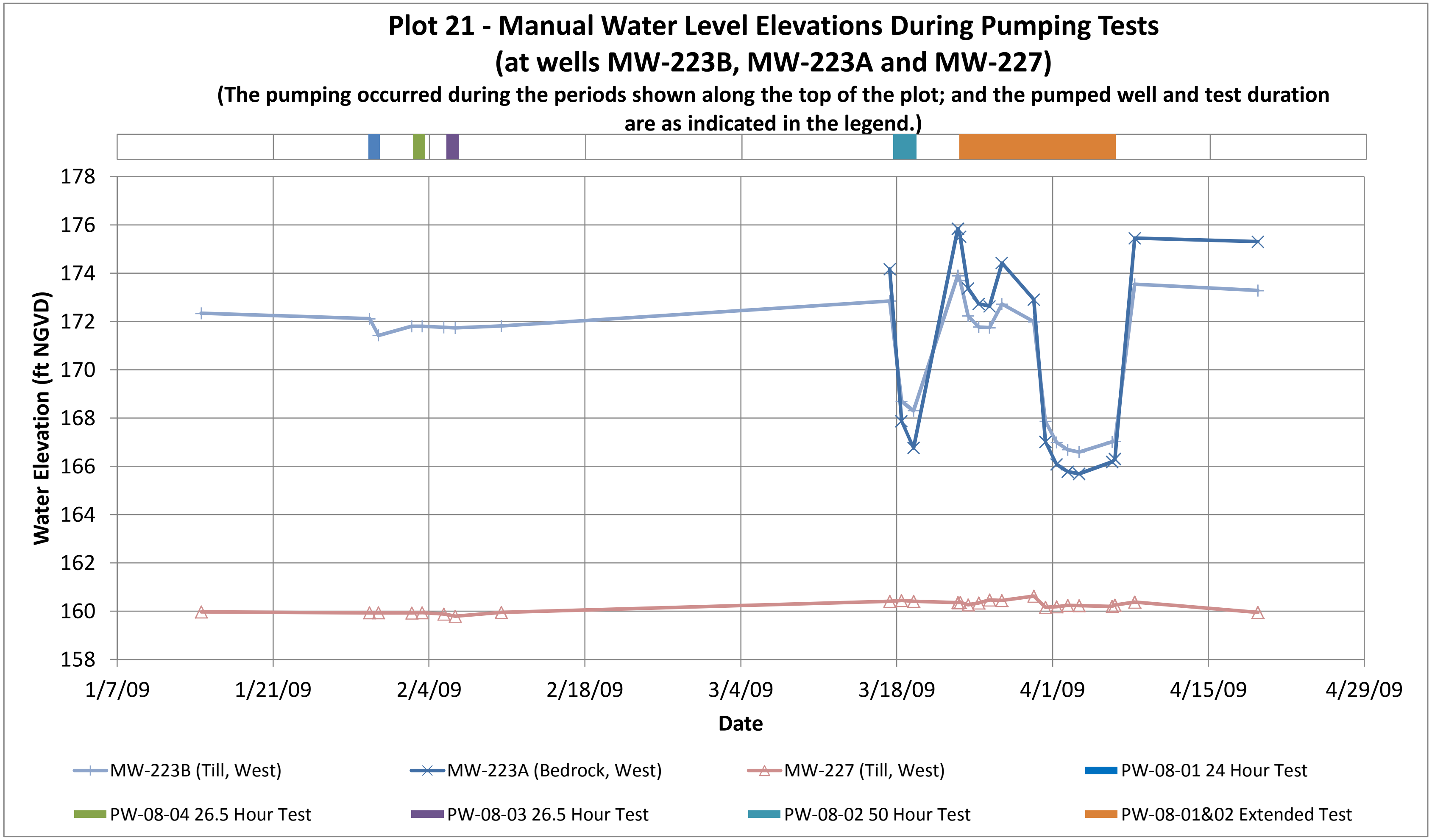
Plot 17 - Manual Water Level Elevations During Pumping Tests
(at wells P-06-04B, P-06-04A and MW06-01 with background well MW05-04)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
Water Elevation (MW05-04) (ft NGVD)
180
175
170
165
160
155
200
195
190
185
180
175
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-06-04B (Till, East)
P-06-04A (BR/Till, East)
MW06-01 (Cobbles, East)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test
MW05-04 (Till, North)



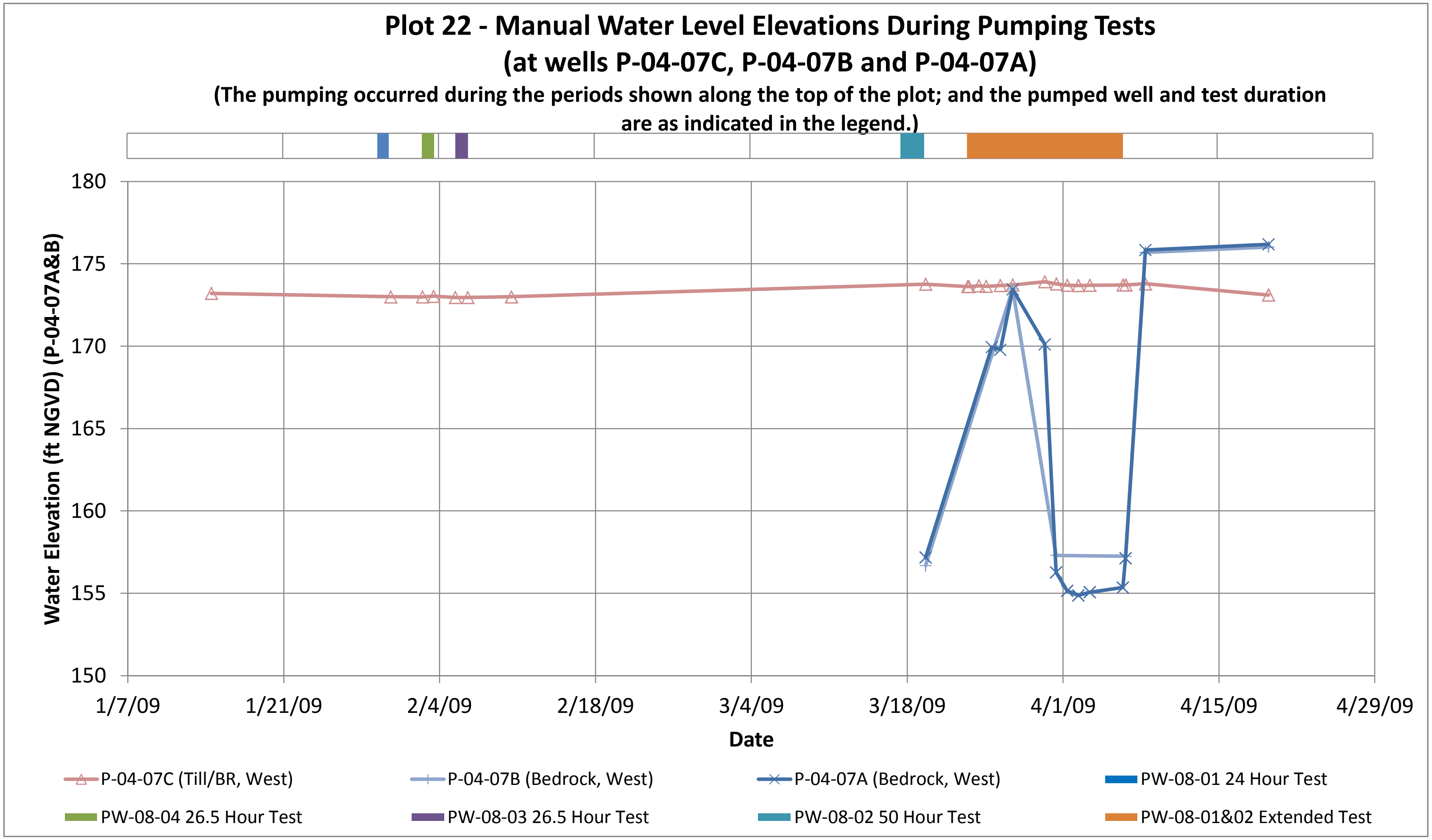
Plot 18 - Manual Water Level Elevations During Pumping Tests
(at wells P-08-09C, P-08-09B and P-08-09A)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
192
191
190
189
188
187
186
185
184
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-08-09C (Till, East)
P-08-09B (Till, East)
P-08-09A (Sandy Zone, East)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test


Plot 19 - Manual Water Level Elevations During Pumping Tests
(at wells P-08-10C, P-08-10B and P-08-10A)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
204
202
200
198
196
194
192
190
188
186
184
P-08-10A and P-08-10B data are very close
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-08-10C (Till, East)
P-08-10B (Sandy Zone, East)
P-08-10A (Sandy Zone, East)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test


Plot 20 - Manual Water Level Elevations During Pumping Tests
(at wells MW-213 and P-213)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD) (P-04-07A&B)
187.5
187.0
186.5
186.0
185.5
185.0
184.5
184.0
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
MW-213 (Till, East)
P-213 (Boulders/cobbles, East)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test



Plot 21 - Manual Water Level Elevations During Pumping Tests
(at wells MW-223B, MW-223A and MW-227)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD)
178
176
174
172
170
168
166
164
162
160
158
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
MW-223B (Till, West)
MW-223A (Bedrock, West)
MW-227 (Till, West)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test


Plot 22 - Manual Water Level Elevations During Pumping Tests
(at wells P-04-07C, P-04-07B and P-04-07A)
(The pumping occurred during the periods shown along the top of the plot; and the pumped well and test duration are as indicated in the legend.)
Water Elevation (ft NGVD) (P-04-07A&B)
180
175
170
165
160
155
150
1/7/09
1/21/09
2/4/09
2/18/09
3/4/09
3/18/09
4/1/09
4/15/09
4/29/09
Date
P-04-07C (Till/BR, West)
P-04-07B (Bedrock, West)
P-04-07A (Bedrock, West)
PW-08-01 24 Hour Test
PW-08-04 26.5 Hour Test
PW-08-03 26.5 Hour Test
PW-08-02 50 Hour Test
PW-08-01&02 Extended Test

ATTACHMENT SME-D6

TABULAR SUMMARY OF DRAWDOWN DATA FROM PUMPING TESTS

PW-08-01 24-HOUR PUMP TEST
JUNIPER RIDGE LANDFILL - JANUARY 29 (1:00 PM) to 30 (1:00 PM), 2009
WEST OLD TOWN, MAINE

Well ID	Drawdown (ft) Near End of Test
MW-04-111	0.01
MW-05-01	0.01
MW-05-02	-0.01
MW-05-03	0.02
MW-05-04	0.02
MW-05-05	0
MW-06-01	5.11
MW-06-02	0.44
MW-207	0.12
MW-223A	1.17
MW-223B	0.69
MW-227	0
MW-302R	0.1
MW-304A	0.07
OW-06-05	0.52
OW-06-06	0.22
OW-06-07	1.04
OW-06-08	0.05
OW-06-09	0.26
OW-06-10	0.31
P-04-05A	4.89
P-04-05B	0.04
P-04-06A	3.79
P-04-06B	0.07
P-04-07A	1.82
P-04-07B	5.68
P-04-08A	0.73
P-04-08B	0.07
P-04-09A	0.19
P-04-10A	0.36
P-04-10B	0.14
P-04-11A	2.24
P-04-11B	0.03
P-04-12A	0.47
P-04-13B	0.29
P-04-13C	0.05
P-04-14A	0.16
P-04-14B	0.05
P-06-04A	0.09
P-06-04B	0
P-08-03A	-0.03
P-08-03B	0.05
P-08-04	-0.01
P-08-06	0.72
P-08-07	0.15
PW-08-01	70.27
PW-08-02	7.39
PW-08-03	2.04
PW-08-04	0.75

