CSXT RIVER STREET DERAILMENT
SUBSURFACE INVESTIGATION REPORT
480 RIVER STREET
ROCHESTER, NEW YORK

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Submitted to:
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ACRONYMS

AMEC	AMEC Earth and Environmental
CAMP	Community Air Monitoring Plan
COR	City of Rochester
CSXT	CSX Transportation, Inc
Danis	William Danis
NAPL	Non-Aqueous Phase Liquid
DNAPL	Dense Non-Aqueous Phase Liquid
DWS	Drinking Water Standard
ER	Emergency Response
FID	Flame Ionization Detector
FLUTe	Flexible Liner Underground Technologies, Ltd. L. C.
HASP	Health and Safety Plan
HCL	Hydrochloric Acid
IRM	Interim Remedial Measure
MCDOH	Monroe County Department of Health
M&R	M&R Holding of Rochester, Inc.
MSDS	Material Safety Data Sheet
NAPL	Non-Aqueous Phase Liquid
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PID	Photoionization Detector
ppb	Parts per billion
ppm	Parts per million
RSCOs	Recommended Soil Cleanup Objectives
Shaw	Shaw Environmental, Inc
SSI	Subsurface Investigation
SVOC	Semi-Volatile Organic Compound
STL	Severn Trent Laboratories
TAGM	Technical and Administrative Guidance Memorandum
Tapecon	Tapecon, Inc.
TWA	Time Weighted Average
USACE	United States Army Corp of Engineers
USCG	United States Coast Guard
USCGA	United States Coast Guard Auxiliary
USEPA	United States Environmental Protection Agency
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This site investigation report summarizes the field activities performed by AMEC Earth and Environmental, Inc. (AMEC) during the Subsurface Investigation (SSI) conducted to determine the nature and extent of possible residual chemical impacts to the environment as a result of the December 23, 2001 derailment of a CSX Transportation, Inc (CSXT) freight train. The derailment occurred on River Street within the city limits of Rochester, New York, in an area known as Charlotte (the 'River Street Site' or 'Site'). The SSI work was performed by CSXT under a Voluntary Cleanup Agreement (VCA), Index# B8-0608-0202, with the New York State Department of Environmental Conservation (NYSDEC) dated March 28, 2002.

1.1 Introduction / Report Organization

This report is divided into six (8) sections, tables, figures, and appendices as described below. Each section will be used to accurately describe the events as they occurred.

- **Section 1.0: Introduction**: this section summarizes the purpose and scope of the investigation including project objectives, Site location and description, background, and previous investigations.
- **Section 2.0: Field Investigation Methods**: this section includes a detailed discussion of the scope and methods employed to carry out the various investigations conducted at the Site. This will include discussion of the soil gas survey, soil boring installation, groundwater quality monitoring well installation and development, groundwater monitoring, hydraulic evaluation, and Site surveying.
- **Section 3.0: Physical Characterization Results**: this section includes a description of the regional geologic setting, site-specific geology and site-specific hydrology.
- **Section 4.0: Nature and Extent of Impacts**: this section details a discussion of analytical results from soil gas, soil and groundwater samples collected during the various stages of the investigation.
- **Section 5.0: Quantitative Exposure Assessment**: An evaluation of chemical of concern (COC) fate and transport for each potential source will be presented in this section. Potential concentrations of COCs in different environmental media as a function of time along with potential routes of migration and COC persistence will be discussed.
- **Section 6.0: Data Usability Report:** An evaluation of the analytical data collected during the field investigations.
- **Section 7.0: Conclusions and Recommendations**: This section of the River Street Site Investigation report will summarize the conclusions of the field investigation.
- **Section 8.0: References**
- **Figures**: includes all figures referenced in this report.
- **Tables**: includes all tables referenced in this report.

- **Appendices**: includes supporting documentation referenced in this report.

1.2 Site Location

The site is located on River Street in the City of Rochester, County of Monroe, State of New York. The derailment occurred along the CSXT railroad tracks adjacent to the Monroe County Public Boat Launch where the tracks make a westward change in direction. The site is located in area that is considered mixed industrial/commercial properties with residences present to the west and south. **Figure 1** details the location of the Site.

1.3 Background

On December 23, 2001 at 3:40 p.m., a CSXT train derailed in Rochester, New York, north of the Latta Road and River Street intersection. The train consisted of 43 cars (including two (2) diesel locomotive engines) traveling north from Kodak Park towards the RG&E Russell Station when the accident occurred. The two engines and 28 additional cars derailed (most of the cars contained coal). But, three were tank cars containing acetone (2) and methylene chloride (1). The tank cars derailed slightly northeast of the Tapecon, Inc. (Tapecon) manufacturing facility and approximately 100-feet to 150-feet west of the Genesee River. The area in which the acetone and methylene chloride was spilled is approximately one-mile upstream from the mouth of the Genesee River. Approximately 14,000 gallons of acetone and 16,000 gallons of methylene chloride were released into the environment.

Immediately following the derailment, emergency response activities commenced including spill delineation, spill containment, community air monitoring, and river water quality monitoring. For a complete description of the emergency response activities refer to the *River Street Derailment Interim Remedial Measure Report*, Shaw, March 10, 2003.

1.3.1 Interim Remedial Measures

An Interim Remedial Measures (IRM) work plan for impacted soils and groundwater was developed and implemented in the summer of 2002. The IRM activities included the excavation and disposal of approximately 28,000 tons of impacted soils and the removal and disposal of 1.4 million gallons of impacted water. The 2002 IRM activities were successful in removing the vast majority of impacted soils from the affected properties. For a complete discussion of the IRM activities please refer to the Shaw 2003 report.

An IRM work plan for impacted sediment was developed and implemented in the summer of 2004. The IRM activities included the excavation, dewatering, stabilization and disposal of approximately ~3,950 tons of impacted sediments. The IRM activities were successful in removing the vast majority of impacted sediment from the River. For a complete discussion of the IRM activities please refer to the 2005 Sediment IRM report.

1.4 Project Objectives

The objectives of the site investigation were as follows:

- Characterize the physical soil and groundwater conditions (i.e. porosity, soil characteristics, and groundwater quality) that are present at the site.
- Install 35 soil gas survey points in order to assess shallow soil vapor for potential of residual impacts.
- Install 18 soil borings to assess soil quality.
- Complete the installation and sampling of 14 overburden monitoring wells, including four nested wells.
- Perform a site survey to confirm location of new monitoring wells.
- Characterize the hydrologic conditions of the aquifer and determine groundwater flow patterns across the Site.
- Determine the extent of residual impacts across the Site.
- Assess potential health concerns posed by chemical compounds in the immediate spill area.
- Determine what additional actions, if any, should be taken to adequately protect human health and the environment for use of the Site.

2.0 FIELD INVESTIGATION METHODS

A subsurface investigation was conducted over the course of several months in the summer of 2004. The first phase of the investigation consisted of a detailed soil gas survey of all areas of concern, which was undertaken on June 21, and 22, 2004. The second phase of the investigation involved the installation of 19 soil borings and the installation of 14 monitoring wells. Monitoring well installation and development was conducted between August 2 and August 11, 2004. The third phase of the investigation involved the installation of the FLUTe™ dense non-aqueous phase liquid (DNAPL) liners, hydraulic characterization of the aquifer and the first round of quarterly groundwater sampling. These events were conducted August 23 through August 26, 2004.

The following sections detail the site investigation activities performed as outlined above:

2.1 Soil Gas Survey

2.1.1 Soil Gas Survey

AMEC and its drilling subcontractor, Zebra Environmental (Zebra), conducted a soil gas survey of the Site on June 21 and 22, 2004. The soil gas survey consisted of the installation of 35 soil gas points across the affected properties. The locations of these points are illustrated on **Figure 2**. Zebra advanced sampling rods to four feet below grade using a direct-push ATV-mounted Geoprobe® unit. The sampling rod was then raised approximately six inches to provide a void space for soil gas to accumulate. Disposable tips at the end of the rod were then expelled and disposable plastic tubing was attached to the sampling rod using a stainless steel adapter. The tubing was then connected to a vacuum pump, which extracted the soil gas. Soil gas samples were collected in one-liter Tedlar bags and submitted to Columbia Analytical Services (CAS) in Rochester, New York for analysis of acetone and methylene chloride by modified EPA method TO-14 per the NYSDEC approved work plan. In addition to analysis for acetone and methylene chloride, soil gas samples collected from the M&R Holding Property and adjacent to the Marine Fire Trailer (see **Figure 2**) were analyzed for volatile organic compounds (VOCs) because of the observed petroleum impacts. Sampling rods and adapters were decontaminated before reuse at each subsequent soil gas point.

The NYSDEC approved, and the City of Rochester (COR) concurred with the sampling locations prior to commencement of activities, as outlined in the Final Site Characterization and Remedial Alternatives Determination Work Plan dated March 26, 2004.

Three additional locations were subsequently added to the scope of work on June 22, 2004. The first additional location SG-33, was installed adjacent to the Marine Fire Trailer at the

request of the NYSDEC. Two additional sampling locations, SG-34 and SG-35, were installed near SG-27 to further delineate the methylene chloride detected in the area of SG-27.

Two scheduled soil gas samples were not collected during the field activities. One location, SG-23, was eliminated, after consulting with COR, due to its location in the middle of the reconstructed River Street. Another location, SG-31, was sampled, but soil gas was no longer present in the Tedlar bag upon receipt at the laboratory. This soil gas location was not resampled.

In addition, three sub-slab vapor-sampling points were advanced through the concrete floor of the Tapecon building using a concrete core drill. Rods were then advanced approximately four feet below grade by hand. The rods were then raised approximately six inches, the annulus between the floor and rods was sealed, and the disposable tip was expelled. A stainless steel adapter was attached to the rods with plastic tubing to collect the sample. The plastic tubing was attached to laboratory provided Summa Canisters with two-hour regulators to collect the sample. Background ambient air samples were placed approximately five feet from the sub-slab samples to evaluate the existing indoor air quality conditions. The background ambient air samples were taken at a height of approximately five feet above the facility's floor. The purpose of these ambient air samples was to ensure that in-house chemicals and processes did not provide false positive readings during the sub-slab vapor survey. Sub-slab and background air samples were submitted to Air Toxins Limited, of Folsom, California for a modified TO-15 analysis.

The locations of the Tapecon sub-slab samples are also illustrated on **Figure 2**.

2.2 Soil Boring and Monitoring Well Installation

The following subsections detail the activities conducted during the soil boring and monitoring well installation including soil sampling, well installation and well development.

2.2.1 Soil Boring Installation

AMEC and its drilling subcontractor, Parratt Wolff, advanced 18 soil borings across the affected properties to delineate the extent of residual impacts remaining subsequent to the completion of the 2002 IRM activities (see **Section 1.3.1**). The locations of these borings were agreed upon by the NYSDEC and all affected parties prior to commencing this phase of the investigation. Parratt Wolff advanced the borings utilizing hollow stem auger techniques. Borings were advanced using 4 ¼ inch and 6 ¼ inch outer-diameter augers. Augers were decontaminated and steam cleaned between each boring. Soil borings were continuously sampled to depth using two-foot long split spoons. The split spoons were decontaminated after each sample with a mix of Alconox and water. Soil borings were advanced until bedrock was encountered at each boring location.

Nine of the 18 borings were installed on COR property, seven borings were installed on the Tapecon property, one was located on CSXT property and one was located on the property of Mr. William Danis (Danis property). In some instances boring locations were moved slightly from the original locations described in the Site Characterization Work Plan dated March 26, 2004 to accommodate utility corridors and/or COR River Street improvements. Soil boring locations are illustrated on **Figure 3**.

2.2.2 Geologic Characterization

An AMEC geologist was onsite throughout the subsurface investigation to document soil classifications during advancement of each soil boring. The purpose of the soil boring logs is to define subsurface stratigraphy, according to the Unified Soil Classification System, noting such features as color, soil texture, particle shape, mottles, structure, consistency, and soil horizon thickness. In addition to soil type and physical characteristics, depth to groundwater, depth of boring, field instrument measurements, presence of odor, vapors by PID and FID reading, discoloration and presence of free product (if observed), date, driller and company name, and type of drilling, will be recorded on the boring log.

Soil Sampling

An AMEC geologist was onsite to screen the soil samples throughout the subsurface investigation. A Thermo OVM 580B photo-ionization detector (PID) with an 11.7 eV lamp and Photovac MicroFID flame ionization detector (FID) were used to screen the soils. Readings from these devices were recorded on the corresponding boring logs. Detailed soil boring logs for each boring are included in **Appendix A**. At a minimum, the soil sample with the highest PID/FID reading was selected for laboratory analysis. Additional soil samples were collected from the borings if there was more then one zone of elevated PID readings or if a significant change in soil types was noted. Additionally, if there were no elevated PID readings, a soil sample was collected from the first saturated zone of the boring. Soil samples that were collected for analysis were placed in a laboratory provided container, sealed, labeled and placed on ice, until it was shipped to Severn Trent Laboratory (STL) in Amherst, New York. Soil samples were analyzed for acetone and methylene chloride in accordance with EPA method 8260 per the NYSDEC approved work plan. Additionally, soil samples collected from SB-18 were analyzed for semi-volatile organic compounds (SVOCs) via EPA method 8270 utilizing the NYSDEC STARS list compounds as requested by the NYSDEC.

2.2.4 Monitoring Well Installation

Ten of the 18 boring locations were converted to monitoring wells between August 4 and August 11, 2004 with the installation of two-inch PVC well materials. At four of these locations (MW-1, MW-3, MW-6 and MW-8), nested wells were installed to monitor both shallow and deep groundwater conditions. Four monitoring locations consisting of six wells were installed on Tapecon property, property owned by COR also received four monitoring locations consisting

on six wells and CSXT property had one monitoring well installed. During the soil boring/monitoring well installation event, a temporary monitoring well was installed on Mr. Danis' property. Subsequently the NYSDEC requested a permanent well be installed on the property. This well, MW-10 was completed on December 2, 2004 in a location agreed upon by Mr. Danis, AMEC, and the NYSDEC. The locations of these monitoring wells are detailed on **Figure 3**.

The shallow monitoring wells were constructed of 2-inch diameter PVC riser pipe and 0.010-inch slotted screen. The well screen within each monitoring well was specifically placed to straddle the water table. The annular space between the screen and the borehole was filled with number 0 Morie filter pack sand. The sand was placed into the annular space in increments to assure that native material did not collapse around the well screen. Frequent measurements of the sand level were made using a weighted measuring tape. The sand pack was extended to approximately two feet above the top of the screen in most cases. Following placement of the sand pack, an approximately two-foot thick bentonite pellet seal was put in place. Pellets were installed by pouring them into the annular space carefully so as to prevent bridging. The remainder of the borehole was filled with a bentonite and Portland cement grout mixture to within one foot of the ground surface.

In the instances where nested wells were installed, the deep wells were set at bedrock. These deep wells consisted of four to six feet of screen to straddle the deep water table. The annular space between the screen and the borehole was filled with number 0 Morie sand. The sand was placed into the annular space in increments to assure that native material did not collapse around the well screen. Frequent measurements of the sand level were made using a weighted measuring tape. The sand pack was extended to approximately two feet above the top of the screen if possible. Following the sand pack, an approximate two-foot thick bentonite pellet seal was put in place to prevent mingling of the upper and lower water tables.

Monitoring wells MW-1 through MW-5, MW-7, MW-9 and MW-10 were completed with flush mounted traffic boxes. Monitoring wells MW-6 and MW-8 were completed with stand-up well heads at the request of the COR's River Street renovations contractors for protection from construction activity in this area. All of the wells were capped and locked to prevent unauthorized access.

For a detailed construction of individual wells, please see the Soil Boring/Well Construction Logs in **Appendix A**.

2.2.5 Monitoring Well Development

Subsequent to monitoring well installation activities, each monitoring well was developed using a submersible pump. The well was surged several times throughout the development process to ensure that fines were drawn into the well and minimize skin effects on the well screen. If a

well dried out during development, it was allowed to recharge for a period of 15 to 30 minutes before pumping began again. A water level meter was used to determine the depth to water and depth to bottom for each well. Well volume was calculated for each individual well based on the water column measurement multiplied by a constant based on the 2" diameter well. At a minimum, wells were developed until ten volumes of water were removed. The number of volumes removed from each well is noted on **Table 1**. A Horiba U-10 water quality meter was utilized to measure pH, conductivity, temperature, salinity, and turbidity throughout the development process for each well. Development was considered complete when parameters stabilized, more than ten well volumes were removed and a turbidity reading at or below 50 nephelometric turbidity units (NTUs) was observed. Well development for MW-1 through MW-9 was completed on August 11, 2004. Monitoring well MW-10 was developed on December 2, 2004 immediately following installation. All development water was staged onsite in drums pending analytical results. The purge water was processed through an onsite water treatment system that was utilized for the water generated during dredging process.

2.3 Groundwater Sampling

Following well development activities, groundwater monitoring wells were allowed to stabilize for a period of 12 days. On August 23, 2004 AMEC personnel arrived onsite to perform groundwater sampling activities, including purging the wells prior to sampling. A Solinist 122 oil-water interface probe was utilized to gauge depth to water and depth to bottom for each well, prior to purging. Each well was then purged utilizing a polyethylene bailer. Purge water was drummed onsite, in a properly labeled 55-gallon steel drum pending analytical results. During purging activities, a Horiba U-10 water quality meter was utilized to monitor pH, conductivity, temperature, salinity, and turbidity. Purging was continued until three to five well volumes were removed from each well and turbidity stabilized near 50 NTUs. Some of the monitoring wells required additional purging to reach 50 NTUs. Monitoring wells were then allowed to recover overnight prior to groundwater sampling.

On Tuesday August 24, 2004, AMEC personnel arrived onsite to sample the monitoring wells. A dedicated disposable bailer was used to sample each of the monitoring wells. Groundwater was placed into 40 milliliter glass bottles, preserved with hydrochloric acid, until there was zero headspace. Groundwater from MW-5 was also placed in a one-liter amber glass bottle for additional analysis. The bottles were then sealed and labeled with sample location, monitoring well number, sample time, sample date, name of sampler and requested analysis, using a waterproof pen. Samples were then placed on ice and sent under proper chain of custody to STL in Amherst, New York for analysis by EPA method 8260 for acetone and methylene chloride per the NSYDEC-approved work plan. Groundwater from MW-5 was also analyzed for SVOC compounds by EPA method 8270 utilizing the NYSDEC STARS list of compounds. This analysis was requested by the NYSDEC in order to determine groundwater quality proximate to the petroleum impacts previously observed at the southern end of the excavation (Shaw, 2003).

A temporary PVC well was installed on Mr. Danis' property to facilitate the collection of groundwater. Groundwater was collected from the temporary well on Mr. Danis' property on August 11, 2004.

Subsequent groundwater quality monitoring events for quarters two and three were conducted on December 15, 2004 and March 31, 2005 respectively.

2.4 DNAPL Testing

On August 24 and August 25, 2004 AMEC and its drilling subcontractor Parratt Wolff installed ten Flexible Liner Underground Technologies (FLUTe™) NAPL liners in the vicinity of other soil borings to determine if DNAPL was present in the subsurface. This is achieved through a colorimetric system where the liner will alter its color in the precise zone of DNAPL product when present. Prior to installation, the FLUTe™ NAPL liners were accepted by the NYSDEC as an approved technology to determine the presence of DNAPL in the subsurface. Location of the liners were determined after consultation with the NYSDEC Project Manager and review of the soil gas survey data. The location of the 10 FLUTe™ NAPL liners is illustrated on **Figure 3**.

The installation of the NAPL Liners was accomplished by first advancing Geoprobe rods to the depth of refusal. A disposable tip was then expelled from the end of the rods and the rods were raised approximately six inches from the bottom of the boring. The wrapped liner was then slowly inserted through the interior of the rods until it reached the bottom. Once the liner had reached the bottom of the borehole, the first four-foot section of Geoprobe rod was removed and the interior of the liner was inflated with water. Then the rods were slowly raised as water was injected into the liner. Increased water pressure broke the string, which held the liner in place, and the liner expanded in order to come in contact with the walls of the bore hole. This was continued until the liner was completely inflated. The liner was then allowed to sit in the boring hole for a period of 20-30 minutes to ensure proper contact was achieved between the liner and borehole walls. After waiting this period of time, the liner was removed by inverting it utilizing the poly tubing (utilized to fill the liner) within its interior. Inverting the liner prevents it from dragging against the sides of the boring which could result in improper DNAPL zone identification. The liner was then spread out on the ground and split down the middle for observation of possible DNAPL staining.

2.5 Hydraulic Characterization

Basic hydraulic characterization of the aquifer was undertaken in order to determine the recharge rates and interconnectivity of water units at the Site. Hydraulic characterization was determined by performing both rising head and falling head slug tests at several of the wells across the Site.

Prior to performing a slug test, depth to water and depth to bottom measurements were collected using a Solinist water level meter. A slug, which consisted of 1" diameter PVC pipe filled with sand and an eyehook, was used for each of the slug tests performed at the Site. Dependant on the size of the water column either a 2-foot or 5-foot long slug was used was to perform the test. An In-Situ MiniTROLL was inserted into the well approximately one foot above the bottom. The MiniTROLL was then connected to a laptop computer for the duration of the test to record temperature, head pressure and allow observation of data during the tests.

Once the MiniTROLL was in position within a well, a slug was then rapidly introduced into the well in a "falling head" test. Care was taken during the introduction of the slug to prevent contact with the MiniTROLL and to ensure the slug was completely submerged. The slug was then left submerged until the test was determined to be complete. A test was determined to have reached completion when the water level showed negligible movement over a period of two minutes. After completion of the "falling head" test, the slug was then rapidly removed from the well beginning a "rising head" test. Again the test was continued until completion. At least three tests were run on each tested well. Slug test data was analyzed using the Super Slug™ software package. All hydraulic conductivity values (K values) were calculated using the Bouwer and Rice Method (Bouwer and Rice, 1976).

2.6 Site Survey

During the soil gas survey conducted on June 22 and 23, 2004, AMEC personnel used a Trimble Pro XRS GPS unit to mark the locations of the soil gas points. Due to the ongoing River Street improvements, some soil gas points had to be moved from their original locations to avoid utility corridors or the newly installed road and sidewalks. Soil gas locations that were relocated due to obstructions were recorded with the Trimble GPS unit and plotted on **Figure 2**.

On August 26, 2004, AMEC and its surveying subcontractor, CT Male, were onsite to perform a Site survey. CT Male surveyed in all the soil boring locations and top of PVC elevations of the nine monitoring wells. CT Male used the North American 1983 Datum for horizontal measurements (NAD 1983). The vertical datum used was either the City of Rochester Datum or the North American Vertical Datum of 1988 (which is City Datum –1.71 feet). Please note the reference section on each map in regards to which vertical datum was used in the survey calculations.

