McPHAIL ASSOCIATES, INC

Geotechnical Engineers

HYDROGEOLOGIC GROUNDWATER MOUNDING EVALUATION REPORT

PROPOSED SOIL ABSORPTION SYSTEM

134 BOSTON POST ROAD

WAYLAND MASSACHUSETTS

for

Waypoint Construction Consultants, Inc.

July 20, 2011

Project No. 5260

McPHAIL ASSOCIATES, INC

Geotechnical Engineers

July 20, 2011

Waypoint Construction Consultants, Inc.
6 Oakhurst Circle
Needham, MA 02492

Attention: Mr. Ray Mitrano, Principal

Reference: Proposed Assisted Living Facility at 134 Boston Post Road; Wayland, Massachusetts
Hydrogeologic Groundwater Mounding Evaluation Report

Ladies and Gentlemen:

This letter report presents the results of our subsurface investigation and hydrogeologic groundwater mounding evaluation for the proposed soil absorption system to be located at 134 Boston Post Road in Wayland, Massachusetts. Refer to the Project Location Plan (Figure 1) for the general site locus.

The hydrogeologic services were performed in accordance with our proposal dated May 5, 2011 and the subsequent authorization of Mr. Ray Mitrano of Waypoint Construction Consultants, Inc. These services are subject to the limitations in Appendix A.

McPhail Associates, Inc. (McPhail) has also been contracted to provide geotechnical foundation engineering services and design assistance in connection with the proposed assisted living facility. The foundation engineering report will be forwarded under separate cover.

Purpose and Scope

It is understood that the western portion of the site is impacted by petroleum hydrocarbons and lead resulting from an historic gasoline release from a former gasoline filling station located on the opposite side of Boston Post Road from the project site.

The purpose of the hydrogeologic study is to assess the impact of the operation of the proposed soil absorption system on the flow of groundwater around the existing contaminated groundwater plume, the limits of which are defined by the MCP disposal site boundary as indicated on Figure 2. The MCP disposal site boundary is based on information presented by ATC Associates, Inc. in their letter report to ConocoPhillips dated July 15, 2011.

Based on the results of our geotechnical subsurface investigation and available hydrological information provided by others, groundwater modeling analyses were performed to evaluate groundwater mounding around the proposed soil absorption system in the vicinity of the existing groundwater plume. The resulting effect of groundwater mounding on the migration of groundwater in the vicinity of the plume was also evaluated. The groundwater modeling analyses discussed in this report were performed using the computer software program Visual MODFLOW.

The analyses presented in this report pertain to the mounding and movement of groundwater at the project site induced by hydraulic loading caused by the operation of the soil absorption system and stormwater management area. The scope of work performed specifically excludes any analyses which predict the transport of contaminants in the groundwater due to hydraulic loading.

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Available Information

Information provided to McPhail includes a drawing detailing the location of the proposed soil absorption system prepared by Stephenson Design Group, LLC (SDG), entitled "Grading, Drainage, and Erosion Control Plan," dated March 17, 2011; a Phase II Comprehensive Site Assessment Report prepared by Conestoga-Rovers & Associates (CRA), dated November 2010; slug test results prepared by Vanasse Hangen Brustlin, Inc. (VHB), dated June 5, 2009; test pit data prepared by VHB; and an original Visual MODFLOW model prepared by VHB.

Existing Conditions

The approximate 9.7-acre site fronts onto Boston Post Road to the south and is bordered by religious and residential properties and wooded areas to the north, east and west. Haywood Brook is located adjacent to the northwest side of the site. The existing site is understood to be occupied by grassed and wooded areas, along with two existing structures and associated paved driveway/parking areas.

Existing ground surface across the site generally slopes downward from southeast to northwest from about Elevation +160 to Elevation +145. The existing ground surface at the northern and western ends of the site slopes downward towards Haywood Brook to about Elevation +130. Elevations indicated herein are in feet and are referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

Proposed Development

The scope of development includes the construction of a one to two-story assisted living facility with an approximate footprint of 40,000 square feet. The existing residential structure at the northern end of the site will be demolished and the existing one-story farm stand at the southern end of the site will be renovated and possibly expanded.

The project also includes the installation of a subsurface soil absorption system and a stormwater management area. The proposed soil absorption system will consist of two separate rectangular-shaped leaching fields with a combined footprint of approximately 26,500 square feet. The leaching fields will be located to the south and southwest of the proposed assisted living facility and to the east of the existing contaminated groundwater plume. It is understood that the stormwater management area will consist of a detention pond occupying a trapezoidal area of approximately 5,000 square feet located to the northwest of the proposed assisted living facility. The location of the proposed soil absorption system and soil management area is shown on the attached Figure 2.

Subsurface Investigation Program

On April 28, 2011, a subsurface investigation program consisting of eleven (11) machine excavated test pits was conducted on the site by Callahan Inc. of Bridgewater, Massachusetts under contract to others. Test pit logs prepared by McPhail are provided in Appendix B. The approximate location of the test pits is indicated on the enclosed Subsurface Exploration Plan (Figure 2).

The test pits were advanced with a PC 150 Komatsu track-mounted excavator to depths ranging from 10

to 14 feet below the existing ground surface. The subsurface explorations were monitored by a representative of McPhail who performed field layout, prepared field logs, obtained and visually classified soil samples, observed groundwater conditions in completed test pits, made minor adjustments to the exploration locations, and determined the required exploration depths based upon the actual subsurface conditions encountered.

Field locations of the subsurface explorations were determined by taping from existing site features identified on a site plan. The approximate existing ground surface elevation at each exploration location was determined by a level survey performed by McPhail.

Laboratory Testing

At the completion of the field work, soil samples were returned to our laboratory for more detailed classification, analysis, and testing. The laboratory testing consisted of sieve analyses to determine the gradations and confirm the visual classifications of the glacial outwash and glacial till deposits. Laboratory test procedures were performed in general accordance with applicable ASTM Standards. Results of the gradation testing appear on Figures 3 and 4 following the text of this report.

Subsurface Conditions

A detailed description of the subsurface conditions encountered within each of the recent explorations is presented on the test pit logs enclosed in Appendix B. Based on the explorations performed at the site, the following is a description of the generalized subsurface conditions encountered.

A 0.5 to 2-foot thick surficial topsoil layer consisting of loose to compact, sandy silt with a trace of gravel and roots was encountered at each test pit location extending beneath the ground surface.

Encountered underlying the topsoil at each test pit location, excluding TP-4 and TP-12, is a 0.5 to 1-foot thick subsoil deposit consisting of compact, orange-brown sand with some silt and a trace gravel varying to silty sand with a trace gravel. At test pit locations TP-4 and TP-12, the topsoil is underlain by a 4.2 to 4.5-foot thick fill layer consisting of loose to compact, brown sand with some silt and a trace gravel. At test pit location TP-4, a 1-foot thick subsoil deposit was encountered underlying the fill material.

Underlying the subsoil deposit or fill material, a 3 to 12-foot thick glacial outwash deposit consisting of compact to dense, brown sand with some to trace silt and a trace gravel was observed. The surface of the glacial outwash deposit was encountered at depths ranging from 1.5 to 5.5 feet below ground surface, corresponding to Elevation +151.1 at TP-5 and Elevation +145.5 at TP-4, respectively. Grain size distribution curves of representative samples of the glacial outwash deposit encountered in the test pits are provided in Figure 3. With the exception of test pits TP-5 and TP-11, the test pits were terminated in the glacial outwash deposit at depths ranging from 10 to 14 feet below ground surface.

At test pit locations TP-5 and TP-11, a glacial till deposit was observed underlying the glacial outwash at depths of 4.5 and 5 feet below ground surface, respectively. The glacial till deposit consists of very dense, gray, silty sand and gravel varying to sandy gravel with some silt. The glacial outwash and glacial till deposits also contain numerous cobbles and boulders. Grain size distribution curves of representative samples of the glacial till deposit encountered in the test pits are provided in Figure 4. Test pits TP-5 and

TP-11 were terminated in the glacial till deposit at 13 and 14 feet below ground surface, respectively. Groundwater was not observed in the open explorations, however monitoring well data presented in the Phase II Comprehensive Site Assessment Report prepared by CRA indicates that the depth of groundwater ranges from about 15 to 20 feet below ground surface within the footprints of the proposed building and soil absorption system, and within the limits of the existing groundwater plume.

Visual MODFLOW Groundwater Mounding Analyses

The computer software program Visual MODFLOW was utilized to model groundwater mounding in the vicinity of the proposed soil absorption system. MODFLOW is a three-dimensional, block centered, finite difference flow package developed by the United States Geologic Survey (USGS). The pre- and post processor, Visual MODFLOW (Waterloo Hydrogeologic Software), was used to input the program variables/boundary conditions into the MODFLOW model and generate the predicted groundwater mounding contours, groundwater flow vectors, and groundwater migration paths. This section describes the conceptual model, the computer model input parameters, calibration of the model, and model simulations.

Conceptual Base Model

A Visual MODFLOW model prepared for the site previously by VHB was used as a base model for our groundwater mounding analyses. The plan domain of the base Visual MODFLOW model was 935,000 square feet in area, encompassing the limits of the entire project site (See Figure 5). The site was modeled as a single layer system with a uniform layer thickness of 34 feet. The layer surface was contoured using imported ground surface elevation data from across the project site. The base model hydrogeologic parameters are discussed below.

Initial hydrostatic groundwater levels across the model domain were interpolated between constant head boundaries applied along the northwestern and southeastern limits of the domain. The constant head boundary along the alignment of Haywood Brook at the northwestern boundary of the domain was set to 125 feet, presumptively corresponding to the typical flow stage. The constant head boundary along the southeastern boundary of the domain was set to vary linearly from 148 feet at the southwestern corner of the domain to 158 feet at the northeastern corner of the domain. The choice to vary the constant head boundaries can be attributed to the fact that the existing ground surface elevation at the site typically increases from the southwest to the northeast.

Monitoring wells can be inputted into Visual Modflow in order to assist in model calibration. Visual MODFLOW contains a graphical calibration module which can be used to compare actual recorded monitoring well groundwater elevation data to the computed model groundwater elevation contours. Close agreement between observed groundwater levels in the field and the modeled groundwater levels indicates that the model has been reasonably calibrated.

The original VHB model included six calibration monitoring wells, MW-1, MW-3, MW-4, MW-5, MW-6B, and MW-8. The model monitoring wells were assigned observed groundwater elevation values of 128.76 feet, 128.79 feet, 129.36 feet, 131.57 feet, 129.28 feet, and 132.1 feet, respectively. These values correspond to the groundwater monitoring data recorded on May 1, 2009 as detailed in the Phase II Comprehensive Site Assessment Report prepared by CRA.

Elements within the original model domain were assigned values of hydraulic conductivity based on the ten slug tests performed in monitoring wells located in the vicinity of the existing groundwater plume. It is understood that the slug tests were performed in monitoring wells installed in the glacial outwash deposit. Calculated values of hydraulic conductivity varied from approximately 1.25 feet/day to 8.82 feet/day.

The domain of the original model was divided into three plan areas of hydraulic conductivity as detailed on Figure 6. Shown in Figure 6, the original model areas with white and blue backgrounds are assigned values of hydraulic conductivity corresponding to 7.6 feet/day and 1.4 feet/day, respectively. The area shaded in red is modeled as an impervious material. The appropriateness of these model parameters and boundaries will be discussed in the following section.

Model Modifications and Calibration

Modifications made to the original model provided by VHB primarily include the alteration of hydrogeologic properties, geometries, and modeled hydraulic loading areas within the model domain. Model calibration was performed by altering the model boundary conditions in order to obtain agreement between observed and calculated groundwater elevations at monitoring well locations.

Considering the relative homogeneity of the outwash soil across the site, the average of the values of hydraulic conductivity measured in the slug tests (5.75 feet/day) was assigned to the entire model domain, excluding the previously discussed area originally modeled as impervious material. Based on the results of our subsurface investigation, it is speculated that the original model included the zone of impervious material due to the presence of glacial till in that area of the site. From examination of the grain size distribution curves of representative samples of outwash and till soil at the site, it is our opinion that the area containing glacial till should not be modeled as an impervious material, but rather as an area with a value of hydraulic conductivity one order of magnitude lower that the surrounding outwash soil (0.575 feet/day). This conclusion is based on estimates of hydraulic conductivity determined from the empirical equation developed by Hazen (1911). Considering that there are typically transition zones between naturally deposited soils, two areas with intermediate values of hydraulic conductivity were also included into the revised model (see Figure 7).

The original ground surface contours associated with the original model were determined to be appropriate and in close agreement with existing ground surface elevation contours indicated on the recent plans provided by SDG. However, the layer thickness of the model was increased from 34 feet to 50 feet to allow for a broader range of hydrogeologic boundary conditions to be modeled.

The modeled hydraulic loading areas were updated to correspond to the proposed locations of the soil absorption system and the stormwater management area (see Figure 5).

Model calibration was performed using the recorded groundwater elevation data at thirteen monitoring wells within the limits of the existing groundwater plume and proposed soil absorption system. The groundwater data used to calibrate the model was recorded on September 7, 2010 and was obtained from the Phase II Comprehensive Site Assessment Report prepared by CGA. A summary of the observation wells and corresponding observed groundwater elevations is provided in Table 1 following the text of this report. The locations of the monitoring wells used to calibrate the model are indicated on Figure 5. The monitoring well data corresponding to September 7, 2010 was utilized to calibrate our model primarily because of the relatively low groundwater elevation readings recorded on that date. It was observed that simulations performed for models calibrated using low groundwater levels indicated increased

groundwater migration during hydraulic loading events. This observation can be attributed to the fact that using lower groundwater data to calibrate the model will in turn result in a smaller gradient between the hydraulic boundary conditions at the limits of the model domain, assuming that one boundary condition is held constant. In regards to the model prepared for this study, the Haywood Brook constant head boundary was assumed to remain constant. The smaller gradient between head boundaries will in turn result in the hydraulic loading caused by the soil absorption system and stormwater management area, which is assumed to remain constant irregardless of seasonal groundwater variations, to have a more influential effect on the flow of groundwater.

The boundary conditions applied along the northwestern and southeastern limits of the domain were calibrated to obtain closer agreement between the observed and measured groundwater elevations at the monitoring wells in the model domain. The constant head boundary along the alignment of Haywood Brook at the northwestern boundary of the domain was assigned a value of 126 feet. The constant head boundary along the southeastern boundary of the domain was set to vary linearly from 130 feet at the southwestern corner of the domain to 135 feet at the northeastern corner of the domain. The variation in this head boundary was implemented due to variations in existing ground surface elevation. Assuming these boundary conditions and the above discussed model parameters, the maximum observed deviation between the observed and modeled groundwater elevations at the monitoring well locations shown on Figure 5 was approximately 8 inches. A summary of the calibration results is provided in Table 1. The model hydrostatic groundwater elevation contours are shown in Figure 8.

Model Simulations

To examine the effect of the operation of the proposed soil absorption system and stormwater management area, three Visual MODFLOW simulations were performed. The Visual MODFLOW simulations performed model steady state groundwater conditions based on the hydrogeologic input parameters discussed previously. For each model simulation, figures were prepared showing groundwater elevation contours and groundwater flow vectors. On each figure, the projected migration path of groundwater within the limits of the contaminant plume is indicated with pink path-lines. The results of the MODFLOW analyses are shown in Figures 10 through 15.

The first model (Model 1) simulates the operation of the soil absorption system alone. The proposed soil absorption system was modeled in Visual MODFLOW as an hydraulic recharge area with an infiltration rate of 0.05 feet/day. This model parameter was based on the understanding that the soil absorption system, which occupies a footprint of approximately 26,500 square feet, will be designed for a flow rate of 10,000 gallons per day (1,337 cubic feet per day). Figures 10 and 11 show groundwater elevation contours and flow vectors, respectively, for Model 1.

The second model (Model 2) simulates the operation of the soil absorption system along with the operation of the stormwater management area. In this simulation, the proposed soil absorption system and stormwater management were both designated as a hydraulic recharge area with an infiltration rate of 0.05 feet/day. Figures 12 and 13 display groundwater elevation contours and flow vectors, respectively, for Model 2.

The third model (Model 3) also simulates the operation of the soil absorption system along with the operation of the stormwater management area. In this simulation, the proposed soil absorption system and stormwater management area were assigned separate infiltration rates of 0.05 feet/day and 0.5 feet/day respectively. Figures 14 and 15 show groundwater elevation contours and flow vectors,

respectively, for Model 3.