PW-08-02 50-HOUR PUMP TEST
JUNIPER RIDGE LANDFILL - MARCH 17 TO MARCH 19, 2009
WEST OLD TOWN, MAINE

Well ID	Drawdown (ft) Near End of Test
MW-06-01	0.80
MW-06-02	0.80
MW-207	-0.15
MW-223A	7.41
MW-223B	4.55
MW-227	0.00
MW-302R	0.02
OSW	16.30
OW-06-05	0.73
OW-06-06	0.26
OW-06-07	1.53
OW-06-08	-0.01
OW-06-09	0.41
OW-06-10	0.51
P-04-05A	8.10
P-04-05B	-0.01
P-04-06A	16.71
P-04-06B	0.04
P-04-07A	6.51
P-04-07B	19.66
P-04-08A	2.20
P-04-08B	1.34
P-04-09A	-0.09
P-04-09B	-0.28
P-04-10A	1.46
P-04-11A	2.98
P-04-12A	-0.15
P-04-12B	-0.16
P-04-12C	-0.12
P-04-13A	-0.03
P-04-14A	-0.05
P-04-14B	-0.17
P-06-04B	0.34
P-08-06	0.14
P-08-07	-0.22
PW-08-01	6.70
PW-08-02	59.38
PW-08-03	0.76
PW-08-04	1.64
SHSW	26.39

PW-08-03 26.5-HOUR PUMP TEST
JUNIPER RIDGE LANDFILL - FEBRUARY 5 TO FEBRUARY 6, 2009
WEST OLD TOWN, MAINE

Well ID	Drawdown (ft) Near End of Test
MW-04-111	0.01
MW-05-01	0.00
MW-05-02	0.06
MW-05-03	0.00
MW-05-04	-0.04
MW-05-05	-0.01
MW-06-01	0.00
MW-06-02	0.03
MW-207	0.12
MW-223A	-0.02
MW-223B	0.02
MW-227	0.09
MW-302R	0.10
MW-304A	0.03
OW-06-05	0.02
OW-06-06	0.02
OW-06-07	0.02
OW-06-08	0.03
OW-06-09	0.04
OW-06-10	0.02
P-04-05A	0.10
P-04-05B	0.06
P-04-06A	0.07
P-04-06B	0.09
P-04-07A	0.02
P-04-07B	0.04
P-04-07C	0.00
P-04-08A	0.00
P-04-08B	-0.03
P-04-09A	0.24
P-04-09B	0.02
P-04-10A	0.98
P-04-11A	0.02
P-04-11B	0.09
P-04-12A	-0.03
P-04-13A	0.15
P-04-13B	0.04
P-04-13C	-0.03
P-04-14A	0.07
P-04-14B	0.00
P-06-04A	0.10
P-06-04B	0.05
P-08-03A	-0.29
P-08-03B	0.26
P-08-04	0.01
P-08-06	0.07
P-08-07	0.08
PW-08-01	0.06
PW-08-02	0.04
PW-08-03	176.14
PW-08-04	1.42

PW-08-04 26.5-HOUR PUMP TEST
JUNIPER RIDGE LANDFILL - FEBRUARY 2 TO FEBRUARY 3, 2009
WEST OLD TOWN, MAINE

Well ID	Drawdown (ft) Near End of Test
MW-04-111	-0.04
MW-05-01	-0.04
MW-05-02	-0.02
MW-05-03	-0.03
MW-05-04	-0.04
MW-05-05	-0.02
MW-06-01	-0.09
MW-06-02	0.13
MW-207	0.09
MW-223A	0.01
MW-223B	0.00
MW-227	-0.02
MW-302R	0.09
MW-304A	0.06
OW-06-05	0.15
OW-06-06	0.05
OW-06-07	0.28
OW-06-08	0.00
OW-06-09	0.09
OW-06-10	0.10
P-04-05A	0.05
P-04-05B	0.05
P-04-06A	0.05
P-04-06B	0.04
P-04-07A	0.02
P-04-07B	0.00
P-04-07C	-0.04
P-04-08A	0.07
P-04-08B	0.00
P-04-09A	0.45
P-04-09B	0.01
P-04-10A	1.98
P-04-10B	0.01
P-04-11A	0.08
P-04-11B	-0.06
P-04-12A	4.82
P-04-12C	0.11
P-04-13A	0.10
P-04-13B	-0.01
P-04-13C	-0.02
P-04-14A	0.03
P-04-14B	-0.16
P-06-04A	0.07
P-06-04B	-0.06
P-08-03A	-0.04
P-08-03B	-0.01
P-08-04	-0.01
P-08-06	0.06
P-08-07	0.04
PW-08-01	0.25
PW-08-02	0.13
PW-08-03	7.12
PW-08-04	77.96

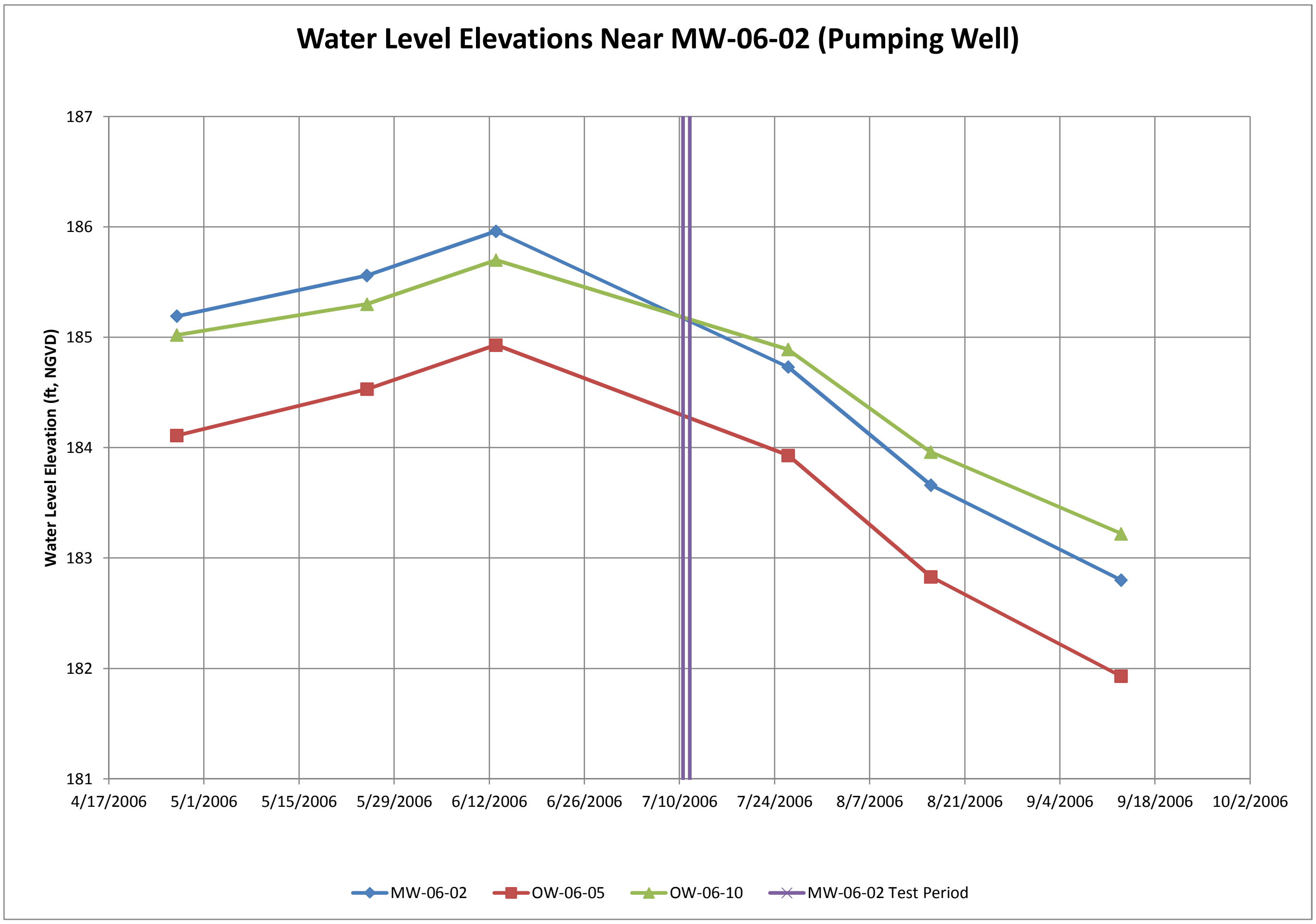
COMBINED PUMPING FROM TWO WELLS
PW-08-01 337-HOUR PUMP TEST
JUNIPER RIDGE LANDFILL - MARCH 23 TO APRIL 6, 2009
PW-08-02 167-HOUR PUMP TEST
JUNIPER RIDGE LANDFILL - MARCH 30 TO APRIL 6, 2009
WEST OLD TOWN, MAINE

Well ID	Drawdown (ft) Near End of Test	
MW-05-04	-0.21	
MW-06-01	7.16	
MW-06-02	1.14	
MW-207	-0.17	
MW-223A	9.66	
MW-223B	6.89	
MW-227	0.10	
MW-302R	-0.15	
MW-304A	-0.93	
OSW	19.17	
OW-06-05	1.39	
OW-06-06	1.03	
OW-06-07	4.63	
OW-06-08	-0.26	
OW-06-09	0.66	
OW-06-10	0.75	
P-04-05A	14.29	
P-04-05B	0.06	
P-04-06A	19.83	
P-04-06B	0.31	
P-04-07A	21.76	
P-04-07B	20.62	
P-04-07C	-0.09	
P-04-08A	4.17	
P-04-08B	0.04	
P-04-09A	0.12	
P-04-10A	8.16	
P-04-11A	5.61	
P-04-12A	0.85	
P-04-12B	0.13	
P-04-12C	0.00	
P-04-13A	0.29	
P-04-13B	0.37	
P-04-13C	-0.07	
P-04-14A	0.25	
P-04-14B	-0.30	
P-06-04B	-0.68	
P-08-03A	-0.17	
P-08-03B	-0.44	
P-08-04	-0.30	
P-08-06	2.39	
P-08-07	0.00	
P-08-09A	-1.69	
P-08-09B	-1.66	
P-08-09C	<-0.74	Well started dry and level rose
P-08-10A	-1.37	
P-08-10B	-1.37	
P-08-10C	-0.40	
P-213	-1.33	
MW-213	-1.06	
PW-08-01	123.79	
PW-08-02	67.14	
PW-08-03	4.67	
PW-08-04	2.39	
SHSW	32.60	

ATTACHMENT SME-D7

WATER LEVELS NEAR MW-06-02 AROUND TEST PERIOD

WATER LEVEL ELEVATIONS NEAR MW-06-02
JUNIPER RIDGE LANDFILL



ATTACHMENT SME-D8

SIM TESTING TRI (FROM PTL 2008) AND UPDATED C-306

Reference:
2008 CONSTRUCTION DOCUMENTATION REPORT
PINETREE LANDFILL
FINAL COVER
PHASES VII AND VIII-C STAGE 3
HAMPDEN MAINE
Vol. III Manufacturers Geonet and Geocomposite Submittal

RECEIVED
By Peter Mailey at 2:01 pm, 4/25/08

October 16, 2004)

Mr. Perry Vyas
SKAPS Industries
571 Industrial Parkway
Commerce, GA 30529
fax: 706-336-7007
(cc: Rick Franklin fax: 770-564-1818)

Re: Conventional and Accelerated Compression Creep of 330 mil Geonet

Dear Mr. Vyas:

TRI/Environmental, Inc. (TRI) is pleased to present this updated final report for conventional and accelerated compression creep testing. This update incorporates new values for porosity measurements as well as inclusion of updated compressive creep data. Creep reduction factors are computed in accordance with relevant portions of GRI GC8. All work was registered and performed under TRI log number E2177-68-06. The following sections describe the work and present the results.