2.7 Supplemental Petroleum Investigation

AMEC conducted a supplemental subsurface investigation around the former Rochester Marine Fire Trailer to discern if any significant petroleum impacts were present at the Site. This area

had been previously inaccessible due to the presence of the aforementioned fire trailer. AMEC agreed to conduct a limited investigation of this area once the trailer was removed.

On December 2, 2004, AMEC and its drilling subcontractor, Parratt Wolff, advanced five soil borings to between 8 and 12 feet (bgs). Soil samples were collected, utilizing a hollow stem auger rig.

Soil samples were described, noting such features as color, soil texture, particle shape, mottles, structure, consistency, and thickness of the horizon, on soil boring logs. In addition to soil type and physical characteristics, depth to groundwater, field instrument measurements, odors and discoloration, were also recorded on the logs. All headspace monitoring was performed using a calibrated RAE systems PID and noted on the soil boring logs.

One soil sample was collected for laboratory analysis from each of the five borings. These samples were collected from the boring section exhibiting the greatest PID reading, visual evidence of impacts and/or at the interface between the saturated and unsaturated zones (e.g. capillary fringe). Samples were placed into Teflon seal jars, sealed, labeled and delivered under proper chain of custody to STL in Amherst, New York for analysis by EPA Method 8021 and 8270 in accordance with NYSDEC STARS Memorandum analyte list.

Soil boring locations were determined in the field based upon subsurface conditions and accessibility. The locations of the soil borings are identified on **Figure 4**.

3.0 PHYSICAL CHARACTERIZATION RESULTS

The following sections detail the regional and site-specific geologic and hydrologic conditions for the River Street Site.

3.1 Regional Geologic Setting

The site is located along the floodplain of the Genesee River. The southern shores of Lake Ontario, near Rochester, New York, are underlain by Ordovician and Silurian sedimentary rocks. These units are representative of shallow marine environments that dominated the area approximately 425 million years ago. The Ordovician Queenston Shale is unconformably overlain by the Silurian Medina Group throughout the greater Rochester area. The overburden soils overlying the area are mapped as lacustrine silts and clays (Muller and Cadwell, 1986).

3.2 Site Specific Geology

The River Street Derailment Site is located on the western banks of the Genesee River approximately one mile from the outlet to Lake Ontario. The Site is generally flat with a raised rail bed running approximately north-to-south through the Site. Subsurface soils vary depending upon the area of the Site. In general the Site consisted of between 19 and 35 feet of overburden overlying the local bedrock. Bedrock in the area dips from the southwest to the northeast.

The overburden material varies throughout the Site. In general, the Site consists of two different areas that were excavated during the IRM activities. These consist of between four and 20 feet of moderately sorted brown sands overlying organic rich silts. These silts are underlain by a tight, cohesive, tan-orange brown till which contains sub-angular to angular pebble sized matrix-supported clasts. Below the till there is a red siltstone that is assigned to the Upper Ordovician Queenston Shale. In areas north and south of the major excavations of the IRM, the soil types are similar to those described above, except that the first four to six feet of overburden consist of fill materials. Areas underlying the Tapecon property that were not excavated generally consist of tan, medium grained, moderately to well sorted, sands underlain by dense tills similar to those described above. This area lacks the organic rich silts observed on the east side of the railroad tracks.

Detailed soil boring logs for each boring are included in Appendix A.

3.3 Site Specific Hydrology

Fourteen monitoring wells, which include the four deep wells each nested with a shallow well, were installed at the Site to determine the extent of groundwater impacts, general aquifer characteristics, and groundwater flow direction.

Surface water at the Site generally flows from west to east towards the Genesee River. The hydrology of the Site has been affected by several factors since the derailment occurred in December of 2001. The factors include the following:

- Replacement and realignment of the utility corridors through the Site;
- Excavation of 28,000 tons of native soils and subsequent replacement of that material with moderately well sorted medium grained sands;
- Installation of a 225 feet sheet pile wall along the west bank of the Genesee River;
- Removal of that sheet pile wall to a depth of approximately six and one half feet below mean high water along the riverbank; and
- The installation of a second sheet pile wall in the Spring of 2005 for the City of Rochester waterfront revitalization project.

Since monitoring wells were not present onsite prior to the derailment, it is unclear exactly how these modifications to the Site may have effected groundwater flow, but it is assumed that groundwater would still have flowed from west to east across the site towards the Genesee River even prior to the above discussed events.

A review of the groundwater data collected from onsite monitoring wells, indicate that there are two separate water bearing units present at the Site. The uppermost unit is an unconfined aquifer, which is typically intercepted between six and ten feet below grade. This water-bearing interval is typically found in tan, moderately sorted, medium grained sands. Groundwater flow direction is generally west to east. Groundwater contours from the initial gauging event are illustrated on **Figure 5**. The second quarter groundwater contours illustrate a similar flow pattern, though slightly more skewed to the south as illustrated on **Figure 6**. Third quarter groundwater gauging indicates a similar shallow groundwater water flow direction as the second quarter results and is illustrated on **Figure 7.**

The second water-bearing interval is observed near the top of bedrock between 18 and 20 feet below grade. This interval is typically observed in a thin (< six inches), very fine gray sand and clay lense. Groundwater flow in this zone appears to be from the northwest to the southeast towards the Genesee River and is illustrated in **Figure 5**.

Though these two water bearing intervals are separated through localized conditions (i.e. boring specific geology), these water bearing intervals appear to be linked laterally across the Site. It is unclear if this was always the case at the Site, or if remedial activities including the IRM excavation has provided pathways for groundwater to intermingle. The vertical gradient between the wells indicates the groundwater from the upper zone flows downward to the lower zones. Given the proximity to the river, groundwater around MW-8 and MW-6 has likely been affected by the excavation and removal of the original sheet pile wall and installation of the second one. Excavation around MW-6 has been observed to be greater then six feet below grade during City of Rochester improvement activities.

Slug test data collected from the Site indicate a moderate hydraulic conductivity (K values between 0.988-7.786 meters/day) for the formations. These values indicate the groundwater moves relatively freely throughout the formation. This is also supported by the water development data in **Table 1** and the presence of abundant moderately sorted medium sands which were used as backfill and the more well sorted naturally occurring sands found below the railroad tracks and across the Tapecon property. The relative similarity of K values between the shallow and deep wells (**Table 8)** is likely related to the lateral interconnectedness of the water bearing intervals.

Groundwater elevations are summarized in **Table 2**.

4.0 NATURE AND EXTENT OF IMPACTS

4.1 Soil Gas Survey Results

Final results indicted that two of the 33 soil gas samples collected had detections for methylene chloride. One was located on the CSXT Right-Of–Way (SG-15) and one was located on City of Rochester property (SG-27). Soil gas samples SG-8, SG-18, and SG-22 originally indicated detections of methylene chloride; however, after data validation activities the detections were determined to be attributable to background laboratory levels and were qualified to be non-detects with adjusted reporting limits (Refer to **Section 6.7**). The methylene chloride detection on the west side of the tracks (SG-15) was not unexpected due to its proximity to known impacted material which could not be removed during IRM activities.

The detection of methylene chloride at SG-27, however, was not anticipated since closure samples from the vicinity of that location were below the Site-specific cleanup standards set forth by the NYSDEC. To address this detection, AMEC installed two additional soil gas points, identified as SG-34 and SG-35. SG-34 was completed approximately 30 feet south of SG-27 and SG-35 was completed approximately 30 feet north of SG-27. Soil gas point SG-27 was constrained by the Genesee River to the east and by SG-26 to the west, which was previously determined to be non-detect for methylene chloride. Both additional soil gas points, SG-34 and SG-35, reported non-detect for methylene chloride. Based on these results, the methylene chloride detected at SG-27 is likely limited to that immediate area, or a lab error. In order to collect additional information in this area, an additional soil boring was added to the work scope to determine if residual impacts were present at the Site. The results of this additional boring are discussed in **Section 4.2**.

Acetone was not detected in any of the 33 soil gas samples. In addition, the six soil gas samples (SG-2, SG-5, SG-29, SG-30, SG-32, and SG-33) analyzed for petroleum compounds were all non-detect. The locations and analytical results of each soil gas point are illustrated on **Figure 2**. Sample analytical results are detailed on **Table 3**.

Three sub-slab soil gas and three indoor air samples were collected at the Tapecon facility in response to concerns that methylene chloride and acetone released from the December 2001 derailment might have adversely affected the air quality inside the Tapecon facility.

Sub-slab soil gas and indoor air samples were collected in SUMMA canisters for analysis by EPA Method TO-15 for a target analyte list of common volatile organic compounds at the request of the New York State Department of Health (NYSDOH). The locations of the sub-slab and indoor air samples are illustrated on **Figure 2**. The results of these samples indicated that

minor concentrations of acetone (ranging from 40 to 380 ug/m^3) were present at all three of the sub-slab locations and a minor detection of methylene chloride (3 ug/m^3) was detected in one location. Neither of these compounds was detected in the background ambient air samples collected at the same time as the soil gas samples in the facility.

Although acetone was released as a result of the derailment, its presence in the soil gas is not necessarily attributable to the spill. Acetone is a very common solvent for various paints, cleaning solutions and other household and industrial chemicals. Chemically related solvents, MEK and 4-methyl-2-pentanone, are also present in the soil gas, and it would not be unusual to find acetone usage in commercial label making processes. Acetone has also been identified as a background compound in the area.

4.2 Soil Sample Results

Soil samples from the 18 borings were screened for VOCs throughout the investigation process. A Thermo OVM 580B PID with an 11.7 eV lamp and Photovac MicroFID were used to screen the soils. Readings from these devices were recorded on the corresponding boring logs. Based on the methods discussed in **Section 2.2.3** of this report, 40 soil samples were collected from the 18 soil borings completed at the Site. The soil samples were analyzed for acetone and methylene chloride by a modified EPA method 8260.

The initial analytical results indicate that minor concentrations of acetone were observed in most of the soil borings. The majority of the samples where acetone was detected, concentrations ranged from 30 to 75 parts per billion (ppb). However, in four of the samples the results exceeded 100 ppb, but none were found to be above 170 ppb. These analytical results are as follows:

- SB-2 26-28’ Acetone- 150 ppb
- SB-10 18’ Acetone- 120 ppb
- SB-14 7’ Acetone- 170 ppb
- SB-14 29’ Acetone- 110 ppb

During data validation many of the acetone detections initially reported were determined to be attributable to laboratory background and results have been qualified to be non-detects with adjusted reporting limits.

A detailed list of detected acetone concentrations within soil samples is presented in **Table 4**. These concentrations are below the site-specific soil cleanup standards established for the Site. Additionally, since acetone is a ubiquitous compound, it is possible that the low concentrations observed in the soil samples are the result of it naturally occurring or an existing level of background acetone in the area.

In general, analytical results indicate that residual concentrations of methylene chloride are still present under the railroad tracks, but no other significant residuals of acetone and methylene chloride were observed on any of the affected properties. Sample results from SB-11 (located proximate to the railroad tracks), at nine feet and twelve feet showed concentrations of methylene chloride of 92,000 and 30,000 ppb, respectively. The concentrations of methylene chloride observed in SB-11 are consistent with concentrations observed in the Track 4 Bottom soil sample (120,000 ppb) and the GP-58 soil sample (50,000 ppb), both collected during the IRM (Shaw, 2003).

Methylene chloride was detected in all of the other soil samples collected with concentrations ranging between 7 and 13 ppb, but it was also detected in the sample blank for each of those samples. During data validation that all the methylene chloride detections with the exception of SB-11 samples were determined to be attributable to laboratory background and results have been qualified to be non-detected with adjusted reporting limits. Therefore, methylene chloride was only detected at two depths at one location (SB-11). A detailed summary of the soil boring results is included in **Table 4** and the soil boring locations are illustrated in **Figure 3**.

4.3 DNAPL Testing Results

On August 24 and 25, 2004 an AMEC geologist supervised the installation of 10 NAPL FLUTe™ liners (nine locations) adjacent to the soil boring locations to determine if methylene chloride DNAPL was present at the Site. The locations of the FLUTe™ liners are indicated on **Figure 3**. Liner locations were selected based upon the soil boring analytical results and discussion with the NYSDEC Project Manager. Nine of the 10 liners installed were recovered and in no case was there a noticeable color change, which would indicate the presence of DNAPL. Based on these results there is no evidence that DNAPL is currently present onsite.

4.4 Groundwater Results

The first round of groundwater sampling was conducted on August 24, 2004. Groundwater samples were collected from all nine permanent monitoring well locations (13 wells total) located at the site. Groundwater from a temporary monitoring well on Mr. Danis' property was collected for analysis on August 11, 2004 during the boring installation activities. Samples were collected using dedicated polyethylene bailers. The samples were carefully placed into 40-milliliter vials preserved with hydrochloric acid, sealed, labeled and placed on ice for transport to STL in Amherst, New York.

The groundwater samples from all of the wells were analyzed for acetone and methylene chloride by EPA method 8260. The groundwater from MW-5 was also analyzed for petroleum compounds by EPA method 8270 utilizing the NYSDEC STARS list of compounds (see **Section**

2.3). All groundwater samples collected from permanent monitoring wells were non-detect for both acetone and methylene chloride. Additionally, groundwater from MW-5, which was also analyzed for semi-volatile compounds, had no detections.

Groundwater from the original temporary well on Mr. Danis' property did have a minor detection (20 ppb) for methylene chloride. Based upon this detection, permanent monitoring well MW-10 was installed on Mr. Danis' property at a location agreed upon by Mr. Danis, AMEC and the NYSDEC. The location of this well is illustrated on **Figure 3**. This well was sampled during the second quarter groundwater monitoring event and will be sampled during all subsequent groundwater monitoring events. As with the first quarter all of the samples collected from the (now ten permanent) groundwater quality well locations during the second quarter (collected on December 15, 2004) were non-detect for both COCs. Third quarter groundwater quality monitoring results were collected on March 31, 2005 and illustrate non-detect results for both COCs at every sampling location except for MW-4. This location exhibited a concentration of 21J ppb for acetone (a 'J' qualifier indicates an estimated value).

A summary of the groundwater analytical data is included in **Table 5**.

4.5 Supplemental Petroleum Investigation Results

The borings used to characterize the site soils in the vicinity of the former Marine Fire Trailer location indicate that the overburden material generally consists of fill material which overlies tan to dark brown, moderately sorted fine to medium sands and silt with occasional pebble and larger sized clasts overlying gray organic rich silty clay with some wood fragments. Borings were only completed to the interface with the organic rich silty clay. Groundwater was observed in all five borings at approximately six feet bgs.

Headspace measurements were taken using a calibrated Multi-RAE PID throughout the installation of the soil borings. PID readings above zero were detected in only one of the five soil borings (SBD-1). Low PID readings were recorded in the 6-8 foot range. Petroleum odors were noted in the 4-6, 6-8 and 8-10 foot intervals in SBD-1.

VOCs were detected in three of the soil samples, SBD-1, SBD-4, and SBD-5. VOCs were not detected above the TAGM 4046 listed Recommended Soil Cleanup Objectives (RSCOs) in any of the samples collected. A summary of the VOC data including RSCO values is provided in **Table 6**.

SVOCs were detected in two of the soil samples, SDB-1 and SBD-4. SVOCs were also not found to be above the TAGM 4046 RSCOs in any of the samples collected. A summary of the SVOC data including RSCO values is provided in **Table 7**.

5.0 QUANTITATIVE EXPOSURE ASSESSMENT

CSXT entered the Voluntary Cleanup Program (VCP) to facilitate the remediation and permitting process at this Site. This section has been prepared using the VCP guidance for qualitative exposure assessment (NYSDEC, 2002). NYSDEC (2002) defines a qualitative exposure assessment as consisting of characterizing the exposure setting (including the physical environment and potentially exposed human populations), identifying exposure pathways, and evaluating contaminant fate and transport. They further define an exposure pathway as the means by which an individual may be exposed to contaminants originating from a site. The five elements of an exposure pathway are:

1. A contaminant source;
2. Contaminant release and transport mechanisms;
3. A point of exposure;
4. A route of exposure; and
5. A receptor population.

An exposure pathway is complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway is not documented and thereby presumed potentially present. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future.

The data used in this exposure assessment consist of the soil gas data from **Table 3** the soil boring data presented in **Table 4.**

As discussed in **Section 4.1**, the soil gas samples were collected from four feet below grade following IRM activities. After data validation, there were no detected concentrations of acetone in any of the 33 soil gas samples, and there were two detections of methylene chloride in the 33 soil gas samples.

As discussed in **Section 4.2**, 40 soil-boring samples (including three duplicates) were collected from 18 borings following IRM activities. Sample depth ranged from three feet below grade at SB-1 to thirty-nine feet below grade at SB-5. The majority of the samples were collected from depths more than eight feet below grade. After data validation, there were three detected concentrations of acetone in the 37 soil boring samples, and there were two detection concentrations of methylene chloride in the 37 soil boring samples.

This qualitative exposure assessment assumes that complete exposure pathways could exist for both acetone and methylene chloride in soils and for methylene chloride in soil gas. However, acetone was not detected in any of the soil gas samples, so there is no complete exposure pathway for acetone through soil gas.

NYSDEC (1994) has developed generic recommended soil cleanup objectives that are intended to, at a minimum, eliminate all significant threats to human health and/or the environment posed by the impacts at an inactive hazardous waste site under any reasonably anticipated circumstances. For acetone, the soil cleanup objective is 200 ug/Kg, and for methylene chloride, the cleanup objective is 100 ug/Kg. As seen in **Table 4**, all the soil boring locations were non-detect except SB-2, SB-10, and SB-14, and these locations all had acetone concentrations less than the 200 ug/Kg recommended soil cleanup objective. Similarly, all the soil boring locations except SB-11 had non-detect methylene chloride concentrations at much less than the cleanup objective of 100 ug/Kg. SB-11 is located adjacent to the CSXT railroad tracks on Tapecon property. The exceedances of the methylene chloride cleanup objective seen in soil samples from SB-11 occurred at depths at and greater than nine feet below grade, with non-detects in the surrounding soil sampling locations (SB-8, SB-7, SB-13, SB-14) from depths of 7 feet below grade and deeper. It is noted that SB-8 and SB-14 represent sampling locations nearer the adjacent building.

With respect to the 9.2E_01mg/kg and 3.0E+01mg/kg exceedances of methylene chloride in the two samples taken at depth from SB-11, USEPA Region IX has developed Preliminary Remediation Goals (PRGs) that are risk-based tools for evaluating and cleaning up contaminated sites. They are being used to streamline and standardize all stages of the human health risk evaluation process. The Region IX PRG Table combines current human health toxicity values with standard exposure factors to estimate contaminant concentrations in environmental media (soil, air, and water) that are considered by the USEPA to be health protective for human exposures (including sensitive groups), over a lifetime. That is, PRGs are chemical concentrations that correspond to fixed levels of risk (i.e. either a one-in-one million [10-6] cancer risk or a noncarcinogenic hazard quotient of 1.0) in soil, air, and water. The Region IX PRGs are based on soil equations that combine potential risks from ingestion, skin contact, and inhalation simultaneously. For methylene chloride, the PRG for industrial soil is 2.1 E+01mg/Kg. Samples taken at depth from SB-11 (9.2E+01mg/Kg and 3.0E+01mg/Kg) exceed the related USEPA PRG for industrial soil. Moreover, the average concentration of methylene chloride is **3.3E+00** mg/Kg which is substantially below the respective residential PRG of 9.1E+00 mg/Kg (see **Table 4**). The maximum concentration of acetone does not exceed either the TAGM 4046 RSCO or the USEPA Region IX PRG, but the maximum two concentrations of methylene chloride exceed both.

However, these maximum concentrations of methylene chloride occurred in a light industrial/commercial area at depths of 9 and 12 feet below the ground surface at SB-11. Furthermore, this area was part of IRM activities conducted at the site, and as a result, these subsurface sampling locations are covered with a minimum of nine feet of clean fill. So, the assumed multi-year exposures behind the TAGM 4046 and USEPA IX PRGs are not representative of potential exposures to these impacted soils at the site, or specifically, at sampling location SB-11, which is immediately adjacent to an active rail line and falls within the CSXT right-of-way. Therefore, risks from future residential exposures are unlikely and if they occur at all, will occur as a result of excavation work, such as the installation of utilities. That kind of work is of short duration.

NYSDEC has not developed cleanup objectives for soil gas. However, NYSDOH (2005) and USEPA (2002) have developed a draft protocol for conducting a screening evaluation of whether or not the vapor intrusion exposure pathway is complete and, if so, whether it poses an unacceptable risk to human health.

Although one of the three sub-slab soil vapor samples had a minor methylene chloride detection of 3 ug/m^3, methylene chloride was not detected in any of the indoor air samples. The draft NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York establishes a process for evaluating the exposure risks related to soil vapor. In section 3.2.5, NYSDOH has established an indoor air guideline of 60 ug/m^3 for methylene chloride. No methylene chloride was detected in the indoor air samples. No further action is required.

Although minor concentrations of acetone were detected in the three sub-slab samples it was not identified in any of the indoor air samples. Based on the locations of where the acetone was detected in the sub slab samples, surrounding non-detect soil gas sampling locations and the fact that Tapecon is a manufacturing facility where acetone is easily associated with their processes, these detections are not considered to be associated with the CSXT derailment.

In addition, the USEPA (2002) guidance includes of a number of tables containing “Target Soil Gas Concentrations” based on three scenarios: Target Indoor Air Concentrations, Target Shallow Soil Gas Concentrations Corresponding to Target Indoor Air Concentration, and Target Deep Soil Gas Concentrations Corresponding to Target Indoor Air Concentration. This draft guidance is intended to address the incremental increases in exposures and risks from subsurface contaminants that may be intruding into indoor air for residential exposures.

For acetone, the target shallow soil gas concentration is 3.50E+00 mg/m^3, and the target deep soil gas concentration is 3.50E+01 mg/m^3 [1](USEPA 2002). For methylene chloride, the target

[1] The target soil gas concentrations are based on a cancer risk limit 1E-6 and a soil gas to indoor air attenuation factor of 0.1.

shallow soil gas concentration is 5.20E-02 mg/m^3 representing a cancer risk of 1E-06, and 5.20E+1 mg/m^3 representing a cancer risk limit of 1E-05. The target deep soil gas concentration is 5.20E-01 mg/m^3 representing a cancer risk of 1E-06, and 5.2E+2 mg/m^3 representing a cancer risk limit of 1E-05[2]. Acetone was not detected in soil gas, and one-half the highest detection limit is less than the target shallow and deep soil gas concentrations (see **Table 3**).

