WORK PLAN FOR 1998 EXPLORATIONS
EAST PARKING LOT AREA
DELPHI AUTOMOTIVE SYSTEMS
1000 LEXINGTON AVENUE
ROCHESTER, NEW YORK
Site No. 8-28-064

by

Haley & Aldrich of New York
Rochester, New York

for

Delphi Automotive Systems
Rochester, New York

File No. 70014-051
October 1998

HALEY & ALDRICH

DELPHI
Automotive Systems

October 9, 1998

Ms. Mary Jane Peachey, P. E.
Regional Hazardous Waste Remediation Engineer
NYS Department of Environmental Conservation
6274 East Avon-Lima Road
Avon, New York 14414

Re: Work Plan for 1998 Explorations, East Parking Lot Area
Delphi Energy and Engine Management Systems, Rochester, NY

Dear Ms. Peachey:

Enclosed are two copies of the "Work Plan for 1998 Explorations, East Parking Lot Area, Delphi Energy and Engine Management Systems, 1000 Lexington Avenue, Rochester, NY." The work plan describes proposed subsurface exploration activities planned for the fall of 1998. The work will focus on intermediate-bedrock groundwater contamination in the area of the east parking lot to determine the extent of contamination and whether off-site migration of contaminants may be occurring.

Delphi understands that your office will not conduct a formal review and approval of this work plan since a consent order has not been signed. However, we would appreciate your informal review and comments, verbal or written. Delphi hopes to begin installing wells no later than the first week of November.

Please call me at 647-4766 if you have any questions during your review of the work plan.

Sincerely,

Richard C. Eisenman

Richard C. Eisenman
Senior Environmental Engineer

c: Mr. Richard Elliott, P. E., Monroe County Department of Health

Energy & Engine Management Systems
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UNDERGROUND
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HALEY & ALDRICH

9 October 1998
File No. 70014-051

Delphi Automotive Systems
1000 Lexington Avenue
P.O. Box 92700
Rochester, New York 14692-8800

Attention: Mr. Richard C. Eisenman
Senior Environmental Engineer

Subject: Work Plan for 1998 Explorations
East Parking Lot Area
Delphi Automotive Systems Facility
1000 Lexington Avenue
Rochester, New York

Gentlemen:

This work plan describes subsurface environmental explorations to be performed in the fall of 1998 at the Delphi Automotive Systems (Delphi) facility located on Lexington Avenue in Rochester, New York. The location of the Delphi facility is shown on Figure 1, Project Locus.

Thank you for asking Haley & Aldrich to provide this work plan. If you have any questions or require additional information, please call us.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK

Thomas D. Wells
Senior Env. Geologist

Jeffrey E. Loney
Vice President

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EXECUTIVE SUMMARY

This work plan describes subsurface environmental-exploration activities to be performed in the fall of 1998 at the Delphi Automotive Systems (Delphi) facility located at 1000 Lexington Avenue in Rochester, New York. The work plan was prepared by Haley & Aldrich of New York (Haley & Aldrich) at the request of Delphi. The Delphi facility is identified by NYSDEC's Division of Environmental Remediation as Inactive Hazardous Waste Disposal Site No. 8-28-064.

Remedial investigations have been performed by Delphi at the site since 1981, and ongoing remedial actions have been undertaken to address contamination identified at the site. Results of previous remedial investigations were previously reported to NYSDEC on a regular basis, and a report summarizing data from the previous remedial investigations was prepared and submitted to NYSDEC in September 1998.

The September 1998 report indicated that additional work was necessary to determine the extent of contamination in intermediate-bedrock groundwater in the area of the east parking lot. The report stated that a work plan for this area would be prepared and submitted to NYSDEC. This work plan addresses that commitment.

The work to be performed in the fall of 1998 will focus on intermediate-bedrock groundwater contamination in the area of the east parking lot to determine whether off-site migration of contaminants may be occurring. The proposed work includes installation of two new intermediate-bedrock wells at the apparently-downgradient northeast site boundary north of the east parking lot and installation of three new intermediate-bedrock monitoring wells and one shallow-bedrock well at locations adjacent to the Lexington Avenue sewer tunnel on the south side of the east parking lot. A visual inspection of and sampling of seeps in the Lexington Avenue sewer tunnel will also be performed.

Installation of a monitoring well adjacent to groundwater migration-control system well GR-2 will be performed. Sampling and measurement of water levels at GR-2, a migration-control system pumping well, is hindered by the configuration of the well head and associated equipment. A new well adjacent to GR-2 will facilitate monitoring of groundwater conditions at the east end of the migration-control trench, which is located northwest of the east parking lot, and will facilitate monitoring of the effects of migration-control pumping on groundwater-quality and hydraulic conditions in the east parking lot.

Hydrogeologic testing and groundwater sampling for laboratory analysis will be performed at the new wells. Groundwater sampling for laboratory analysis and groundwater-level monitoring will also be performed at selected existing site wells in the east-parking-lot area.

The results of these activities will be evaluated and presented in a report which will also cover 1998 groundwater-sampling and water-level-monitoring activities performed at the site through August 1998. The results of the previous 1998 activities were summarized in the September 1998 data summary report; however, a standard, detailed report of these activities has not yet been submitted to NYSDEC. The September 1998 data summary report stated that a detailed report of the previous 1998 activities would be submitted to NYSDEC, and this commitment will be addressed by the report specified in this work plan.

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I. INTRODUCTION

This work plan was prepared at the request of Delphi to describe activities planned for the fall of 1998 at the Delphi Automotive Systems (Delphi) facility located at 1000 Lexington Avenue in Rochester, New York. The site location is shown on Figure 1. The Delphi site has been identified by NYSDEC as Inactive Hazardous Waste Disposal Site No. 8-28-064.

A report summarizing data from the previous remedial investigations performed at the site was prepared and submitted to NYSDEC in September 1998. The September 1998 report indicated that additional work was necessary to determine the extent of contamination in intermediate-bedrock groundwater in the area of the east parking lot of the Delphi facility. The report stated that a work plan for this area would be prepared and submitted to NYSDEC. This work plan addresses that commitment.