INTRODUCTION

Objective

The objective of this effort was to develop 10,000-hour compressive creep data and the resulting reduction factors for a 330-mil geonet product under various normal compressive loads. An initial estimate of long-term compressive creep was obtained using the Stepped Isothermal Method (SIM) of time-temperature superposition (TTS). In order to validate the accelerated testing procedure, the resulting compressive creep results were compared directly with results from conventional isothermal compressive creep tests performed at room temperature.

MATERIAL AND TEST EQUIPMENT

Material

The material tested was a nominal 330-mil high-density polyethylene geonet product manufactured by SKAPS Industries.

Test Equipment used in this study is listed below:

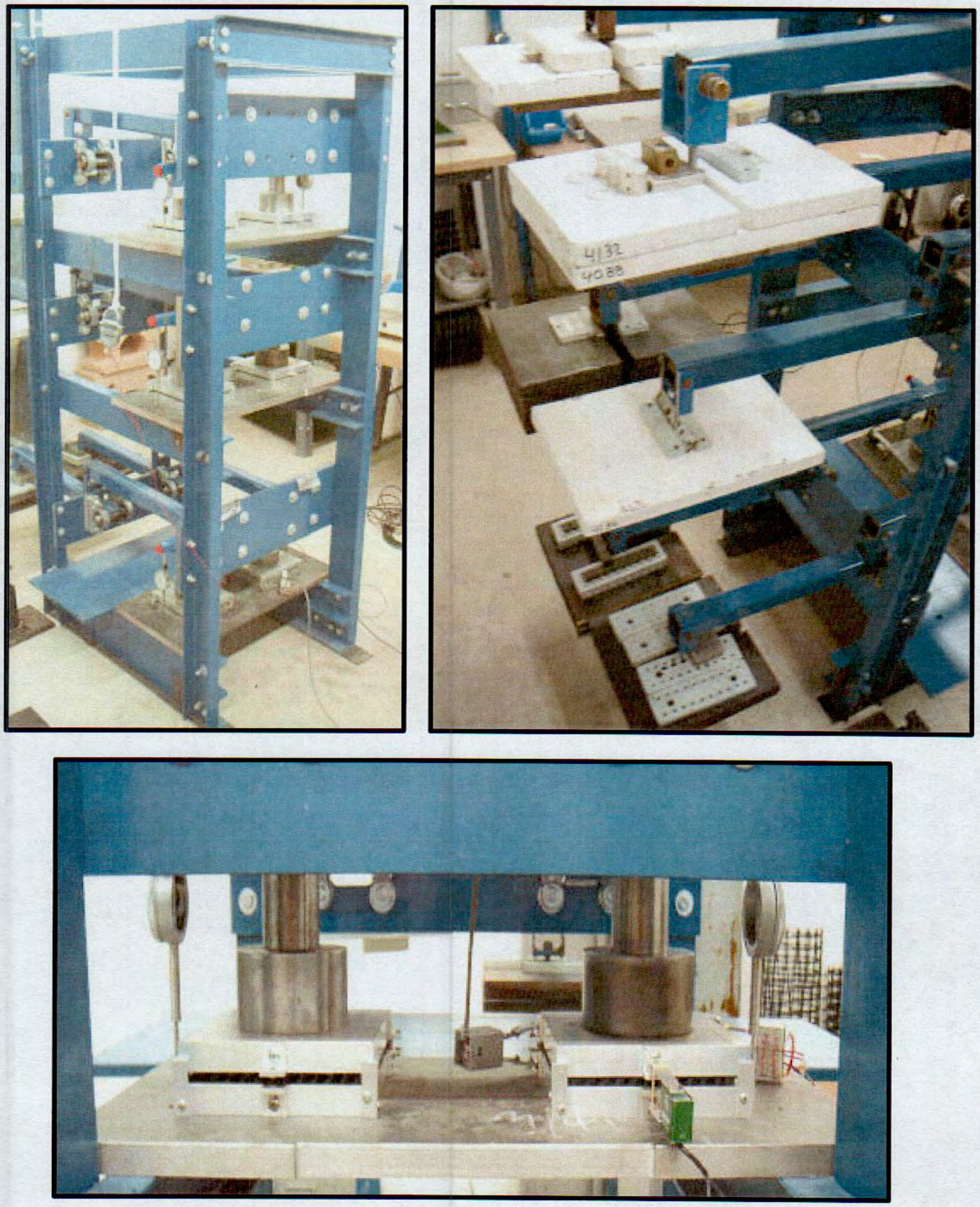
<u>Accelerated Compressive Creep Testing Equipment</u>
- Testing platforms: Instron Model 4505 load frame under computer control.
- Environmental chamber: TRI Model SIW - stepped isothermal, wide chamber).

- Extensometers: Epsilon Model SW3542-0200-050-ST, Instron Model 2620-524
- Temperature controller: Watlow Series 982 programmable temperature controller.
- Heating/cooling - Electrical/liquid CO2
- Data acquisition: HP-3852A data acquisition and control unit & Labview V5.1 software.

Figure 1: Accelerated Testing Apparatus

Traditional Isothermal Compressive Creep Testing

- Testing platforms: machined platens outfitted with extensometers for strain measurement during first 48 hours of creep and single dial gages thereafter.
- Testing frames equipped with advantage lever arms for application of normal compressive load.
- Extensometers: Epsilon Model SW3542-0200-050-ST, Instron Model 2620-524
- Heating/cooling – HVAC
- Data acquisition: HP-3852A data acquisition and control unit & Labview V5.1 software.



Figure(s) 2: Conventional Creep Testing Apparatus

METHODS

Conventional Compressive Creep - Testing was performed in general accordance with GRI test method GS4, *Time Dependent (Creep) Deformation under Normal Pressure.* The procedure was modified to afford only vertical creep as would be experienced in the field and in laboratory transmissivity testing. Normal compressive loads were applied using the strain rate specified in ASTM D 6364, *Standard Test Method for Determining the Short-Term Compression Behavior of Geosynthetics.*

Accelerated Compressive Creep - Accelerated compressive creep testing was performed using a modified application of GRI Test Method GS10, Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method. This procedure was modified to apply a compression stress rather than a tension stress. As with conventional creep, test specimens measured 150 mm square. The temperature regimen employed used a ramp from 20°C to 55°C via 10,000-second steps of 7°C each. All shifting was performed in accordance with GRI GS10.

In addition, to compressive creep tests, ramp-and-hold tests (very short-term creep tests) were performed at each one of the normal compressive loads. It is acknowledged that the onset of creep is a variable that depends heavily on surface features at load contact. The purpose of the ramp-and-hold testing was to study and average initial creep response to "position" the creep curves successfully.

RESULTS

A presentation of all compressive creep test results may be found in the attached graphs and tables. 10,000-hour creep reduction factors and reduction factors for a 35 year design life (306803 hours) were determined using both SIM and conventional creep testing in accordance with GRI GC8 as shown below.

$$RF_{CR} = \left[\frac{\left(t_{CO}/t_{original}\right)-\left(1-n_{original}\right)}{\left(t_{CR}/t_{original}\right)-\left(1-n_{original}\right)}\right]^3$$

RF_{CR} = reduction factor for creep
$t_{original}$ = original thickness (m)
t_{CO} = thickness at 100-hours (m)
t_{CR} = thickness at >>100-hours, e.g., at 10,000 hours (m)
$n_{original}$ = original porosity (see Equation 7)

$$n_{original} = 1 - \frac{\mu}{\rho t_{original}}$$

where

μ = mass per unit area (kg/m^2)
ρ = density of the formulation (kg/m^3)

The resulting reduction factors are provided below.

Compressive Load (psf)	Retained Thickness @ 10K Hours (%)	Calculated RF_{CR}(10K hrs)	Calculated RF_{CR} (35 years)
5000	94.8	1.025	1.045
10000	89.7	1.027	1.065
15000	88.9	1.057	1.113
20000	85.6	1.135	1.386
25000	80.7	1.288	1.601
30000	67.6	1.323	1.652

Comparisons between conventional and accelerated SIM creep results, performed at 10,000, 15,000 and 30,000 psf loads, were favorable. The generated creep rates were very similar. Variances were observed in short term load ramp and short term creep behavior.

CONCLUSION

TRI is pleased to be of service to this work effort and looks forward to completion of the 10,000 hour room-temperature conventional creep tests. Please contact me if you have any questions or require any additional information at this time.