The soil gas sample from SG-15 contained 5,600 mg/m^3 of methylene chloride, and the one from SG-27 contained 7.9 mg/m^3 of methylene chloride, both of which are over the target shallow soil gas concentration and the target deep soil gas concentration. Sampling location SG-27, however, is more than 160 feet from the nearest structure, the Tapecon manufacturing building. The detected concentration of methylene chloride (7.9 mg/m^3) at SG-27 does not exceed the target soil gas concentration representing a 1E-5 risk limit, but it exceeds the target soil gas concentration based on a 1E-6 risk limit. However, SG-27 is located on land on the bank of the Genesee River owned by the City of Rochester. Thus, it is unlikely that a residential-use scenario will exist at the site; the soil target concentrations are based on residential indoor air exposures. Also, at the request of NYSDEC, two additional soil gas sampling points, SG-34 and SG-35, were installed near SG-27 to further delineate the methylene chloride detected in the area of SG-27. Both SG-35 and SG-35 were non-detect for methylene chloride indicating that the area of potential impact, if any, is small.

SG-15 represents the only significant exceedance because it is located within 60 feet of a structure, the Tapecon manufacturing building. However, multiple soil gas samples were taken between the Tapecon building and SG-15, all of which were non-detect at low reporting limits. SG-13, SG-14, and SG-17 were non-detect at <1 mg/m^3, while SG-18 was non-detect at <1.1 mg/m^3.

In summary, any residual impacts from soils in the main excavation area following IRM activities are unlikely to result in human exposure and adverse effects because they are covered by a layer of clean fill of over eight feet in depth, and located over 60 feet from the nearest (industrial) occupied structure. Residual impacts from soils and soil gas located outside the main excavation area are also unlikely because acetone and methylene chloride were infrequently detected. In cases where they were detected, railroad tracks cover some of the area. In other cases, detected concentrations were surrounded by sample locations with non-detects, indicating that the area of potential impact, if any, is small.

[2] The methylene chloride target soil gas concentrations are based on a soil gas to indoor air attenuation factor of 0.1.

6.0 DATA USABILITY REPORT

6.1 Introduction

This Data Usability Summary Report has been prepared to document the quality and usability of data for samples collected to characterize concentrations of contaminants of concern (COCs) in the subsurface soils, groundwater and soil gas at the CSXT River Street derailment site, Rochester, NY after completion of remedial activities. Soil boring, soil gas and groundwater samples were collected during the summer of 2004. These samples were analyzed for acetone and methylene chloride, with six soil gas samples also analyzed for benzene, toluene, ethylbenzene and xylenes (BTEX), two soil boring samples and one groundwater analyzed for PAH and one soil boring sample analyzed for petroleum products.

Results for quality assurance/quality control measures were reviewed and used to evaluate data quality in general accordance with U.S. EPA National Functional Guidelines for Organic Data Review (EPA540/R-99/008). Laboratory performance-based control limits as required by SW-846 were applied for assessment purposes. All raw data have been reviewed and calculations and identifications verified. Results of this review were used to evaluate data usability for project purposes.

6.2 Data Usability Summary

Data are of appropriate quality to meet project objectives. Analyses were conducted in compliance with method requirements for quality assurance. Holding times were met for all samples. Instrument tune and calibration requirements were met and all surrogate, laboratory control and matrix spike recoveries were acceptable. No matrix interferences were noted. Field duplicates demonstrated acceptable agreement.

Trip blanks were free of target analytes, but many of the low level detections of acetone and methylene chloride reported in soil borings are seemingly attributable to laboratory background and have been qualified during validation to be non-detected with adjusted reporting limits. Low level detections of methylene chloride in three soil gas samples were also qualified to be non-detected as a result of method blank levels.

All reported data are consistent with the raw data. Chromatograms, instrument integrations and subsequent calculations support the results.

Data as validated are appropriate for program usage. Data provide defensible information to characterize the levels of the COCs in the soils, soil gas and groundwater at the site.

6.3 Samples

Samples included in this review are listed on the attached tables with validation qualifiers attached.

6.4 Review Elements

Data validation included review and evaluation of the following elements:

1. Sampling records/preservation
2. Chain of Custody documentation
3. Holding times
4. Instrument tune and analysis sequence
5. Instrument initial and continuing calibrations
6. Method blanks
7. Laboratory spike samples
8. Matrix spike samples
9. Surrogate recoveries
10. Internal standard areas
11. Chromatograms and calculations
12. Trip and rinsate blanks
13. Field duplicates

Only those areas where method modifications, quality assurance discrepancies or anomalous results were noted are discussed in detail below.

6.5 Soil Borings

Forty soil boring samples, including three field duplicates, were collected over the period August 2 - August 10, 2004 and submitted to STL Buffalo, Amherst, NY for analyses for acetone and methylene chloride. Two of these samples were also analyzed for PAH and one was analyzed for petroleum products. STL reported these analyses under their project numbers A04-7507 and A04-7616.

6.5.1 VOC Method Blanks

Method blanks for soils analyses contained trace levels of acetone and methylene chloride, both common in laboratory background air. With the exception of samples from SB11, all results for methylene chloride were below 15 ug/kg and were flagged by the laboratory to indicate that the method blank contained this compound at a level that may result in a false positive for the other samples. Although acetone method blank levels were below the laboratory reporting limit and data were not flagged by STL with the “B” qualifier, levels noted in the review of raw data were applied for data qualification during validation. Sample results falling within a factor of 10 of the amount noted in the method blank are potentially attributable to background and these results

were qualified to be non-detected with the reporting limits for each affected sample set at the amount noted in the analysis.

Sample results qualified to be non-detected as a result of blank contamination include:

Acetone		**Methylene Chloride**		
SB10 30-32’	SB17 11’	SB10 18’	SB13 26’	SB15 25’
SB13 17’	SB2 12’	SB10 30-32’	SB13 7’	SB15 8-8’5’
SB15 25’	SB3 34’	SB10 9’	SB14 19’	SB16 19’
SB17 4’	SB6 20’	SB13 17’	SB14 7’	SB16 26’
SB1 13’	SB18 18’	SB17 11’	SB2 26-28	SB3 19’
SB1 3’	SB18 7’	SB17 4’	SB2 34’	SB4 10’
SB12 6’	SB5 26’	SB2 12’	SB3 11.5’	SB4 18’
SB9 8’		SB6 14’	SB8 24’	SB12 6’
		SB6 20’	SB8 7.5’	SB12 9’
		SB7 7.5’	SB1 13’	SB18 18’
		SB5 26’	SB5 39’	SB18 7’
		SB5 9’5	SB9 13’	SB9 8’

6.5.2 Field Duplicates

Three sets of field duplicates were included in the program. Results demonstrate acceptable precision and indicate that the sampling program was representative.

Sample ID	**Acetone**	**Methylene Chloride**
SB-5 9.5'	25 U	7 U
SB-5 39'	25 U	9 U
SB-10 18'	120	10 U
SB-10 30-32'	55 U	8 U
SB-14 29'	110	12 U
SB-14 7'	170	12 U
RPD=	43%	

6.6 Water Analysis

Five water samples collected during the period August 5-11, 2004 and fourteen groundwater samples collected on August 24, 2004 were submitted to STL for analyses for acetone and methylene chloride, with one sample also analyzed for PAH. STL reported these analyses under their project numbers A04-7778 and A04-8164.

6.6.1 Sample Preservation

Aqueous sample TMW-1 had a pH of 7 at the time of analysis, indicating that acid preservation had not occurred. However, the analysis was conducted within 7 days, which is the holding time for non-preserved samples, so no data were qualified.

6.7 Soil Gas Analysis

Soil gas samples collected on June 21 and 22, 2004 were submitted to Columbia Analytical Services Laboratory (CAS), Rochester, NY for analyses. Thirty-three of these samples were analyzed for acetone and methylene chloride and six were duplicate samples from selected locations analyzed for BTEX. CAS reported these samples under their project numbers 2421841, 2421843, 2421858 and 2421865.

An additional six soil gas samples collected in SUMMA canisters from the Tapecon property on June 22, 2004 were submitted to Air Toxics, Folsom, CA for analysis for volatile organics by EPA Method TO-15. Air Toxics reported the results under their Work Order 0406424.

Soil gas samples were analyzed by CAS using modified SW-846 Method 8021 for BTEX and modified Method TO-14/ Method 8260B procedures for acetone and methylene chloride. Briefly, at the time of analysis, 5 ml. of deionized water and surrogates and internal standards were placed into the sparge chamber for purge and trap analysis. A measured volume of the soil gas was then taken from the Tedlar bag with an air-tight syringe and injected through a leak-tight valve into the sparge chamber while purging was in progress. The instrument was calibrated with standards prepared in syringes and injected into the system in the same manner as the samples.

Results for BTEX and acetone and methylene chloride were initially reported by CAS in units of ug/m^3. Review of the raw data indicated that the correct units for all analytes should be ug/l, or mg/m^3. CAS subsequently submitted revised reports.

Samples collected in SUMMA canisters and submitted to Air Toxics were analyzed by GC/MS. Method TO-15 involves concentrating the volatile organics in up to 200 ml of the vapor sample onto a multisorbent trap. Trapped volatiles are then flash vaporized into the GC/MS system. The sample concentration step allows for significantly lower detection limits for these samples than achieved for the soil gas samples from the other areas of the River Street derailment site that were analyzed at CAS.

Validated Methylene Chloride and Acetone Data for Indoor SUMMA Canister Samples Tapecon Facility, Rochester, NY

Report No. / Date	Sample	Acetone mg/m^3	MeCl2 mg/m^3
Air Toxics: 0406424 June 22, 2004	TA-1BG	0.180U	0.066U
	TA-2BG	0.090U	0.033U
	TA-3BG	0.180U	0.066U
U = Not detected at the stated limit.			

6.7.1 Sample Preservation and Holding Time

CAS internal custody records provided with the reports indicate that two of the four sample sets submitted were stored in "cooler 1". Tedlar bag samples should be stored at ambient temperature. The laboratory has indicated that all samples were properly held in ambient storage until the time of analysis.

Samples were analyzed within 24 hours of collection. Method TO-14 does not specify a holding time for Tedlar bags, but a holding time of 24 hours is generally considered acceptable. Sample SG-15 was reanalyzed two days after the initial analysis, and no apparent loss was noted.

6.7.2 Method Blanks

Method blanks associated with the soil vapor samples analyzed by CAS contained trace levels of acetone and methylene chloride, resulting in qualification to results for three samples. Acetone was not detected in any sample above reporting limits. Methylene chloride results in SG-18, SG-8 and SG-22 have been qualified to be non-detected with reporting limits elevated to the level detected in the analysis since the amount noted is comparable to that in the method blank and is potentially attributable to laboratory background.

Method blanks associated with the Tapecon samples had no detectable volatile organics.

6.7.3 Internal Standard Areas and Surrogates

Method TO-14 does not specify requirements for internal standard areas, but the areas for several samples analyzed by CAS were above the limit typically required for GC/MS analyses by SW-846 methods. All surrogate recoveries were acceptable, which indicates that non-detected target analyte results are reliable. Acetone and methylene chloride were not detected in the affected samples and reporting limits have not been qualified. Re-analyses were conducted to achieve internal standards within control limits and confirm results, but data were reported from the initial analyses.

All surrogate and laboratory control sample recoveries were acceptable for the samples analyzed at Air Toxics.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This compressive investigation of the Site has been successful in documenting the current conditions present at the Site. Based on the results of the soil gas survey, soil boring samples and groundwater analytical results, the nature and extent of the residual impacts from the release of acetone and methylene chloride at the Site appear to be limited in extent to the area underneath the railroad tracks which bisect the Site.

Extensive sampling on both sides of the track during the investigation and validation of the analytical data indicates that only minor concentrations of acetone were present in four locations:

- SB-2 26-28' Acetone- 150 ppb
- SB-10 18' Acetone- 120 ppb
- SB-14 7' Acetone- 170 ppb
- SB-14 29' Acetone- 110 ppb

In each case the acetone detected was below the soil cleanup guidelines of 200 ppb for the Site and the impacted material was seven feet or greater below grade. In the case of SB-14, the area is encapsulated by an asphalt parking lot. Since acetone is a ubiquitous substance, it is possible that these detections are the result of background levels or a source not related to CSXT.

Methylene Chloride was identified in one location (SB-11) at two depths (9' and 12' below grade). These impacts are well below grade and are covered by an asphalt parking lot limiting exposure pathways.

Groundwater results from the initial investigation indicate that neither methylene chloride nor acetone have significantly impacted the groundwater. Subsequent quarterly monitoring events (December '04 and March '05) also verify that to date groundwater does not exhibit significant COC impacts. Groundwater results indicated only a minor detection (20 ppb) of methylene chloride at a temporary monitoring well placed on the Danis property, which can be discounted through the installation of a permanent well and two additional rounds (December '04, March '05) of non-detect sampling results. During the March '05 sampling event MW-4 exhibited an estimated (J) acetone value of 21 ppb. This concentration is below the analytical detection limit and NYSDEC TOGS 1.1.1 guidance value of 50 ppb.

In summary, any residual impacts from soils in the main excavation area following IRM activities are unlikely to result in human exposure and adverse effects because they are covered by a

layer of clean fill of over eight feet in depth. Residual impacts from soils and soil gas located outside the main excavation area are also unlikely because acetone and methylene chloride were infrequently detected. In cases where they were detected, railroad tracks cover some of the area. In all cases, detected concentrations were surrounded by sample locations with non-detects, indicating that the area of potential impact, if any, is small.

The residual methylene chloride impacts present underneath the railroad tracks appear to be stable, and have not caused any impacts to the groundwater at the Site. Given the depth of these impacts and the limited exposure pathways present in this area, AMEC does not recommend any further action in regards to this area at this time. If subsequent groundwater monitoring indicates migration of the impacts, AMEC and CSXT will work with the NYSDEC to determine an appropriate course of action to address this area.

In the vicinity of the former Marine Fire Department Trailer, field characterized soil conditions (visual, PID) and laboratory results of the soil borings indicate that minimal petroleum impacts are present at a depth below four feet. No SVOC or VOC compounds were detected above TAGM RSCO in any of the soil samples collected. Analytical results from the monitoring well closest to the area indicate that there are no petroleum impacts present in the groundwater. Based on the soil analytical results and the relatively limited zone where any impacts were observed, AMEC does not feel any further action is necessary to characterize or remediate the area of petroleum impacts and requests that a No Further Action determination be rendered.

Based on these results, AMEC recommends continued quarterly monitoring of all groundwater-monitoring wells for a period of 6 more quarters, or through September 2006. Furthermore AMEC would like to propose that groundwater from MW-5 is no longer analyzed for SVOC compounds in subsequent sampling events.

8.0 REFERENCES

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NYSDOH, Guidance for Evaluating Soil Vapor Gas Intrusion in the State of New York, February 2005 Public Comment Draft

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Figures

CSX TRANSPORTATION

Public Safety & Environment

Site Location Map

CSXT River Street Derailment Site
Rochester, NY

Figure #1

Monroe County — New York

LOCATOR

LEGEND

CSXT Rail

NOTES & SOURCES

Aerial Imagery Source: USGS
Projection: NAD 83 UTM Zone 18N
Map Created: 4 May 2005

0 — 200 Feet

N
W E
S

AMEC Earth & Environmental, Inc.
Westford, Massachusetts

LANDS NOW OR FORMERLY
CSX TRANSPORTATION, INC.
(FORMERLY CONRAIL)
BOOK 9214 PAGE 520
TAX MAP 47.55-1-5

LANDS NOW OR FORMERLY
THE UNITED STATES OF AMERICA
(U.S. COAST GUARD)
REPUTED OWNER
TAX MAP 47.63-1-1.2

LANDS NOW OR FORMERLY
TAPECON, INC.
REPUTED OWNER
TAX MAP 47.63-1-12

LANDS NOW OR FORMERLY
TAPECON, INC.
REPUTED OWNER
TAX MAP 47.62-1-22

LANDS NOW OR FORMERLY
THE UNITED STATES OF AMERICA
(U.S. COAST GUARD)
REPUTED OWNER
TAX MAP 47.63-1-9

SG-1 SG-2 SG-3 SG-4 SG-5 SG-6 SG-7 SG-8 SG-9 SG-10 SG-11 SG-12 SG-13 SG-14 SG-15 SG-16 SG-17 SG-18 SG-19 SG-20 SG-21 SG-22 SG-23 SG-24 SG-25 SG-26 SG-27 SG-28 SG-29 SG-30 SG-31 SG-32 SG-34 SG-35

TA-1 TA-2 TA-3

SG-15 M.C.-5,600 PPM 6/22/04

SG-27 M.C.-7.9 PPM 6/22/04

EXCAVATED 5.5'-7' BGS 11/12/02

EXCAVATED 4' BGS 11/13/02

EXCAVATION CELL 10/01/02

EXCAVATION CELL 10/30/02

SHEET PILING

TOP OF BANK 06/20/02

TOP OF BANK @CUT OFF

PROPOSED SHEET PILING

GAS VENT

CB RIM=250.19 INV=246.34

CB RIM=252.03 INV=244.53

CB RIM=251.96 INV=248.16

6"HDPE INV=250.73

24"RCP 12"RCP 12"PVC 10"RCP 18"PVC 8"SW 6"SW 4"SW SEW

7'x7' VAULT

EMETERA

RIVER ST.

GENESEE RIVER

1 2 3 4 5 6 7 8 9 10 11 12 13

N

LEGEND:

- SOIL GAS SURVEY POINT
- GUY WIRE
- CHAIN LINK FENCE
- WOOD RAIL FENCE
- DECIDUOUS TREE
- TM 47.70-2-63.1 — TAX MAP NUMBER (MAP-BLOCK-PARCEL)
- APPROXIMATE PROPERTY LINE

MAP NOTES:

1) NORTH ORIENTATION IS BASED UPON THE NEW YORK STATE PLANE COORDINATE SYSTEM (NAD 83) ORIGINATING FROM RIGHT OF WAY MONUMENTS AS SHOWN ON MAP REFERENCE NUMBER 1.

2) VERTICAL DATUM IS BASED ON THE CITY OF ROCHESTER DATUM AS SHOWN ON MAP REFERENCE NUMBER 1. CONVERSION TO THE NORTH AMERICAN VERTICAL DATUM OF 1998 (NAVD 1998). CITY DATUM MINUS 1.71 FEET = NAVD 88.

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6) THE PLACEMENT OF TA-1, TA-2 AND TA-3 SOIL GAS SURVEY POINTS ARE ESTIMATED LOCATIONS.

MAP REFERENCES:

1) "RIVER STREET, LATTA ROAD, LIGHTHOUSE STREET IMPROVEMENTS" NYSDOT PIN 4753.02 DATED APRIL 2001, PREPARED BY LABELLA ASSOCIATES, P.C. DRAWING Nos.: ROW-01, G-02.

2) "RIGHT OF WAY AND TRACK MAP" NEW YORK CENTRAL RAILROAD VALUATION MAPS V77/7 AND V77/8.

3) "EXCAVATION AND CONSTRUCTION LAYOUT" DRAWING 834540-D2 DATED 01/07/02 PREPARED BY IT CORPORATION.

SCALE
0 30 60 90 FEET

REFERENCES:

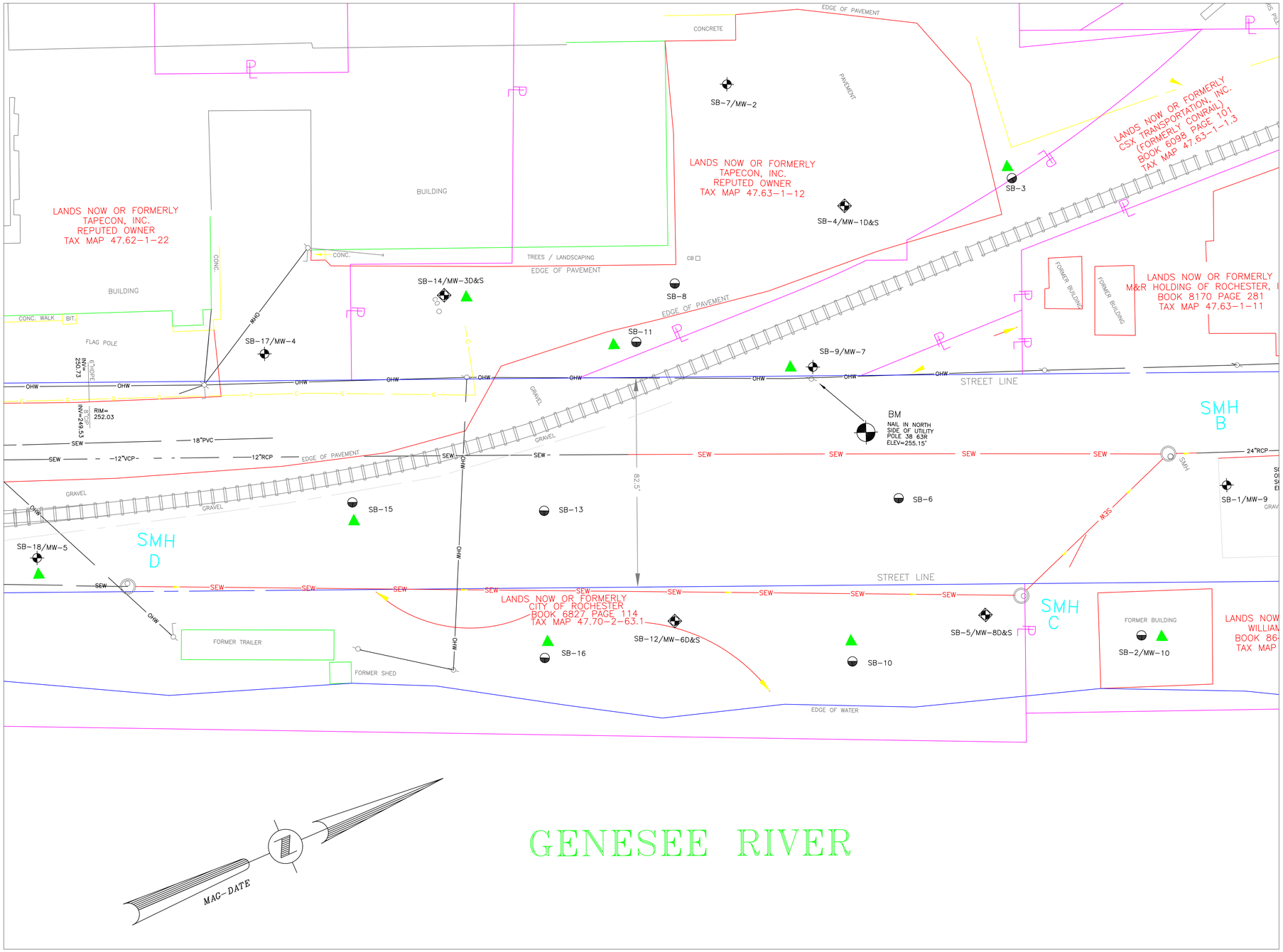
BASE MAP SOURCE: CT MALE ASSOCIATES, P.C.
IRM EXCAVATION LOCATION MAP SOURCE: SHAW ENVIRONMENTAL, INC.

amec
EARTH & ENVIRONMENTAL
Edison Plaza, 2nd Floor
155 Erie Boulevard
Schenectady, NY 12305

SOIL GAS SAMPLING LOCATIONS AND RESULTS

CSXT RIVER ST. DERAILMENT
480 RIVER ST. ROCHESTER, NY 14612

DRAWN BY: TPA
DATE: 04/20/05
REVIEWED BY: WL
FIGURE 2



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3) "EXCAVATION AND CONSTRUCTION LAYOUT" DRAWING 834540-D2 DATED 01/07/02 PREPARED BY IT CORPORATION.