The east parking lot is located north of Lexington Avenue between Delphi's east property line and the Delphi manufacturing plant. It is bounded on the northeast by a rail spur which leads to the Delphi property; a manufacturing facility (American Packaging Corporation) is located on the northeast side of the rail spur. The east parking lot is bounded on the east by an embankment for a separate railroad line which crosses over Lexington Avenue; various commercial and industrial properties are located on the east side of the rail line. South of the east parking lot on the south side of Lexington Avenue an electrical-transformer substation owned by Rochester Gas & Electric Company (RG&E) is present.

1.1 Background Information

Data collected in 1998 from wells installed in the east parking lot in the fall of 1997 indicate that additional monitoring wells are needed to determine the extent of contamination and the gradients of groundwater flow and contaminant migration in this area. Locations of all existing wells in the east parking lot area are shown on Figure 2. At present there are two pairs of shallow- and intermediate-bedrock monitoring wells located on either side of Lexington Avenue on the south side of the east parking lot (SR/R-234 and SR/R-235). The SR/R-2 well pair is located at the east property line near Lexington Avenue at the southeast corner of the parking lot. There are two overburden piezometers (PZ-111 and -113) and one shallow-bedrock piezometer (PZ-115) located along the Delphi property line at the northeast edge of the east parking lot. There are a number of overburden, shallow-bedrock, and intermediate-bedrock wells located west of these perimeter wells.

Groundwater Contamination

Delphi began on-site investigations of the source and extent of the contamination in this part of the site in 1993, and groundwater monitoring activities are currently ongoing. The contamination of intermediate-bedrock groundwater previously detected includes dissolved-phase contamination by chlorinated volatile organic compounds (VOCs) and contamination by LNAPLs containing PCBs or chlorinated VOCs.

LNAPL containing PCBs is present in intermediate-bedrock well R-2 located in the east parking lot on the east side of the Delphi facility. LNAPL containing chlorinated VOCs is present in the east parking lot at intermediate-bedrock wells R-235, R-236, and R-238.

LNAPL has not been detected in intermediate-bedrock wells R-234 and R-237 but dissolved-phase contamination of groundwater by chlorinated VOCs is present at these locations.

The sources for and extent of contamination in the intermediate-bedrock zone on the east side of the facility have not been determined. The available data indicate that a source or sources of chlorinated VOCs including trichloroethylene (TCE) and related breakdown products, and of the LNAPL containing chlorinated VOCs, may be located in a former degreasing-operations area inside Plant 1 of the Delphi facility. There also appears to be an off-site source or sources located south of the Delphi site for some or all of the chlorinated-VOC contamination of groundwater detected at R-234, where 1,1,1-trichloroethane (TCA) has been detected at low levels. TCA and related breakdown products as well as breakdown products of TCE are present in groundwater at the upgradient SR/R-11 well cluster, which is located southwest of R-234 in the southwest corner of Delphi's south parking lot.

The source or sources of the PCBs detected in R-2 LNAPL have not been identified. The previous data indicate that a possible source is the RG&E substation located adjacent to the southeast corner of the Delphi property. First, it is apparent from the VOC, PCB, and other analytical data collected during previous investigations that the R-2 LNAPL contains oils and contaminants from a source or sources other than the sources of the LNAPL present at R-235, R-236, and R-238. Second, in April 1995, personnel from the Monroe County Pure Waters Department had inspected the municipal sewer tunnel which runs beneath Lexington Avenue in the area between the Delphi facility and the RG&E substation. Seeps in the tunnel walls were noted during the inspection, and wipe samples were collected by the county personnel for analysis by Delphi's project laboratory (Free-Col Laboratories, Ltd. of Meadville, Pennsylvania). PCBs were detected in wipe samples from two locations where seeps of oil were noted in the south wall of the sewer tunnel north of the substation; the locations were 50 and 75 feet east of the main, gated entrance to the Delphi plant.

Monitoring wells SR-234 and R-234 were installed in September 1995 between the sewer and the substation in this area. Groundwater sampling at the SR/R-234 location from 1995 to the present has not detected PCBs or LNAPL. It is possible that LNAPL is present in the intermediate-bedrock zone at this location in the horizon above the top of the R-234 monitoring interval.

Bedrock Sewer Tunnels

The east parking lot is located between two large-diameter municipal sewer lines. One is the Lexington Avenue sewer described above. The other sewer line, which is referred to in this work plan as the Driving Park leg of the sewer tunnel, is located along the northeast boundary between the Delphi property and the adjacent American Packaging property. The approximate locations of the sewer tunnels are shown on Figure 2. The two sewers flow towards and merge at a point beneath Lexington Avenue approximately 1,000 feet east of monitoring well R-2 in the southeast corner of the Delphi site. The Lexington Avenue sewer continues east from that point and connects to Monroe County's municipal sewage treatment system.

Both sewers receive stormwater and sanitary and industrial wastewater discharges from the Delphi site and other properties north, west and southwest of the Delphi site. Pretreated process wastewater from the Delphi facility is discharged to the Driving Park leg at a point near monitoring well PZ-140.

Both sewers were built in the period from 1938 to 1940 and are concrete-lined semi-elliptical structures with a 7-foot inside width. In the east parking lot area, both sewers are contained in bedrock tunnels. The bedrock tunnels are approximately 10 feet from top to bottom, and the bases of the tunnels in this area are 25 to 35 feet below the top of bedrock. (The upstream section of the Driving Park leg of the sewer tunnel located under Delphi's north parking lot, northwest of the east parking lot, was constructed in an open-cut excavation. The sewer elevation is higher and the top-of-bedrock surface is lower in this area than in the area of the east parking lot. The location of the end of the open-cut section is shown on Figure 2.)

Beneath Lexington Avenue, at a location directly south of the main entrance to the Delphi plant and north of the RG&E substation, there is an unlined 14- by 15-foot shaft which extends 32 feet down from the roadway deck through bedrock to the top of the tunnel. The location of the shaft is shown on Figure 2. As-built section drawings of the shaft are presented in Appendix A. A 27-inch combined sewer which runs along the south side of Lexington Avenue connects to the 7-foot tunnel at the shaft.