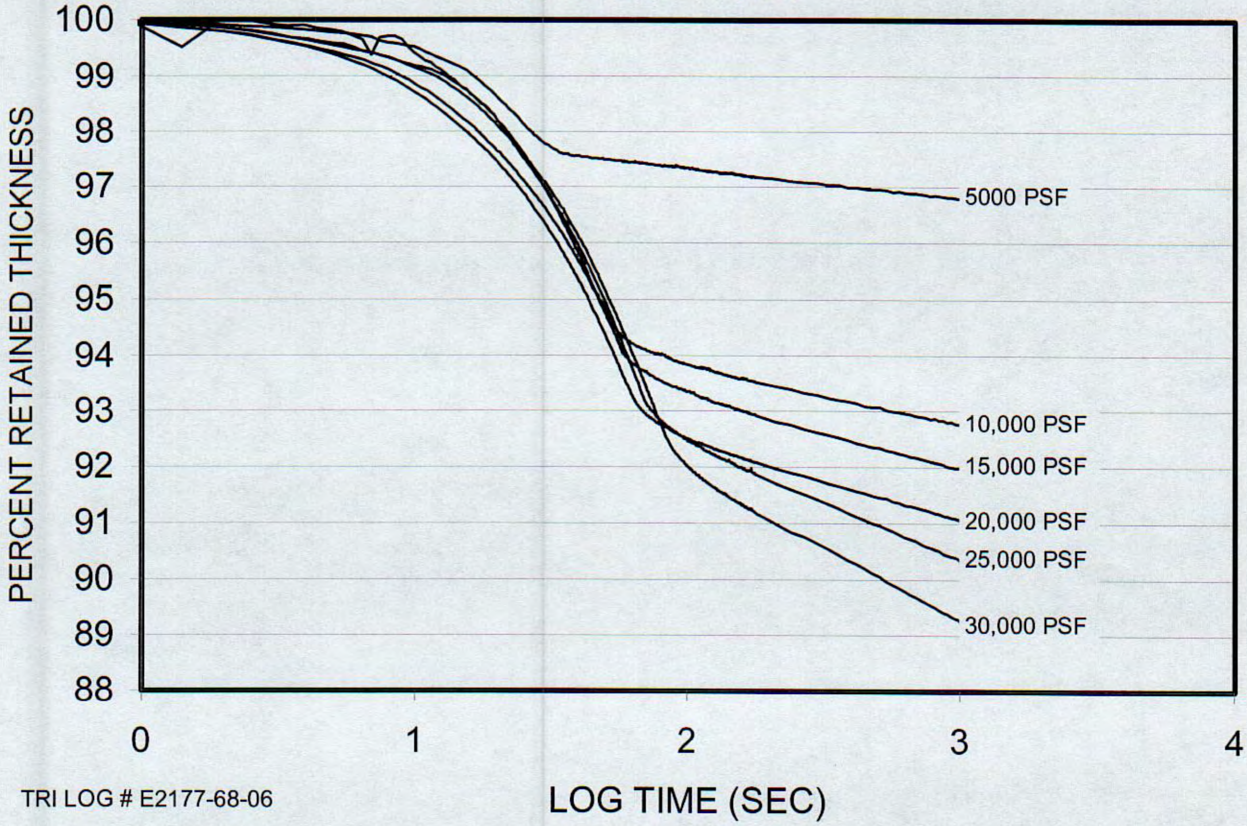
Sincerely,

Sam R. Allen

Sam Allen
Vice President and Division Manager
TRI Geosynthetic Services
www.GeosyntheticTesting.com

[Attachments]

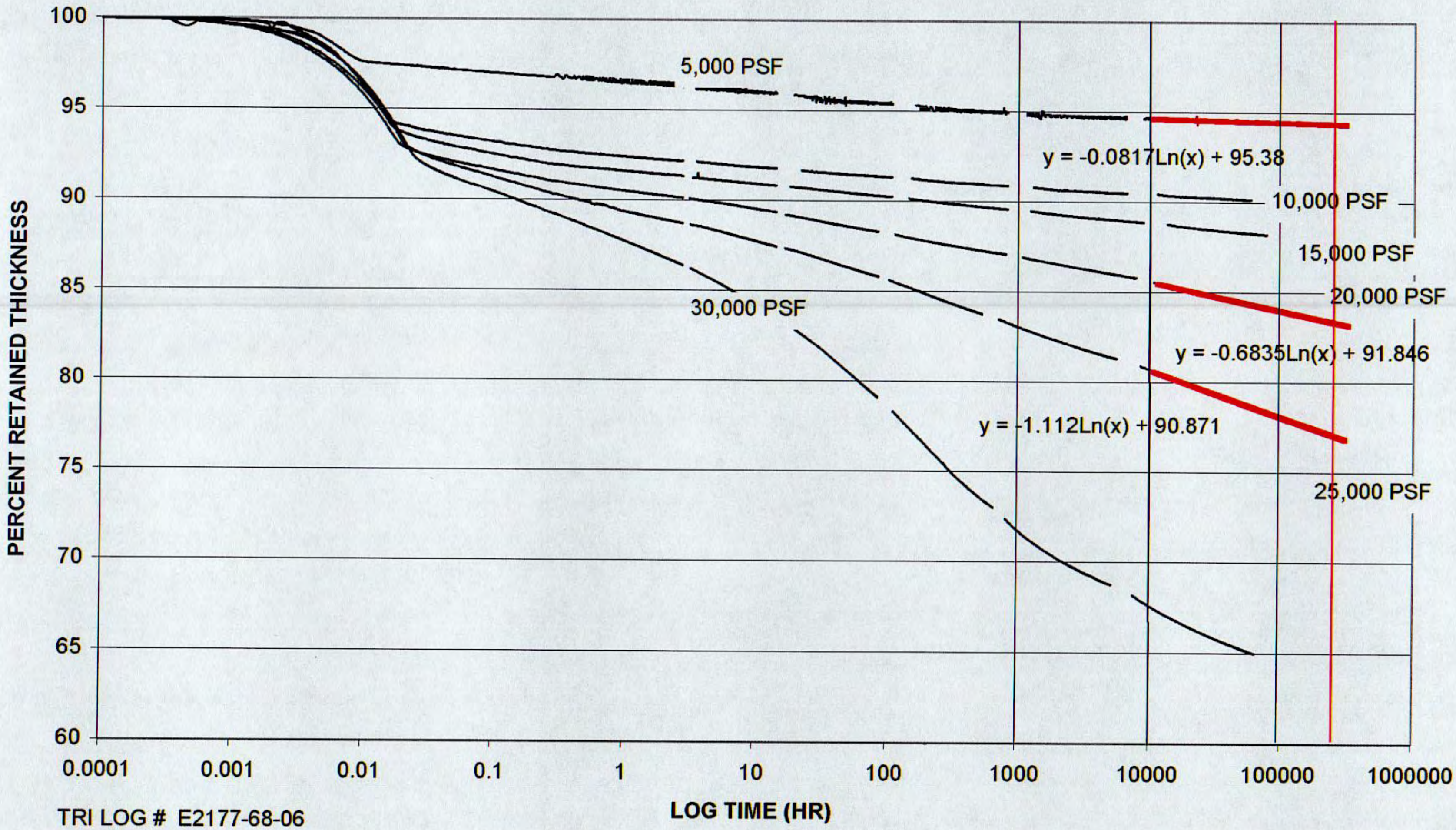
SKAPS, Industries
Ramp and Hold Test Results
Product Code: TN-330



TRI LOG # E2177-68-06

9063 Bee Caves Road / Austin, TX 78733-6201 / (512) 263-2101 / FAX (512) 263-2558

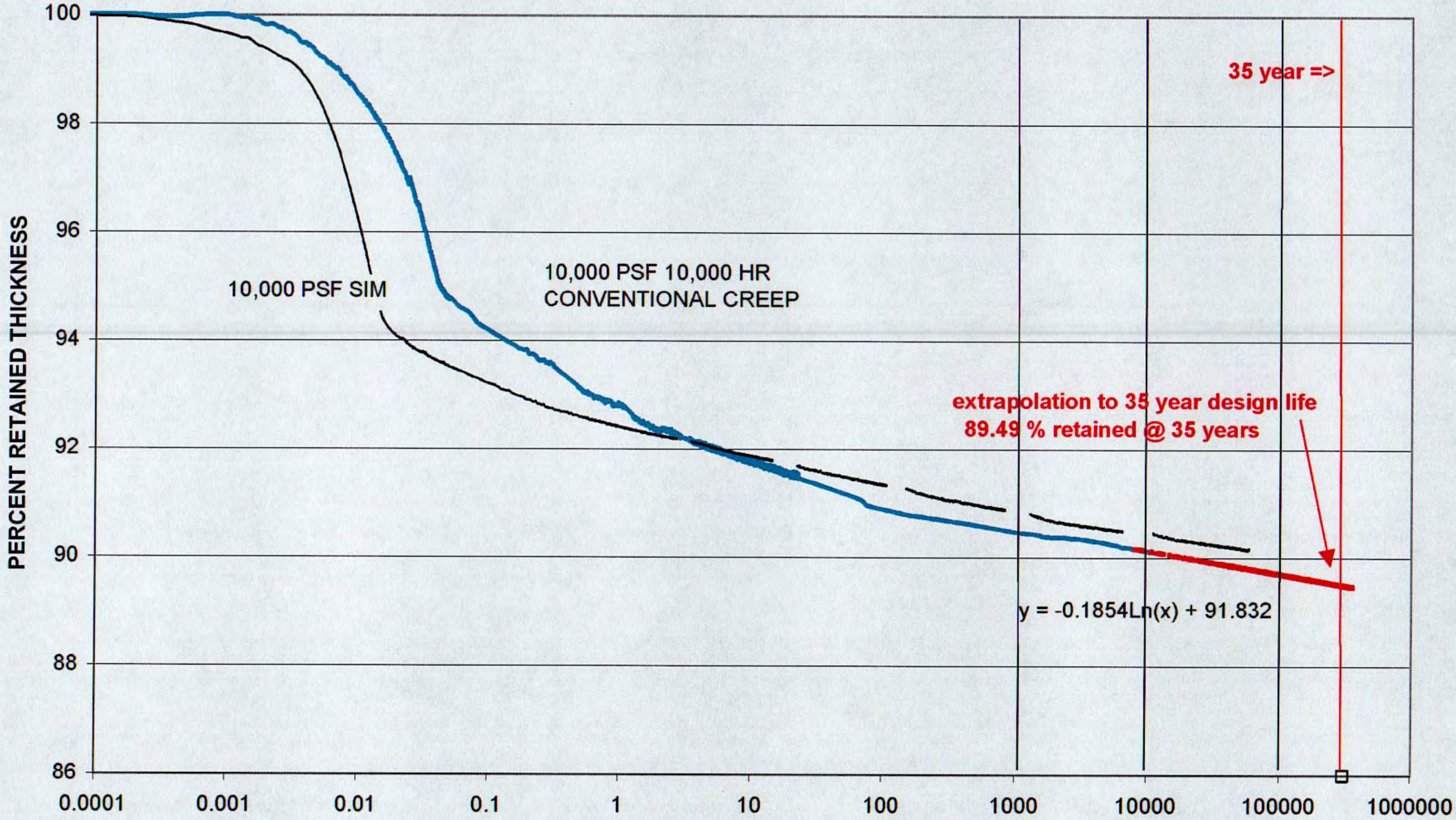
SKAPS, Industries
Compression Creep Test Results via SIM
Product Code: TN-330