Discussion of Results

The monitoring wells used to calibrate the model were also used as reference points to compare changes in groundwater elevations between the hydrostatic model and the three simulation models discussed previously. The modeled groundwater elevations and corresponding groundwater mounding heights at each monitoring well location for the three simulations are summarized in Table 1.

The results of the MODFLOW analyses indicate that the operation of the proposed soil absorption system alone will cause groundwater mounding within the limits of the existing groundwater plume ranging from approximately 1.1 to 2.5 feet above the hydrostatic groundwater elevations shown in Figure 8. The Visual MODFLOW simulations also indicate that groundwater flow will shift westward and increase in velocity (see Figure 11). Evident from examination of the summary data in Table 1, the operation of the stormwater management area with a recharge rate of 0.05 feet/day in conjunction with the hydraulic loading of the soil absorption system will not increase groundwater mounding in the area of the groundwater plume more so than would occur with the operation of the soil absorption system alone. Furthermore, the simulations indicate that the additional operation of the stormwater management area will have a negligible effect on the groundwater flow direction and velocity. The third simulation (Model 3) was performed in order to examine the effect of a heavy precipitation event. With the stormwater management area modeled as a recharge area with an infiltration rate of 0.5 feet/day, the simulations indicate groundwater mounding approximately 2.2 to 4.2 feet above hydrostatic groundwater elevations as well as a further shift of groundwater flow westward.

We trust that the above is sufficient for your present requirements. Should you have any questions concerning the recommendations presented herein, please do not hesitate to call us.

Very truly yours,

McPHAIL ASSOCIATES, INC.

Brendan A. O'Neil

Jonathan W. Patch, P.E.

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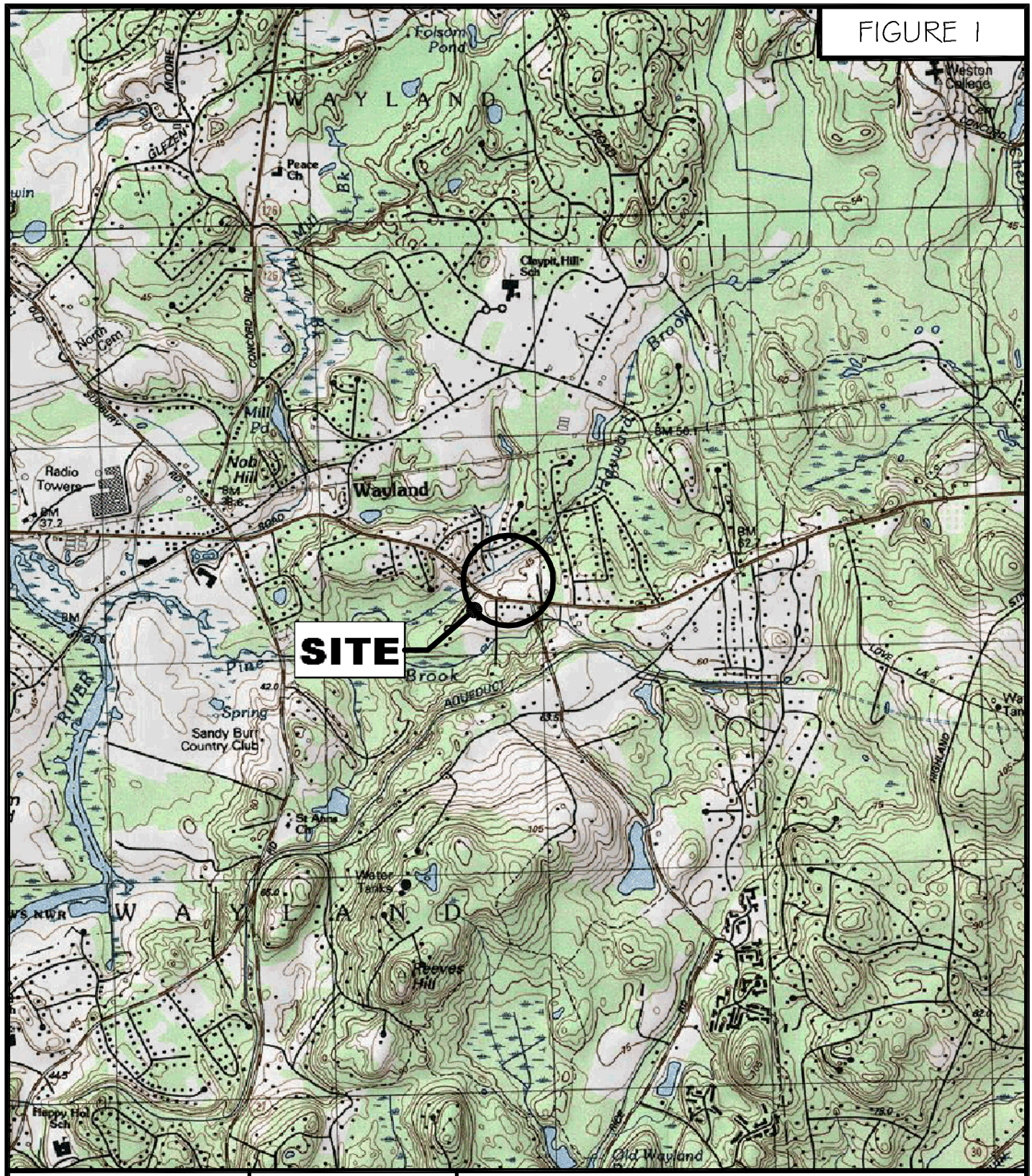
BAO/jwp

FIGURE 1



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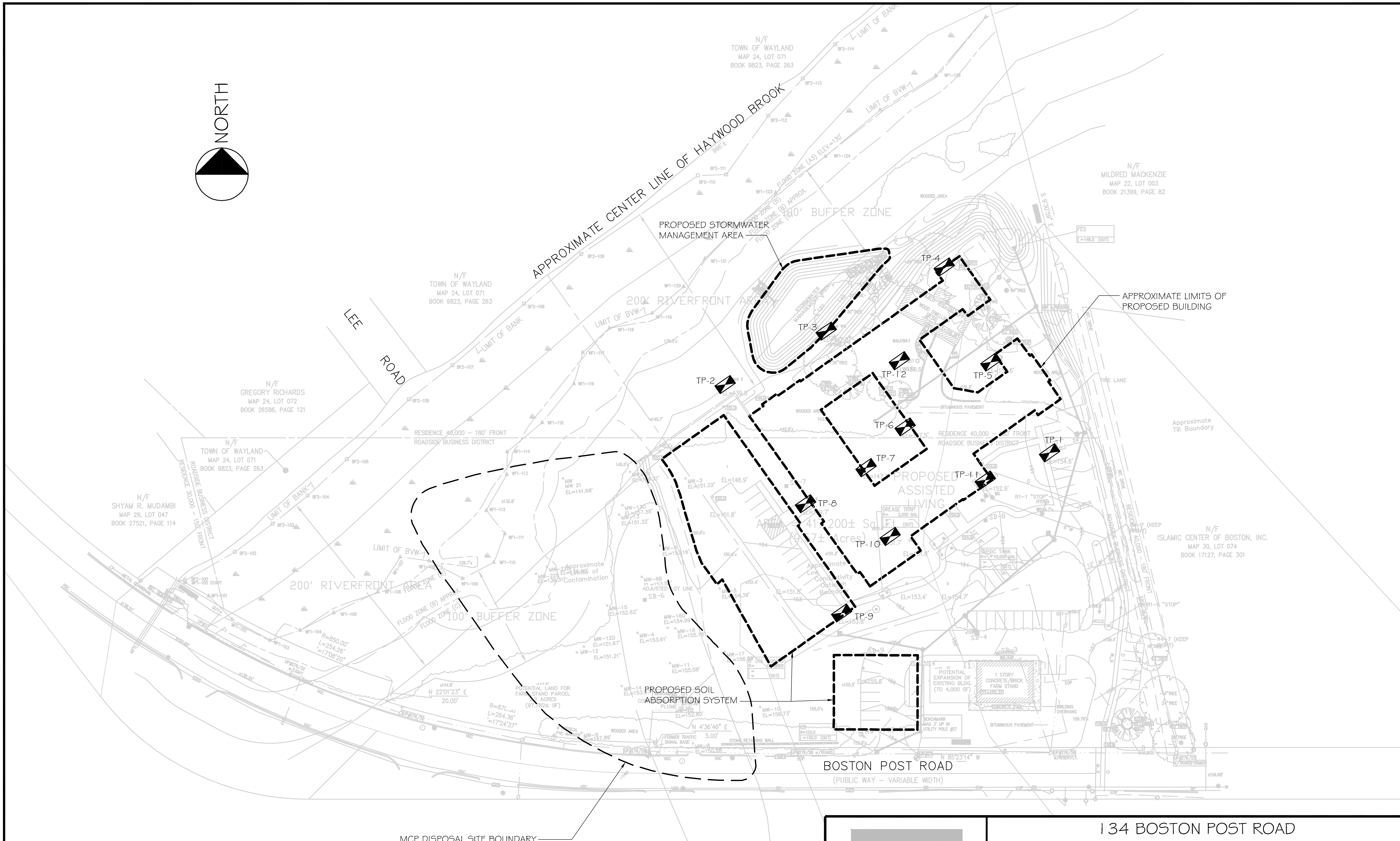
SCALE 1:25,000

PROJECT LOCATION PLAN

134 BOSTON POST ROAD

WAYLAND MASSACHUSETTS



LEGEND

— APPROXIMATE LOCATION OF TEST PIT PERFORMED BY CALLAHAN, INC. ON APRIL 28, 2011 UNDER CONTRACT TO OTHERS

REFERENCE: THIS PLAN WAS PREPARED FROM A 40-SCALE DRAWING ENTITLED, "PROPOSED ASSISTED LIVING DEVELOPMENT" DATED MARCH 17, 2011 PREPARED BY STEPHENSON DESIGN GROUP, LLC

GRAPHIC SCALE

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FILE NAME: Update Model\5260-F02

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134 BOSTON POST ROAD

WAYLAND MASSACHUSETTS

SUBSURFACE EXPLORATION PLAN

FOR

WAYPOINT CONSTRUCTION CONSULTANTS, INC.

BY

McPHAIL ASSOCIATES, INC.

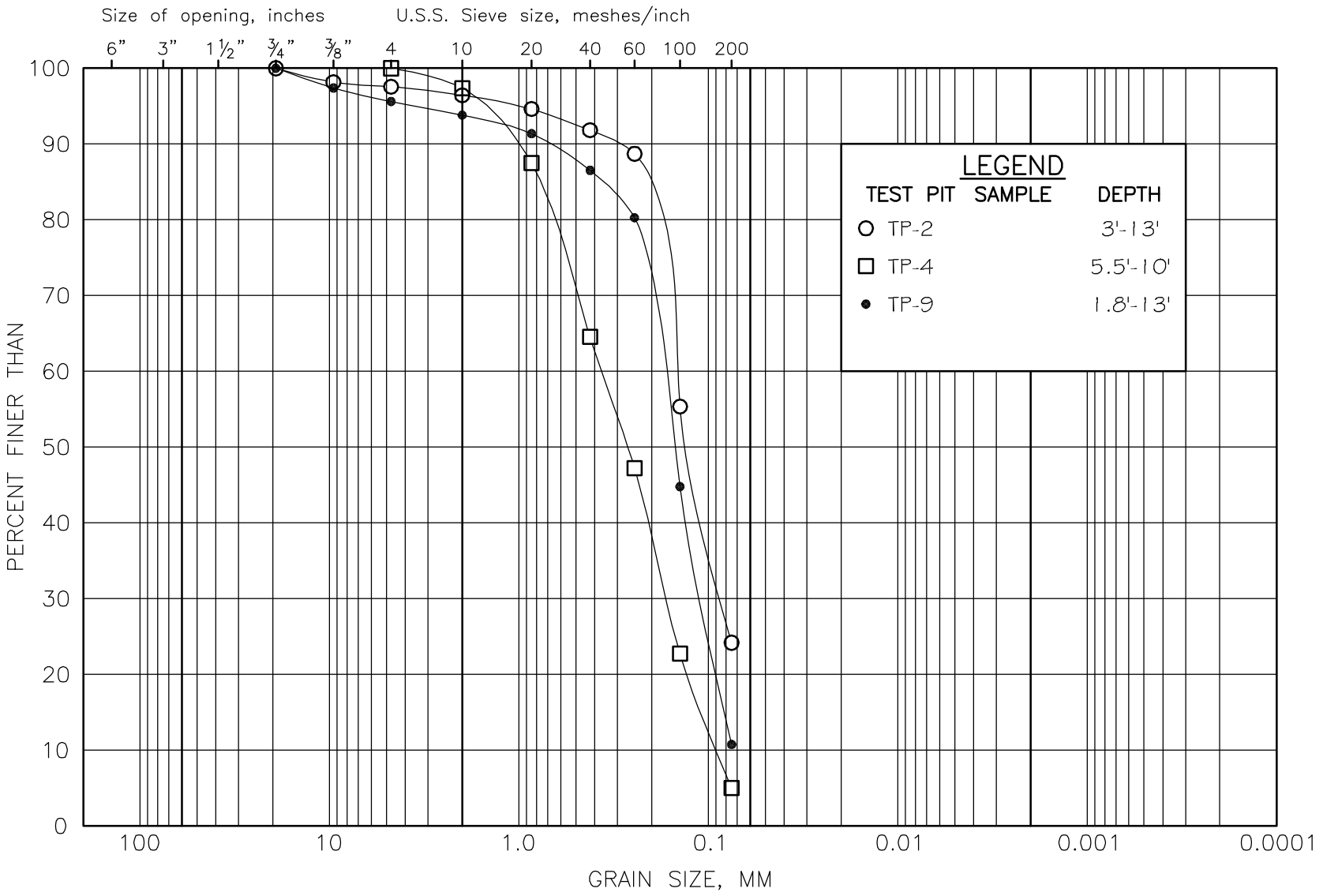
CONSULTING GEOTECHNICAL ENGINEERS

Date: JULY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 60'
Project No: 5260			FIGURE 2

FILE NAME: 5260-F03_Sieve

PROJECT No. 5260

M.I.T. GRAIN SIZE SCALE



COBBLE SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE

McPHAIL ASSOCIATES, INC.