LEGEND

CB □	CATCH BASIN
—SEW—	UNDERGROUND SEWER LINE
—OHW—	OVERHEAD WIRES
— T —	UNDERGROUND TELEPHONE
TM 47.70-2-63.1	TAX MAP NUMBER (MAP-BLOCK-PARCEL)
℄	APPROXIMATE PROPERTY LINE
BM	BENCHMARK
	SOIL BORING
	SOIL BORING/MONITORING WELL
	SOIL BORING/SHALLOW & DEEP MONITORING WELL
	DNAPL SAMPLING POINT

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REV	D/M/Y	REVISION	DRN	CHK	APP	APP	APP	APP
A	10/4/05	SITE INVESTIGATION FIGURE 3	CJS	JWL				

ISS	D/M/Y	APP	ISSUED FOR

REF	NUMBER	REFERENCES TITLE
		SOIL BORING/MONITORING WELL/DNAPL LOCATION MAP

STAMP/SEAL

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APPROVED FOR CONSTRUCTION

CLIENT PROJECT MGR. DEPARTMENT MGR. PROJECT MGR.

PROJECT PHASE: 0700

PROJECT NO.: 643008504

ACTIVITY NO.: --

PACKAGE CODE: --

SCALE: 1 = 20

	BY	D/M/Y
DSN.	CRIS SCHRADER	4/20/05
DRN.		

AREA: --

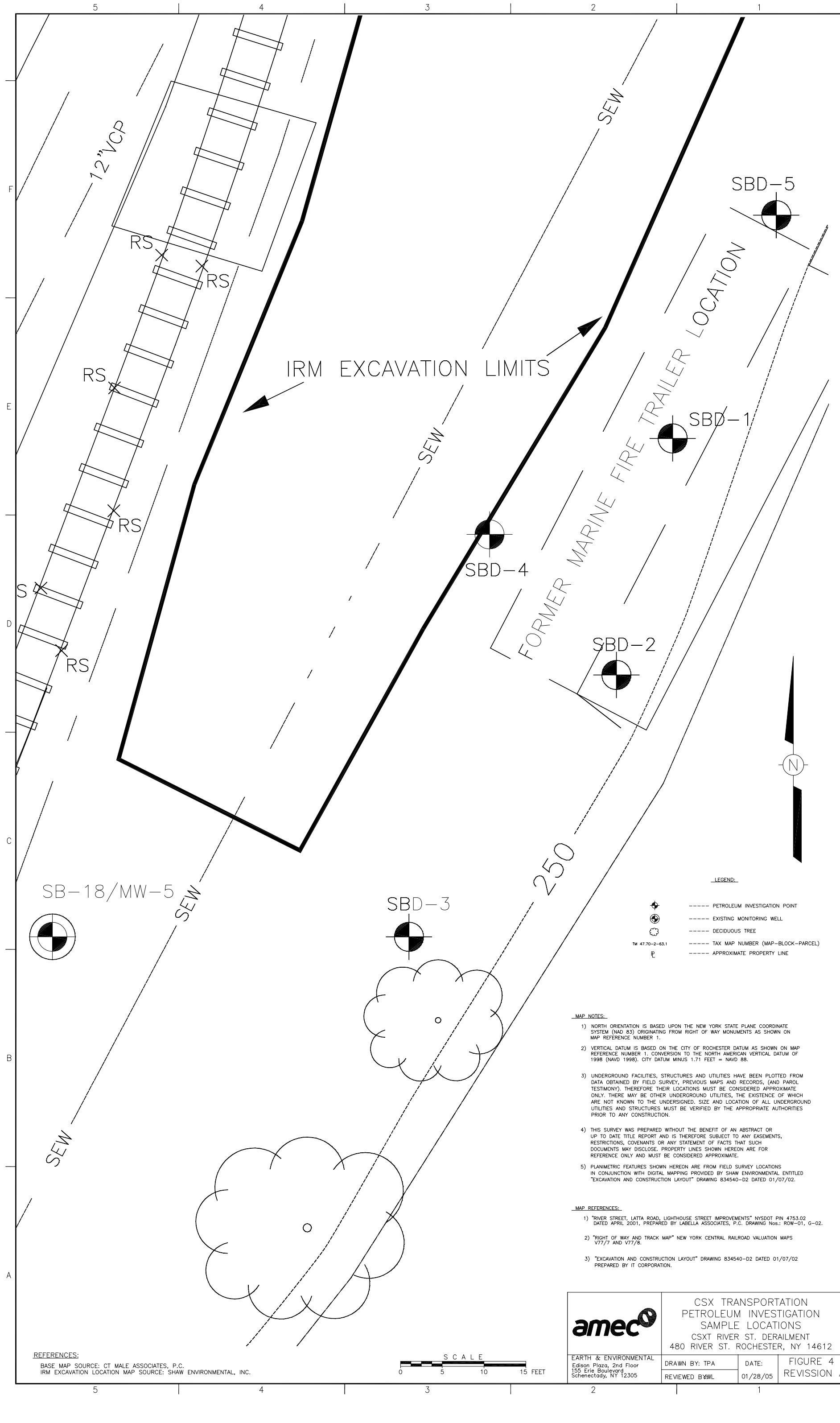
SUBJECT: SOIL BORING/MONITORING WELL/DNAPL LOCATION MAP CSXT RIVER STREET DERAILMENT SITE ROCHESTER, NY

CLIENT DWG. NO.: --

DRAWING NO.: FIGURE 3

REV.

CADD FILE ADDRESS



REFERENCES:

BASE MAP SOURCE: CT MALE ASSOCIATES, P.C.
IRM EXCAVATION LOCATION MAP SOURCE: SHAW ENVIRONMENTAL, INC.

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2) "RIGHT OF WAY AND TRACK MAP" NEW YORK CENTRAL RAILROAD VALUATION MAPS V77/7 AND V77/8.

3) "EXCAVATION AND CONSTRUCTION LAYOUT" DRAWING 834540-D2 DATED 01/07/02 PREPARED BY IT CORPORATION.

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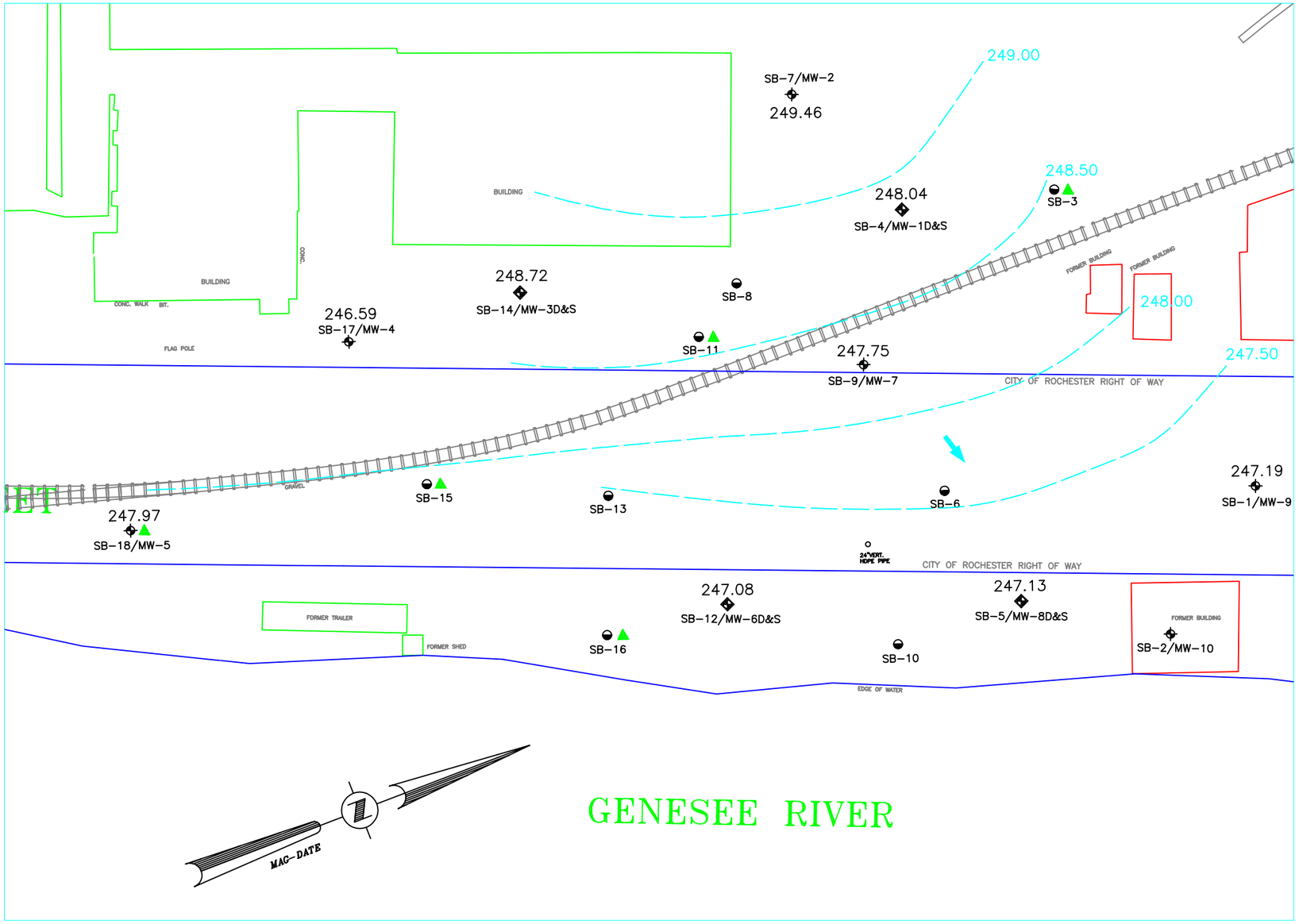
EARTH & ENVIRONMENTAL
Edison Plaza, 2nd Floor
155 Erie Boulevard
Schenectady, NY 12305

CSX TRANSPORTATION
PETROLEUM INVESTIGATION SAMPLE LOCATIONS
CSXT RIVER ST. DERAILMENT
480 RIVER ST. ROCHESTER, NY 14612

DRAWN BY: TPA
DATE: 01/28/05
REVIEWED BY: WL
FIGURE 4
REVISSION A

P:\CSX\RiverStreet\CAD\Figure 3.dwg



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3) "EXCAVATION AND CONSTRUCTION LAYOUT" DRAWING 834540-D2 DATED 01/07/02 PREPARED BY IT CORPORATION.

LEGEND

- BM ----- BENCHMARK
- ----- SOIL BORING
- ----- SOIL BORING/MONITORING WELL
- ----- SOIL BORING/SHALLOW & DEEP MONITORING WELL
- ----- DNAPL SAMPLING POINT
- ----- GROUNDWATER CONTOURS
- ----- GROUNDWATER FLOW DIRECTION

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REV	D/M/Y	REVISION	DRN	CHK	APP	APP	APP	APP
A	4/22/05	INITIAL INVESTIGATION GROUNDWATER CONTOURS, AUGUST 2004	CJS	JWL	TPA			

ISS	D/M/Y	APP	ISSUED FOR

STAMP/SEAL

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	BY	D/M/Y
DSN.	CRIS SCHRADER	4/22/05
DSN.		

CSX TRANSPORTATION, INC.
500 WATER STREET, J-275
JACKSONVILLE, FL 32202

PROJECT PHASE: 0700

AREA:

PROJECT NO.: 643008504

ACTIVITY NO.: --

SCALE: 1 = 50

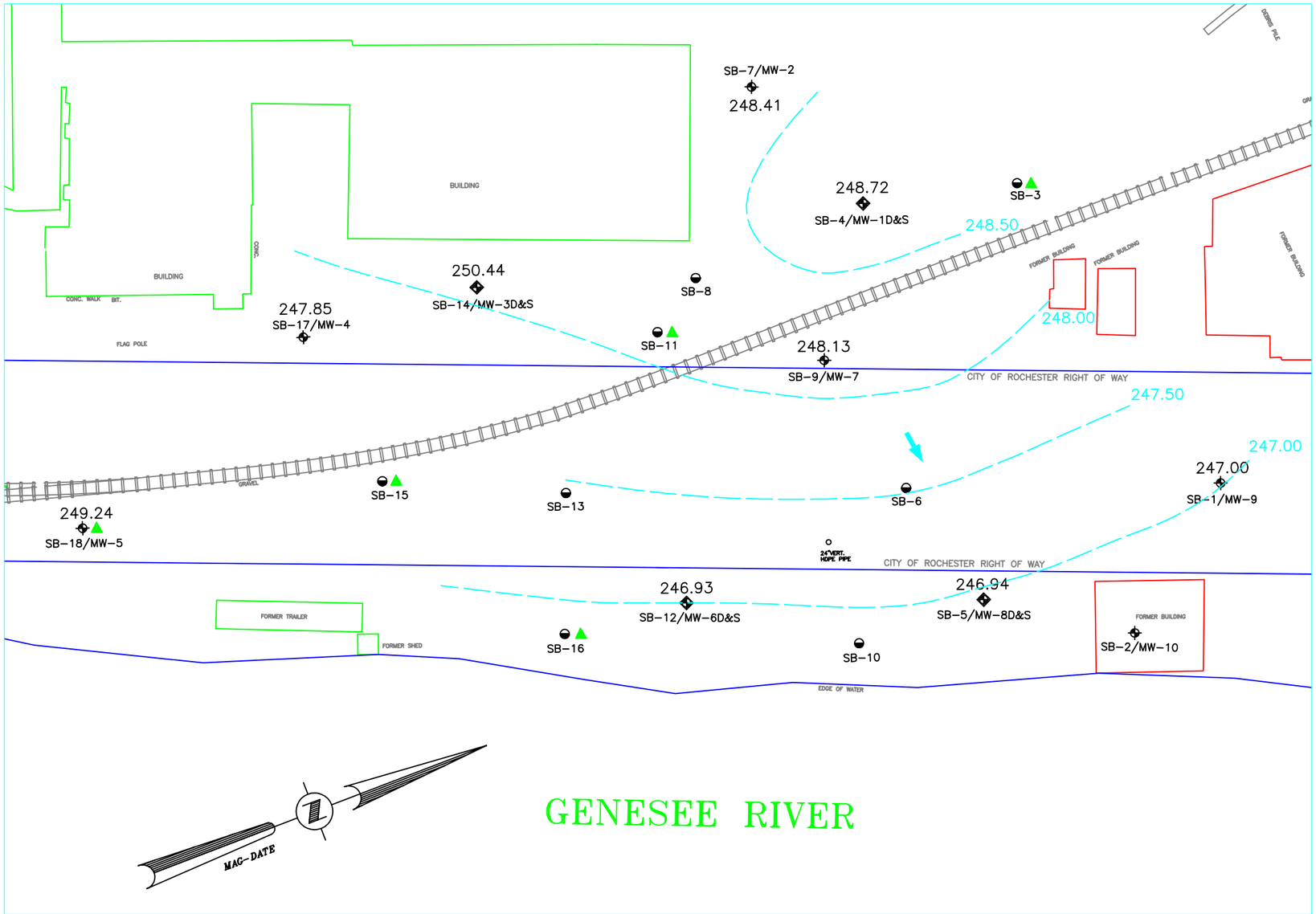
PACKAGE CODE:

SUBJECT: 1ST QUARTER SHALLOW GROUNDWATER FLOW DIRECTION AND CONTOUR MAP CSXT RIVER STREET DERAILMENT SITE ROCHESTER, NY

amec

CLIENT DWG. NO.: 643008504-05

DRAWING NO.: FIGURE 5



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2) "RIGHT OF WAY AND TRACK MAP" NEW YORK CENTRAL RAILROAD VALUATION MAPS V77/7 AND V77/8.

3) "EXCAVATION AND CONSTRUCTION LAYOUT" DRAWING 834540-D2 DATED 01/07/02 PREPARED BY IT CORPORATION.

LEGEND

- BM ----- BENCHMARK
- ----- SOIL BORING
- ----- SOIL BORING/MONITORING WELL
- ----- SOIL BORING/SHALLOW & DEEP MONITORING WELL
- ----- DNAPL SAMPLING POINT
- ----- GROUNDWATER CONTOURS
- ----- GROUNDWATER FLOW DIRECTION

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REV	D/M/Y	REVISION	DRN	CHK	APP	APP	APP	APP
A	4/22/05	2ND QUARTER GROUNDWATER CONTOURS, DECEMBER 2004	CJS	JWL	TPA			

ISS	D/M/Y	APP	ISSUED FOR

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	BY	D/M/Y
DSN.	CRIS SCHRADER	4/22/05
DSN.		

CSX TRANSPORTATION, INC.
500 WATER STREET, J-275
JACKSONVILLE, FL 32202

PROJECT PHASE: 0700

AREA:

PROJECT NO.: 643008504

ACTIVITY NO.: --

SCALE: 1 = 50

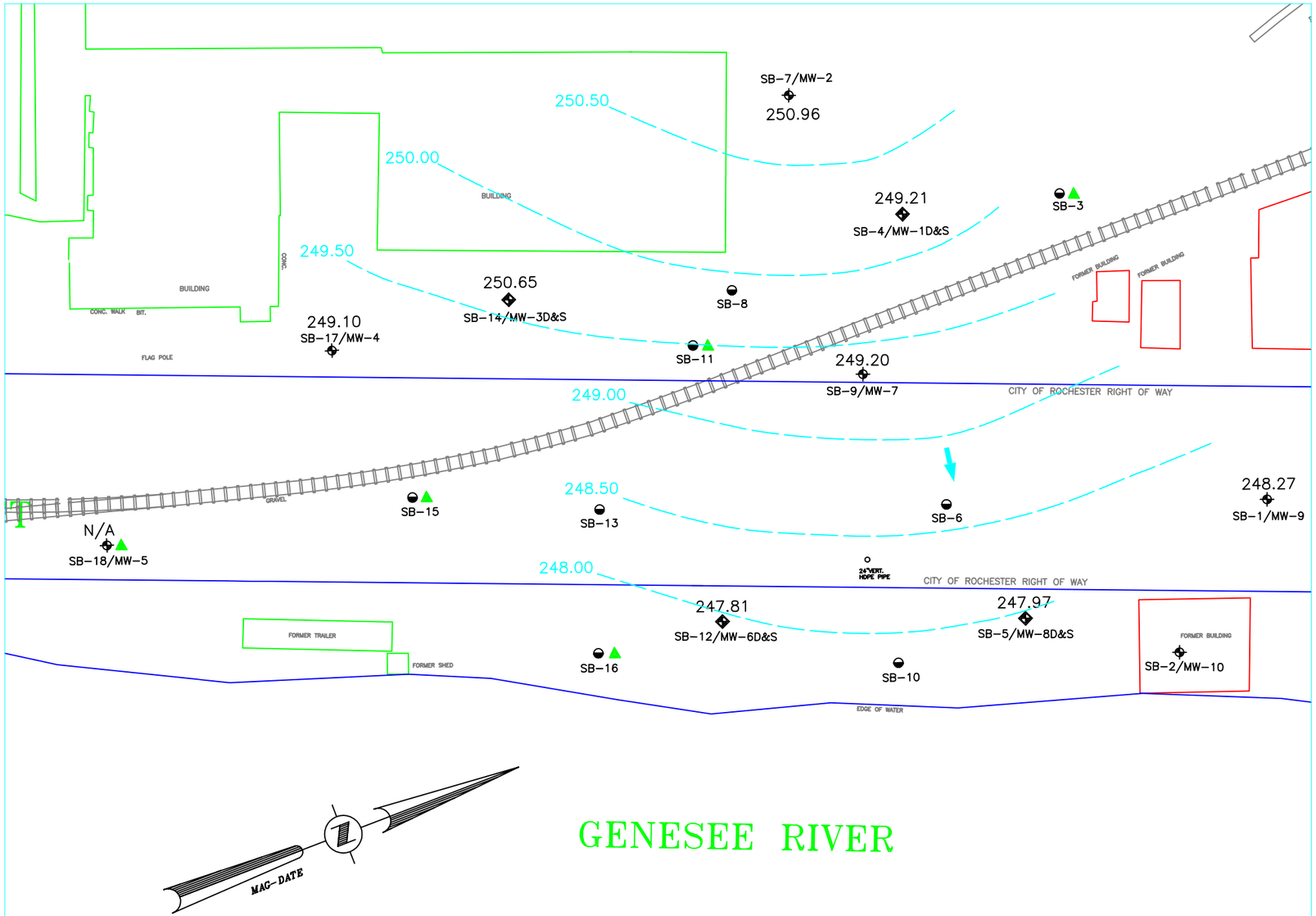
PACKAGE CODE:

SUBJECT: 2ND QUARTER SHALLOW GROUNDWATER FLOW DIRECTION AND CONTOUR MAP CSXT RIVER STREET DERAILMENT SITE ROCHESTER, NY

amec

CLIENT DWG. NO.: 643008504-06

DRAWING NO.: FIGURE 6



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LEGEND

- BM ----- BENCHMARK
- ----- SOIL BORING
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- ----- SOIL BORING/SHALLOW & DEEP MONITORING WELL
- ----- DNAPL SAMPLING POINT
- ----- GROUNDWATER CONTOURS
- ----- GROUNDWATER FLOW DIRECTION

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REV	D/M/Y	REVISION	DRN	CHK	APP	APP	APP	APP	ISS	D/M/Y	APP	ISSUED FOR
A	4/22/05	3RD QUARTER GROUNDWATER CONTOURS, MARCH 2005	CJS	JWL	TPA							

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BY	D/M/Y
DSN. CRIS SCHRADER	4/22/05
DSN.	