TRI LOG # E2177-68-06

9063 Bee Caves Road / Austin, TX 78733-6201 / (512) 263-2101 / FAX (512) 263-2558

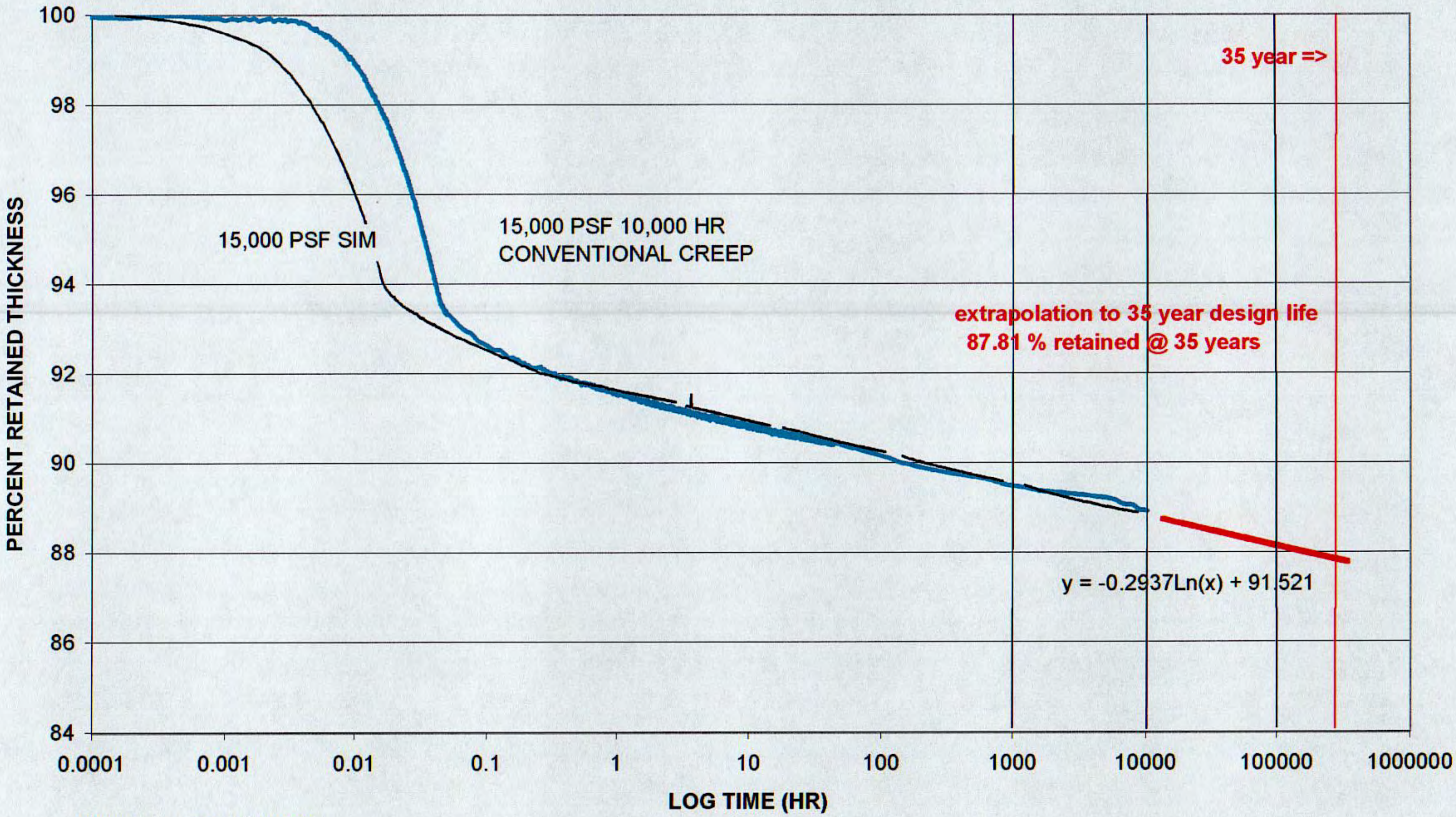
SKAPS, Industries
Compression Creep Test Results
Product Code: TN-330



TRI LOG # E2177-68-06

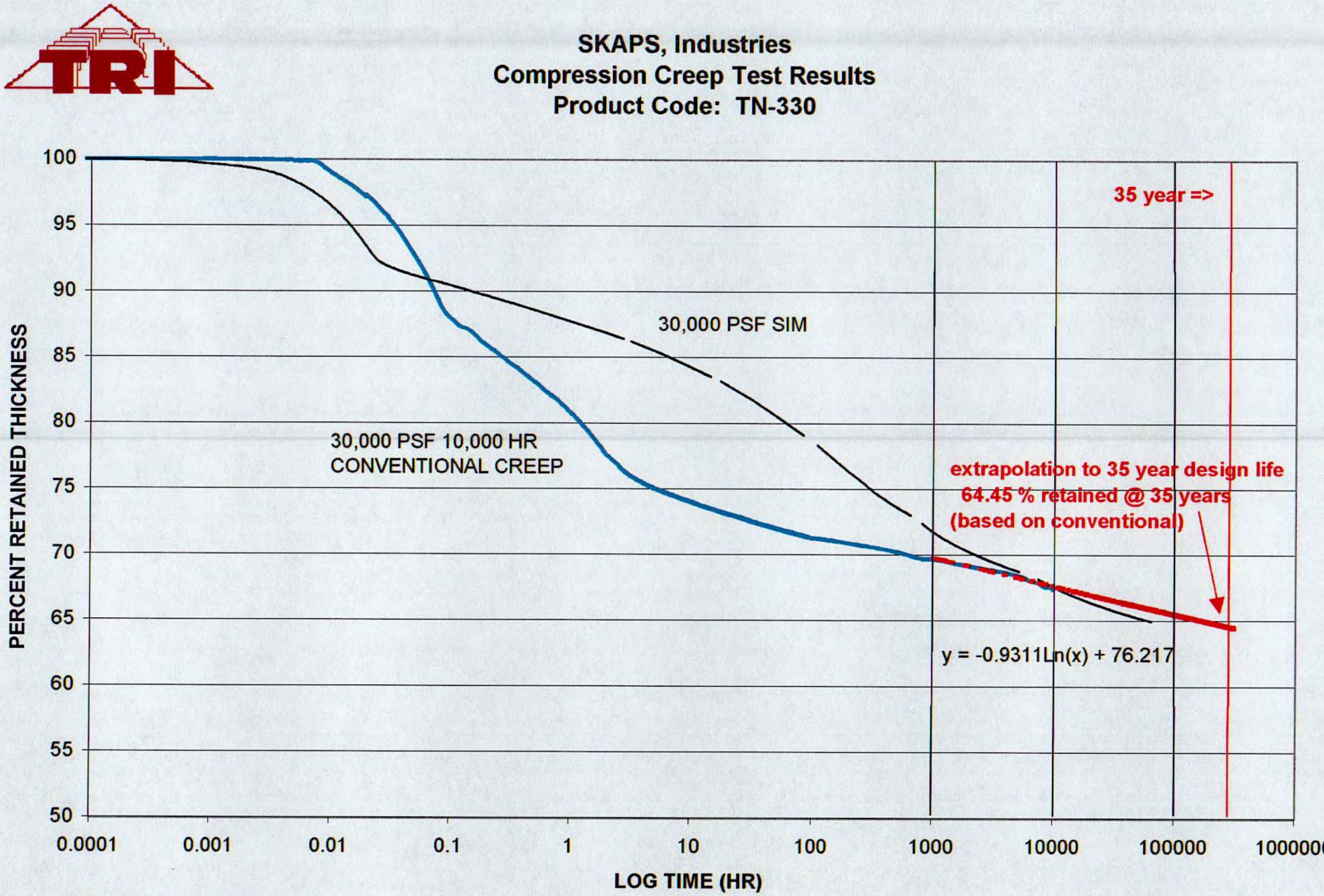
9063 Bee Caves Road / Austin, TX 78733-6201 / (512) 263-2101 / FAX (512) 263-2558

SKAPS, Industries
Compression Creep Test Results
Product Code: TN-330



TRI LOG # E2177-68-06

9063 Bee Caves Road / Austin, TX 78733-6201 / (512) 263-2101 / FAX (512) 263-2558



TRI LOG # E2177-68-06

9063 Bee Caves Road / Austin, TX 78733-6201 / (512) 263-2101 / FAX (512) 263-2558

TRI/Environmental, Inc.
A Texas Research International Company

Summary of Testing for SKAPS, Industries
TRI Log No. E2177-68-06
Geonet Drainage Study
Product Code: TN-330

Creep Reduction Factor

Normal Load (psf)	Original Thickness (mils)	Original Thickness (m)	Percent Retained Thickness at 100 hours	Thickness at 100 hours (m)	Percent Retained Thickness at 10,000 hours	Thickness at 10,000 hours (m)	Mass (g) of 6x6 in specimen	Mass/Area (kg/m^2)	Density (g/cm^3)	Density (kg/m^3)	Original Porosity	RF_{CR} at 10,000 hours
5000	307	0.0078	95.4	0.00744	94.8	0.00739	39.4	1.696	0.954	954	0.7720	1.025
10000 *	**307**	**0.0078**	**90.9**	**0.00709**	**90.3**	**0.00704**	**41.26**	**1.776**	**0.954**	**954**	**0.7612**	**1.027**
15000 *	**305**	**0.0077**	**90.1**	**0.00698**	**88.9**	**0.00689**	**41.73**	**1.797**	**0.954**	**954**	**0.7569**	**1.057**
20000	307	0.0078	88.2	0.00688	85.6	0.00667	43.38	1.868	0.954	954	0.7489	1.135
25000	311	0.0079	85.6	0.00676	80.7	0.00637	43.7	1.882	0.954	954	0.7503	1.288
30000 *	**302**	**0.0077**	**71.7**	**0.00550**	**67.6**	**0.00519**	**43.58**	**1.876**	**0.954**	**954**	**0.7436**	**1.323**

*** Conventional Testing at 20 Degrees C**

9063 Bee Caves Road / Austin, TX 78733-6201 / (512) 263-2101 / FAX (512) 263-2558

TRI/Environmental, Inc.
A Texas Research International Company

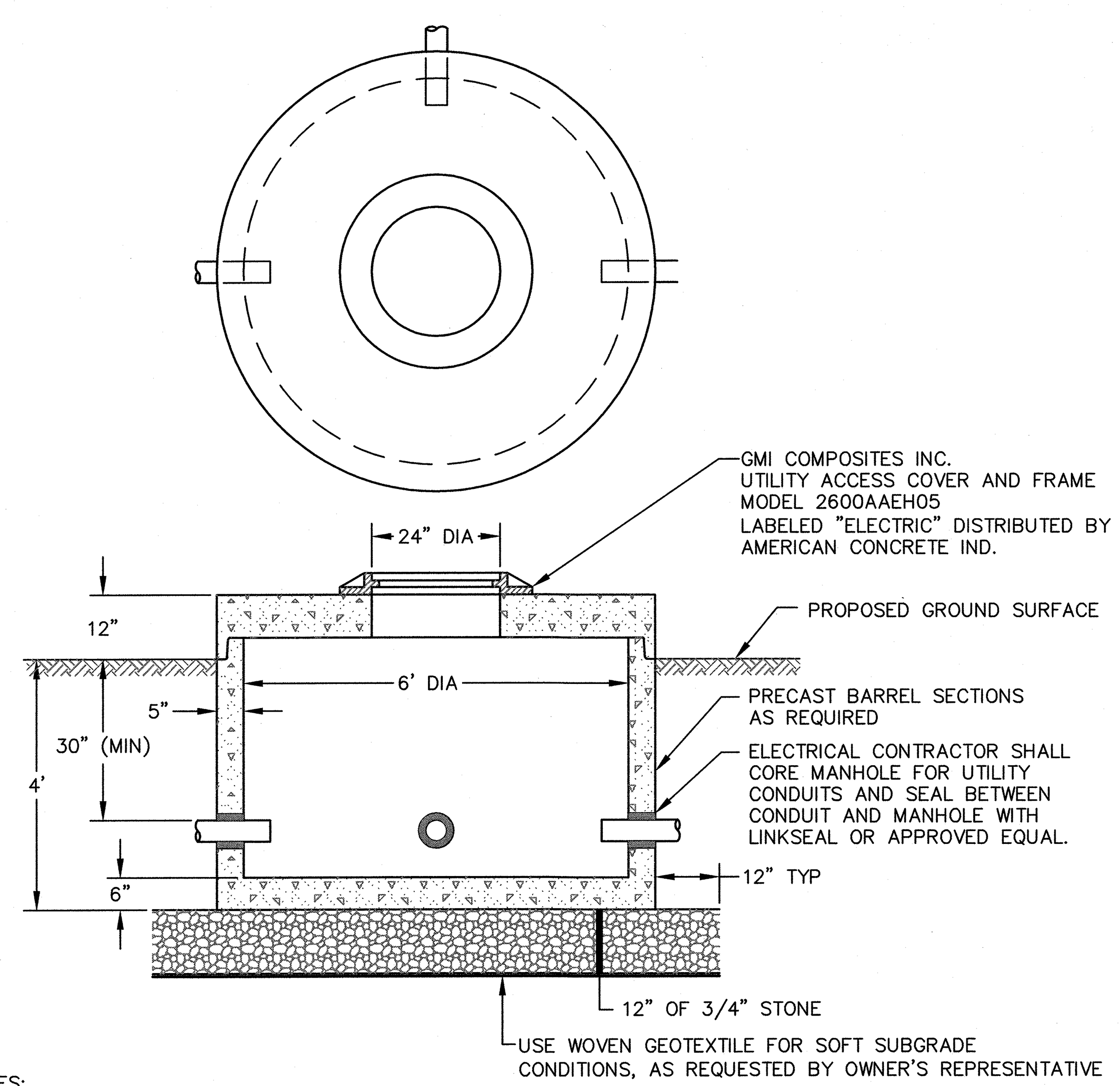
Summary of Testing for SKAPS, Industries
TRI Log No. E2177-68-06
Geonet Drainage Study
Product Code: TN-330