A 15-inch sanitary sewer line from the Delphi facility connects to the Driving Park leg of the sewer at a point approximately 90 feet east of PZ-115. An as-built plan and section drawing of the connection is presented in Appendix A. The drawing indicates that the sanitary line drops from a shallow trench in the top of bedrock to the level of the 7-foot sewer in a narrow shaft located 50 feet south of the tunnel. The drawing shows concrete plugs around the Delphi sewer at the top and bottom of the shaft and at the end of the drift where the Delphi sewer connects to the tunnel. The approximate locations of the Delphi sewer and the associated shaft are shown on Figure 2.

Site data indicate that the sewer tunnels or related structures act as shallow-groundwater discharge features. Depressions in the water table above and along both sewers are apparent from the site data. The sewers or related structures may also affect groundwater flow and contaminant migration in the intermediate-bedrock zone. The sewer tunnels, water-table depressions above the tunnels, or zones of increased permeability around the tunnels may serve as potential pathways for off-site migration of contaminants.

Possible Influence of Migration-Control System

The February 1998 report on 1997 well-installation and groundwater-sampling activities in the east parking lot area included a recommendation that a trial reduction in the groundwater pumping rate from the groundwater migration-control trench located in the north parking lot be conducted. The trial was recommended to determine whether a reduced pumping rate would maintain VOC-contaminant-migration control at the property boundary along the north side of the site and at the same time minimize the potential for drawing PCB-contaminated LNAPL in the intermediate-bedrock zone north toward the migration-control system trench from the area of Lexington Avenue south of the east parking lot.

The pumping-rate trial was initiated in May 1998. Prior to the trial, the pumping rate from the trench fluctuated seasonally but averaged approximately 40 gallons per minute. Since the trial began the average pumping rate has been approximately 26 gpm. To date, effects of the reduction in pumping rate on groundwater quality, groundwater elevation, or LNAPL distribution in the east parking lot area have not been evident in the data collected. Effects of the reduction in pumping rate on groundwater quality or LNAPL distribution elsewhere on site have also not been evident in the data collected. Effects on groundwater elevations have

only been noted in the immediate vicinity of the trench, where a rise in shallow- and intermediate-bedrock water levels on the order of 1 to 2 feet has been noted.

1.2 Work Plan Organization

Section II of the work plan presents an overview of the work to be performed. The investigative methods and quality assurance and quality control procedures to be followed are summarized in Section III of the work plan. Proposed exploration locations are shown on Figure 2.

II. OVERVIEW

This section of the work plan describes the work to be performed at the site and the laboratory analyses to be performed on soil, groundwater, and LNAPL samples to be collected. The work described is intended as the next step in delineation of the extent of LNAPL contamination and of dissolved-phase VOC-contamination of groundwater in the intermediate-bedrock zone on the east side of the Delphi facility. Proposed exploration locations are shown on Figure 2.

2.1 Locational Surveying and Visual Inspection of the Lexington Avenue Sewer Tunnel and Shaft

Pending approval by the Monroe County Division of Pure Waters, a visual inspection of the interior of the Lexington Avenue sewer tunnel in the area south of the east parking lot will be performed. The inspection will include the shaft located between the RG&E substation and the Delphi main gate. Delphi will request logistical assistance for the inspection from the Monroe County Division of Pure Waters. Delphi will also request that Pure Waters provide accurately-surveyed information on the location of the sewer east and west of the shaft.

The inspection will be made by personnel experienced in evaluating tunnel conditions. The inspection will identify the nature and location of seeps of groundwater and LNAPL into the tunnel and shaft. Sampling of groundwater or LNAPL at seeps will be performed where possible, and samples will be submitted to the project laboratory for analysis of PCBs and VOCs by EPA methods 8082 and 8260, respectively.

2.2 Installation of New Monitoring Wells

Installation of additional intermediate-bedrock monitoring wells will be performed on the north side of the east parking lot at two locations on the downgradient site boundary. One well is proposed for a location east of the facility adjacent to existing shallow-bedrock well PZ-115, and a second is proposed for the east side of north parking lot #4 at a location between existing overburden well PZ-111 and Driving Park Avenue. These locations should provide additional information on the following:

- lateral hydraulic gradients in the intermediate-bedrock zone on the northeast side of the Delphi site,
- the presence or absence of contamination in intermediate-bedrock groundwater at the northeast site boundary, and
- groundwater conditions in intermediate bedrock adjacent to the Driving Park Avenue leg of the city sewer tunnel near the point where the tunnel exits the area of the Delphi site.

Pending approval from the City of Rochester, three additional intermediate-bedrock monitoring wells and one additional shallow-bedrock monitoring well will be installed south of the east parking lot at offsite locations adjacent to the Lexington Avenue sewer tunnel on City of Rochester property. Installation of a pair of intermediate-bedrock monitoring wells in

Lexington Avenue on either side of and in close proximity to the tunnel is proposed for a location just west of the railroad overpass located south of the existing SR/R-2 well cluster and east of the RG&E substation. A single shallow-bedrock monitoring well will also be installed at this location in close proximity to or directly above the tunnel. An additional intermediate-bedrock well will be installed near the location of existing well R-234. These new wells should provide additional information on the following:

- hydraulic-gradient and groundwater-quality conditions along the Lexington Avenue sewer tunnel near the southeast corner of the site,
- whether contaminants are migrating offsite to the east in the subsurface above or along the outside of the tunnel, and
- whether LNAPL is present in intermediate-bedrock on the south side of the sewer tunnel in the vicinity of the RG&E substation.

In the north parking lot, installation of a monitoring well in the migration-control trench adjacent to pumping well GR-2 will be performed to facilitate future monitoring of the performance of the groundwater migration-control system and of groundwater conditions at the east end of the migration-control trench. Sampling and measurement of water and LNAPL levels in GR-2 is problematic because of the configuration of the cap and piping at the top of GR-2. The new monitoring well will be screened like GR-2 across the shallow- and intermediate-bedrock zones.

2.3 Health & Safety Monitoring

Appropriate health & safety monitoring according to a site-specific health & safety plan will be performed during tunnel-inspection, well-installation, and groundwater-monitoring activities.

2.4 Surveying of New Wells

Elevations of the casing rims and northing and easting coordinates of the new wells will be surveyed.