CSX TRANSPORTATION, INC.
500 WATER STREET, J-275
JACKSONVILLE, FL 32202

PROJECT PHASE: 0700
AREA:
PROJECT NO.: 643008504
ACTIVITY NO.: --
SCALE: 1 = 50
PACKAGE CODE:

SUBJECT: 3RD QUARTER SHALLOW GROUNDWATER FLOW DIRECTION AND CONTOUR MAP CSXT RIVER STREET DERAILMENT SITE ROCHESTER, NY

amec

CLIENT DWG. NO.: 643008504-07

DRAWING NO.: FIGURE 7

Tables

Table 1
Well Development Totals
CSXT River Street Derailment
Rochester, NY

Soil Boring	Well #	Volumes Removed	Gallons	Did Well Dry Out?	Number of times
SB-4	MW-1S	23	30	No	0
SB-4	MW-1D	11	25	Yes	7
SB-7	MW-2	14	22	Yes	3
SB-14	MW-3D	13.5	34	Yes	1
SB-14	MW-3S	24	35	Yes	2
SB-17	MW-4	15	32	Yes	5
SB-18	MW-5	10	20	No	0
SB-12	MW-6S	24	32	Yes	6
SB-12	MW-6D	23	17	Yes	11
SB-9	MW-7	18	22	Yes	8
SB-5	MW-8S	41	75	No	0
SB-5	MW-8D	12.5	42	Yes	12
SB-1	MW-9	28	21	Yes	8
SB-2	MW-10	16	35	No	0

Table 2
Groundwater Elevations
CSXT River Street Derailment
Rochester, NY

	MW-1S		MW-1D		MW-2		MW-3S		MW-3D		MW-4		MW-5	
	TOC	254.22	TOC	254.04	TOC	253.98	TOC	253.33	TOC	253.40	TOC	253.02	TOC	251.78
Date	DTW	GWELE	DTW	GWELE	DTW	GWELE	DTW	GWELE	DTW	GWELE	DTW	GWELE	DTW	GWELE
08/23/2004	6.18	248.04	11.76	242.28	4.52	249.46	4.61	248.72	8.24	245.16	6.43	246.59	3.81	247.97
12/15/2004	5.50	248.72	4.36	249.68	5.57	248.41	2.89	250.44	5.68	247.72	5.17	247.85	2.54	249.24
03/31/2005	5.01	249.21	4.73	249.31	3.02	250.96	2.68	250.65	3.08	250.32	3.92	249.10	NM*	NA

	MW-6S		MW-6D		MW-7		MW-8S		MW-8D		MW-9		MW-10**	
	TOC	253.14	TOC	253.14	TOC	256.70	TOC	253.54	TOC	253.54	TOC	251.71	TOC	Not Surveyed
Date	DTW	GWELE	DTW	GWELE	DTW	GWELE	DTW	GWELE	DTW	GWELE	DTW	GWELE	DTW	GWELE
08/23/2004	6.06	247.08	7.86	245.28	8.95	247.75	6.41	247.13	5.68	247.86	4.52	247.19	NA	NA
12/15/2004	6.21	246.93	5.73	247.41	8.57	248.13	6.60	246.94	6.61	246.93	4.56	247.15	2.75	NA
03/31/2005	5.33	247.81	5.02	248.12	7.50	249.20	5.57	247.97	5.36	248.18	3.44	248.27	2.65	NA

Notes:

NM=Not Measured

NA=Not Available

DTW= Depth to Water (feet)

GWELE= Groundwater Elevation (feet)

TOC= Top of Casing

* Unable to locate MW-5 due to ongoing construction

** Unable to calculate groundwater elevations for MW-10 because it has not been surveyed.

Table 3
Soil Gas Survey Validated Analytical Results
CSXT River Street Derailment Rochester, NY

Report No. /Sample Date		Acetone	MeCl2	BTEX*
		mg/m^3	mg/m^3	mg/m^3
2421841				
June 21, 2004	SG-1	4U	1U	-
	SG-2	4U	1U	-
	SG-3	4U	1U	-
	SG-5	4U	1U	-
	SG-6	4U	1U	-
	SG-11	4U	1U	-
	SG-12	4U	1U	-
	SG-16	4U	1U	-
	SG-19	4U	1U	-
	SG-20	4U	1U	-
	SG-21	4U	1U	-
	SG-26	4U	1U	-
	SG-27	4U	7.9	-
	SG-2	-	-	1U
	SG-5	-	-	1U
2421843				
June 21, 2004	SG-4	4U	1U	-
	SG-24	4U	1U	-
	SG-25	4U	1U	-
	SG-32	4U	1U	-
	SG-9	4U	1U	-
	SG-29	4U	1U	-
	SG-30	4U	1U	-
	SG-32	-	-	1U
	SG-29	-	-	1U
	SG-30	-	-	1U
406424				
June 22, 2004	TA-1	0.38	0.0032U	-
	TA-2	0.057	0.011U	-
	TA-3	0.04	0.0033	-
2421858				
June 22, 2004	SG-18	4U	1.1U	-
	SG-15	100U	5600 J	-
	SG-10	4U	1U	-
	SG-8	4U	1.8U	-
	SG-7	4U	1U	-
	SG-14	4U	1U	-
	SG-17	4U	1U	-
	SG-13	4U	1U	-
2421865				
June 22, 2004	SG-22	4U	2.2U	-
	SG-28	4U	1U	-
	SG-33	4U	1U	-
	SG-34	4U	1U	-
	SG-35	4U	1U	-
	SG-33	-	-	1U
Average concentration		3.18	1.56E+02	
Average concentration (exc. SG-15)			6.99E-01	
Vapor Intrusion-shallow		3.50E+00	5.20E-01	
Vapor Intrusion-deep		3.50E+01	5.20E+00	

* BTEX compounds including benzene, toluene, ethylbenzene and xylenes
U = Not detected at the stated limit.
J = Estimated value.

Table 4
Soil Boring Sample Results
Validated Data
CSXT River Street Derailment
Rochester, NY

Soil Boring Identification	Acetone (ug/kg)		Methylene Chloride (ug/kg)	
SB-1 3'	40	U	8	U
SB-1 13'	37	U	11	U
SB-2 12'	65	U	12	U
SB-2 26-28'	150		8	U
SB-2 34'	68	U	11	U
SB-3 11.5'	25	U	10	U
SB-3 19'	25	U	11	U
SB-4 10'	25	U	13	U
SB-4 18'	25	U	12	U
SB-5 9.5'	25	U	7	U
SB-5 26'	50	U	11	U
SB-5 39' *	25	U	9	U
SB-6 14'	26	U	12	U
SB-6 20'	39	U	10	U
SB-7 7.5'	26	U	11	U
SB-8 7.5	26	U	12	U
SB-8 24'	26	U	10	U
SB-9 8'	34	U	10	U
SB-9 13'	28	U	10	U
SB-10 9'	25	U	11	U
SB-10 18'	120		10	U
SB-10 30-32' **	55	U	8	U
SB-11 9'	16,000	U	**92,000**	
SB-11 12'	3,500	U	**30,000**	
SB-12 6'	33	U	9	U
SB-12 9'	55	U	13	U
SB-13 7'	26	U	12	U
SB-13 17'	73	U	9	U
SB-13 26'	26	U	8	U
SB-14 7'	170		12	U
SB-14 19'	26	U	12	U
SB-14 29' ***	110		12	U
SB-15 8-8.5'	27	U	10	U
SB-15 25'	56	U	10	U
SB-16 19'	33	U	10	U
SB-16 26'	26	U	8	U
SB-17 4'	27	U	9	U
SB-17 11'	49	U	8	U
SB-18 7'	27	U	9	U
SB-18 18'	63	U	11	U
Trip Blank	25	U	5	U
Average Conc. (mg/kg)	0.29		3.30	
TAGM 4046 RSCO (mg/kg)	0.20		0.10	
Residential Region 9 PRGs (mg/kg)	1.40E+03		9.10E+00	
Industrial Region 9 PRGs (mg/kg)	5.40E+04		2.10E+01	

Notes:
B=Analyte found in blank
U=Indicates that the compound was not detected at or above the reporting limit
* Duplicate Sample of SB-5 9.5'
** Duplicate Sample of SB-10 18'
*** Duplicate Sample of SB-14 7'

Table 5
Groundwater VOC Analytical Results
CSXT River Street Derailment
Rochester, NY

Well ID	24-Aug-04		15-Dec-04		31-Mar-05	
	Acetone	Methylene Chloride	Acetone	Methylene Chloride	Acetone	Methylene Chloride
MW-1S	25U	5U	25U	5U	25U	5U
MW-1D	25U	5U	25U	5U	25U	5U
MW-2	25U	5U	25U	5U	25U	5U
MW-3S	25U	5U	25U	5U	25U	5U
MW-3D	25U	5U	25U	5U	25U	5U
MW-4	25U	5U	25U	5U	21J	5U
MW-5	25U	5U	25U	5U	NS	NS
MW-6S	25U	5U	25U	5U	25U	5U
MW-6D	25U	5U	25U	5U	25U	5U
MW-7	25U	5U	25U	5U	25U	5U
MW-8S	25U	5U	25U	5U	25U	5U
MW-8D	25U	5U	25U	5U	25U	5U
MW-9	25U	5U	25U	5U	25U	5U
MW-10	NS	NS	25U	5U	25U	5U
TMW-1	25U	**20**				
NYSDEC TOGS 1.1.1	50	5	50	5	50	5

Notes:

U - Not detected at laboratory method detection limits;

J - indicates an estimate value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectra data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

NS - Not sampled

- All results are in micrograms per liter (ug/l) or parts per billion (ppb)

- Bold Face indicates values above NYSDEC TOGS 1.1.1

- Standards taken from NYSDEC Memorandum TOGS 1.1.1, Ambient Water Quality Standards and Guidance Values, and Groundwater Effluent Limitations, June 1998

- SVOC analytical results for MW-5 were ND for all analytes on the 8270 STARS list

Table 6
Supplemental Petroleum Investigation
Volatile Organic Compounds Analytical Results
CSXT River Street Derailment
Rochester, NY

SAMPLE ID		SBD-1 7-8'	SBD-2 6'	SBD-3 7-8'	SBD-4 7'	SBD-5 5'
SAMPLE DATE		12/02/2004	12/02/2004	12/02/2004	12/02/2004	12/02/2004
VOCs	NYSDEC RSCO (1)					
Benzene	60	ND	ND	ND	ND	50
n-Butylbenzene	10,000	ND	ND	ND	180	260
sec-Butylbenzene	10,000	450	ND	ND	ND	310
p-Cymene	NA	86	ND	ND	ND	ND
Ethylbenzene	5,500	ND	ND	ND	ND	65
Isopropylbenzene	2,300	38	ND	ND	89	ND
MTBE	120	ND	ND	ND	ND	ND
n-Propylbenzene	3,700	ND	ND	ND	31	65
1,2,4-Trimethylbenzene	10,000	ND	ND	ND	ND	290
1,3,5-Trimethylbenzene	3,700	100	ND	ND	ND	130
Toluene	1,500	ND	ND	ND	20	220
Total Xylenes	1,200	80	ND	ND	230	470
m-Xylene	-	80	ND	ND	180	330
o-Xylene	-	ND	ND	ND	50	140
p-Xylene	-	ND	ND	ND	ND	ND

Notes:

1. TAGM #4046 Recommended Soil Cleanup Objective
2. All units are ug/kg (ppb)
3. ND = Non Detect
4. J indicates an estimate value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectra data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.
5. Bold Face indicates values above NYSDEC TAGM #4046 Guidance values

Table 7
Supplemental Petroleum Investigation
Semi-Volatile Compounds Analytical Results
CSXT River Street Derailment
Rochester, NY

SAMPLE ID		SB-18 7'	SBD-1 7-8'	SBD-2 6'	SBD-3 7-8'	SBD-4 7'	SBD-5 5'
SAMPLE DATE		08/09/2004	12/02/2004	12/02/2004	12/02/2004	12/02/2004	12/02/2004
SVOCs	NYSDEC RSCO (1)						
Acenapththene	50	ND	ND	ND	ND	0.36 J	ND
Anthracene	50	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	0.224	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.061	0.16 J	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	1.1	ND	ND	ND	ND	ND	ND
Benzo(ghi)perylene	50	ND	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	1.1	ND	ND	ND	ND	ND	ND
Bis (2-ethylhexyl) phthalate	50	ND	ND	ND	ND	ND	ND
Chrysene	0.4	0.15 J	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	0.014	ND	ND	ND	ND	ND	ND
Dibenzofuran	6.2	ND	ND	ND	ND	ND	ND
Fluoranthene	50	0.16 J	ND	ND	ND	ND	ND
Fluorene	50	ND	ND	ND	ND	0.53	ND
Indeno(1,2,3-cd)pyrene	3.2	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	36.4	ND	ND	ND	ND	ND	ND
Naphthalene	13	ND	ND	ND	ND	ND	ND
Phenanthrene	50	ND	0.19 J	ND	ND	1.2	ND
Pyrene	50	0.25 J	ND	ND	ND	0.18 J	ND

Notes:
1. TAGM #4046 Recommended Soil Cleanup Objective
2. All units are mg/kg (ppm)
3. ND = Non Detect
4. J indicates an estimate value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectra data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

5. Bold Face indicates values above NYSDEC TAGM #4046 Guidance values

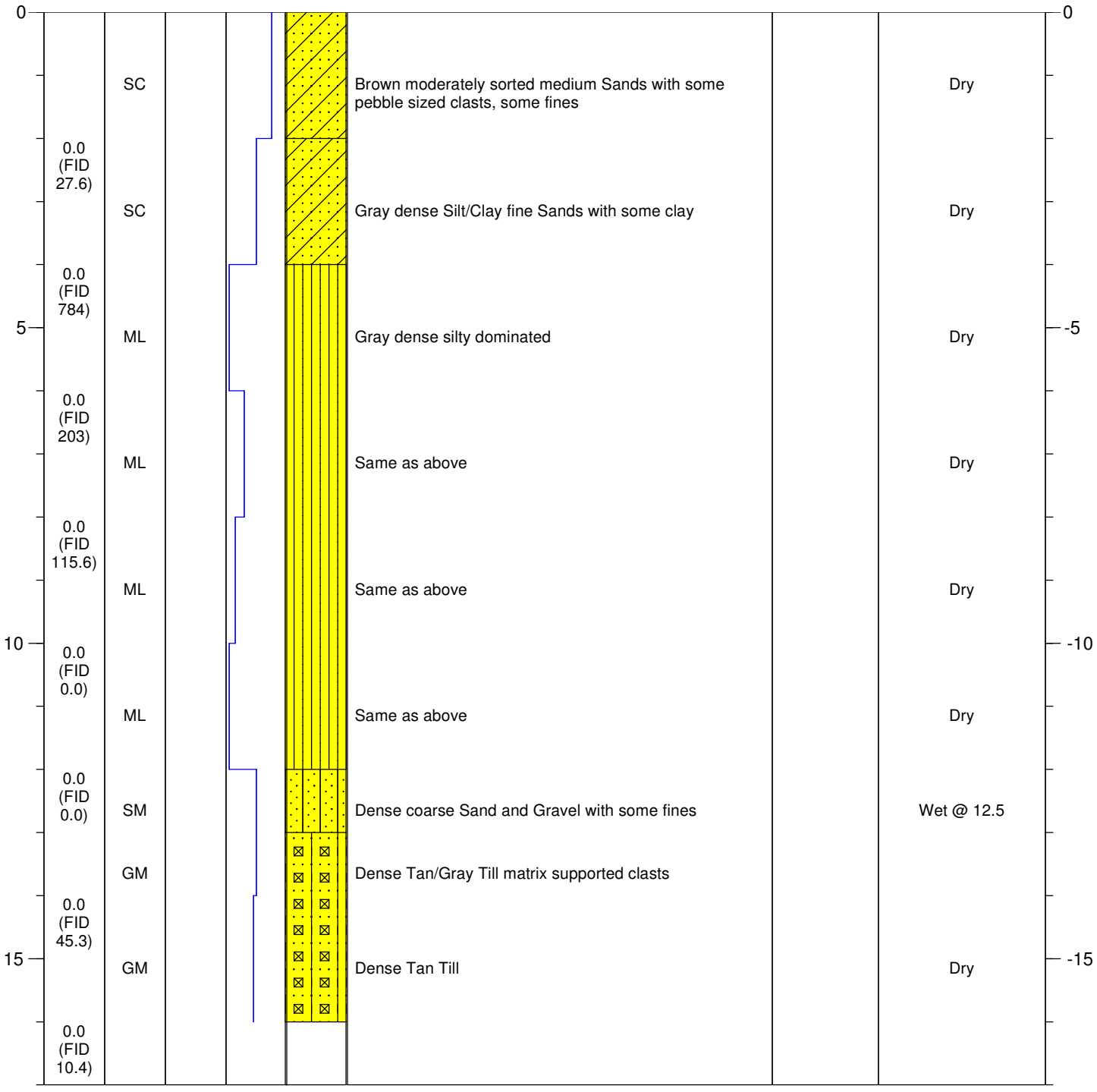
Table 8
Hydraulic Conductivity K Values
CSXT River St. Derailment
Rochester, NY

Well ID	Test Number	K Value	Average K
MW-1S	T1	6.275	
MW-1S	T2	3.369	
MW-1S	T3	7.55	
MW-1S	T4	13.95	**7.786**
MW-1D	T1	1.024	
MW-1D	T2	0.8041	
MW-1D	T3	2.122	
MW-1D	T4	***	**0.988**
MW-2	T1	0.2319	
MW-2	T2	2.304	
MW-2	T3	2.733	
MW-2	T4	1.244	**1.628**
MW-3S	T1	1.93	
MW-3S	T2	2.67	
MW-3S	T3	1.898	**1.625**
MW-3D	T1	4.438	
MW-3D	T2	3.059	
MW-3D	T3	2.867	
MW-3D	T4	3.081	**3.361**
MW-5	T1	1.891	
MW-5	T2	2.055	
MW-5	T3	1.457	
MW-5	T4	1.57	**1.743**
MW-7	T1	2.933	
MW-7	T2	2.404	
MW-7	T3	4.995	
MW-7	T4	3.568	**3.475**
MW-9	T1	1.213	
MW-9	T2	3.569	
MW-9	T3	0.7282	
MW-9	T4	2.932	**2.111**

Notes:
All K values calculated using the Bouwer and Rice method (Bouwer and Rice, 1976)
All K values are in Meters per day
*** Test was determined to be invalid. Passing train at the time of test disrupted transducer leading to anomalous data

Appendix A

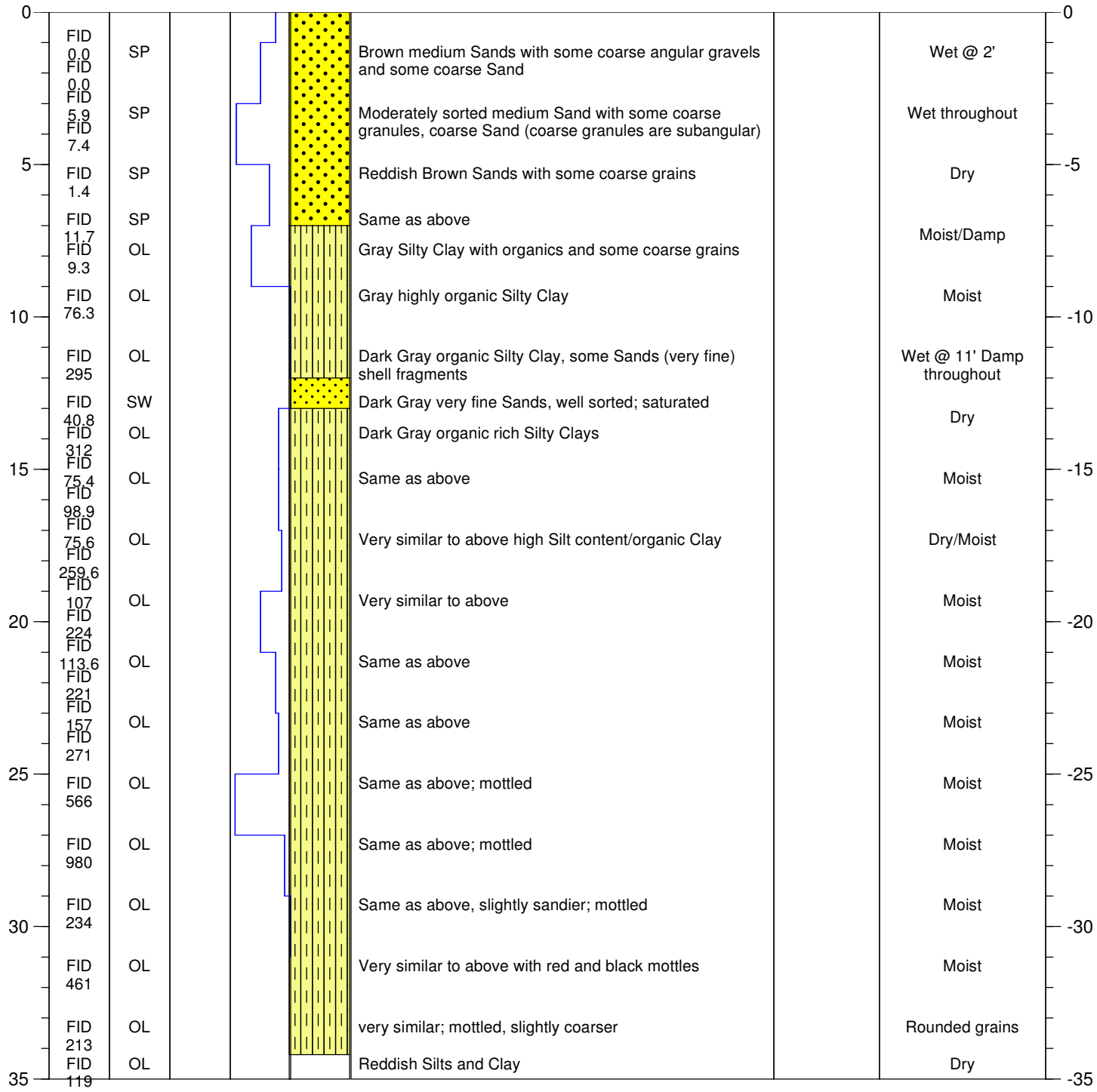
Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-1
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/03/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



Notes:

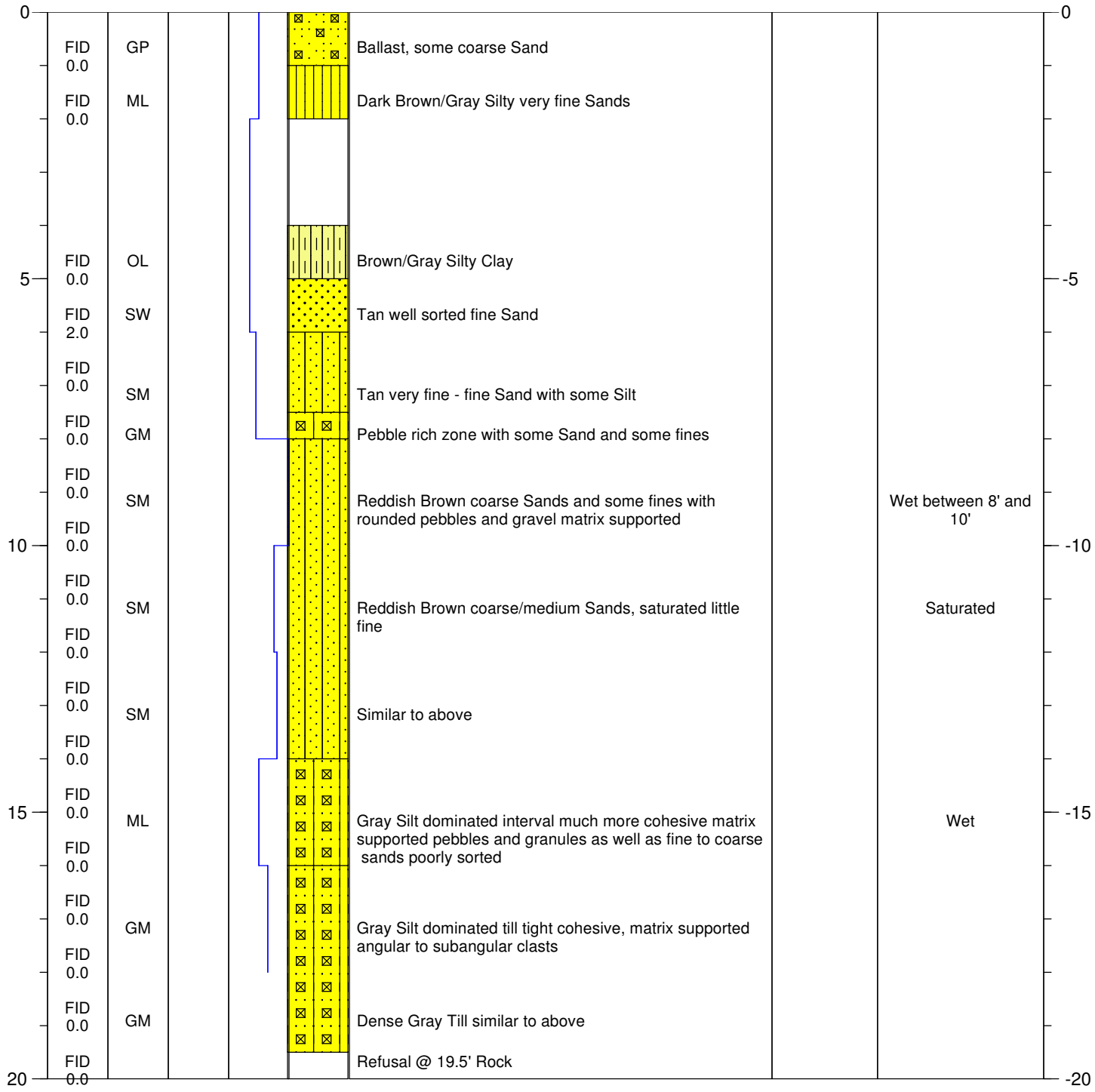
Date: 8/3/04

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-2
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/03/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



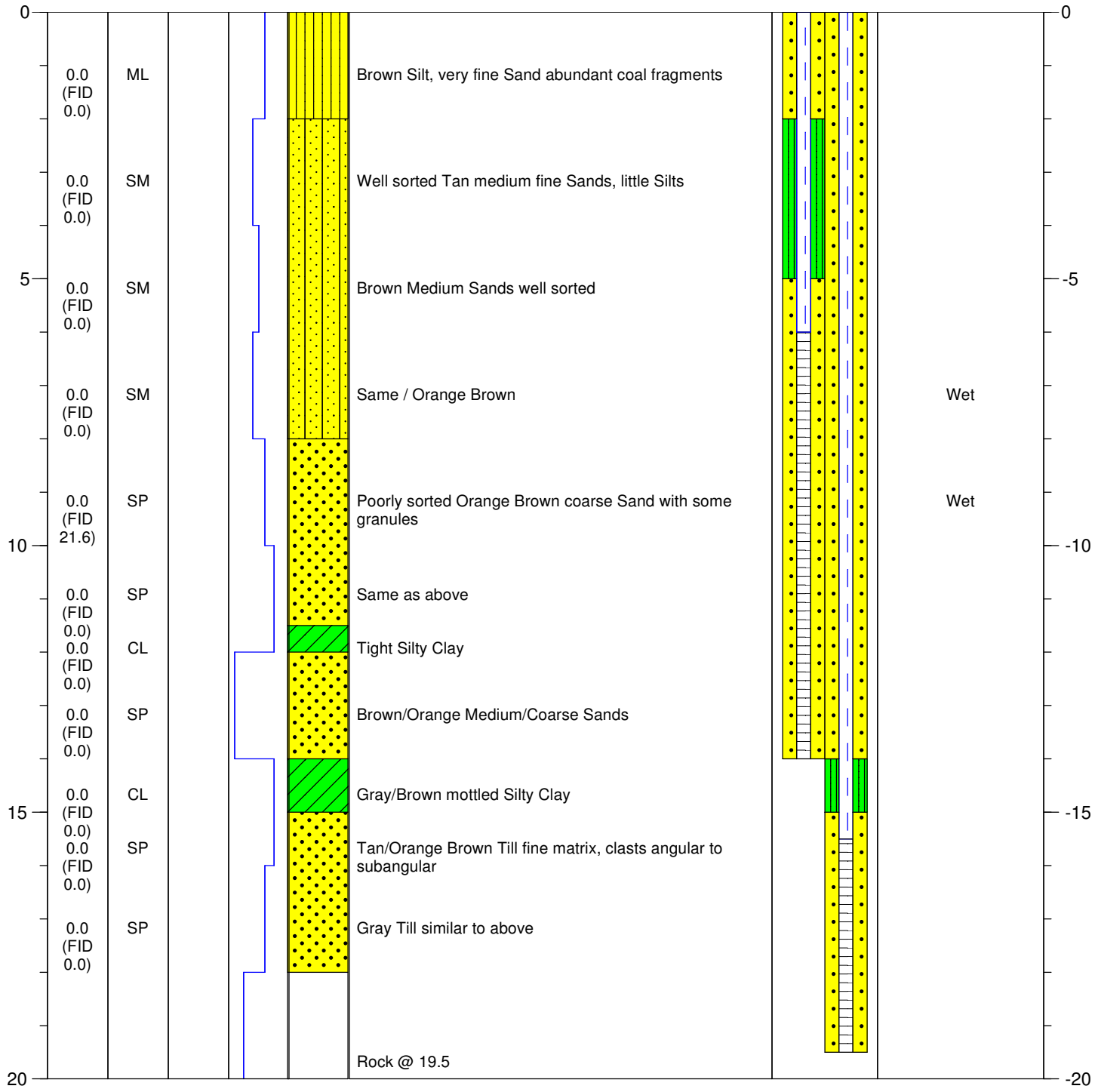
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-3
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/03/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



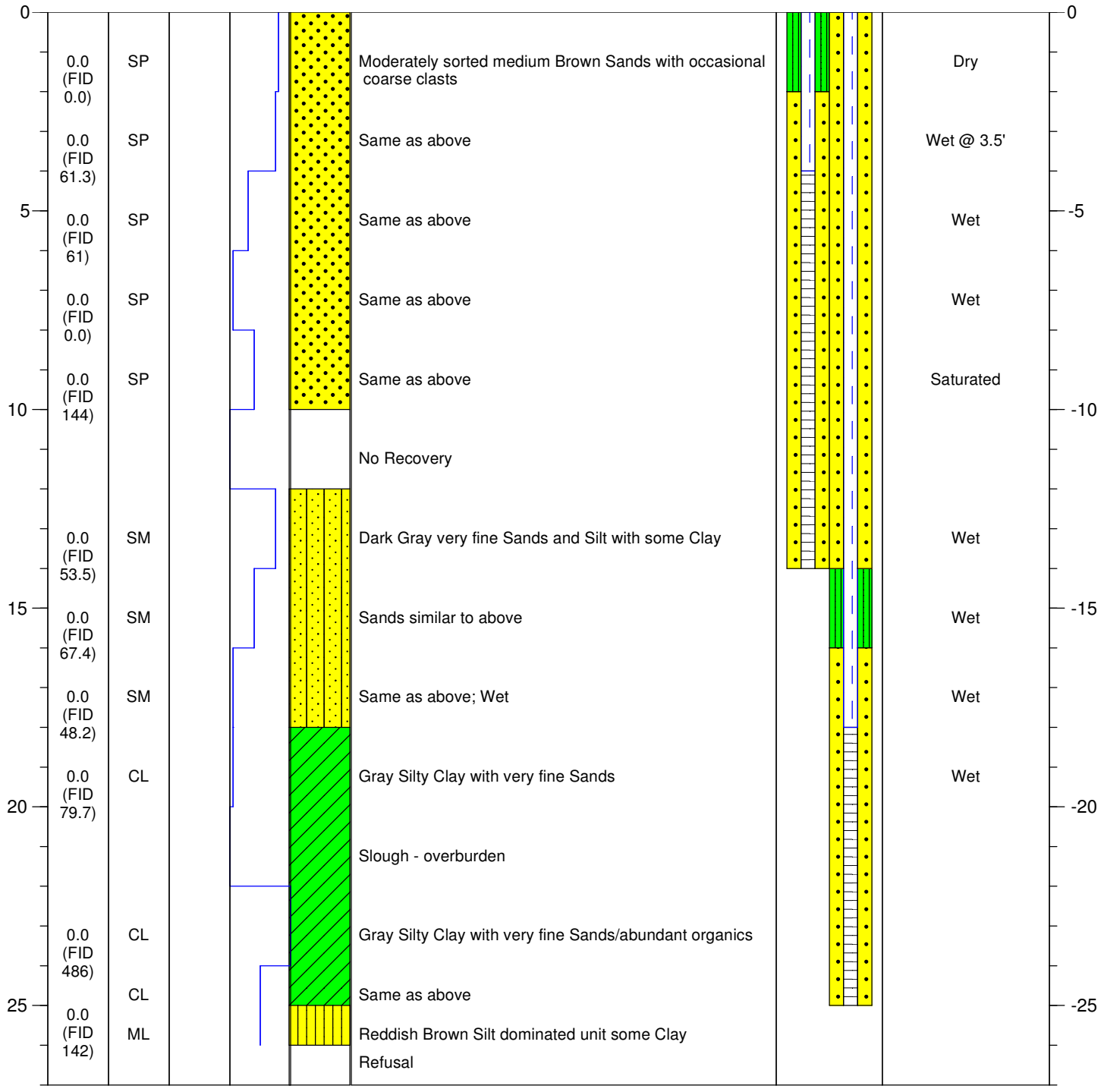
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-4
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/03/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



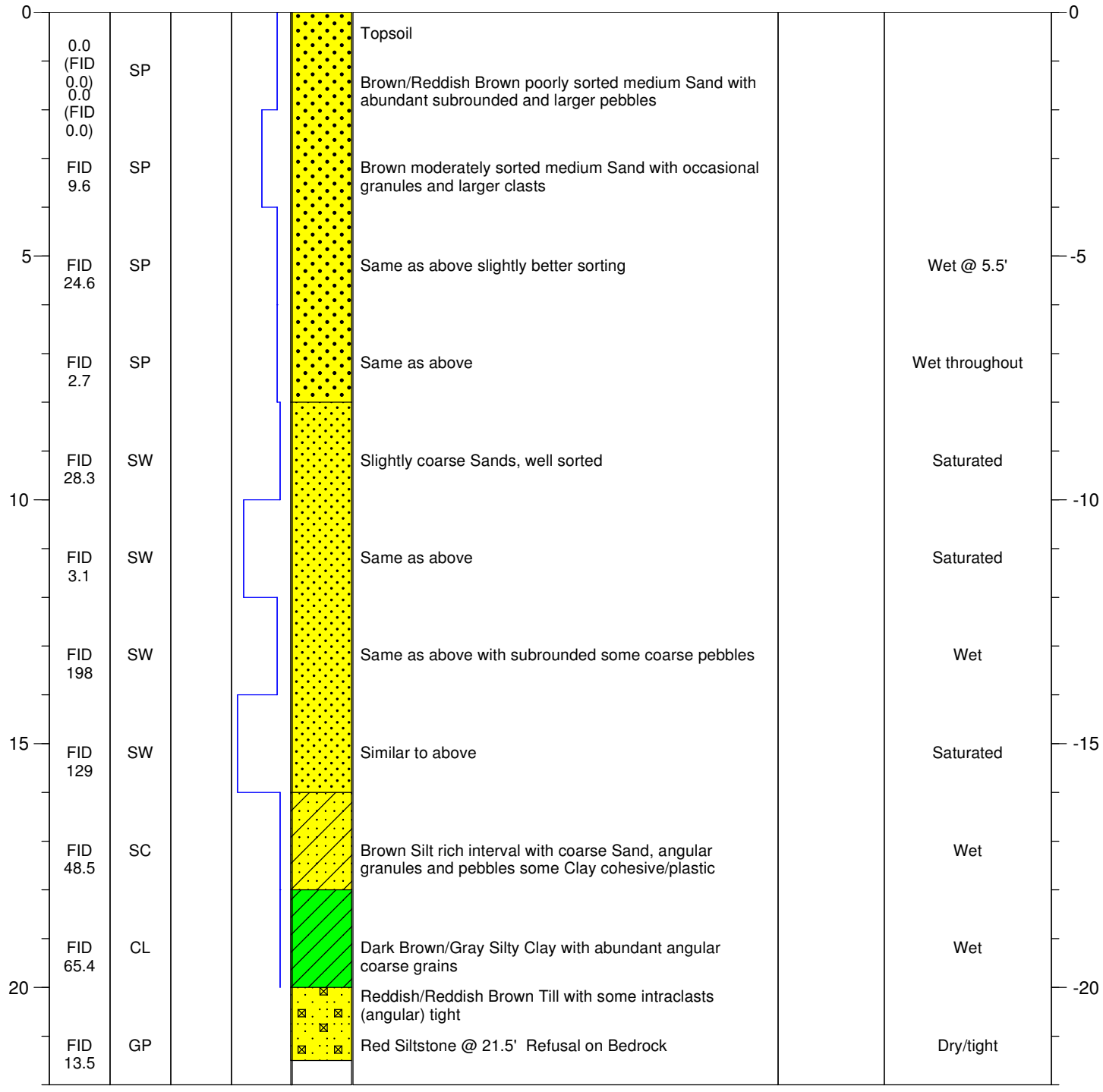
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-5 MW-8
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/09/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



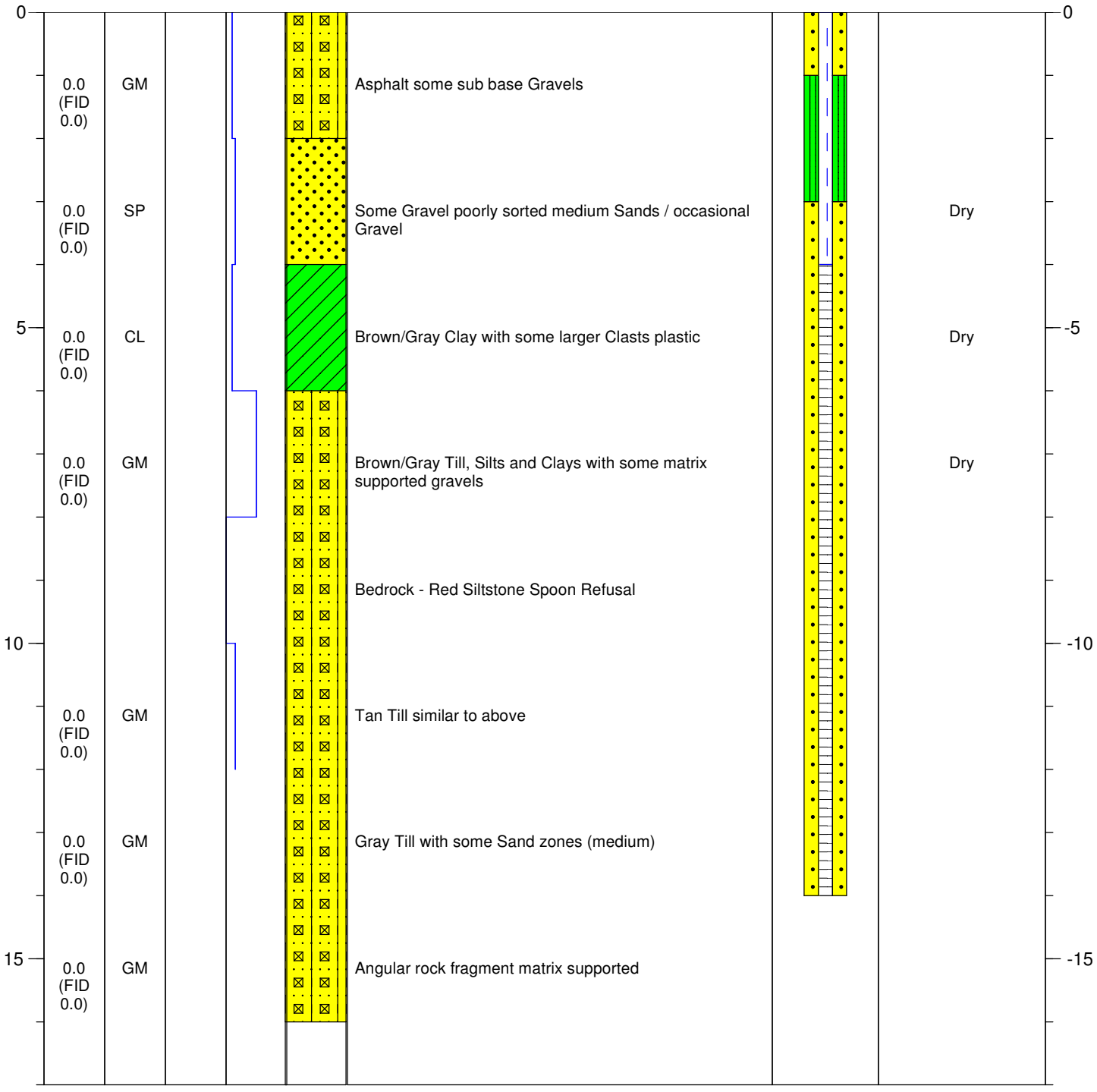
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-6
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/03/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



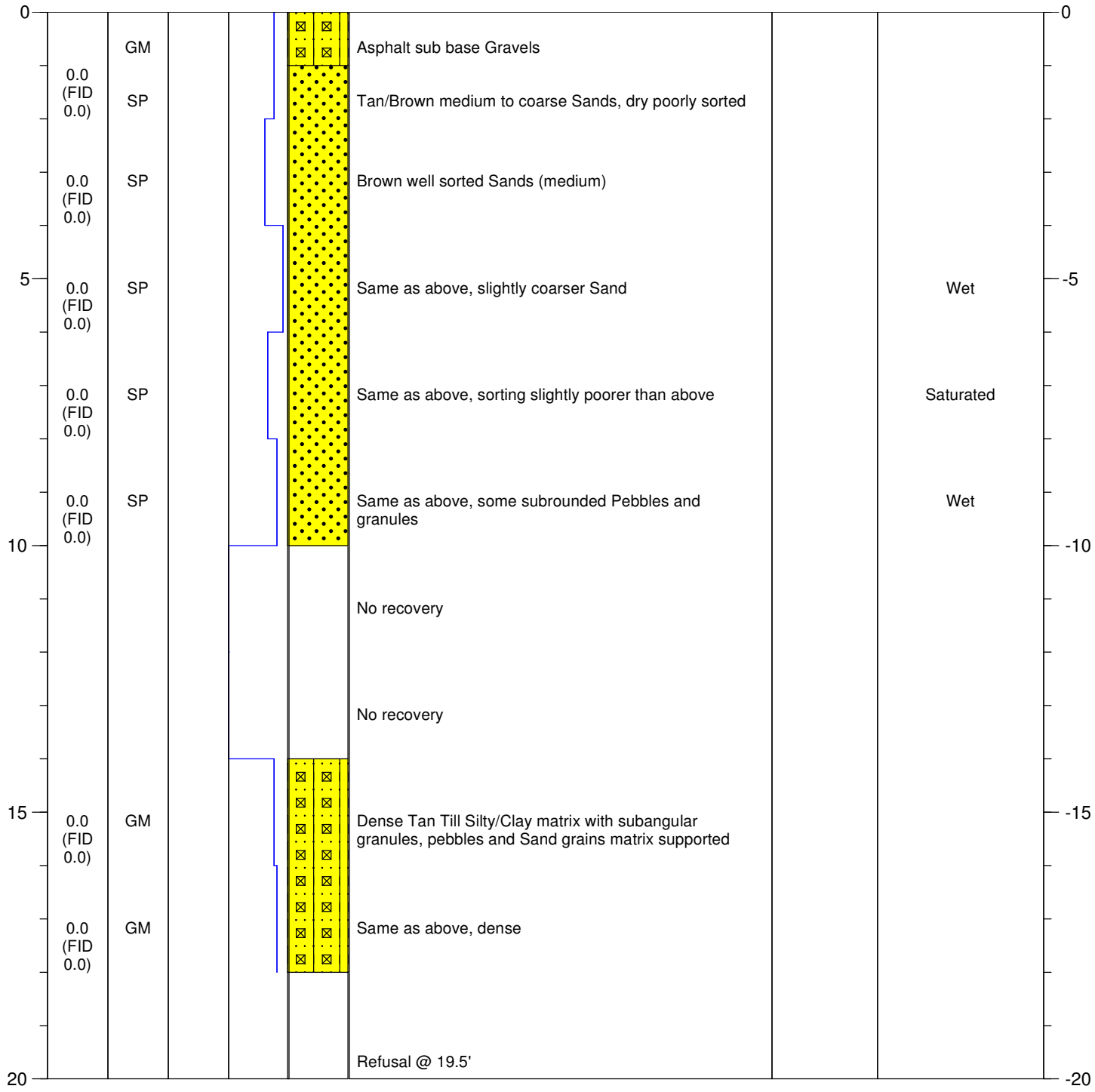
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-7 MW-2
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/06/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