Creep Reduction Factor

Normal Load (psf)	Original Thickness (mils)	Original Thickness (m)	Percent Retained Thickness at 100 hours	Thickness at 100 hours (m)	Percent Retained Thickness at 306803 hours	Thickness at 306803 hours (m)	Mass (g) of 6x6 in specimen	Mass/Area (kg/m^2)	Density (g/cm^3)	Density (kg/m^3)	Original Porosity	RF_{CR} at 35 Years
5000	307	0.0078	95.5	0.00745	94.4	0.00736	39.4	1.696	0.954	954	0.7720	1.049
10000 *	**307**	**0.0078**	**90.9**	**0.00709**	**89.5**	**0.00698**	**41.26**	**1.776**	**0.954**	**954**	**0.7612**	**1.065**
15000 *	**305**	**0.0077**	**90.1**	**0.00698**	**87.8**	**0.00680**	**41.73**	**1.797**	**0.954**	**954**	**0.7569**	**1.113**
20000	307	0.0078	88.2	0.00688	81.7	0.00637	43.38	1.868	0.954	954	0.7489	1.386
25000	311	0.0079	85.6	0.00676	76.8	0.00607	43.7	1.882	0.954	954	0.7503	1.601
30000 *	**302**	**0.0077**	**71.7**	**0.00550**	**64.6**	**0.00496**	**43.58**	**1.876**	**0.954**	**954**	**0.7436**	**1.652**

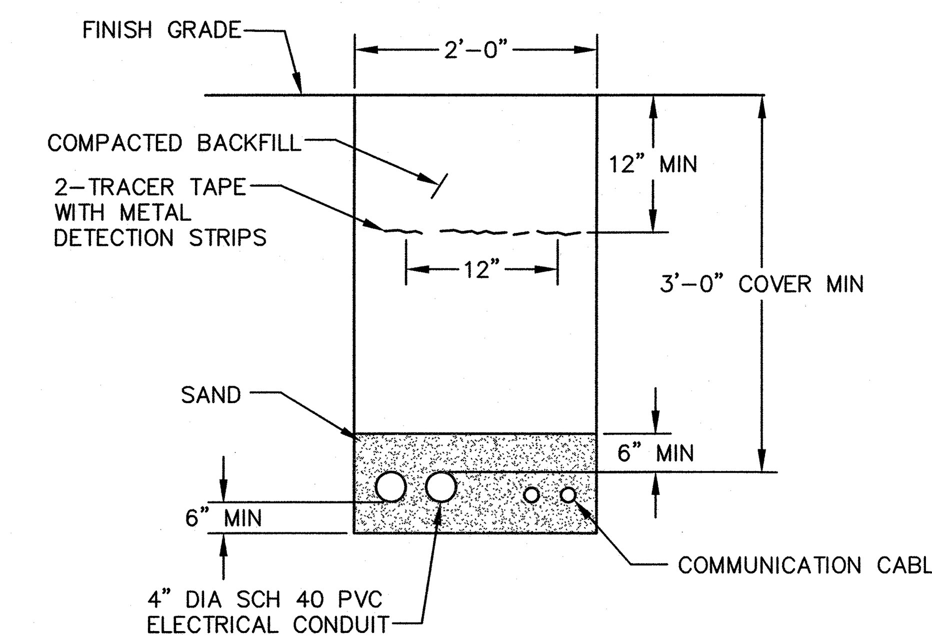
*** Conventional Testing at 20 Degrees C**

9063 Bee Caves Road / Austin, TX 78733-6201 / (512) 263-2101 / FAX (512) 263-2558

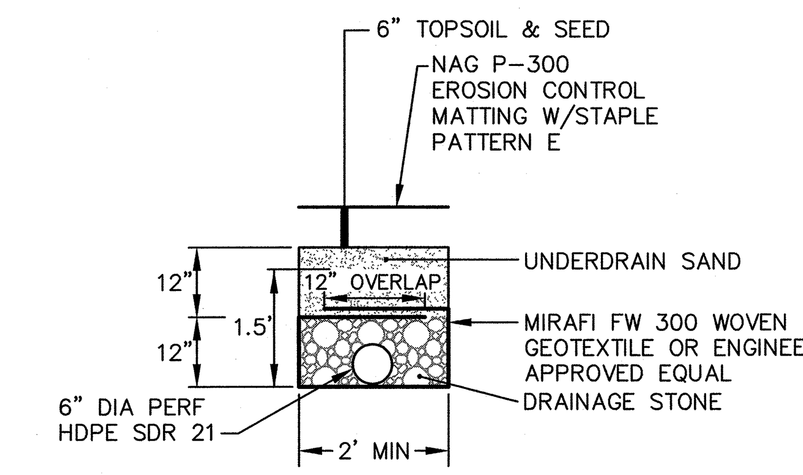


NOTES:
1. 6' DIA MANHOLE AS MANUFACTURED BY AMERICAN CONCRETE INDUSTRIES OR ENGINEER APPROVED EQUAL.
2. 4000 PSI CONCRETE AT 28 DAYS.
3. DESIGNED FOR H-20 WHEEL LOADING.
4. CONFORMS TO ASTM C-478 SPECIFICATIONS.
5. REINFORCED TO 0.12 IN SQ/LF.
6. SHIPLAP JOINTS SEALED WITH BUTYL RUBBER.
7. EXTERIOR COATED WITH ASPHALTIC PROTECTIVE DAMPROOFING.
8. BOTTOM MIN 5'-0" BELOW FINISH GRADE.
9. PRECAST CONCRETE VAULT MANUFACTURER TO PROVIDE ANTI-FLOATATION EXTENDED BASE SLAB AS NECESSARY. ANTI-FLOATATION DESIGN AND SHOP DRAWINGS SHALL BE PREPARED BY THE MANUFACTURER AND SUBMITTED TO THE ENGINEER FOR APPROVAL.