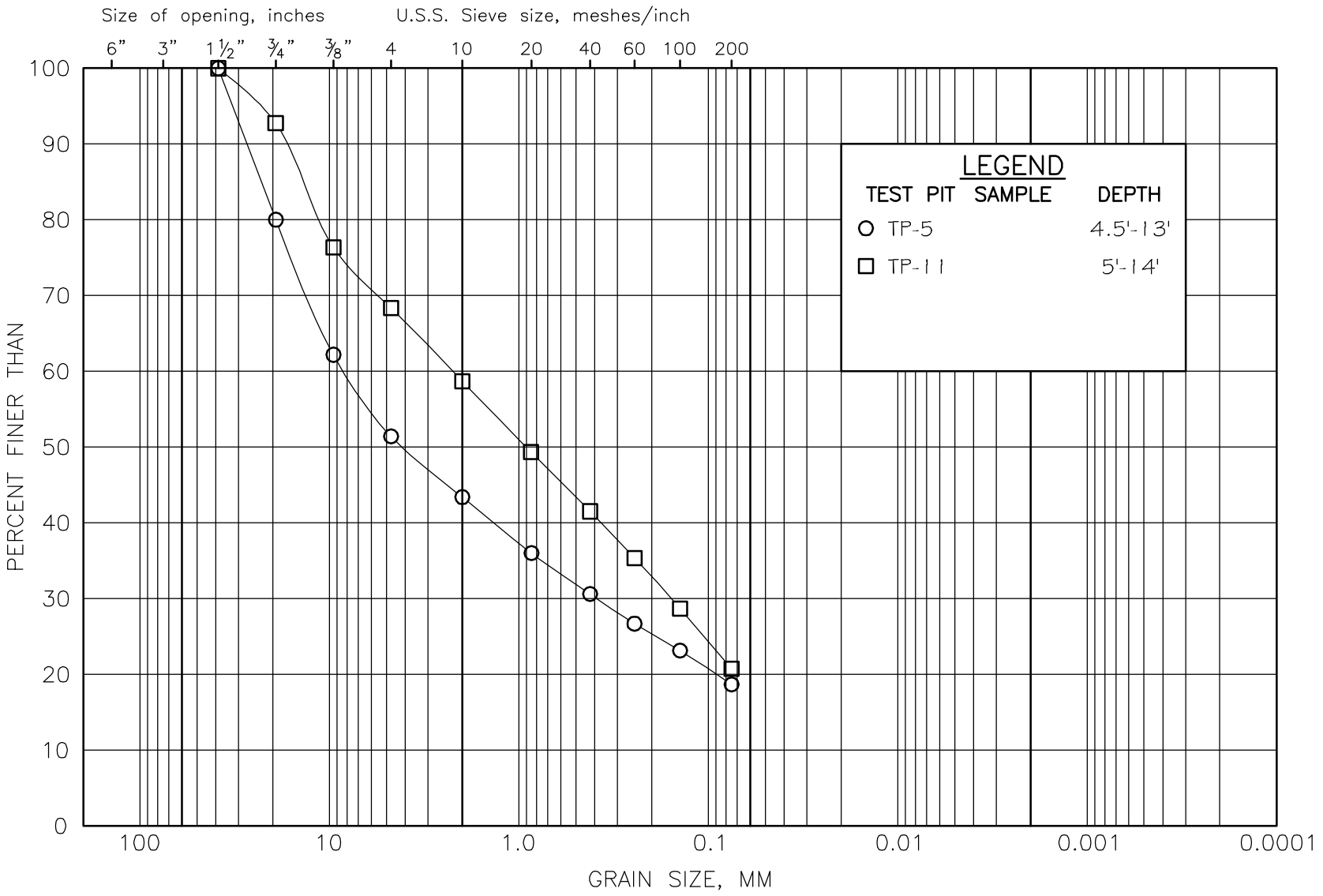
GRAIN SIZE DISTRIBUTION
GLACIAL OUTWASH

FIGURE 3

FILE NAME: 5260-F04_Sieve

PROJECT No. 5260

M.I.T. GRAIN SIZE SCALE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

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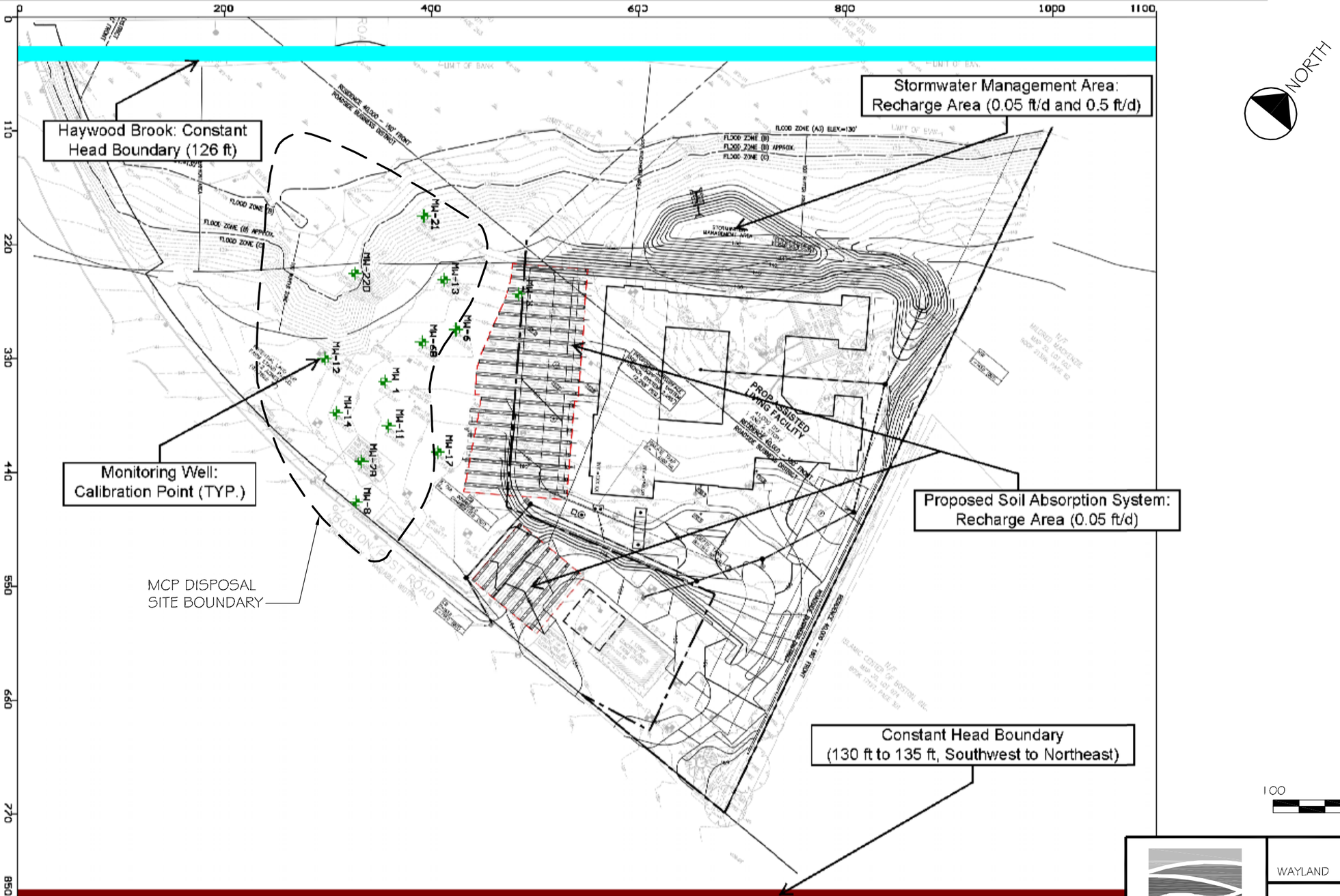
GRAIN SIZE DISTRIBUTION
GLACIAL TILL

FIGURE 4

FIGURE 5



NOTES:
1. AXES DIMENSIONS ARE IN FEET
2. GROUNDWATER CONTOUR ELEVATIONS ARE IN FEET.

REFERENCE: THIS PLAN WAS PREPARED FROM A 40-SCALE DRAWING ENTITLED, "GRADING, DRAINAGE AND EROSION CONTROL" DATED MARCH 17, 2011 PREPARED BY STEPHENSON DESIGN GROUP, LLC

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WAYLAND MASSACHUSETTS

MODFLOW MODEL
FOR
WAYPOINT CONSTRUCTION CONSULTANTS, INC.
BY
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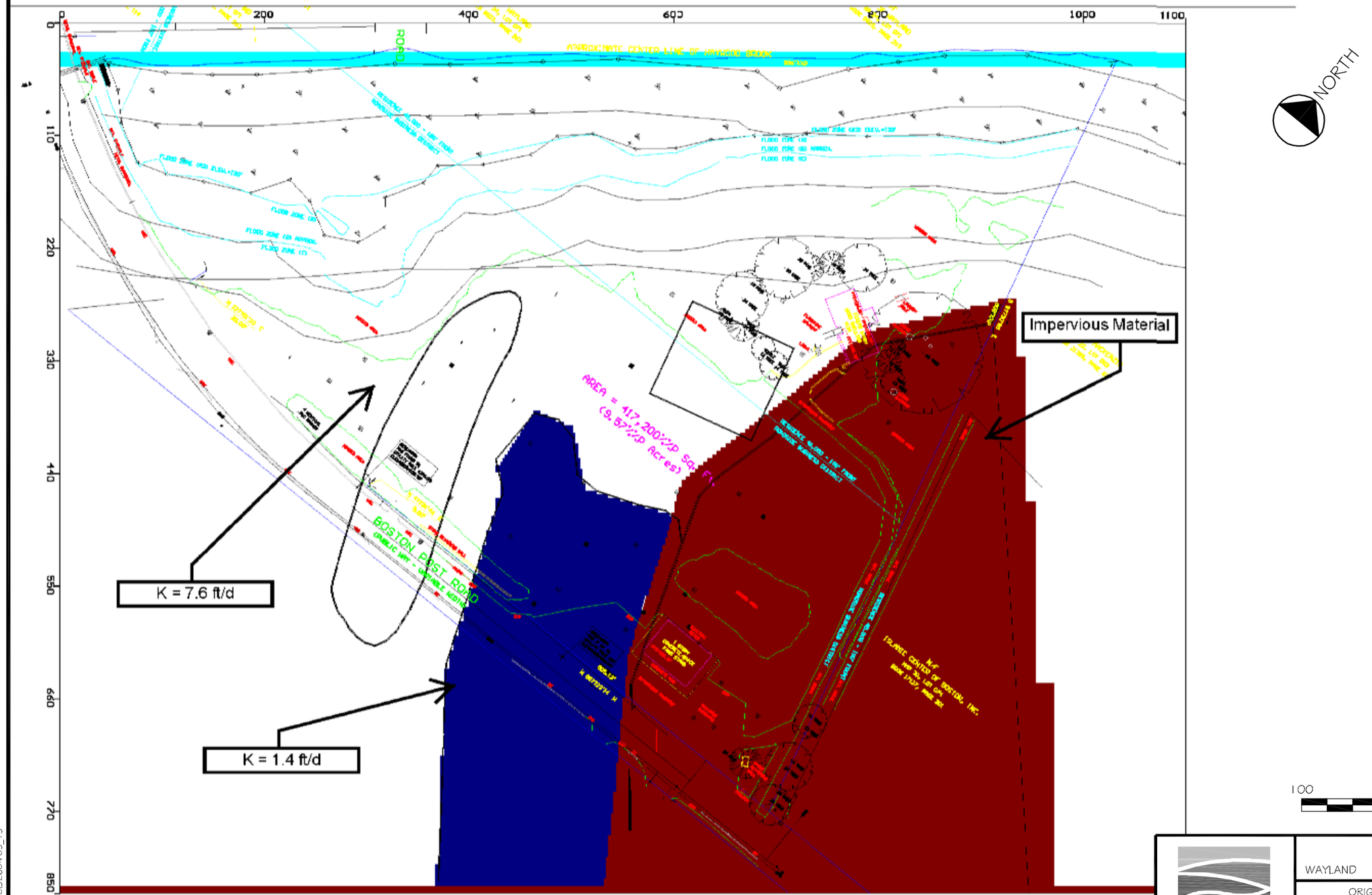
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
Project No: 5260			

FILE NAME: Update Model\5260-F05_15

FIGURE 6



NORTH

GRAPHIC SCALE

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134 BOSTON POST ROAD

WAYLAND MASSACHUSETTS

ORIGINAL MODEL HYDRAULIC CONDUCTIVITY PLAN

FOR

WAYPOINT CONSTRUCTION CONSULTANTS, INC.

BY

McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
Project No: 5260			

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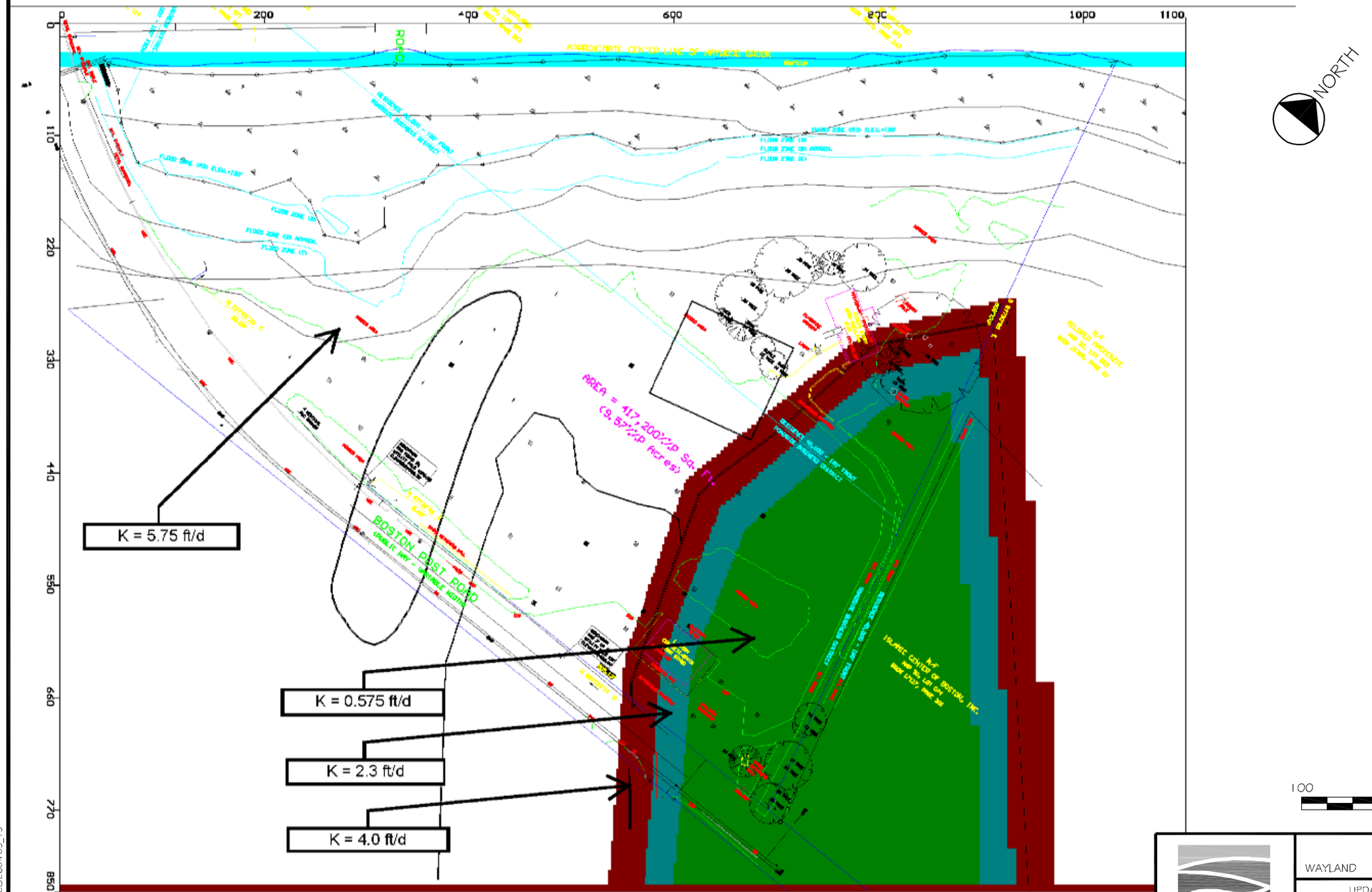
FIGURE 7



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134 BOSTON POST ROAD
WAYLAND MASSACHUSETTS

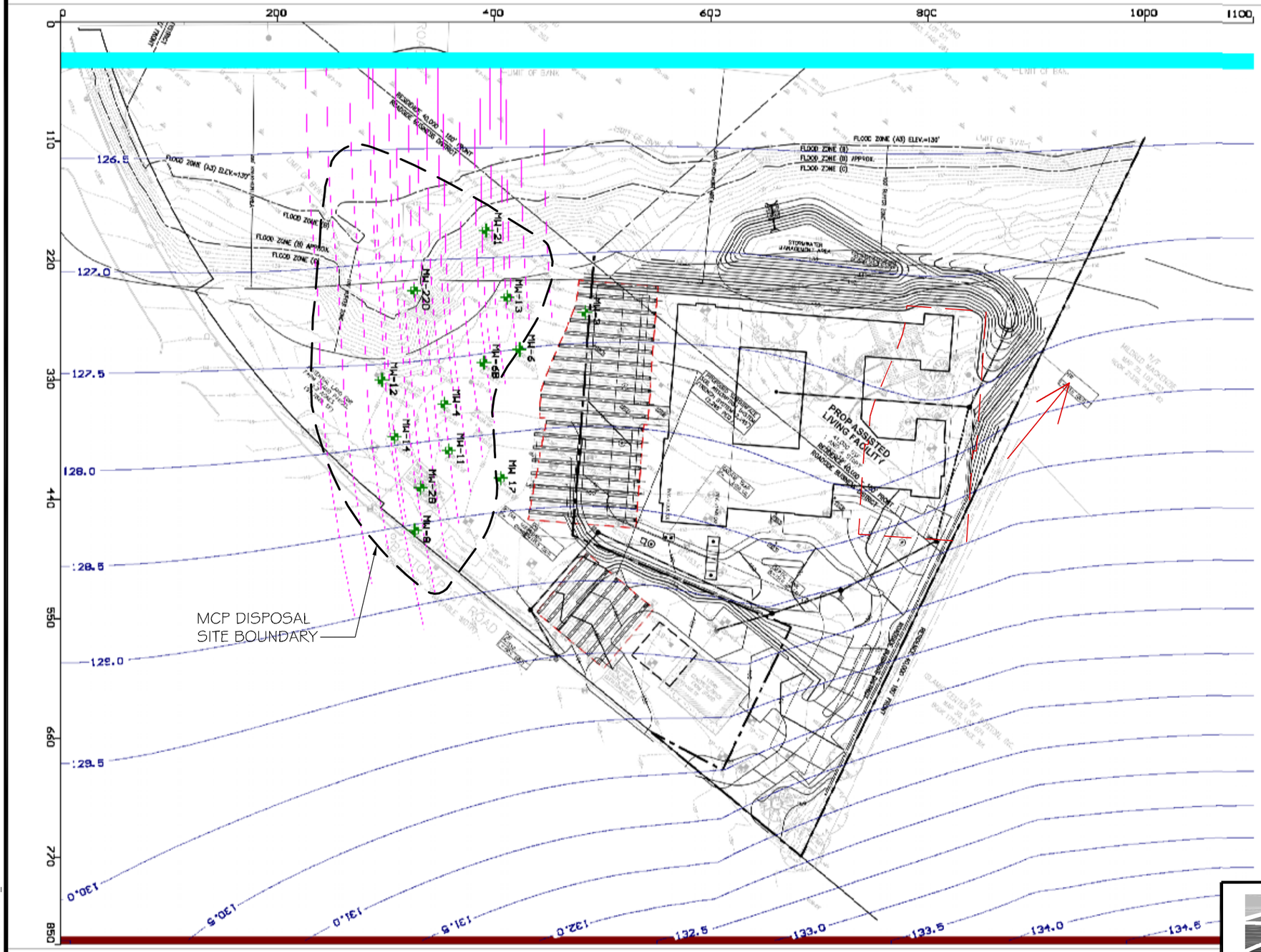
UPDATED MODEL HYDRAULIC CONDUCTIVITY PLAN