2.5 Development and Permeability-testing of New Wells

The wells will be developed after installation to remove water and particulate matter introduced to groundwater during drilling. Depth to static groundwater levels and LNAPL (if present) will be measured in the new wells after development is complete. Slug tests will be performed on each of the new wells and hydraulic conductivity values will be calculated using the Bouwer & Rice method. Development and slug-testing methods may be modified from standard methods where LNAPL is encountered, if necessary.

2.6 Groundwater Sampling

All new wells will be sampled for Delphi by Free-Col Laboratories, Ltd., of Meadville, Pennsylvania (Free-Col) during the next semi-annual groundwater sampling event for the site. (The wells to be sampled during the next semi-annual sampling event will also include existing east-parking-lot-area monitoring wells, selected Tank-Farm-Area piezometers, and selected other site wells.) Groundwater samples will be collected from each new well for VOC analysis by EPA method 8260 and PCB analysis by EPA method 8082. LNAPL samples will be collected from each new well in which it is present for VOC analysis by method 8260, PCB analysis by method 8082, analysis of specific gravity and flashpoint, and GC fingerprinting.

2.7 Ongoing Monitoring of the Migration-Control System Pumping Rate

In accordance with previous procedures, groundwater and LNAPL levels will be measured at all accessible site wells on the first day of the site-wide groundwater sampling event to be performed by Free-Col in November. After the sampling event is completed, the pumping rate from the migration-control trench will be increased to the pre-trial rate of approximately 40 gpm. Groundwater and LNAPL levels will be measured at wells located on the east side of the facility and in the north parking lots on a weekly basis thereafter for approximately two weeks, and a sitewide groundwater- and LNAPL-level monitoring event will be performed in December 1998.

2.8 Data Evaluation and Reporting

Data collected during the activities described above will be evaluated with data collected during 1998 groundwater sampling events and groundwater/LNAPL-level monitoring events. All of the 1998 data and conclusions derived from its evaluation will be presented in a report.

III. METHODS

3.1 New Well Installations

A. Soil sampling

At each well installation location, an auger boring will be advanced to the top of bedrock using standard drilling techniques. The depth to top of bedrock in the areas of the site where wells are to be installed ranges from approximately 5 to approximately 18 feet below grade. Continuous split-spoon soil sampling will be performed using standard techniques at three of the locations where wells are to be installed. The three locations where soil-sampling will be performed are: the intermediate-bedrock well boring in north parking lot #4, the shallow-bedrock well boring above the Lexington Avenue sewer tunnel, and the well adjacent to migration-control well GR-2. At the remaining locations, soil sampling has previously been or will be performed in adjacent borings, and therefore the well borings will be advanced without soil sampling.

Split-spoon samples will be visually examined and field-screened with an organic-vapor monitoring device to determine whether soil contamination is present, and soil types and conditions will be recorded on a geologic log. The examination and logging of soil conditions will be performed by experienced personnel. Should evidence of soil contamination be observed, apparently- or potentially-contaminated soil samples will be collected and submitted to the project laboratory for analysis of Target Compound List (TCL) VOCs and PCBs. Analysis of other parameters may be added on the basis of conditions observed in the field.

B. Bedrock coring

At each well installation location, a rotary boring will be advanced in bedrock using standard drilling techniques. Continuous core-sampling of bedrock will be performed at all but three of the locations where wells are to be installed. The three locations where soil-sampling will not be performed are: the intermediate-bedrock well boring on the south side of Lexington Avenue adjacent to the R-234 location, the shallow-bedrock well boring above the Lexington Avenue sewer tunnel, and the well adjacent to migration-control well GR-2. At the R-234 location, bedrock coring has already been performed, and therefore coring will only be performed in the interval which will serve as the monitoring interval for the new well. At the shallow-bedrock well boring above the Lexington Avenue sewer tunnel, bedrock coring will be performed in the two adjacent borings to be installed on either side of the tunnel. At the well adjacent to migration-control well GR-2, bedrock in the interval to be drilled was extensively fractured by the blasting of the migration-control trench.

Bedrock cores retrieved from well borings will be placed in core boxes. Cores will be visually examined and bedrock types and conditions will be recorded on a geologic log. The examination and logging of bedrock cores will be performed by experienced personnel.

C. Installation of intermediate-bedrock monitoring wells

At each well installation location, the augers will be seated at the top of bedrock or the augers will be withdrawn and a temporary 8-inch casing will be installed to seal off the overburden. The augers or casing will be cleaned of any soil material left inside, and a core boring or

rotary boring will then be advanced using standard techniques to approximately 15 feet below the top of bedrock. Clean water will be used as the drilling fluid for all coring and rotary drilling activities. For the wells to be installed near sewer tunnels, the actual depth will be adjusted to permit monitoring of conditions in the depth interval in which the adjacent sewer-tunnel section occurs.

If cored, the core boring will be reamed to a nominal 8-inch diameter with a rotary bit. A 4-inch inside-diameter black-iron or steel casing equipped with centralizers will be installed to within 6 inches of the bottom of the borehole and pressure-grouted in place. The grout will consist of Portland Cement with 3 to 5 lbs. of powdered bentonite and 2 lbs. of calcium chloride added per sack of cement. The grout will be mixed with 6.5 gallons of potable water per sack of cement. The casing will be grouted in place utilizing one of the following two methods:

- Haliburton single-plug displacement grouting technique: Approximately 1.5 times the total annular space volume of grout will be mixed. The grout will be placed inside the casing and a drillable plug will be placed on top of the grout. Freshwater will be injected under pressure into the casing, forcing the plug to the bottom of the casing and grout into the annular space. A valve on the freshwater line will be closed to maintain pressure on the plug and the grout will be allowed to set. The temporary casing or auger assembly will be gradually withdrawn during the grouting process.