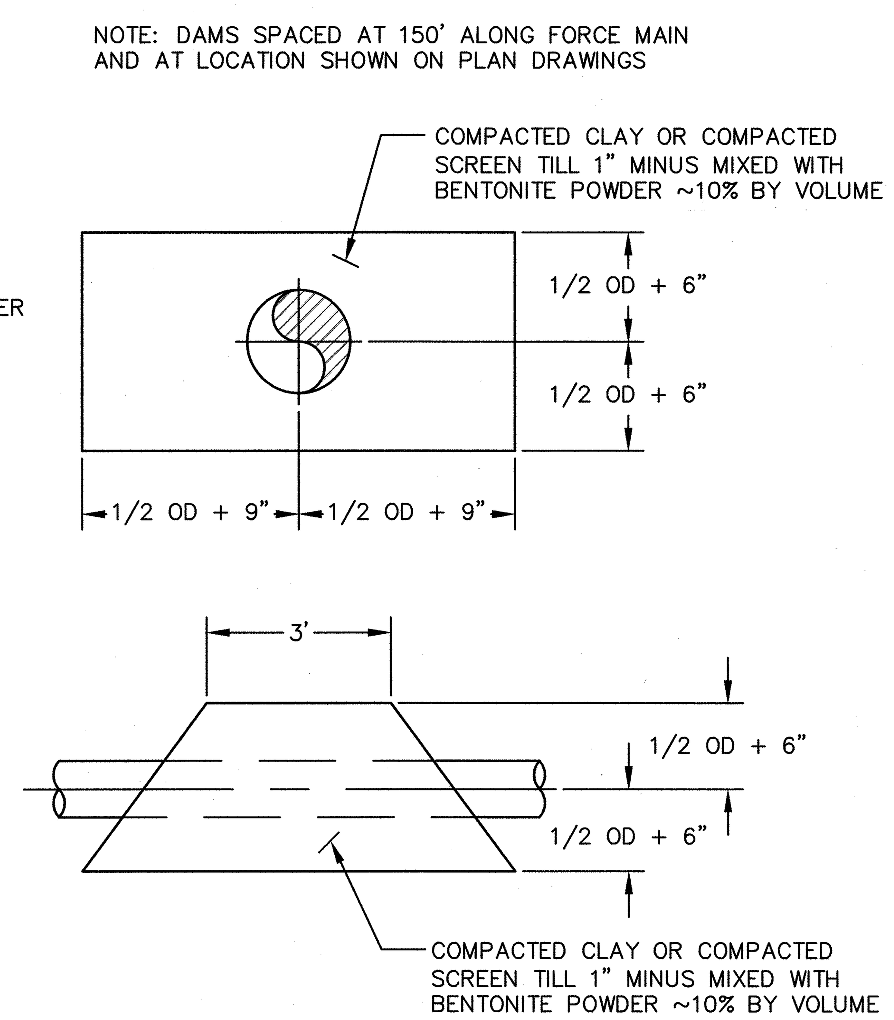
ELECTRIC UTILITY MANHOLE
NTS



UNDERGROUND ELECTRIC AND COMMUNICATION TRENCH
NTS

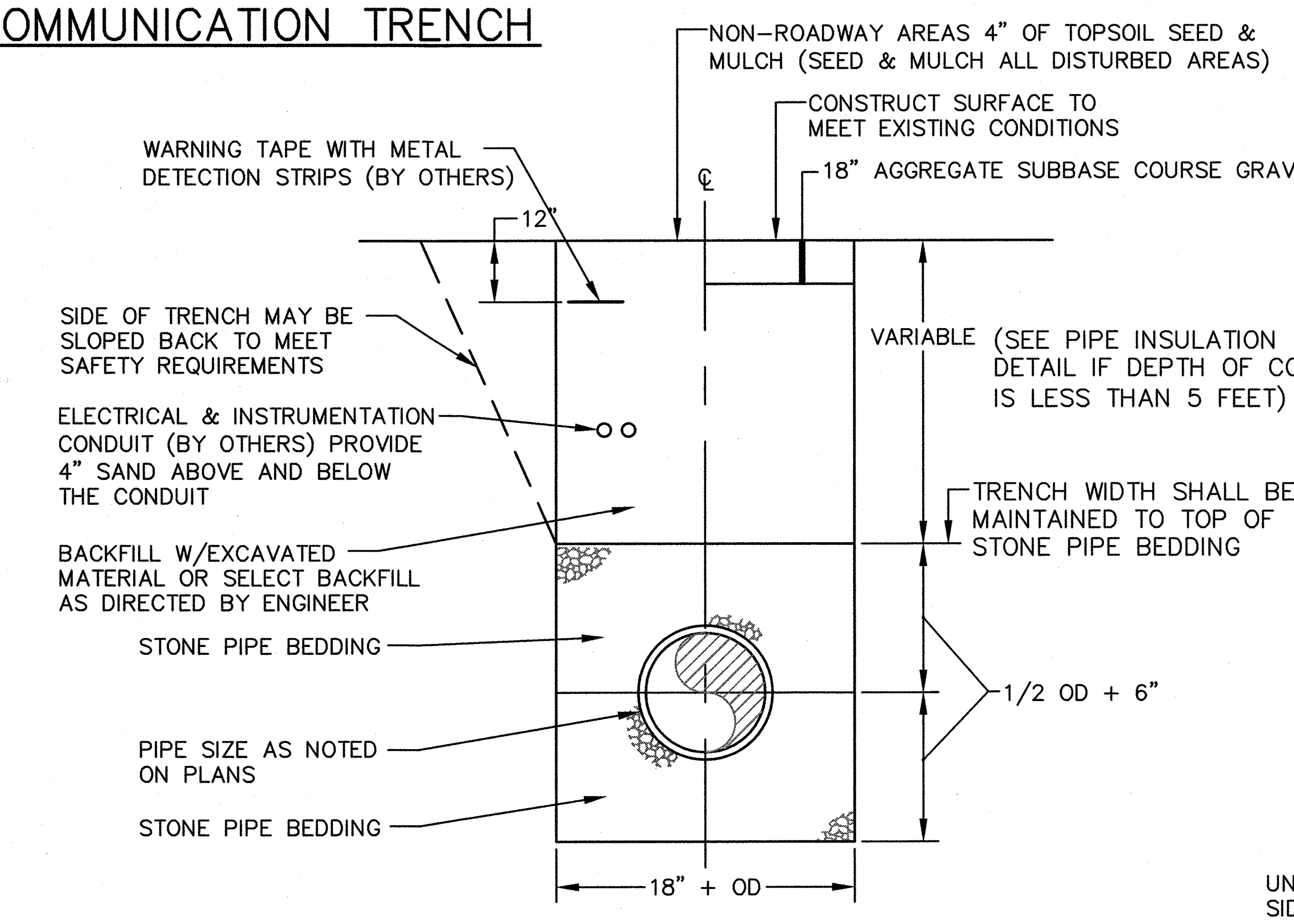


POND UNDERDRAIN
NTS



PIPE DAM
NTS

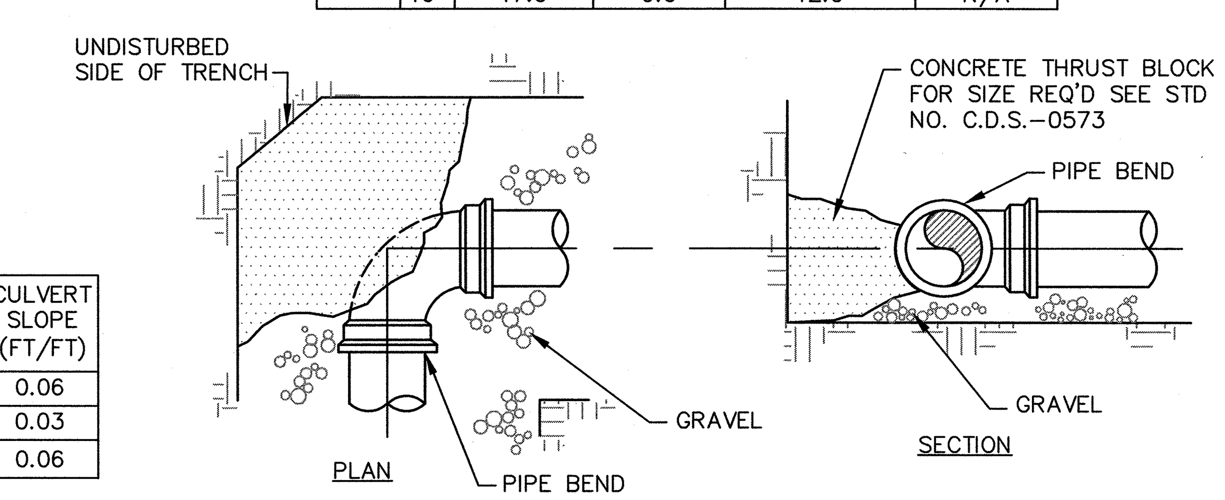
SIZE REQUIREMENTS FOR CONCRETE THRUST BLOCKS					
	BEARING ON UNDISTURBED SOIL (SQ FT)				
FITTINGS		90° BENDS	45° BENDS	TEES & PLUGS	HYDRANTS
PIPE SIZE	4"	2.0	1.0	1.0	N/A
	6"	3.0	2.0	2.0	6.0
	8"	5.0	3.0	4.0	N/A
	10"	7.0	4.0	5.0	N/A
	12"	10.0	6.0	7.0	N/A
	14"	13.0	7.0	10.0	N/A
	16"	17.0	9.0	12.0	N/A



PIPE TRENCH
NTS

CULVERTS	DIAMETER (IN)	LENGTH (FT)	SLOPE (FT/FT)	INV IN (FT)	INV OUT (FT)
C-2BA	36	40	0.008	203.2	202.9
C-2BB	24	96	0.01	195.0	194.0
C-4BA	24	78	0.01	204.4	203.7
C-4BB	24	78	0.01	204.4	203.7
C-4F	18	78	0.04	165.0	162.0
C-4G	24	36	0.03	175.0	174.0
C-4HA	18	40	0.03	201.9	200.9
C-4HB	18	101	0.03	178.5	176.0
C-4I	18	80	0.13	202.5	192.0
C-4IA	18	40	0.02	212.9	212.2
C-4JA	18	60	0.03	214.0	212.3
C-4JB	24	73	0.02	211.5	210.0
C-4JC	24	73	0.02	211.5	210.0
C-4K	24	51	0.04	216.5	214.3
C-4L	18	121	0.02	213.0	211.0
C-4N	18	33	0.03	184.0	183.0

CULVERT SCHEDULE
NTS



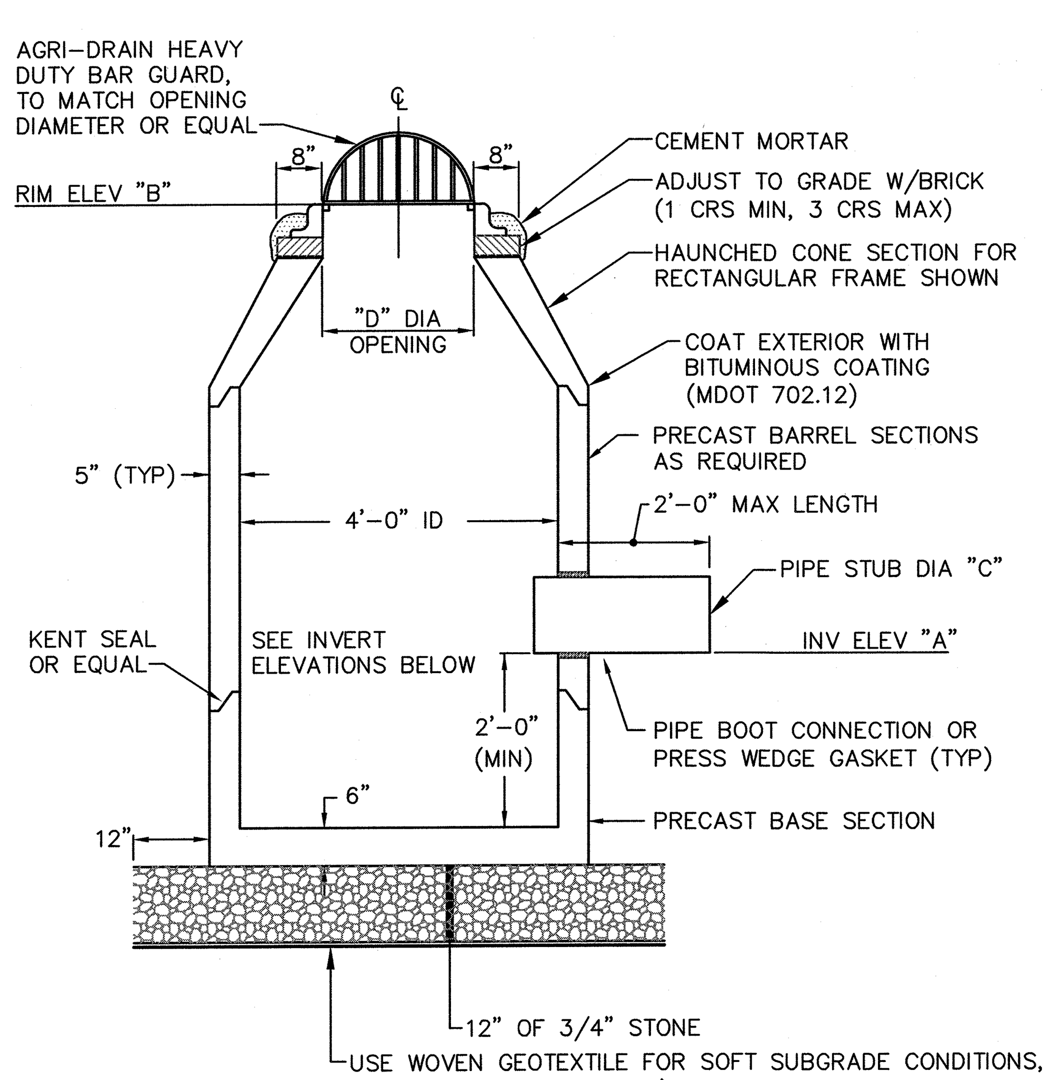
TYPICAL THRUST BLOCK PLACEMENT ON BENDS
NTS