FOR
WAYPOINT, INC.
BY
McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
Project No: 5260			

FILE NAME: Update Model\5260-F05_15

FIGURE 8



NORTH

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134 BOSTON POST ROAD
WAYLAND MASSACHUSETTS
HYDROSTATIC CONDITIONS: GROUNDWATER ELEVATION CONTOURS
FOR
WAYPOINT CONSTRUCTION CONSULTANTS, INC.
BY
McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
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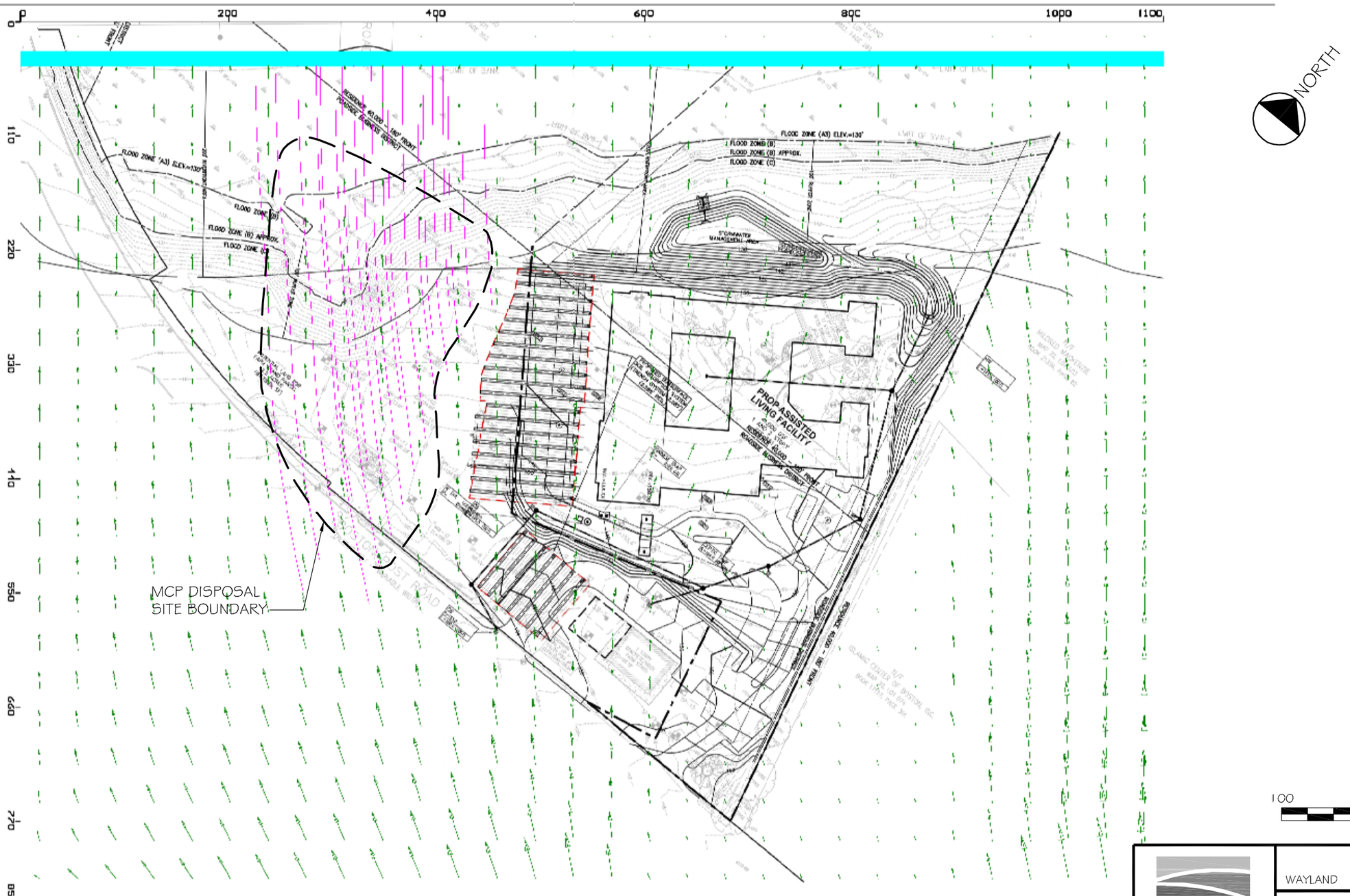
FILE NAME: Update Model5260-FIG5_15

FIGURE 9



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134 BOSTON POST ROAD
WAYLAND MASSACHUSETTS

HYDROSTATIC CONDITIONS: FLOW VECTORS

FOR
WAYPOINT CONSTRUCTION CONSULTANTS, INC.
BY
McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

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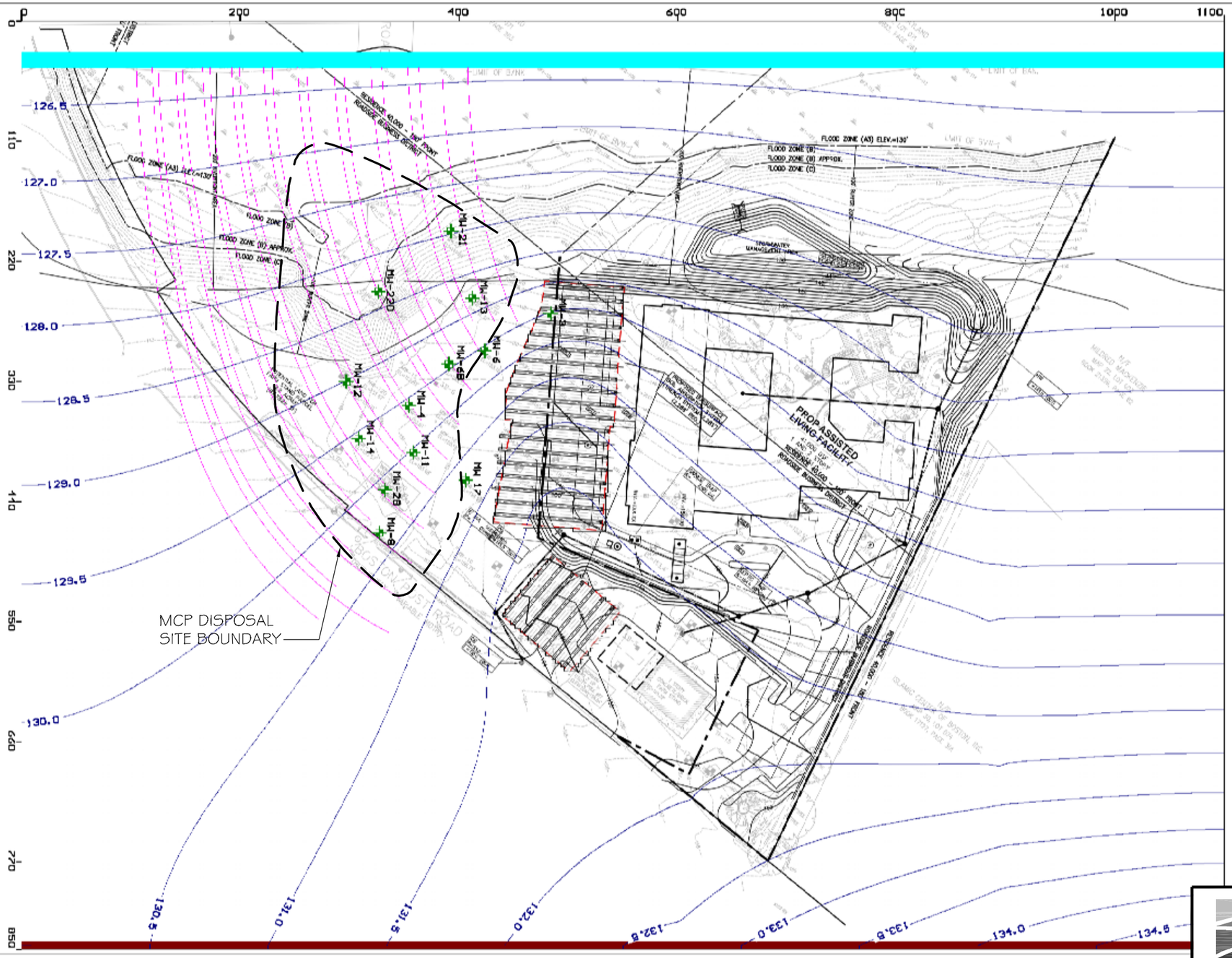
FIGURE 10



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617/868-1423 (Fax)

134 BOSTON POST ROAD
WAYLAND MASSACHUSETTS

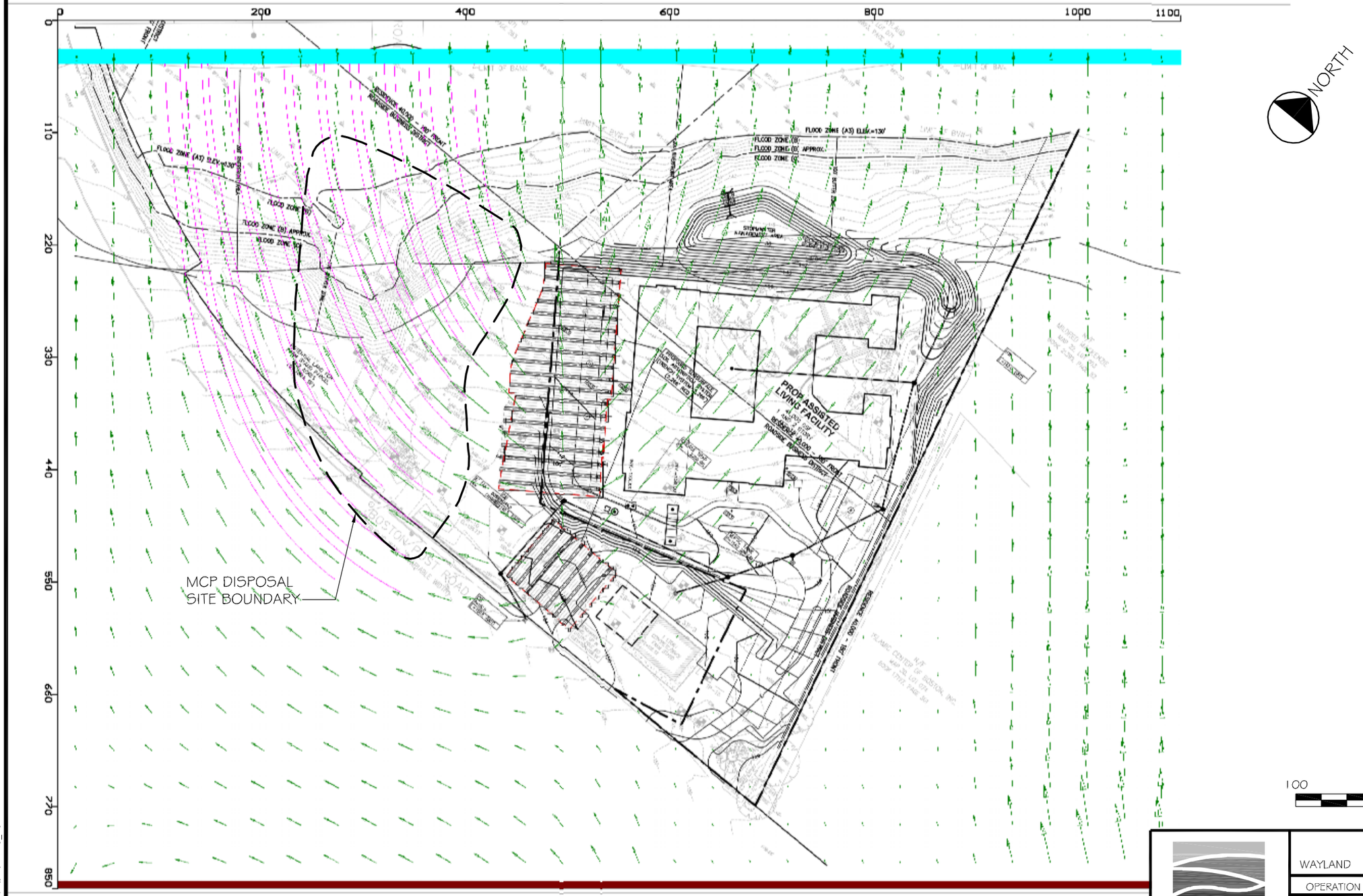
OPERATION OF SOIL ABSORTION SYSTEM (SAS): GROUNDWATER ELEVATION CONTOURS

FOR
WAYPOINT CONSTRUCTION CONSULTANTS, INC.
BY
McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
Project No: 5260			

FILE NAME: Update Model5260-F05_15

FIGURE 11



GRAPHIC SCALE

100 0 100 200

NOTES:
1. AXES DIMENSIONS ARE IN FEET
2. GROUNDWATER CONTOUR ELEVATIONS ARE IN FEET.