- Pressure grouting: A temporary tremmie pipe will be installed to the depth of the bottom of the 4-inch casing in the annular space between the 4-inch casing and the 8-inch borehole wall. Grout will be pumped through the pipe until undiluted grout return is noted at the ground surface in the annular space between the 4-inch casing and the temporary casing or augers. The temporary casing or auger assembly will then be gradually withdrawn: the tremmie pipe will be disconnected from the grout pump without removing it from the bottom of the borehole, temporary-casing sections or auger flights will be withdrawn one at a time, the tremmie pipe will be reconnected, and additional grout will be pumped until grout return is again observed at the ground surface inside and outside the temporary casing or augers. This procedure will be repeated until the temporary casing or auger string has been completely withdrawn. Additional grout will then be pumped through the tremmie pipe if necessary to achieve and maintain undiluted grout at ground surface outside the 4-inch casing. The tremmie pipe will then be withdrawn from the borehole.

The grout will be allowed to set a minimum of 12 hours prior to the resumption of drilling operations. At most locations, after the casing-grout has set, an HQ or NX-core boring will be advanced approximately 10 feet below the 4-inch casing seat. An HQ barrel will be used for the two wells to be installed in close proximity to the Lexington Avenue sewer tunnel. For the well at the location adjacent to existing well R-234, the core boring will be advanced approximately 5 feet below the 4-inch casing seat to the depth of the top of the R-234 monitoring interval.

The cored interval will be left to serve as the monitoring interval for the wells at the two locations on the northeast site boundary and for the well at the location adjacent to existing well R-234. For the two wells to be installed in close proximity to the Lexington Avenue sewer tunnel, a 2-inch-diameter stainless-steel well screen equal in length to the cored interval will be inserted with an attached stainless-steel riser pipe. The annular space between the

well screen and corehole will be filled with a sandpack of appropriate size, and seals of bentonite and grout will be installed above the sandpack to fill the annular space between the 2-inch riser and 4-inch casing.

At unprotected locations the 4-inch riser will be finished at grade with locking flush-mounted protective surface-casing completions. At protected locations, the 4-inch casing will extend to 2.5 feet above ground surface, and a locking steel outer casing and two or three protective guard posts will be installed.

Well installation will be followed by development which will include 1) purging by pumping or bailing to remove water lost to the formation during drilling, and 2) additional purging with surging or over-pumping to reduce well-water turbidity. Bailing, surging, and overpumping will be limited if LNAPL is encountered in a well.

D. Installation of a shallow-bedrock monitoring well

A shallow-bedrock well will be installed near the pair of Lexington Avenue sewer tunnel intermediate-bedrock wells by advancing a 6-inch nominal-diameter rotary boring without sampling to approximately 10 feet below the top-of-bedrock (approximate total depth of 15 to 20 feet below grade). A 10-foot length of stainless-steel 10-slot wellscreen attached to sufficient stainless-steel riser will be installed to complete the well at ground surface. The well construction will include installation of a sand filter pack, bentonite-pellet seal, and bentonite/cement grout to ground surface, as well as a protective, lockable, flush-mounted casing.

Well installation will be followed by development to remove water lost to the formation during drilling and further development by surging or over-pumping to reduce well-water turbidity.

E. Installation of a monitoring well adjacent to GR-2

A well will be installed adjacent to groundwater-migration-control-system well GR-2 by advancing a 6-inch nominal-diameter rotary boring without sampling to approximately 49 feet below grade. A 30-foot length of stainless-steel 10-slot well screen attached to sufficient stainless-steel riser will be installed to complete the well at 2.5 feet above ground surface. The well construction will include installation of a sand filter pack, bentonite-pellet seal, and bentonite/cement grout to ground surface, as well as a protective, lockable, stick-up casing.

Well installation will be followed by brief development by surging and over-pumping to reduce well-water turbidity along the total length of the well screen.

F. Decontamination and Handling of Drilling-related Wastes

Drilling and sampling equipment will be decontaminated by steam cleaning before and after each exploration. Steam cleaning will be performed at the Delphi facility on a concrete-lined pad with drains connected to Delphi's wastewater pre-treatment facility.

Soil and rock cuttings will be placed in tubs and decanted drilling- and development-water will be placed in drums. Tubs and drums will be provided, staged, and handled by trained Delphi personnel before and after they are filled. Solid wastes such as discarded personnel

protective equipment will be placed in Delphi's solid waste container except where LNAPL is encountered during drilling or development activities, in which case these wastes will be segregated and drummed for handling as potentially hazardous. Delphi will dispose of solid and liquid drilling wastes using laboratory analysis of soil, groundwater, or LNAPL samples collected as a basis for determining the appropriate disposal method.

3.2 Permeability-testing of New Wells

In order to determine the in-place hydraulic conductivity of geologic material which occurs in the screened interval of newly installed wells, single-well, rising head tests (slug tests) will be performed. Slug tests will be performed by a qualified hydrogeologist. These tests involve lowering the water level in the well and measuring the change in head with respect to time as the water level recovers. In wells which are slow to recover the water level will be bailed down as described below. The measurements in these wells will be taken manually. Wells which recover too quickly for this method will be tested by removing only one bailer of water and the recovery measured by means of an electronic pressure transducer system.

Each test will be evaluated using the Bouwer and Rice method of slug test data evaluation (Bouwer, H.,and R.C. Rice, 1976, A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with completely or Partially Penetrating Wells Water Resour. Res., 12, pp. 423-428; and Bouwer, H., 1989, The Bouwer and Rice Slug Test - An Update, Ground Water, 27, pp. 262-268).

A. Wells with Slow Recovery Rates

For wells with slow recovery rates the following procedure will be used:

- The static water level will be measured prior to slug testing using an electronic oil/water interface probe. The static level will be recorded.

- The well will be bailed by hand until the depth to water appears to stabilize based on the depth of travel of the bailer rope (this measurement needs only to be approximated and is not critical to the test), or to the top of the open or screened interval in wells which are screened below the standing water level.

- The bailer will then be removed and water level measurements will be collected by hand using measuring tape or an electronic water level indicator at a frequency which will provide approximately 15 to 20 data points during recovery (to within 10 percent of the total drawdown), if feasible. Water level measurements will be recorded.

B. Wells with Rapid Recovery Rates

The rising head tests for wells with rapid recovery rates will be conducted as follows:

- The static water level in the well to be tested will be measured and recorded using an electronic oil/water interface probe prior to slug testing.

- The pressure transducer will be placed in the well to a minimum depth of three feet below the static water level.