OUTLET CONTROL STRUCTURE SCHEDULE

STRUCTURE DESIGNATION	BOTTOM OF CONCRETE EL "A" (FT)	TOP OF CONCRETE EL "B" (FT)	OUTLET INV EL "C" (FT)	ORIFICE DIA "D" (IN)	ORIFICE INV EL "E" (FT)	RIM EL "F" (FT)	OUTLET (C) CULVERT DIAMETER (IN)	CULVERT LENGTH (FT)	CULVERT SLOPE (FT/FT)
DP-10	174.2	174.7	175.2	6	178.0	179.0	18 HDPE	52	0.06
DP-11	163.5	164.0	164.3	6	167.5	168.4	18 HDPE	92	0.03
DP-12	183.5	184.0	184.5	8	186.8	188.0	18 HDPE	80	0.06

CATCH BASIN SCHEDULE A

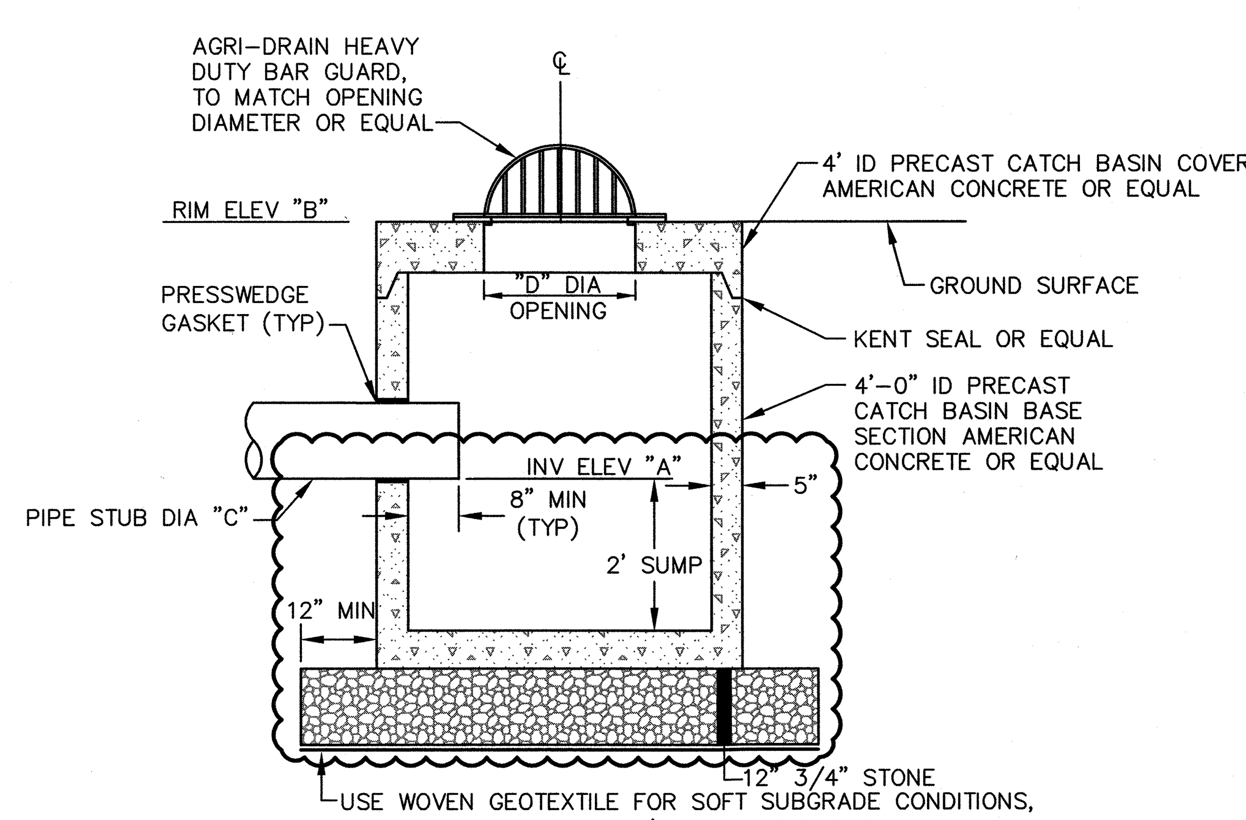
CATCH BASIN DESIGNATION	PIPE INV EL "A" (FT)	RIM EL "B" (FT)	PIPE DIA "C" (IN)	TOP OPENING DIA "D" (IN)
CB-2BB	195.0	200.2	24"	30"
CB-4G	175.0	181.0	24"	24"
CB-4HB	178.5	183.4	18"	24"
CB-4I	202.5	207.6	18"	24"
CB-4JA	214.0	218.7	18"	24"



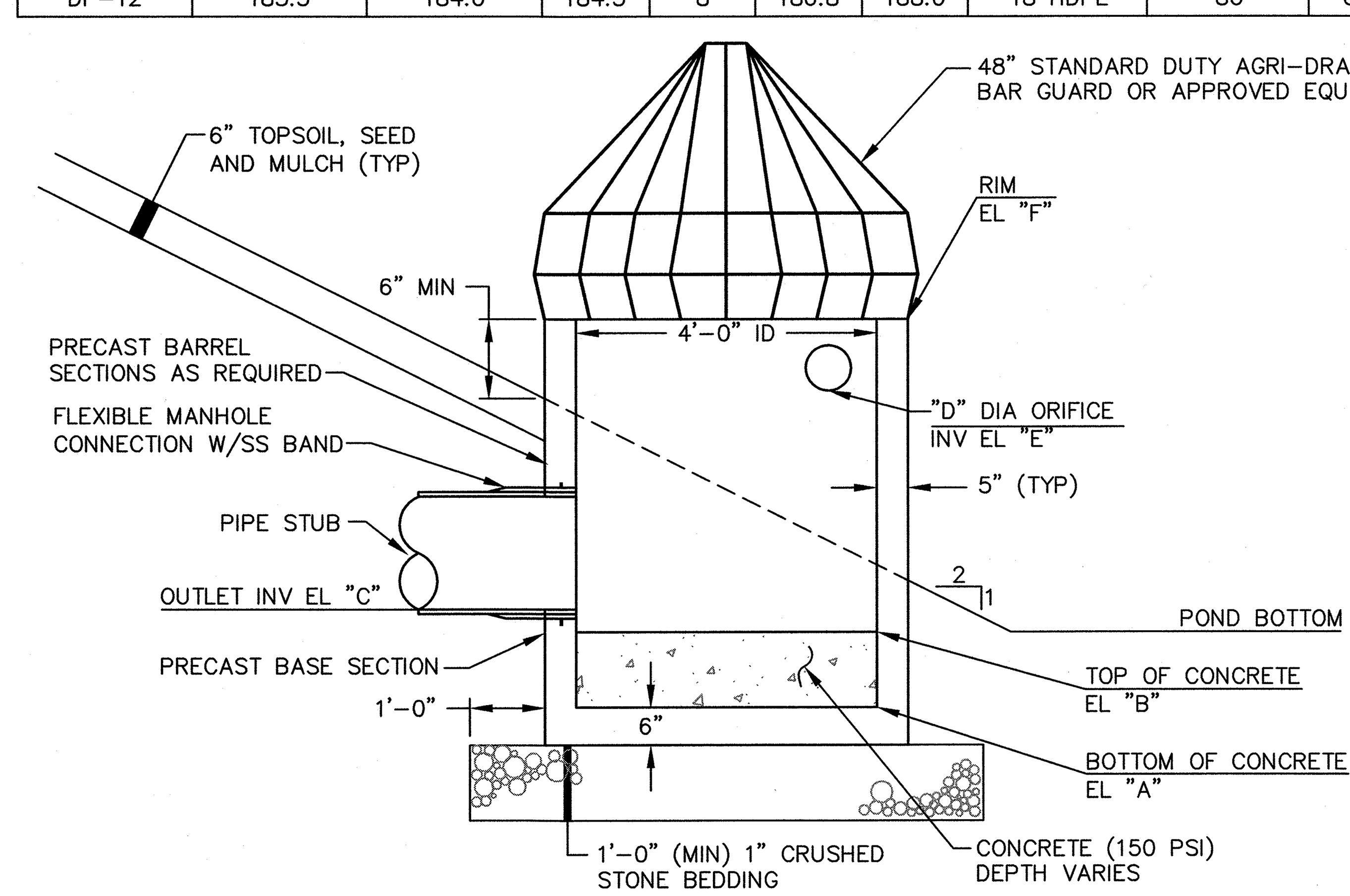
CATCH BASINS 2BB, 4G, 4HB, 4I, & 4JA
NTS

CATCH BASIN SCHEDULE B

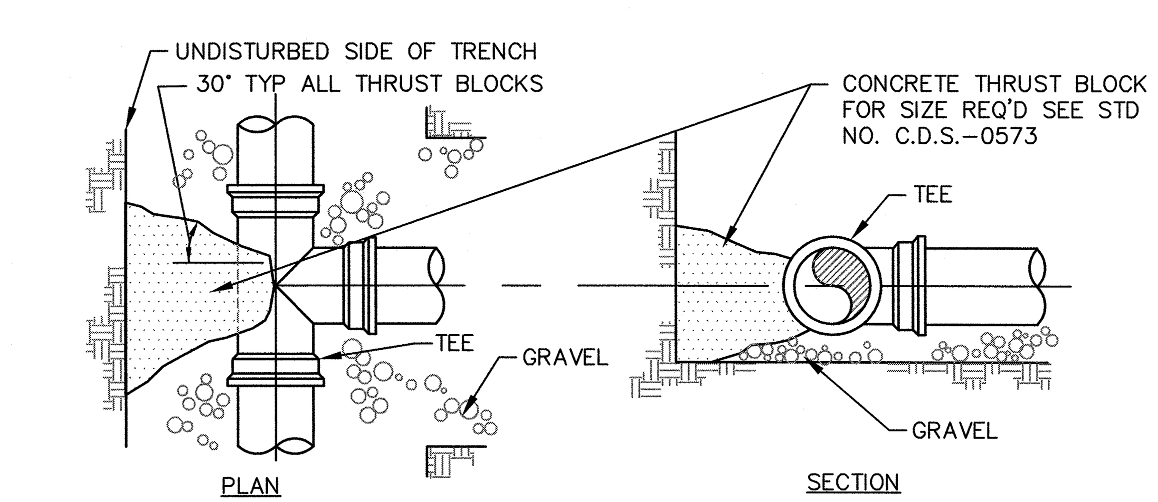
CATCH BASIN DESIGNATION	PIPE INV EL "A" (FT)	RIM EL "B" (FT)	PIPE DIA "C" (IN)	TOP OPENING DIA "D" (IN)
CB-4K	216.5	220.0	24"	30"
CB-4L	213.0	215.0	18"	24"



CATCH BASINS 4K & 4L
NTS



OUTLET CONTROL STRUCTURE
NTS



TYPICAL THRUST BLOCK PLACEMENT ON TEES
NTS

REV.	BY	DATE	STATUS
		5/2016	REVISED PER MEDEP COMMENTS
		2/2016	REVISED PER MEDEP COMMENTS
	PCM	7/2015	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

STATE OF MAINE ... LICENSED PROFESSIONAL ENGINEER No. 5145

JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SECTIONS AND DETAILS

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DESIGN BY: PCM
DRAWN BY: SJM
DATE: 12/5/2014
CHECKED BY:
LMN: NONE
CTB: SME-STD

JOB NO. 14101.00 DWG FILE DETAILS

C-306