REFERENCE: THIS PLAN WAS PREPARED FROM A 40-SCALE DRAWING ENTITLED, "GRADING, DRAINAGE AND EROSION CONTROL" DATED MARCH 17, 2011 PREPARED BY STEPHENSON DESIGN GROUP, LLC

McPHAIL ASSOCIATES, INC.
Geotechnical Engineers
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134 BOSTON POST ROAD
WAYLAND MASSACHUSETTS

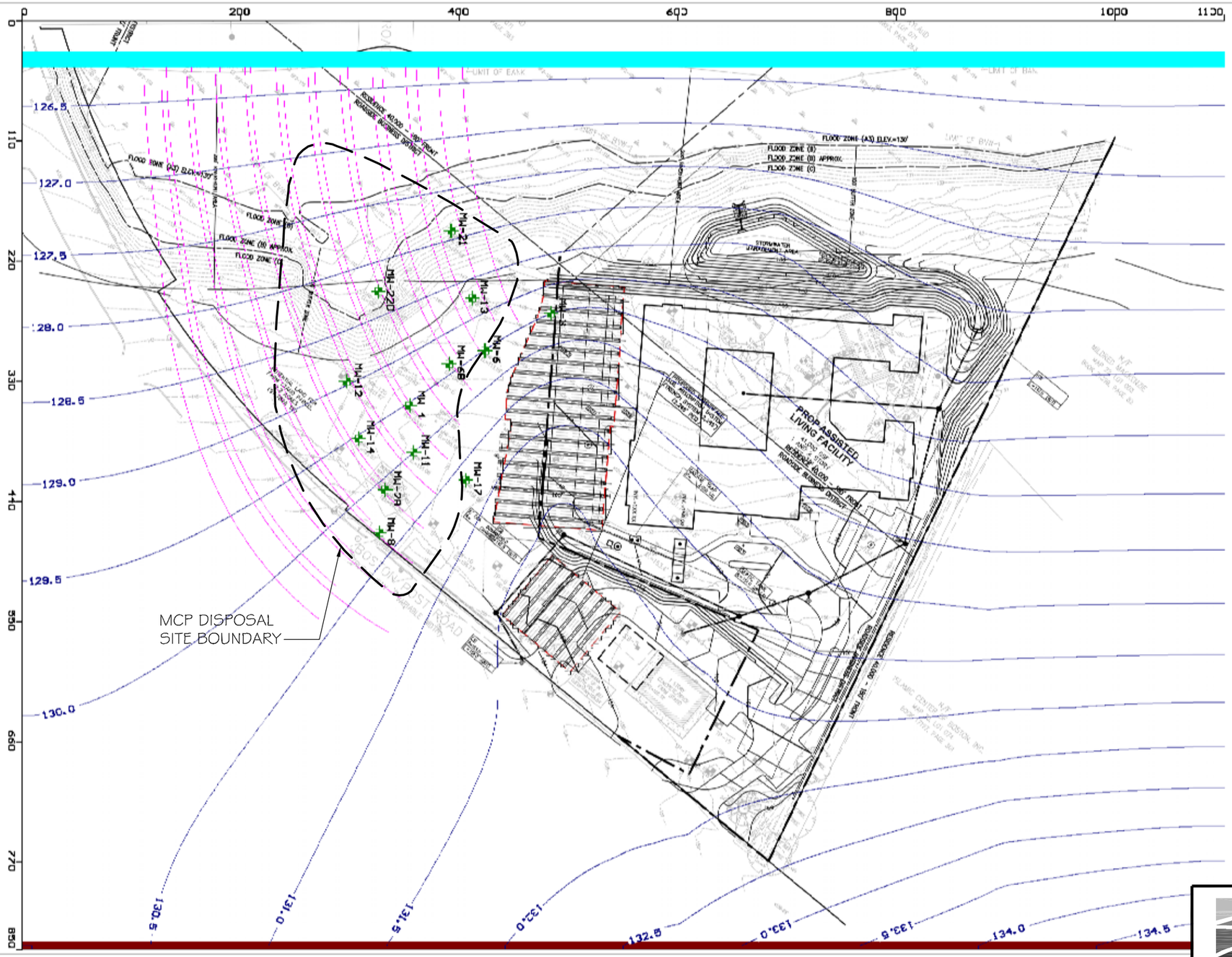
OPERATION OF SOIL ABSORTION SYSTEM (SAS): FLOW VECTORS

FOR
WAYPOINT CONSTRUCTION CONSULTANTS, INC.
BY
McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
Project No: 5260			

FILE NAME: Update Model5260-FIG_15

FIGURE 12



NORTH

GRAPHIC SCALE

100 0 100 200

NOTES:
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2. GROUNDWATER CONTOUR ELEVATIONS ARE IN FEET.

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134 BOSTON POST ROAD
WAYLAND MASSACHUSETTS

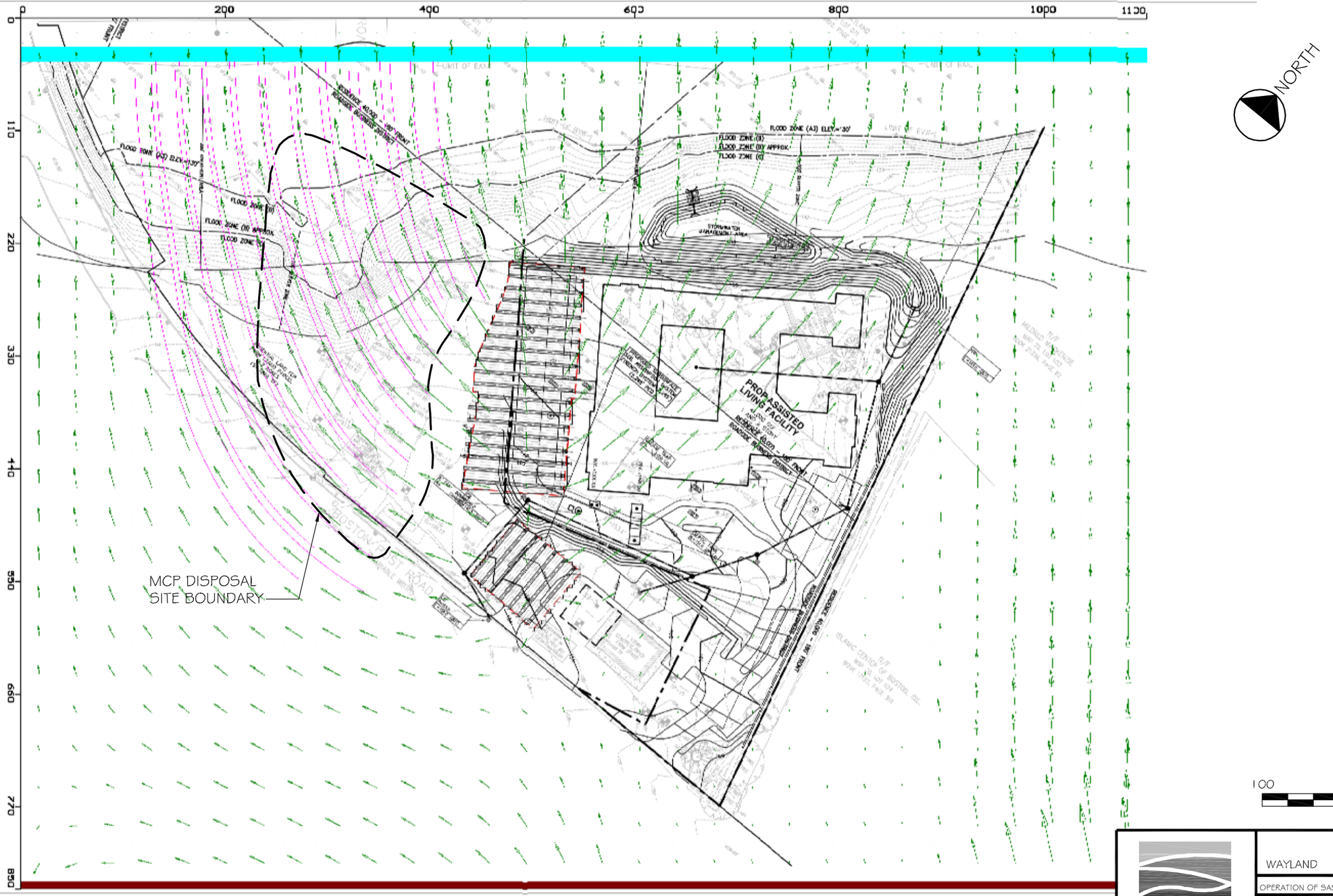
OPERATION OF SAS AND STORMWATER MANAGEMENT AREA (0.05 FT/D): GROUNDWATER ELEVATION CONTOURS

FOR
WAYPOINT CONSTRUCTION CONSULTANTS, INC.
BY
McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
Project No: 5260			

FILE NAME: Update Model5260-F05_15

FIGURE 13



GRAPHIC SCALE

100 0 100 200

NOTES:
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134 BOSTON POST ROAD
WAYLAND MASSACHUSETTS

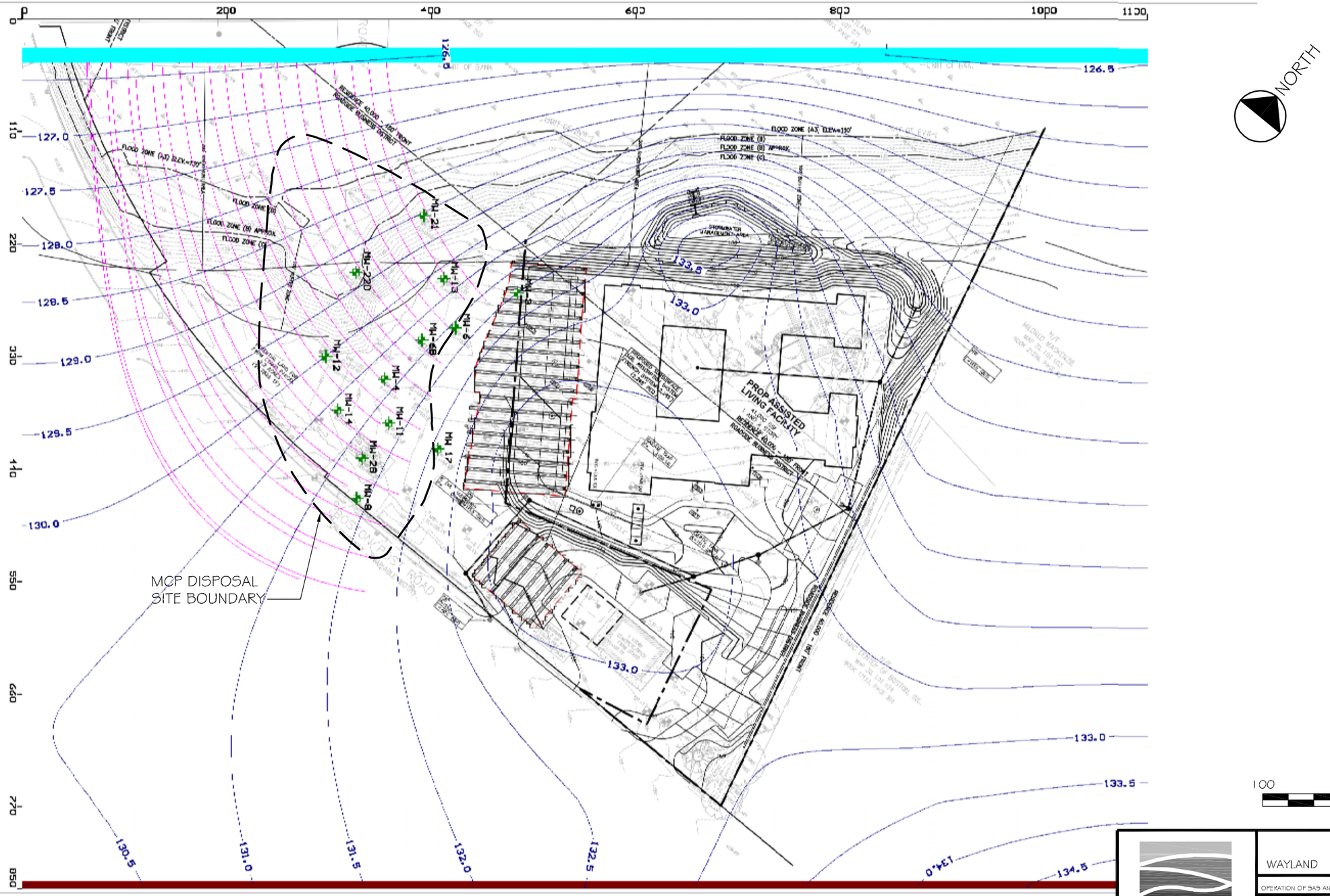
OPERATION OF SAS AND STORMWATER MANAGEMENT AREA (0.05 FT/D): FLOW VECTORS

FOR
WAYPOINT CONSTRUCTION CONSULTANTS, INC.
BY
McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
Project No: 5260			

FILE NAME: Update Model5260-FIG5_15

FIGURE 14



GRAPHIC SCALE

100 0 100 200

NOTES:
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REFERENCE: THIS PLAN WAS PREPARED FROM A 40-SCALE DRAWING ENTITLED, "GRADING, DRAINAGE AND EROSION CONTROL" DATED MARCH 17, 2011 PREPARED BY STEPHENSON DESIGN GROUP, LLC

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134 BOSTON POST ROAD
WAYLAND MASSACHUSETTS

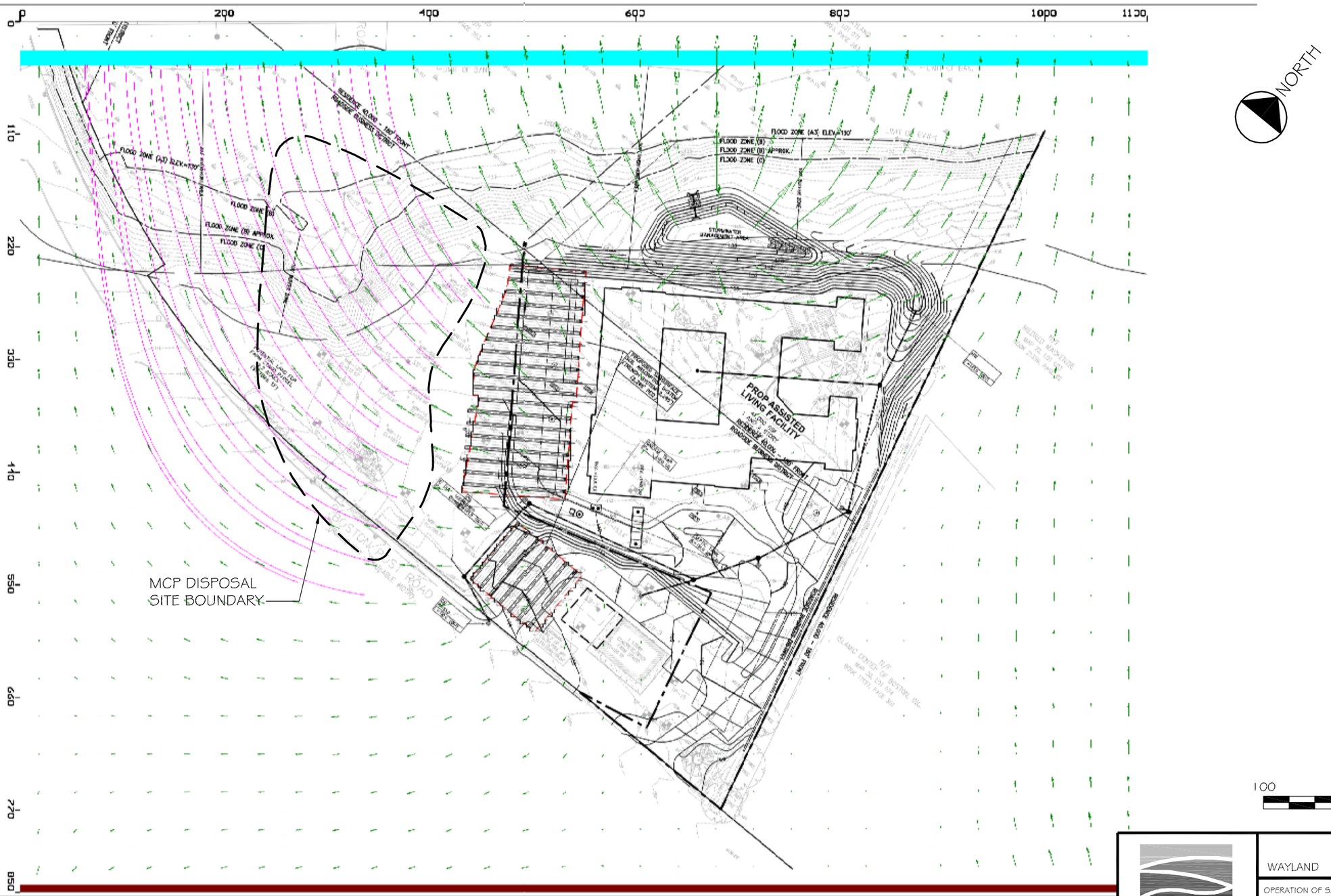
OPERATION OF SAS AND STORMWATER MANAGEMENT AREA (0.5 FT/D): GROUNDWATER ELEVATION CONTOURS

FOR
WAYPOINT CONSTRUCTION CONSULTANTS, INC.
BY
McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
Project No: 5260			

FILE NAME: Update Model5260-FIG_15

FIGURE 15



GRAPHIC SCALE

100 0 100 200

NOTES:
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2. GROUNDWATER CONTOUR ELEVATIONS ARE IN FEET.