- Readings will be made using the data logger until three consecutive readings are the same (equilibrium conditions).

- The data logger will then be calibrated to read 0.00 feet at static conditions. Following the installation and calibration of the pressure transducer, a new or pre-cleaned bailer will be lowered into the well and the top of the bailer will be placed just below the water surface.

- Water level measurements will again be made until the water level returns to static conditions following introduction of the bailer. If static conditions are not reached within 15 minutes following introduction of the bailer the well will be tested using the procedures described for slow recovery wells.

- Once static conditions are re-established, the bailer will be rapidly removed from the water column. Coincident with the withdrawal of the bailer, automatic logging of the water levels will be initiated using the data logger. It is a primary goal in a recovery test to "instantaneously" remove a volume of water that will result in a measurable head decline, the recovery of which (to static conditions) can be monitored over time. Such an instantaneous withdrawal results in recovery due to contributions of flow from the surrounding formation; this flow is controlled by its hydraulic conductivity and not other factors such as storage effects.

- The water level measurements will continue until water levels recover to within a minimum of 10 percent of the original static level (90 percent recovery), or an elapsed time of one hour. If after one hour the well has not recovered to the above criteria at the discretion of the hydrogeologist, the transducer will be removed and the well will be tested at a later date using the procedures described for slow recovery wells.

- Data stored in the data loggers will be printed using a field printer and/or transferred to a magnetic disk using a portable computer. Field printouts will be dated and signed by the hydrogeologist.

A new or pre-cleaned bailer, one for each well, will be used in the rising-head testing. All equipment entering the well, such as the transducer and transducer cable, will be cleaned prior to reuse. Water bailed from wells during slug testing activities will be containerized and handled in the same manner as water removed during well development.

3.3 Groundwater-Level Measurement and Groundwater Sampling

Groundwater-level monitoring and groundwater-quality sampling will be performed in accordance with the "Procedure for Groundwater Quality Sampling" for the site which was presented in Appendix E of "Hydrogeologic Report, AC Rochester Lexington Avenue Facility, Rochester, New York, Volume II (H&A of New York, February, 1990). A summary of groundwater monitoring and sampling procedures is presented below.

Groundwater and LNAPL levels in monitoring wells will be measured prior to each sampling event and at other times. The depth to groundwater will be measured with an electronic oil/water interface probe. The probe will be lowered into the well until the meter indicates LNAPL or water is reached. The probe will be raised above the LNAPL or water level and slowly lowered again until a reading is indicated. The cable will be held against a rule placed across the top of the protective outer casing at the point designated for water-level measurements, and a depth reading will be taken. This procedure will be followed three times or until a consistent value is obtained for both LNAPL and water levels. The value will be recorded to the nearest 0.01 feet. The probe will be raised to the surface and together with the amount of cable that was wetted in the well will be decontaminated with a clean water rinse and dried with paper toweling.

Prior to every sampling event, a routine inspection of the condition of the protective casing and surface seal will be performed. The protective casing will be inspected for the integrity of the locking cap and the surface seal. In addition, each well will be checked for any other signs of damage or inadvertent entry. Observations of any irregularities will be noted in the field logbook as well as the well number, date, and time.

The wells will be purged with a teflon or polypropylene disposable bailer attached to a polypropylene or nylon line. (Some existing wells will be purged using dedicated sampling pumps which are currently installed.) In the event free product is detected with the interface probe, the bailer will be lowered in the well until the top of the water column is encountered; the bailer will be slowly and partially submerged to allow any floating product present at the top of the water column to enter the bailer. The bailer will be carefully withdrawn and checked for a floating product layer which, if present, will be sampled as appropriate. The well will then be bailed to dryness or until 3 well volumes have been purged.

Groundwater quality samples will be obtained after purging of the well. Samples for volatile organic compounds will be sampled immediately after purging if sufficient volume is present. If the sample volume for the other parameters is insufficient, the well will be sampled when sufficient volume is present at an elapsed time of no greater than 24 hours after well purging.

A portion of the groundwater collected during the sampling procedures will be subjected to the field tests of temperature, specific electrical conductance, and pH. Tests for field parameters will be conducted after all sample containers have been filled. Groundwater for these tests will be collected in a glass container with a minimum volume of 125 milliliters.

A groundwater sampling record will be used during sampling procedures to record the following information:

- Well number
- Static water level (depth to water) and depth to LNAPL if encountered
- Depth to bottom of the well
- Calculated well volume
- Actual evacuation volume
- Date and time
- Analyses to be performed
- Field-meter calibration data
- Sample temperature, pH, and specific conductivity
- General remarks (weather conditions, etc.)

All entries will be made in indelible ink. Entry errors will be crossed out with a single line, dated and initialed by the person making the correction. A chain-of-custody form will be completed after sample collection. The chain-of-custody forms will accompany the samples to the laboratory at the end of each day. A sample transfer will be completed when the sampling team relinquishes the samples to laboratory personnel by signing the chain-of-custody form.

All non-disposable, non-dedicated sampling equipment (excluding the pH/temperature and conductivity meters), if any, will be decontaminated between sampling events using appropriate procedures. Disposable sampling equipment and water purged from wells during sampling activities will be containerized and handled in the same manner as wastes produced during drilling and well-development activities.

3.4 Laboratory Analysis Procedures

Soil, groundwater, and LNAPL samples will be analyzed by the project laboratory in accordance with Free-Col's "General Requirements for Laboratory Protocol for Sampling and Analysis Plan" which were presented in Appendix E of "Hydrogeologic Report, AC Rochester Lexington Avenue Facility, Rochester, New York, Volume II (H&A of New York, February, 1990), updated by incorporation of procedures and methods specified by the most recent edition of U.S. EPA's SW-846 test methods for the evaluation of solid waste.