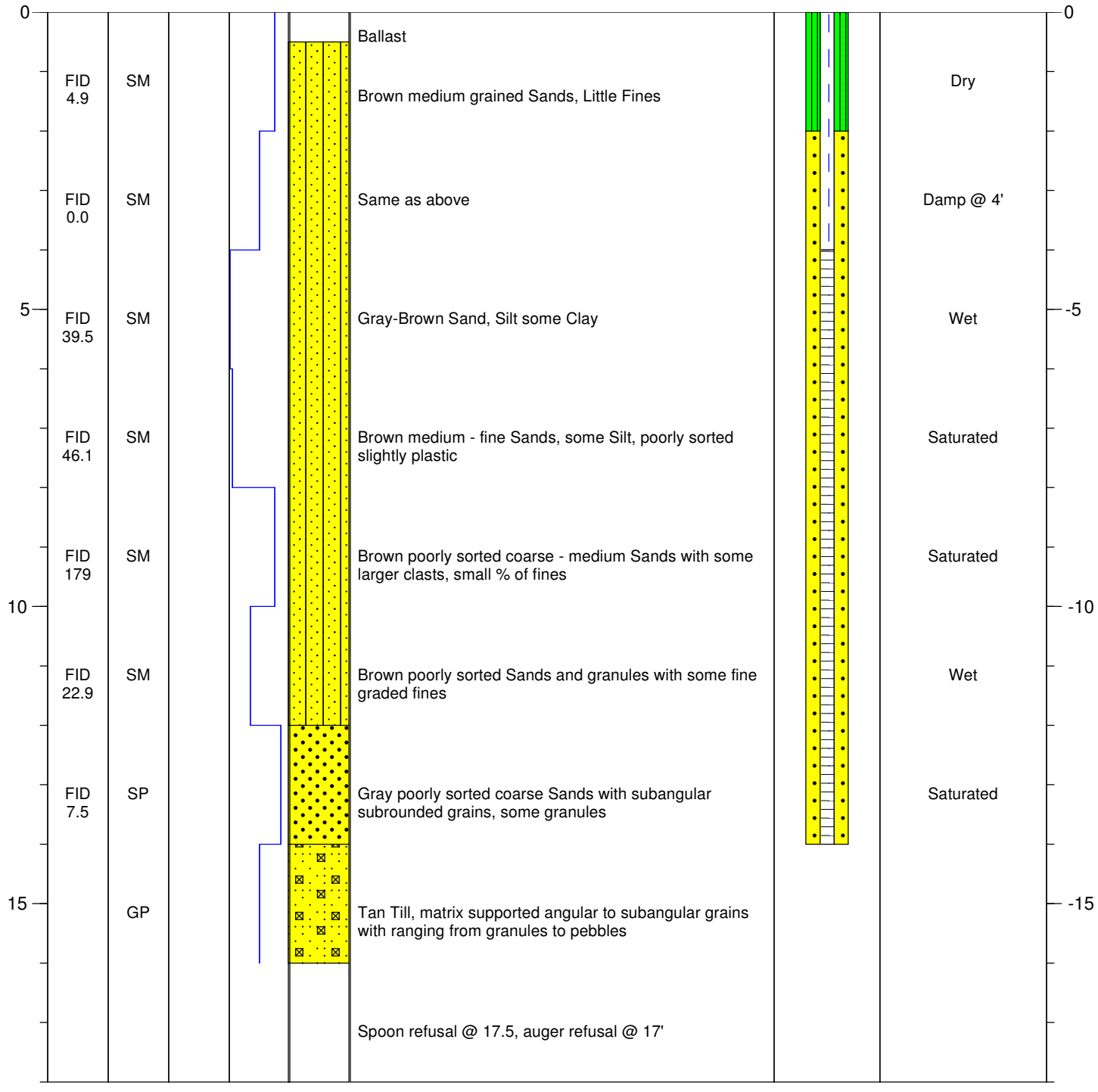
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-8
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/06/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



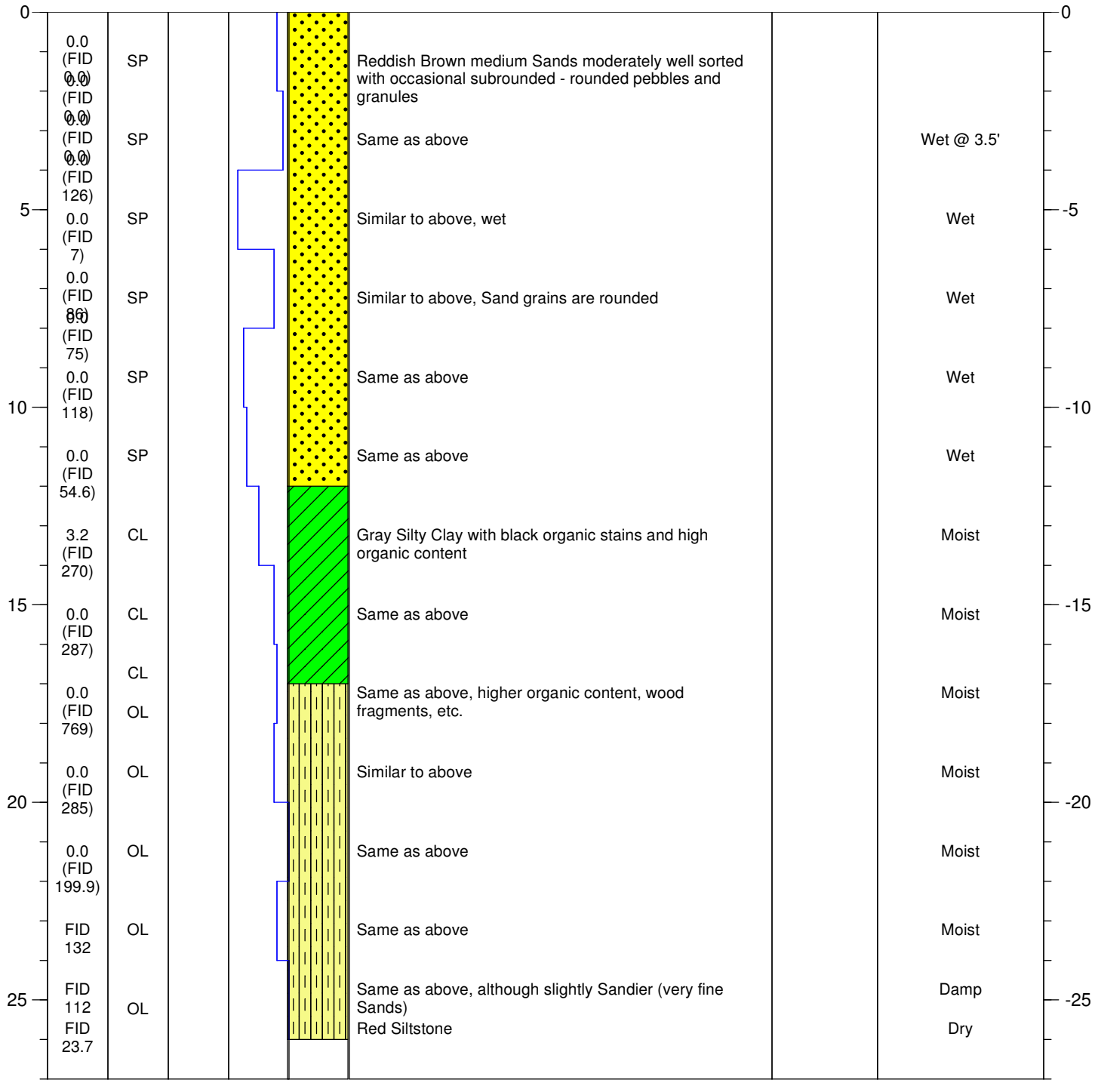
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-9
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/10/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



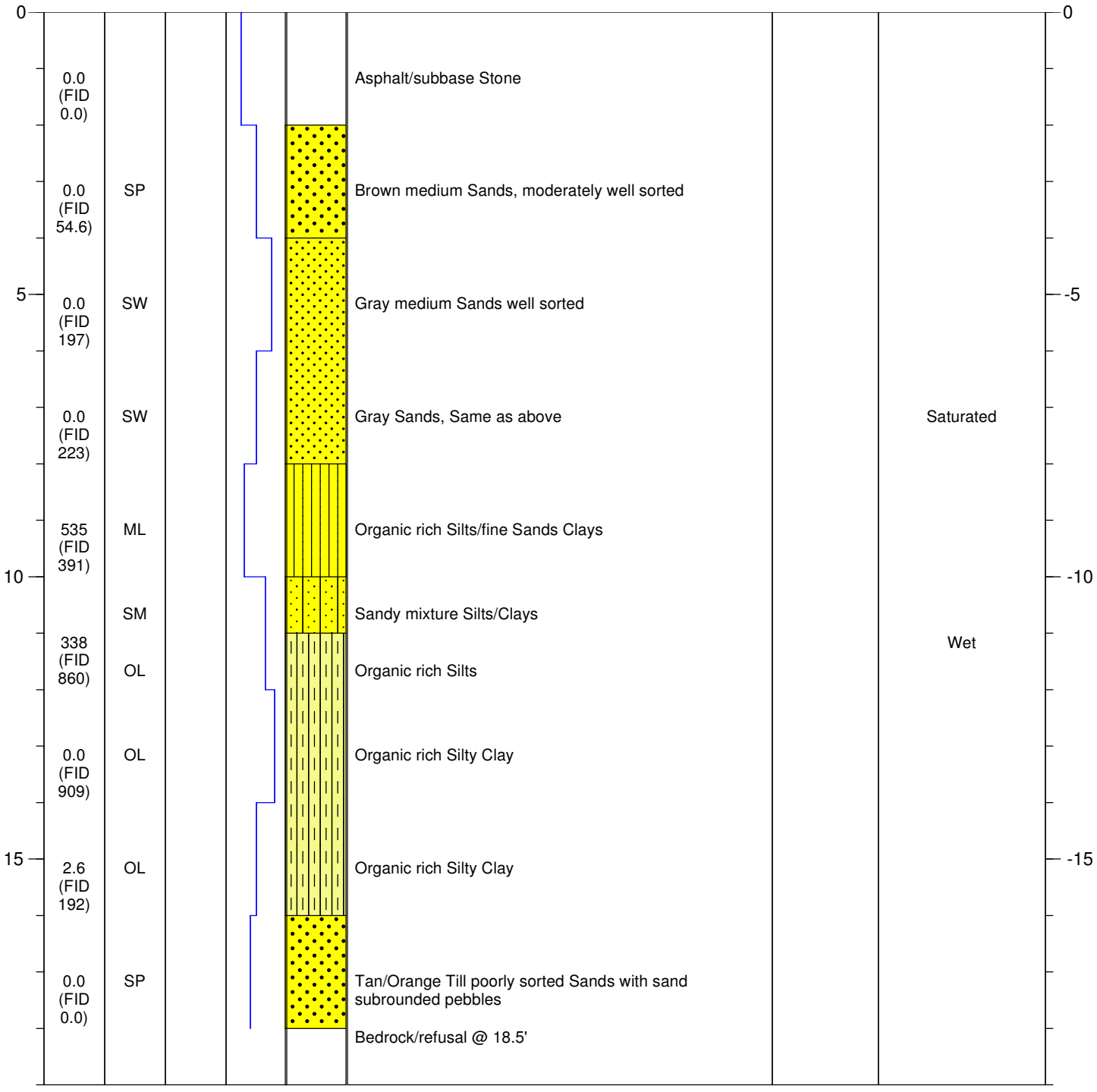
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-10
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/3/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



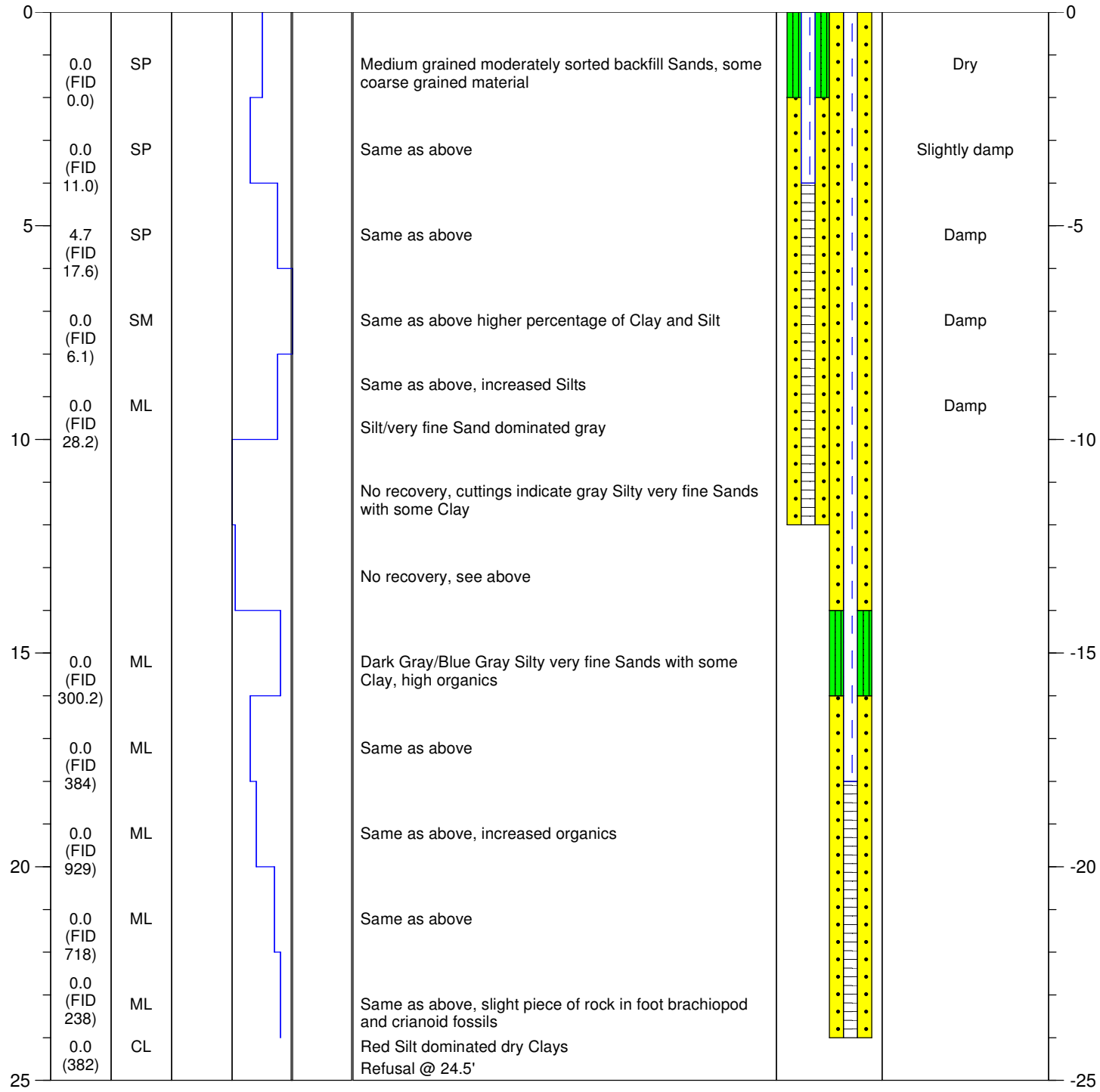
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-11
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/04/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



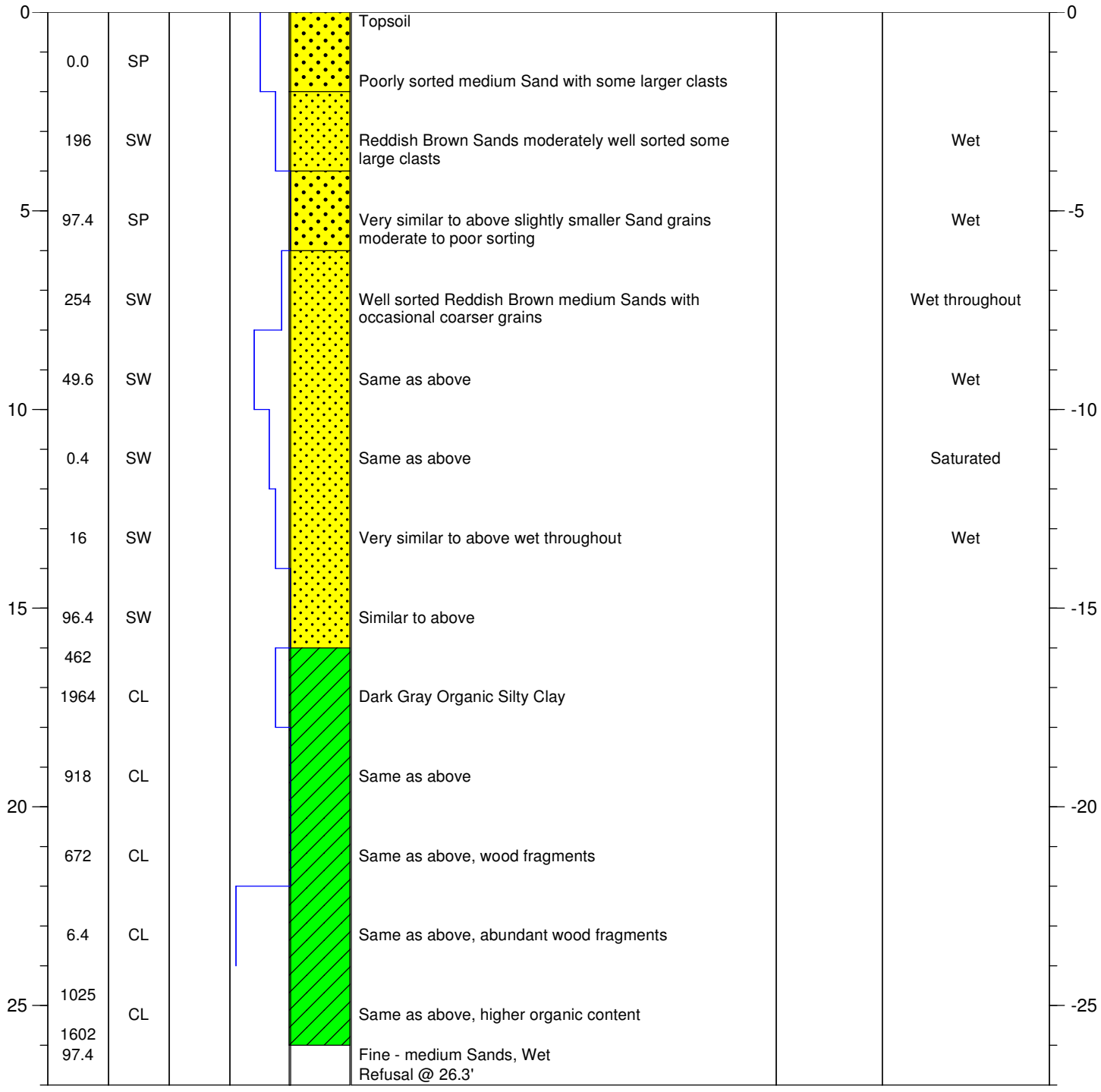
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-12 MW-6
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/10/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



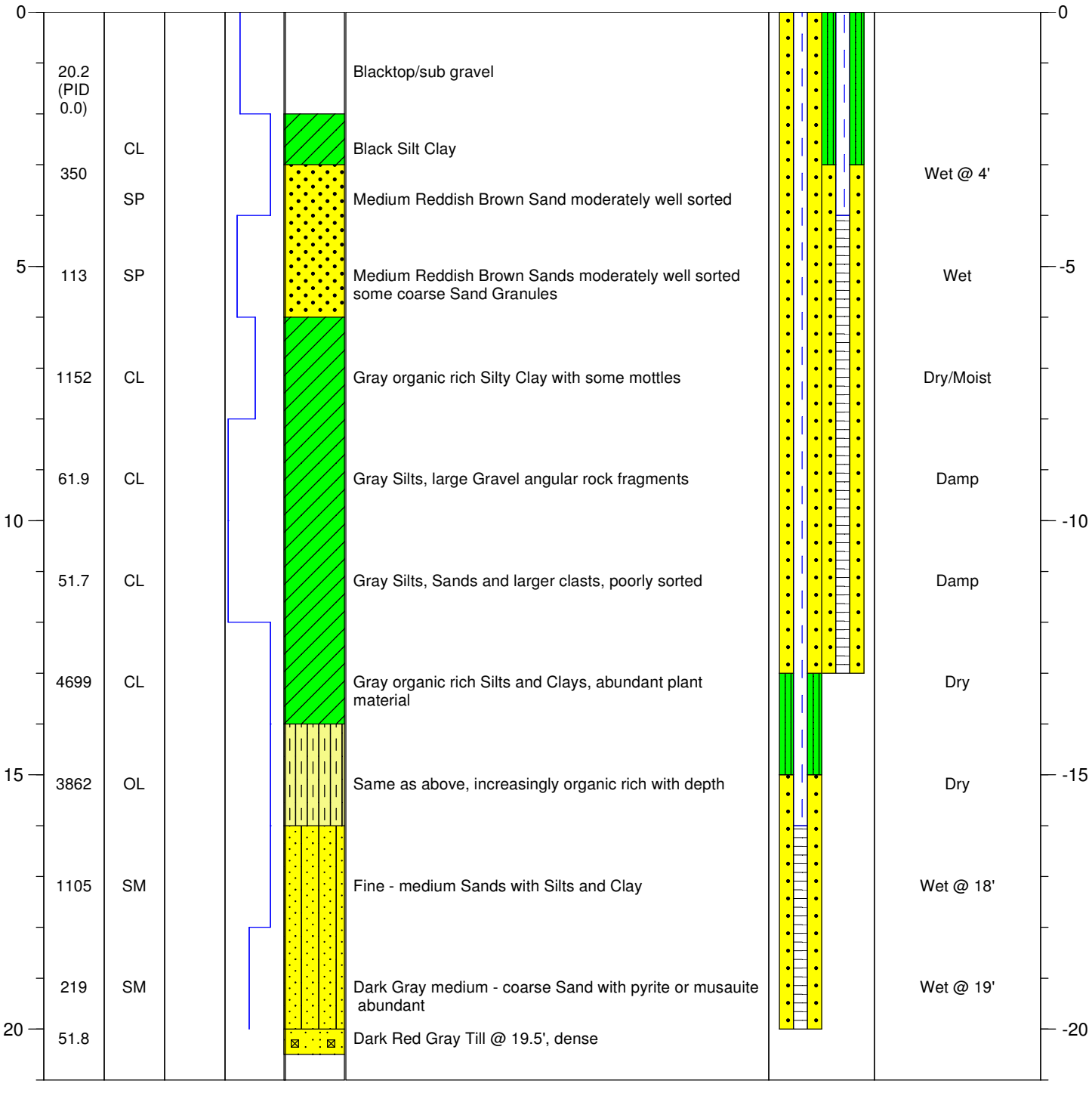
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-13
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