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WAYLAND MASSACHUSETTS

OPERATION OF SAS AND STORMWATER MANAGEMENT AREA (0.5 FT/D): FLOW VECTORS

FOR
WAYPOINT CONSTRUCTION CONSULTANTS, INC.
BY
McPHAIL ASSOCIATES, INC.
CONSULTING GEOTECHNICAL ENGINEERS

Date: MAY 2011	Dwn: F.G.P.	Chkd: B.A.O.	Scale: 1" = 100'
Project No: 5260			

FILE NAME: Update Model5260-F05_15

Table 1: Groundwater Monitoring Well Calibration and Mounding Results

				Operation of SAS (0.05 ft/d)		Operation of SAS (0.05 ft/d) & SWMA (0.05 ft/d)		Operation of SAS (0.05 ft/d) & SWMA (0.5 ft/d)	
Monitoring Well Designation	Observed Hydrostatic Groundwater Elevation (ft)	Model Hydrostatic Groundwater Elevation (ft)	Model Groundwater Elevation Error (ft)	Groundwater Elevation (ft)	Groundwater Mounding (ft)	Groundwater Elevation (ft)	Groundwater Mounding (ft)	Groundwater Elevation (ft)	Groundwater Mounding (ft)
MW-2B	127.66	128.28	0.62	130.11	1.82	130.09	1.81	131.22	2.93
MW-3	127.11	127.33	0.22	129.52	2.20	129.49	2.17	131.49	4.17
MW-4	127.44	127.77	0.33	129.58	1.81	129.53	1.76	130.80	3.03
MW-6	127.37	127.50	0.13	129.57	2.06	129.51	2.00	131.11	3.60
MW-6B	127.36	127.55	0.19	129.44	1.88	129.37	1.82	130.80	3.25
MW-8	129.07	128.54	-0.53	130.33	1.79	130.33	1.79	131.38	2.84
MW-11	127.57	128.07	0.50	130.03	1.96	130.00	1.93	131.26	3.19
MW-12	127.23	127.59	0.36	129.01	1.42	128.96	1.37	130.01	2.41
MW-13	127.04	127.21	0.17	128.81	1.60	128.74	1.53	130.20	2.99
MW-14	128.55	127.95	-0.60	129.56	1.62	129.53	1.59	130.62	2.67
MW-17	128.50	128.28	-0.22	130.69	2.41	130.66	2.37	132.09	3.81
MW-21	126.72	126.87	0.15	127.97	1.10	127.91	1.04	129.05	2.18
MW-22D	126.97	127.14	0.17	128.34	1.20	128.27	1.13	129.31	2.17

McPHAIL ASSOCIATES, INC

Geotechnical Engineers

APPENDIX A

Limitations

McPHAIL ASSOCIATES, INC

Geotechnical Engineers

Limitations

This report has been prepared on behalf of and for the exclusive use of Waypoint Construction Consultants, Inc. for specific application to the proposed soil absorption system and stormwater management area located at 134 Boston Post Road in Wayland, Massachusetts in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

In the event that any changes in nature, design or location of the proposed structure are planned, the information contained in this report should not be considered valid unless the changes are reviewed and the information presented in this report is modified or verified in writing.

The analyses and recommendations presented in this report are based upon the data obtained from the subsurface explorations performed at the approximate locations indicated on the enclosed Figure 2 as well as from hydrological data provided to McPhail by others. If variations in the nature and extent of subsurface and/or hydrogeologic conditions between the widely spaced explorations become evident during the course of construction and subsequent operation of the soil absorption system, it will be necessary for a re-evaluation of the recommendations of this report to be made after performing on-site observations during the construction/operation period and noting the characteristics of any variations.

McPHAIL ASSOCIATES, INC

Geotechnical Engineers

APPENDIX B

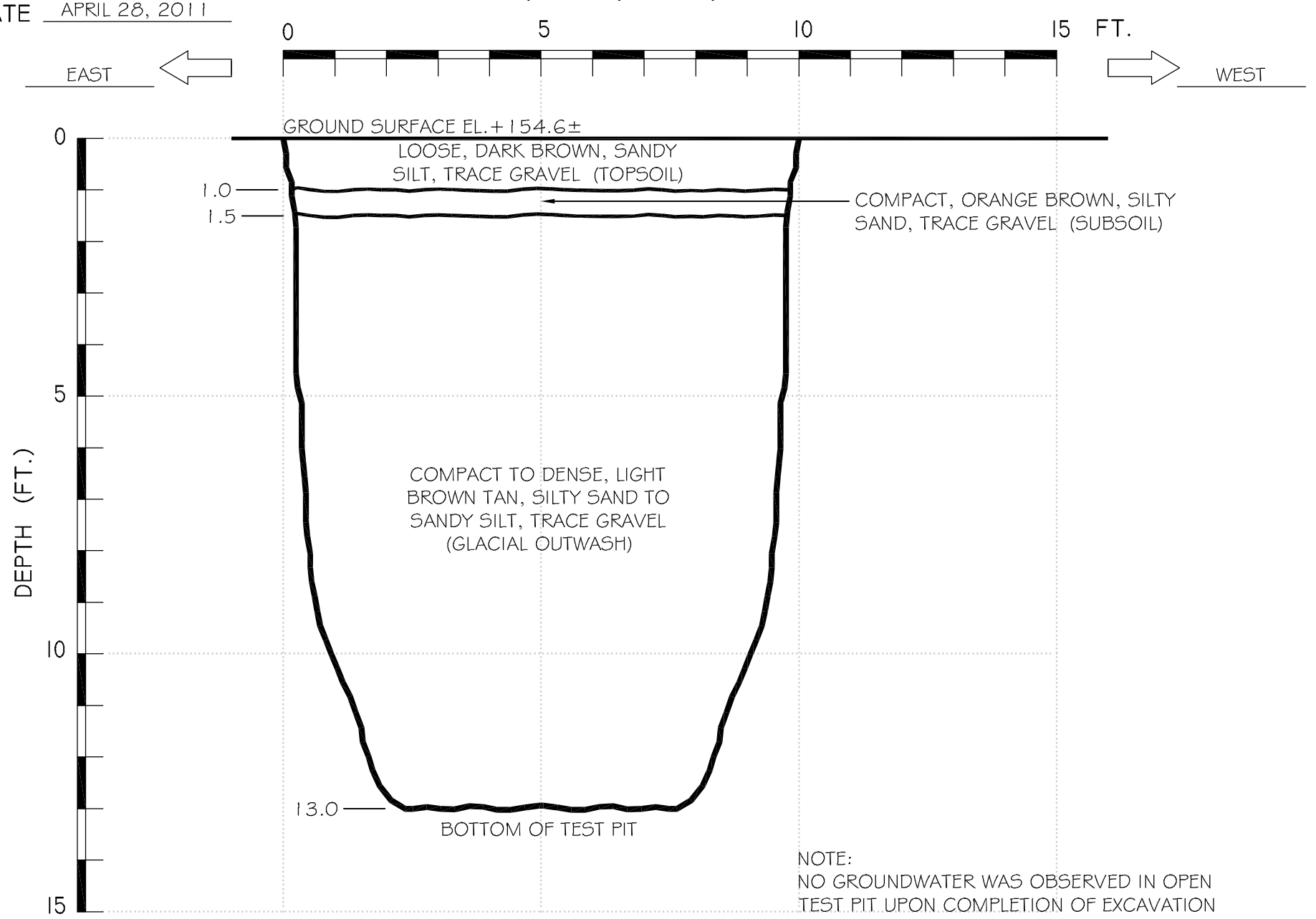
McPhail Associates, Inc.
Test Pit Logs
TP-1 through TP-12

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT LOG

TEST PIT NO. 1



NOTE:
NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION

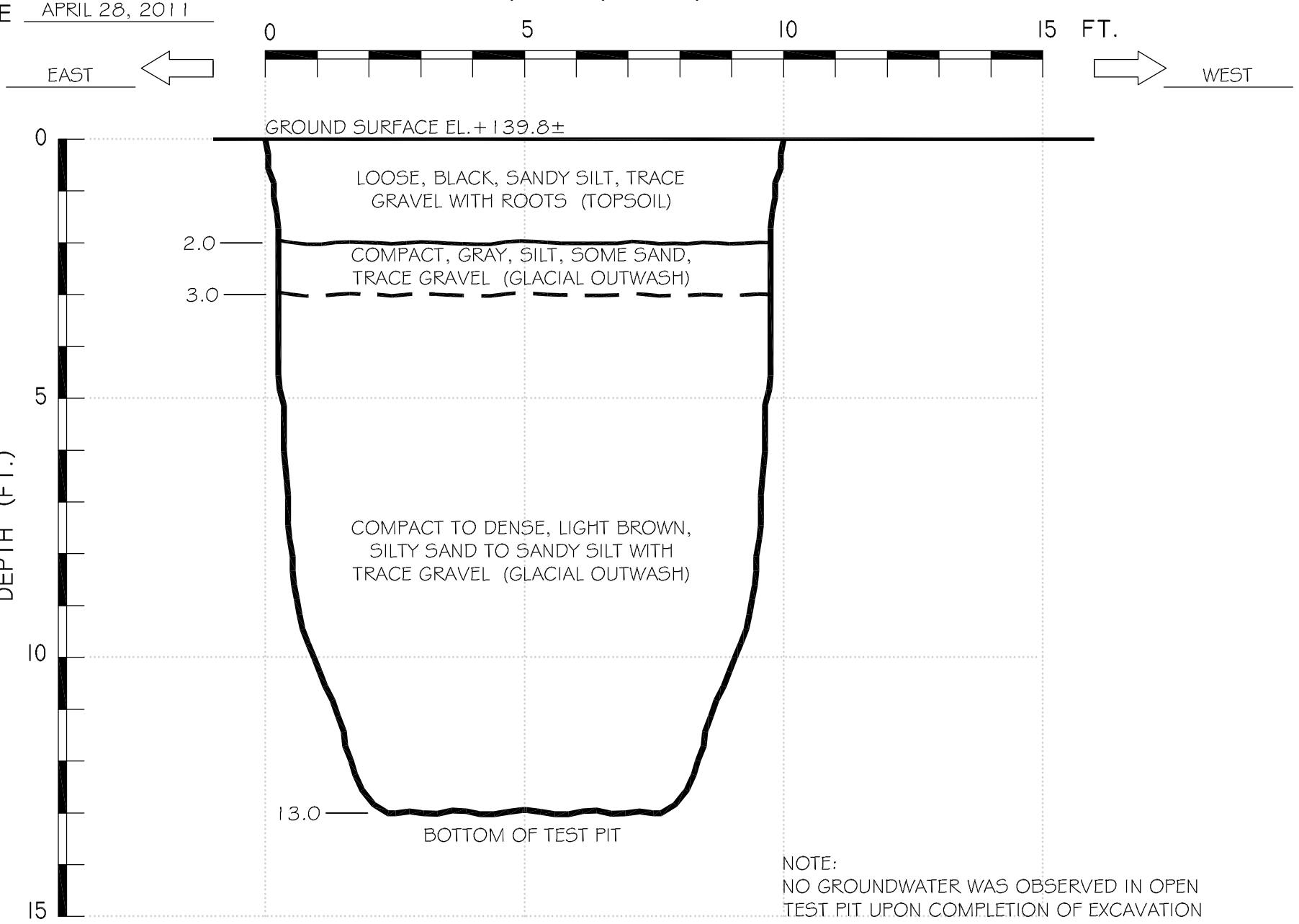
McPHAIL ASSOCIATES INC.

TEST PIT LOG

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT NO. 2



NOTE:
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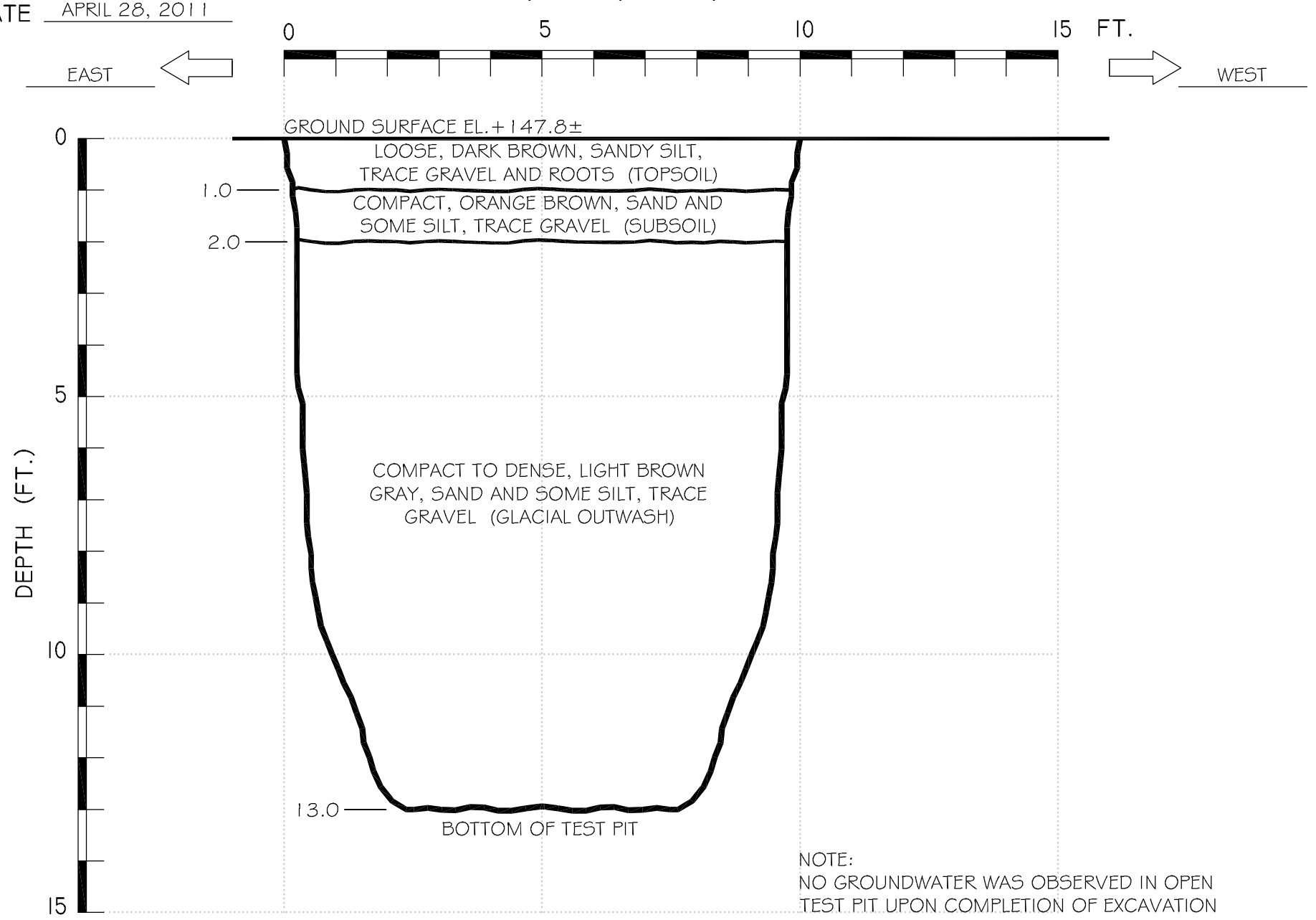
McPHAIL ASSOCIATES INC.

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT LOG

TEST PIT NO. 3



NOTE:
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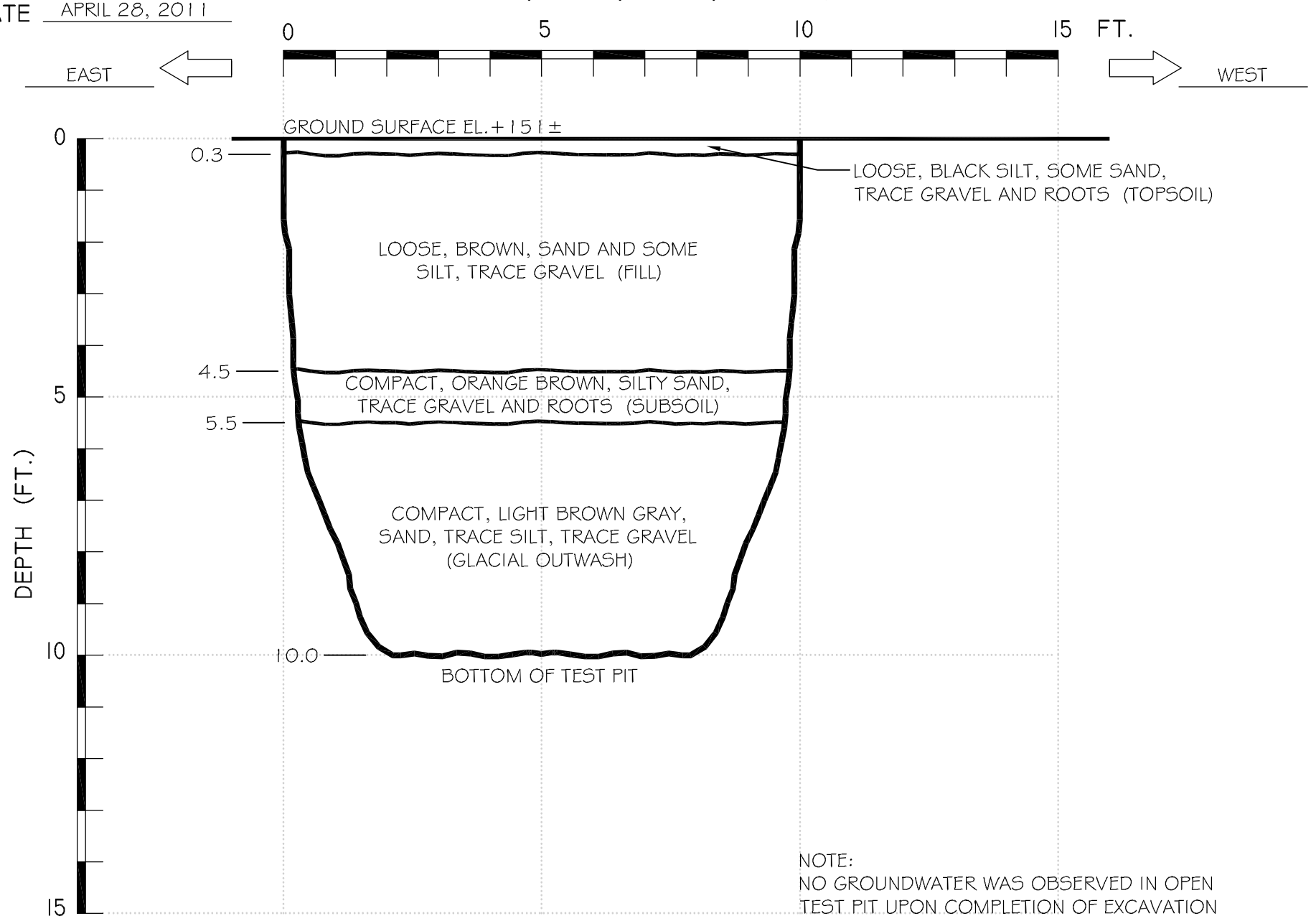
McPHAIL ASSOCIATES INC.