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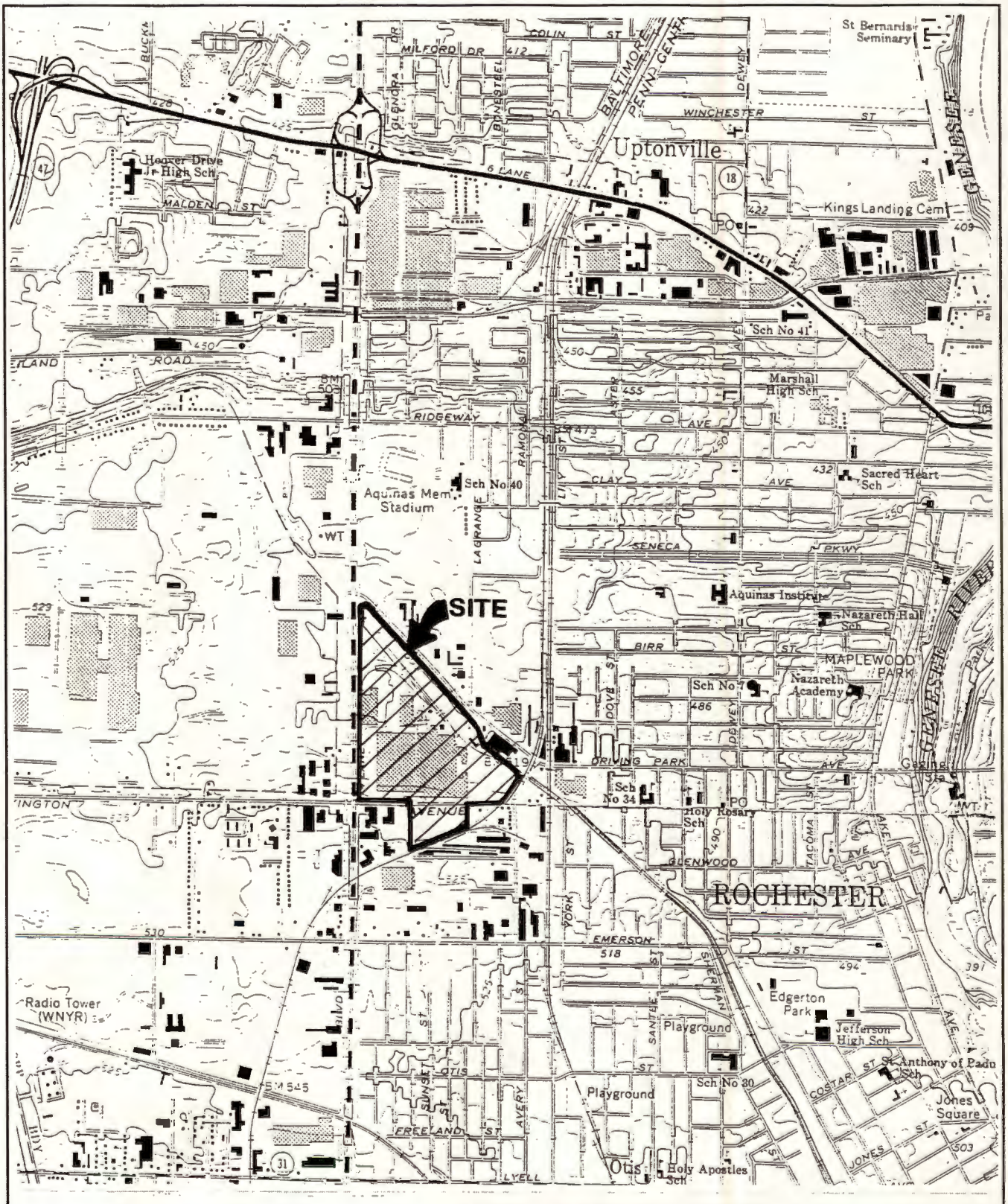
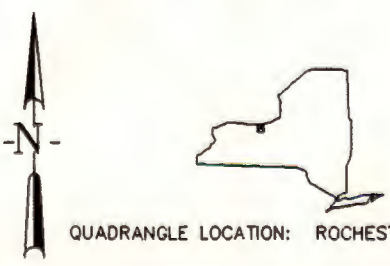




QUADRANGLE LOCATION: ROCHESTER, WEST, N.Y.

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

DELPHI AUTOMOTIVE SYSTEMS
LEXINGTON AVENUE FACILITY
ROCHESTER, NEW YORK

SITE LOCATION

SCALE: 1" = 2000'