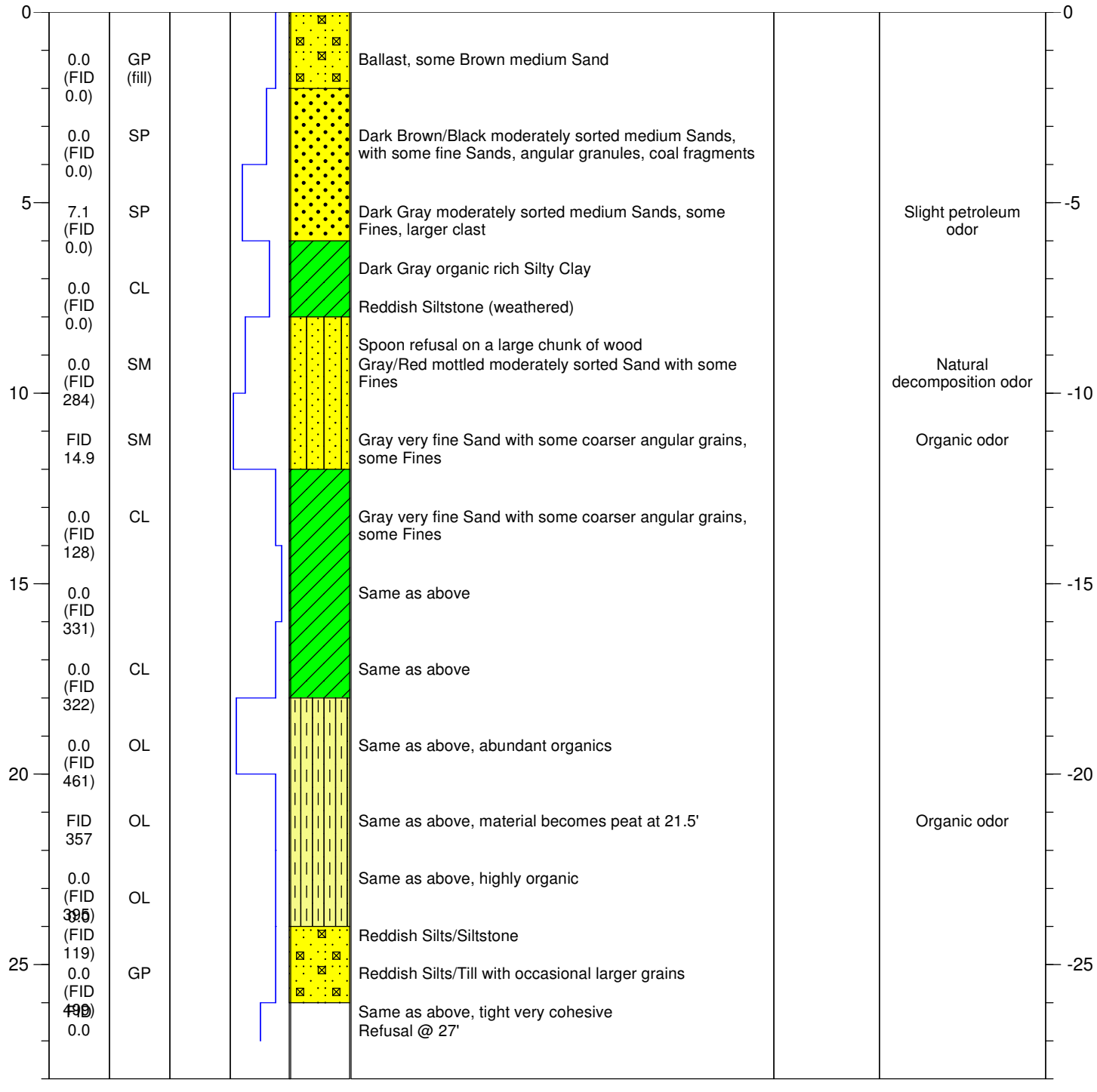
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-14 MW-3
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/05/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



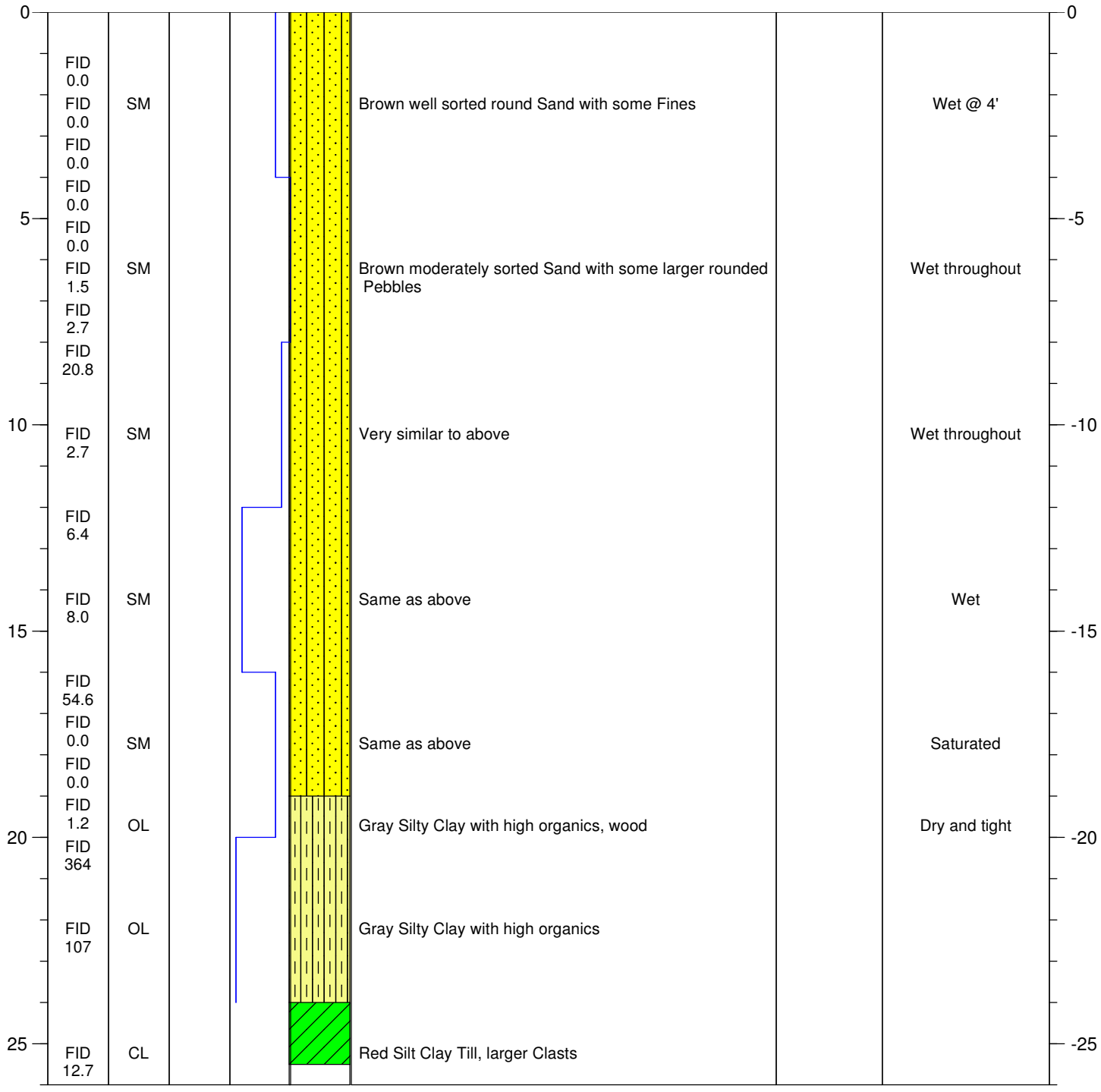
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-15
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



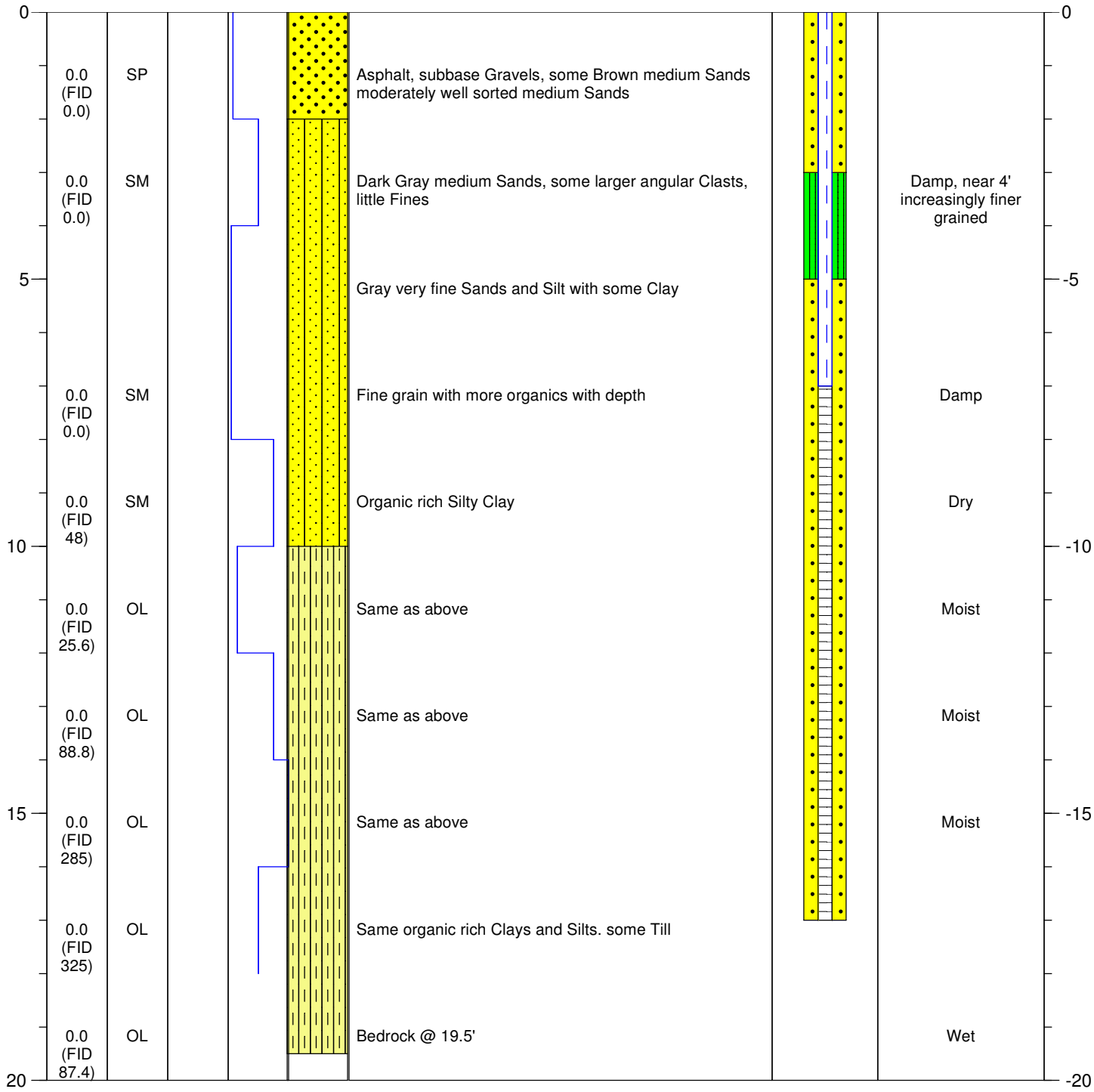
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-16
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	8/2/04
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Direct push



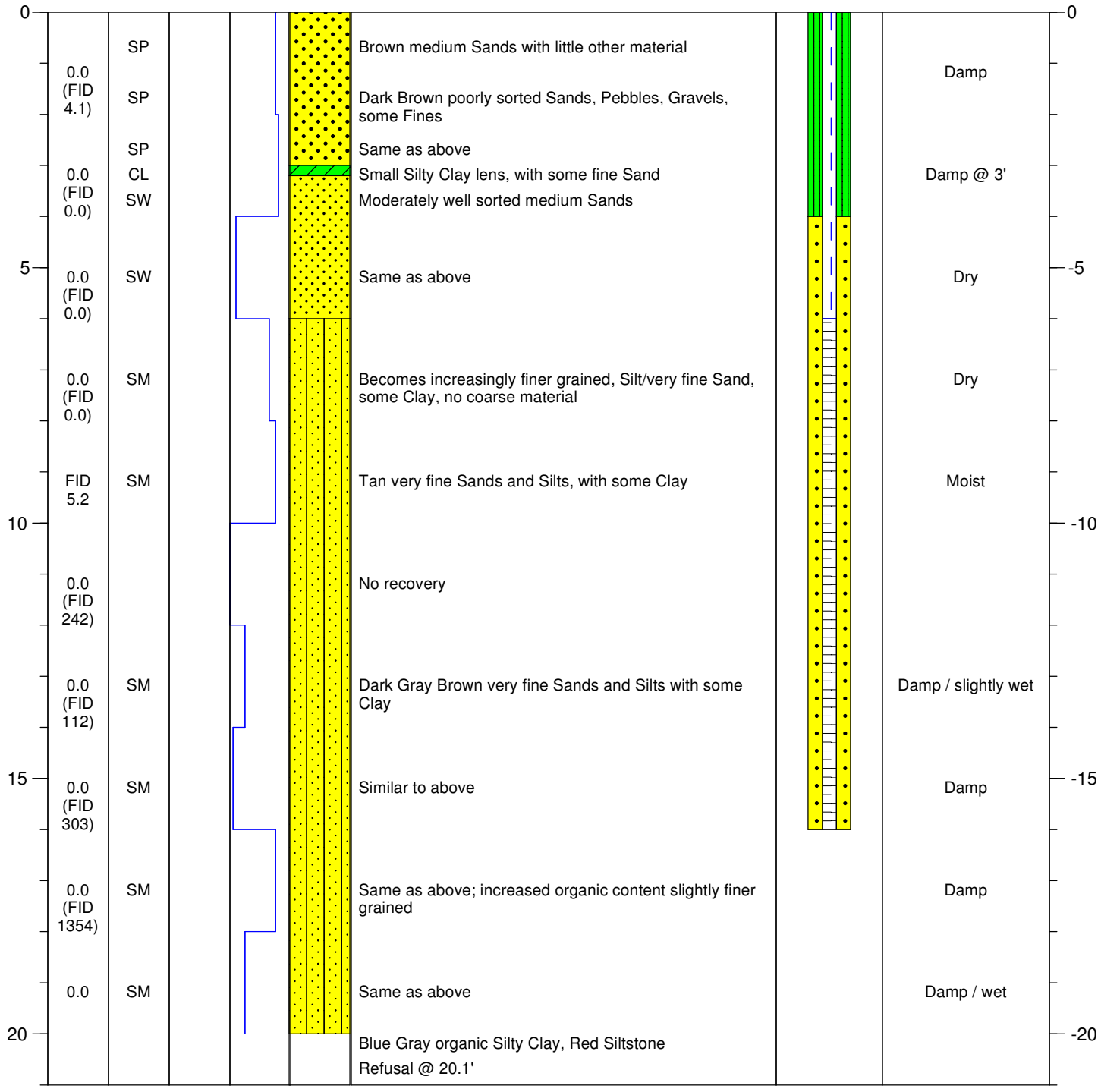
Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-17
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



Notes:

Project:	River Street	**Client:**	CSXT	**Boring No:**	SB-18 MW-5
Location:	Rochester, NY	**Contractor:**	Parrott Wolff	**Date:**	Enter Date
Project No:	643008504-0200	**Driller:**	Doug	**Method:**	Hollow Stem Auger



Notes:

Appendix B

FLUTe™ Flexible Liner Underground Technologies, Ltd. L.C.
For a medley of innovative designs
6 Easy St., Santa Fe, NM 87504
505-455-1300, www.flut.com

Description of *NAPL FLUTe* system

The system once emplaced:
This system consists of an impermeable flexible liner and an exterior covering on the liner which reacts with pure product (e.g., NAPL and DNAPL) to form a bright dye stain on a white background. The liner/cover system can be emplaced via several push rod methods. The pressurized liner forces the reactive cover tightly against the hole wall. The reactive cover is recovered from the hole by inverting/peeling the liner from the hole. In this manner, the cover does not touch the hole wall anywhere else as it is removed. The cover can then be examined for the presence and extent of layers, and even globules, of NAPL in the subsurface. This technique of installation and removal of the reactive covering through the interior of push rods provides a relatively inexpensive method for mapping of NAPLs and DNAPLs in the source region.

The installation technique
This liner installation method can be applied to the many driven casing "drilling" methods. The same trick is employed regardless of the casing diameter to allow the casing to be withdrawn without excessive drag of the liner on the casing. As the casing/rods are withdrawn, the liner is dilated against the hole wall at high pressure to support the hole wall against collapse and to seal the hole against vertical flow.

Experience:
This installation technique was first developed for the installation of color reactive liners for the mapping of NAPL layers in sediments. The technique has been employed at both commercial and Federal sites including: Savannah River Site, SC; Cape Canaveral, FL; Paducah, KY; Ft. Meade and Elkton, MD; WV; NJ; PA; CA, AL, KY, IA, NM.

Procedure:
The procedure is illustrated in the attached drawing. The rods are pushed to the full depth of interest. The liner with its reactive covering is inserted into the interior hole in the rods to the full depth. The rods are then filled with water. The rods are raised by one rod section to expose the hole wall. The liner is pressurized with a charge of water to hold the hole open and to anchor the liner in the hole. More water is added to the interior of the liner as the rods are pulled. Once the rods are fully removed, the hole is supported and sealed by the water filled liner. The covering is pressed against the hole wall for an hour, or so, and then the liner is inverted (peeled inside out) from the hole. The covering is therefore interior to the inverted liner. The covering is then peeled from the interior of the liner to reveal the stained map of the distribution of NAPLs in the subsurface.

For information on this technique, call toll free 888-333-2433.

Flexible Liner Underground Technologies, Ltd.
Santa Fe, NM 87501

Note: This technique is a proprietary method devised by Flexible Liner Underground Technologies, Ltd. Co. of Santa Fe, NM. One patent is held and several patents are pending on the method and hardware for several kinds of applications.

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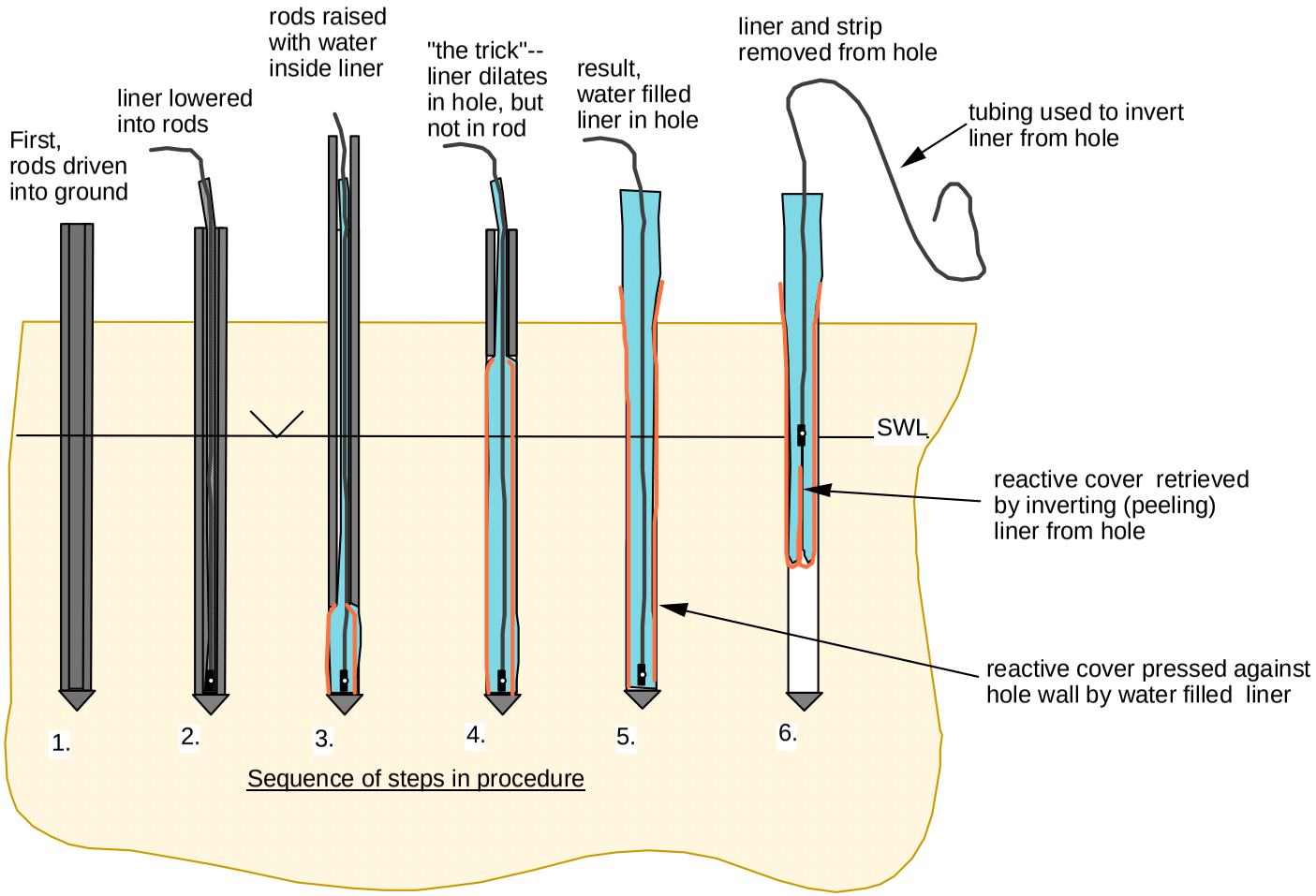
NAPL FLUTe method of installing color reactive liners in a punched hole [patented]



This technique allows mapping of NAPL/DNAPL layers in punched holes

For details, phone: 888-333-2433

Liner dilating as rod is withdrawn

Stains on covers from direct push holes

Stains on cover in 3” cored hole

Note: This technique is a proprietary method devised by Flexible Liner Underground Technologies, Ltd. Co. of Santa Fe, NM. One patent is held and several patents are pending on the method and hardware for several kinds of applications.