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT LOG

TEST PIT NO. 4



NOTE:
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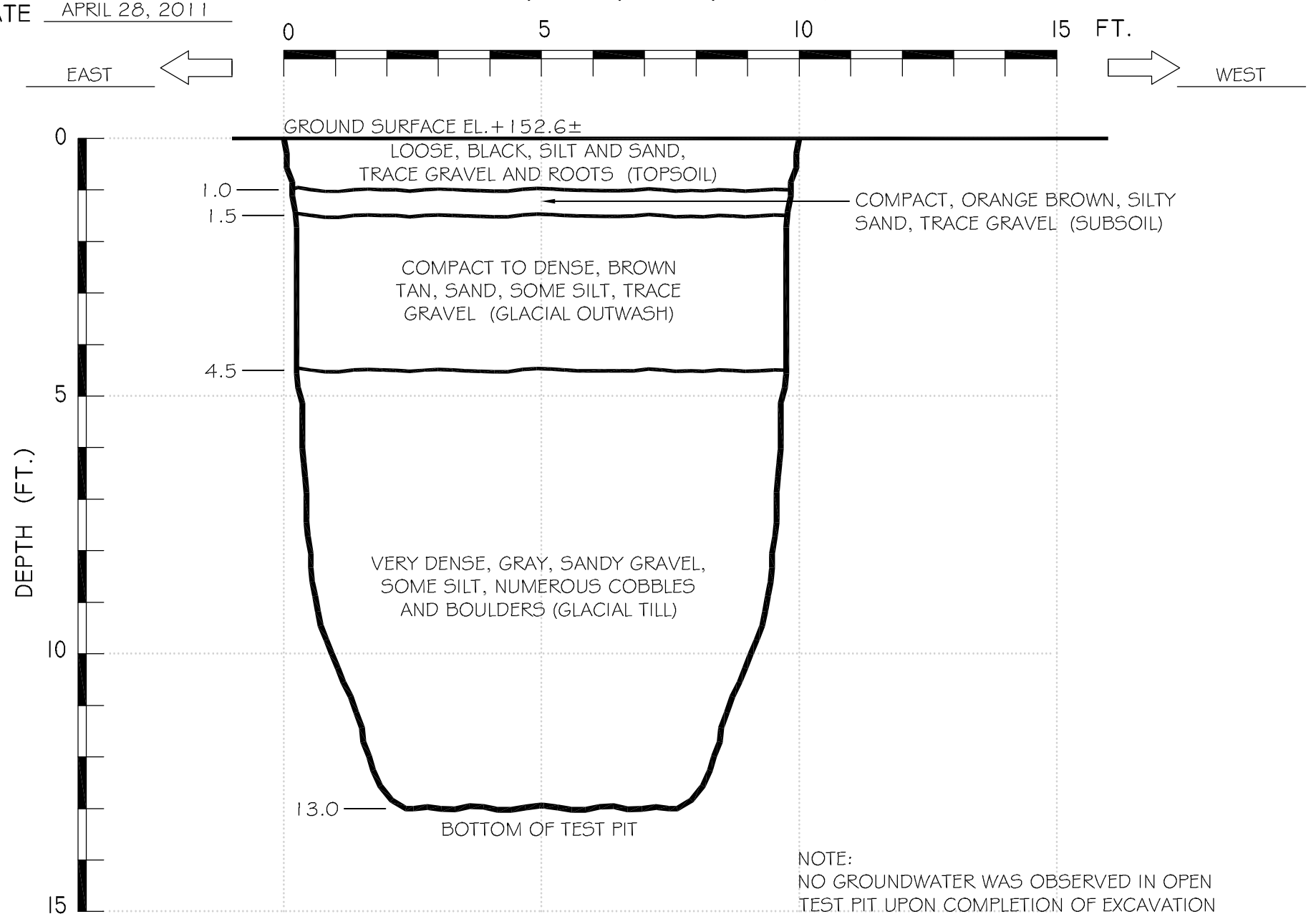
McPHAIL ASSOCIATES INC.

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT LOG

TEST PIT NO. 5



NOTE:
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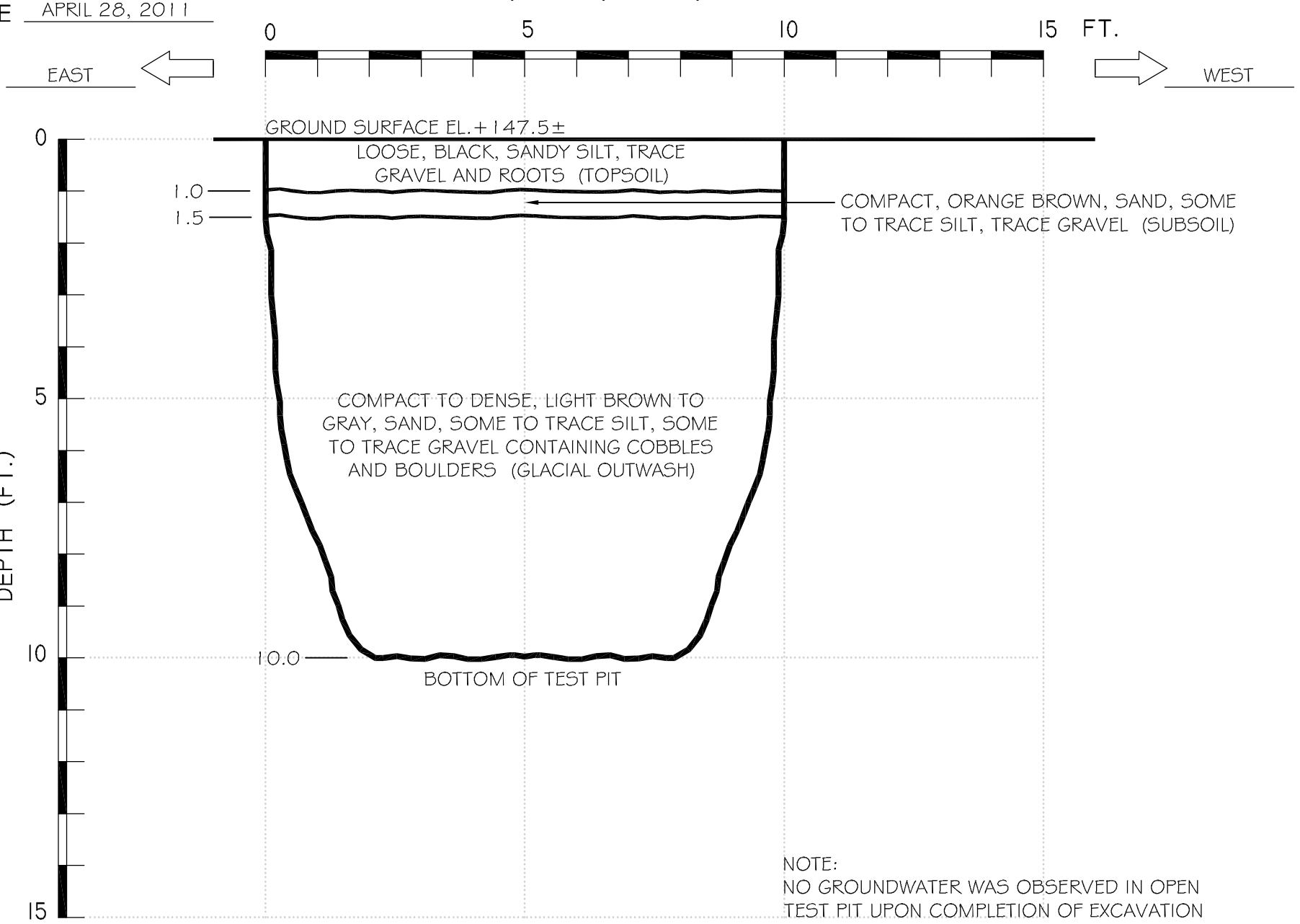
McPHAIL ASSOCIATES INC.

TEST PIT LOG

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT NO. 6



NOTE:
NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION

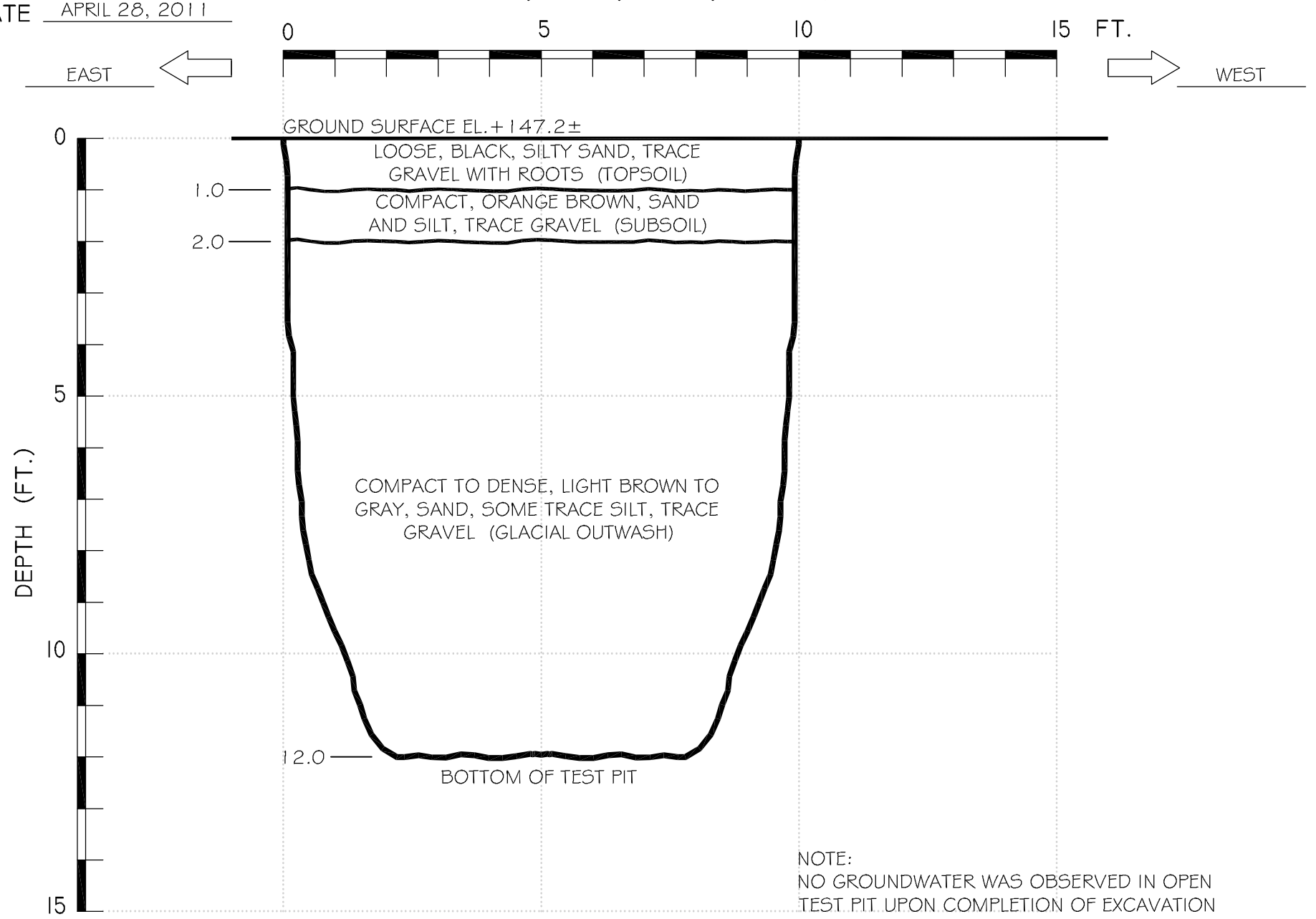
McPHAIL ASSOCIATES INC.

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT LOG

TEST PIT NO. 7



NOTE:
NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION

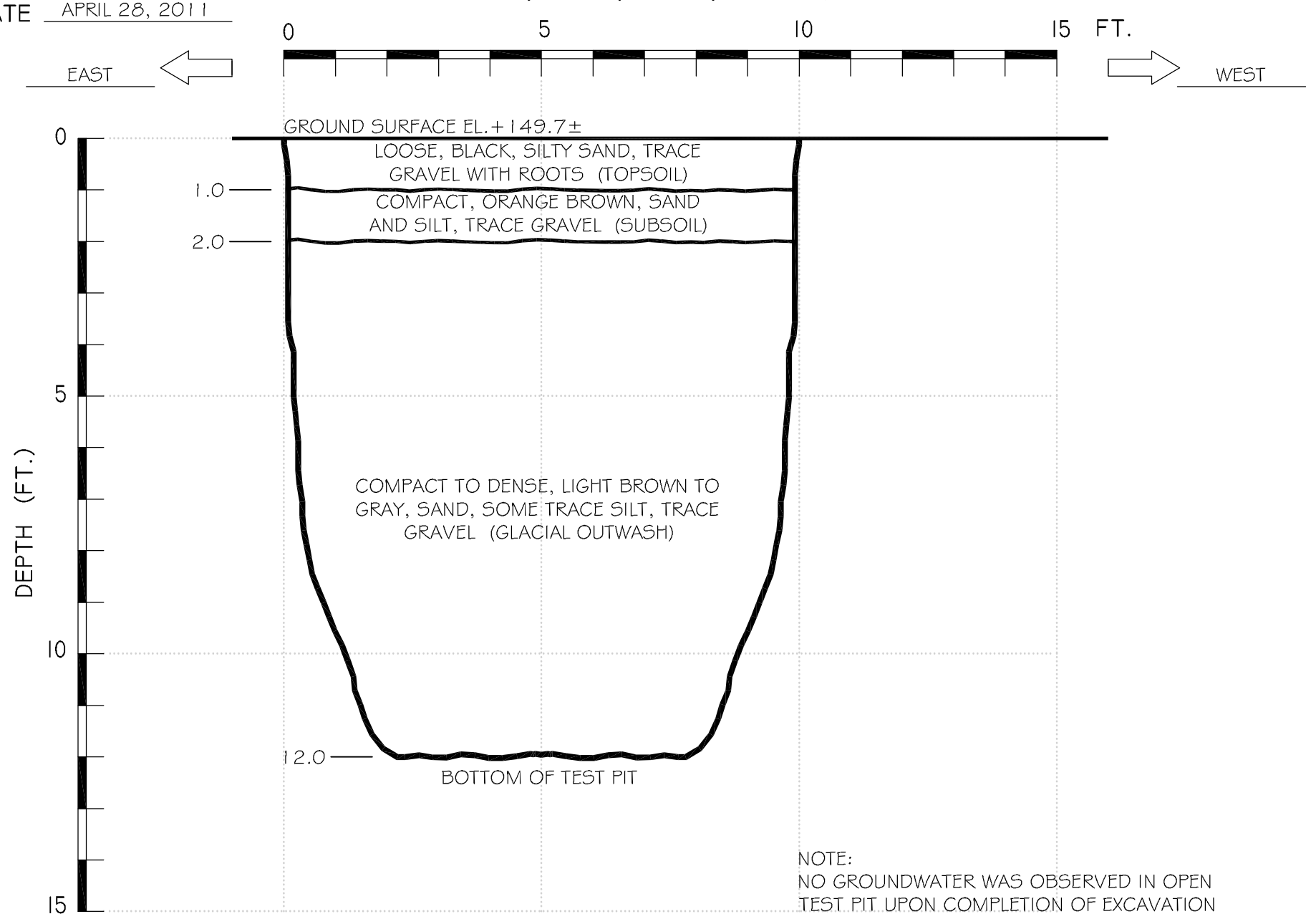
McPHAIL ASSOCIATES INC.