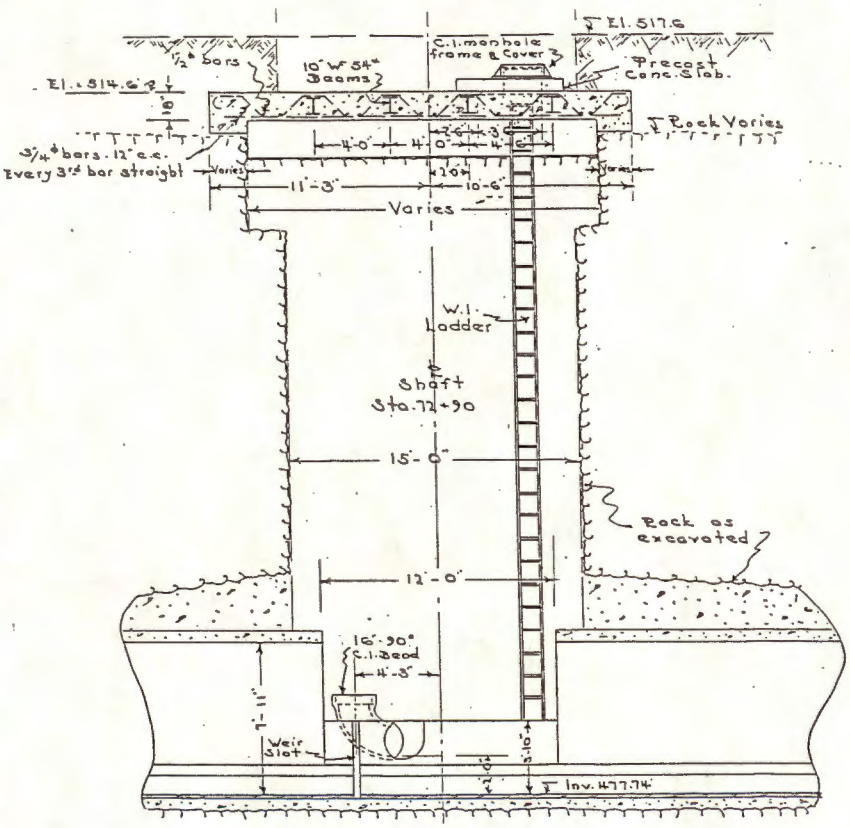
SEPTEMBER 1998

70014-051

FIGURE 1

APPENDIX A

As-built Drawings of City of Rochester Sewer Tunnel Features



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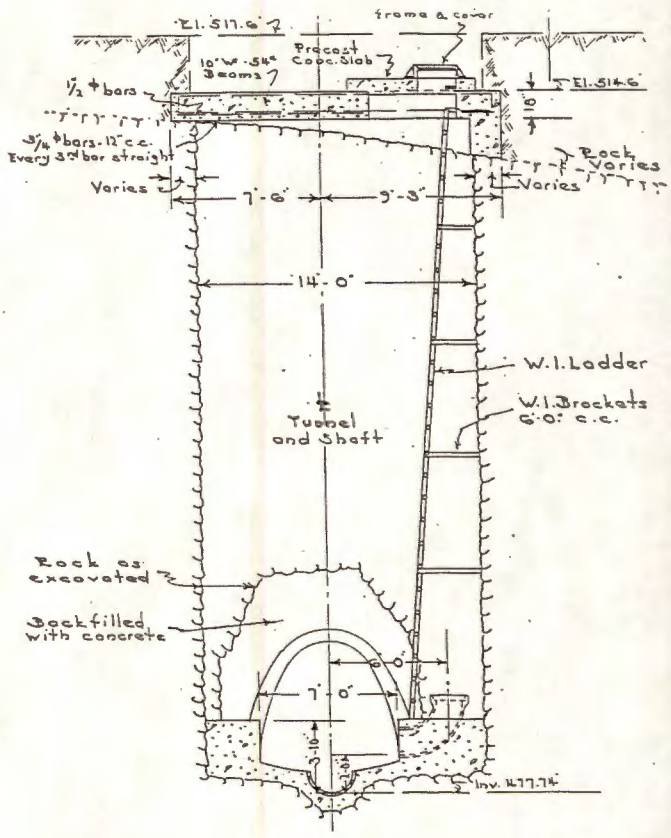
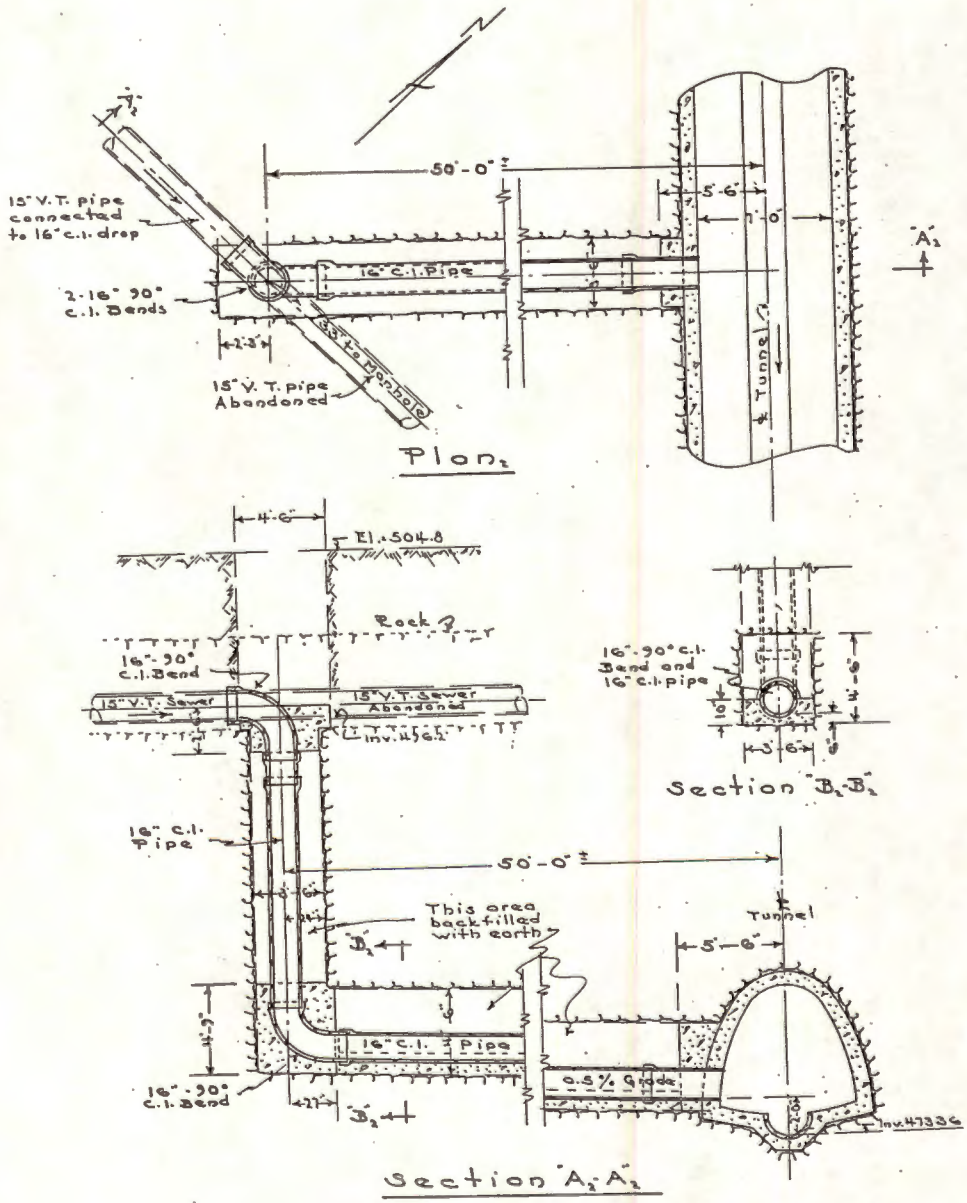


Section "B-B"

Shaft at Sta. 72+90
Lexington Ave.

Scale: 1 inch = approx. 10 feet



General Motors Drift - Sta. 76+25
Subway

Scale: 1 inch = approx. 10 ft.