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT LOG

TEST PIT NO. 8



NOTE:
NO GROUNDWATER WAS OBSERVED IN OPEN TEST PIT UPON COMPLETION OF EXCAVATION

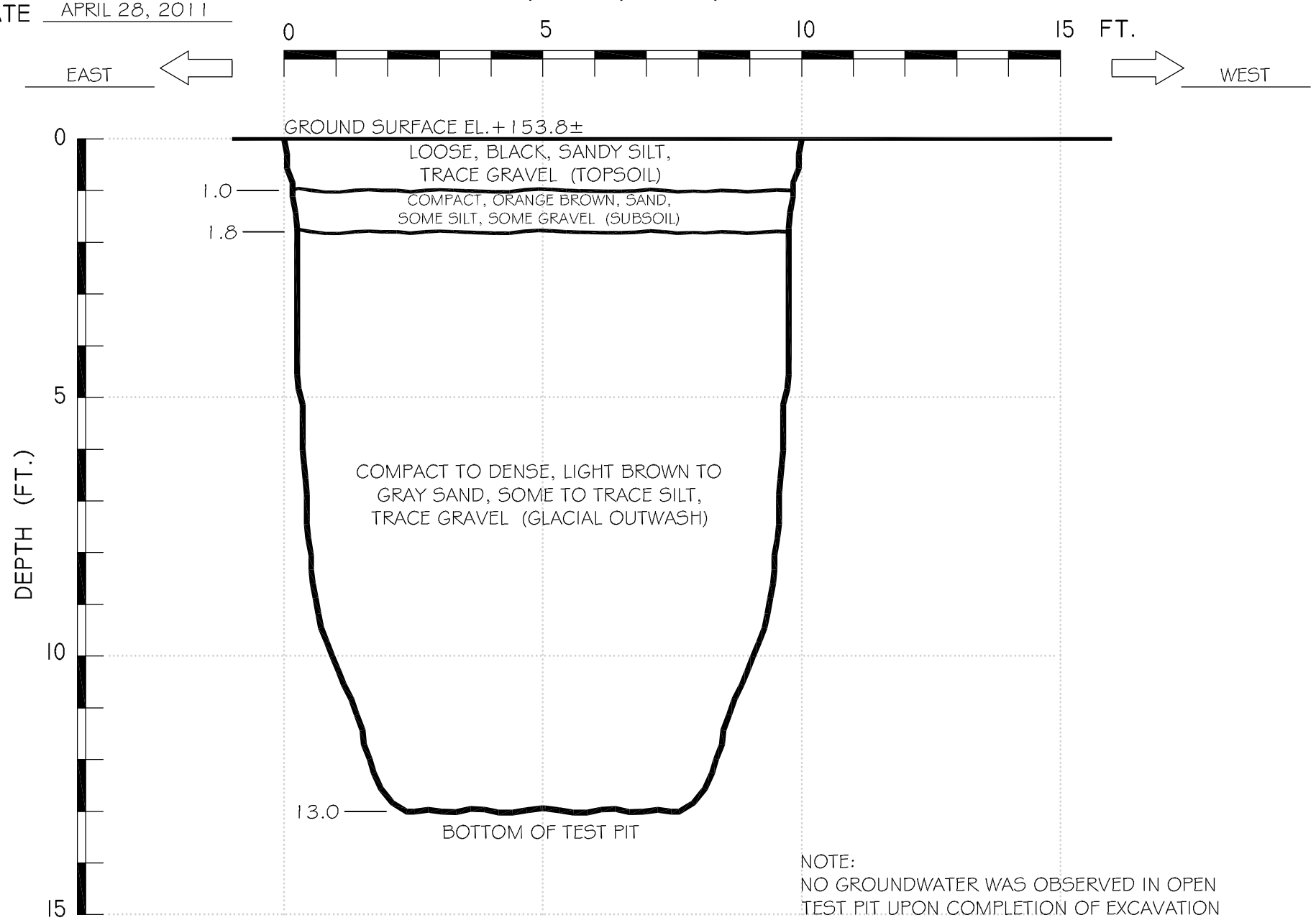
McPHAIL ASSOCIATES INC.

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT LOG

TEST PIT NO. 9



NOTE:
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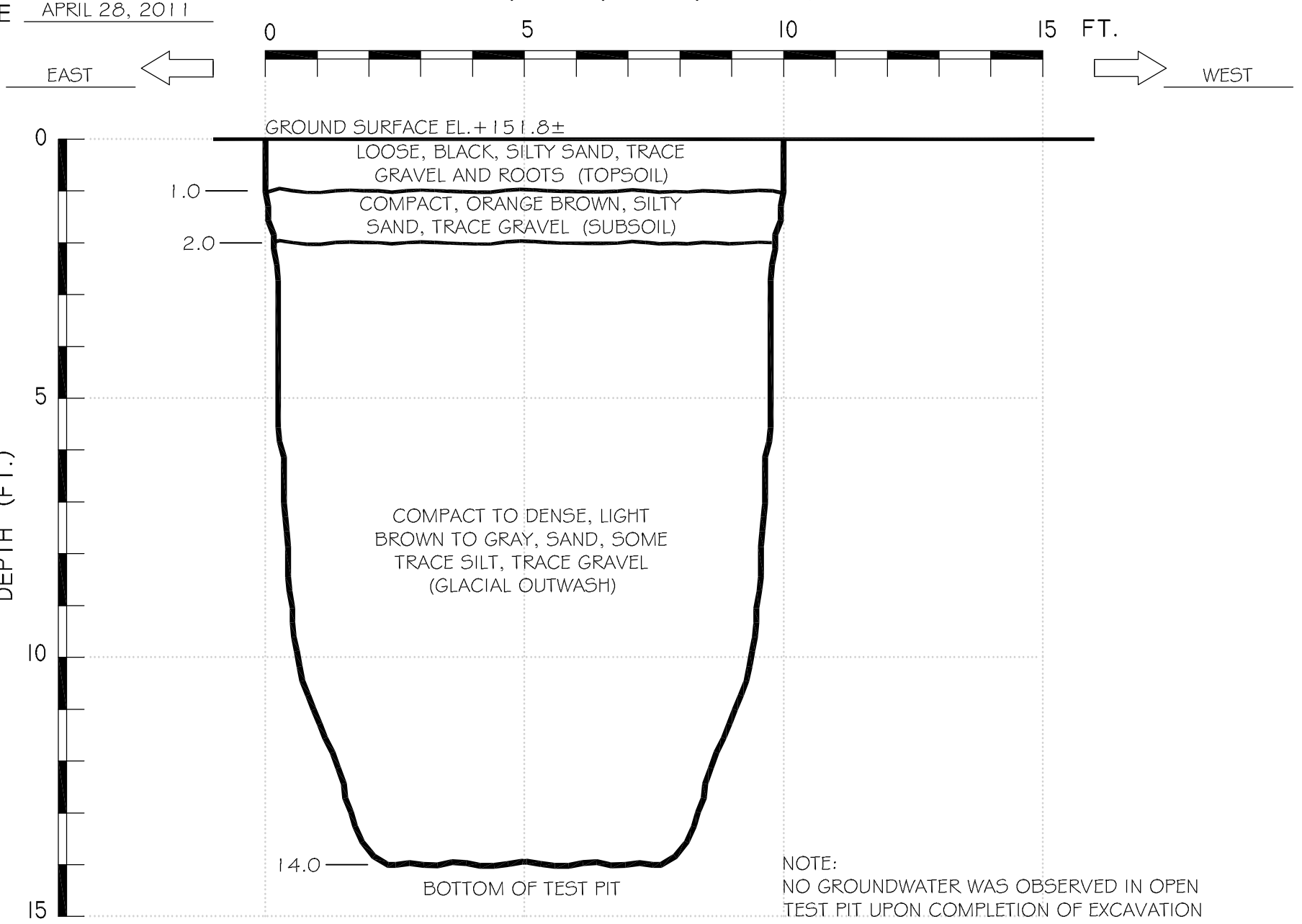
McPHAIL ASSOCIATES INC.

TEST PIT LOG

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT NO. 10



NOTE:
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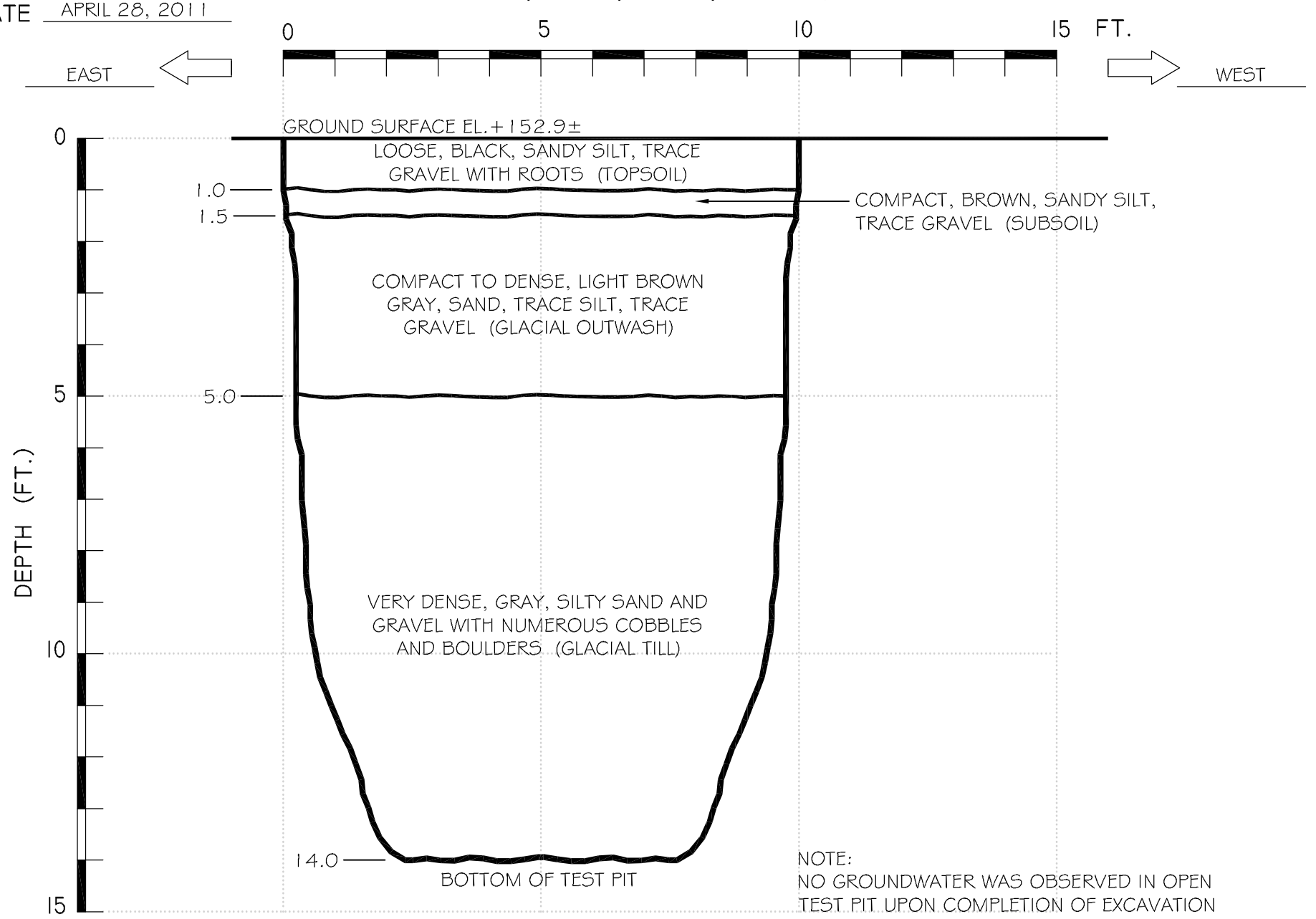
McPHAIL ASSOCIATES INC.

TEST PIT LOG

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT NO. 11



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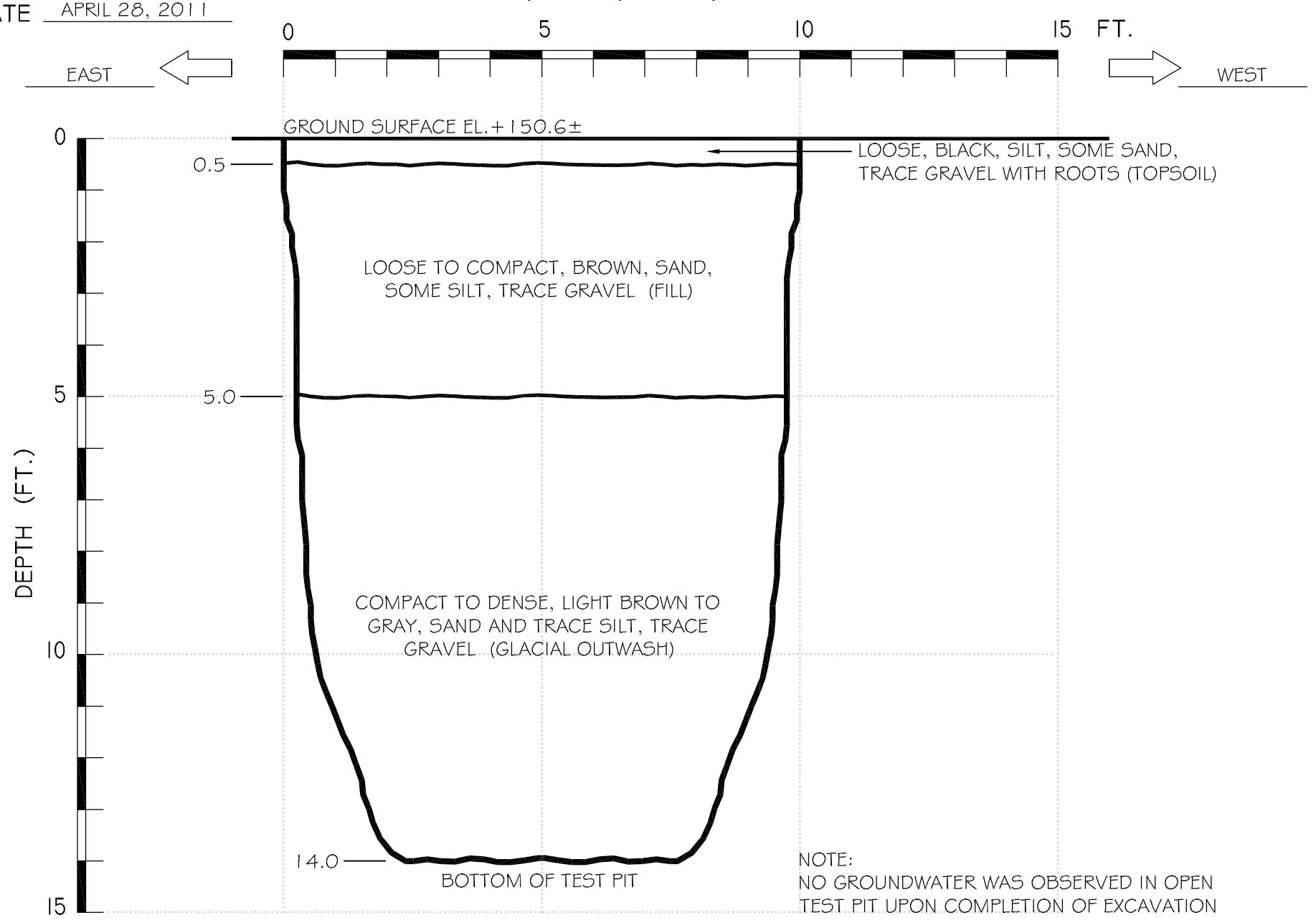
McPHAIL ASSOCIATES INC.

JOB NO. 5260

DATE APRIL 28, 2011

TEST PIT LOG

TEST PIT NO. 12



NOTE:
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McPHAIL ASSOCIATES INC.