WorkPlan.HW.734043.2002-09-17.RAWP_Outfalls_010_and_01
1.PDF

Remedial Action Work Plan
Outfalls 010 and 011

Carrier Corporation, Thompson Road Facility
Syracuse, New York

EnSafe Project No. 3133-056

Prepared for:

UTC Shared Remediation Services
Hartford, Connecticut

Prepared by:

ENSAFE

EnSafe Inc.
220 Athens Way, Suite 410
Nashville, Tennessee 37228
(615) 255-9300
www.ensafe.com

September 17, 2002

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Table of Contents

1.0 INTRODUCTION

The purpose of this Remedial Action Work Plan is to provide control measures at Outfalls 010 and 011 to reduce or eliminate offsite migration of contaminated groundwater into Sanders Creek. This work plan is being submitted to the NYSDEC in lieu of the more traditional CMI portion of the RCRA corrective action process in order to expedite and initiate implementation of corrective measures.

To achieve this goal, Carrier will install a groundwater recovery well at each location (i.e., in the granular bedding material of each outfall) to capture groundwater in the outfall piping trench, thus eliminating or reducing its continued flow into Sanders Creek.

2.0 DESCRIPTION OF CURRENT CONDITIONS

During the RFI (RCRA Facility Investigation) conducted in the summer of 2001, two groundwater monitoring wells were installed in the bedding material of the storm sewer lines leading to Outfalls 010 and 011. The wells (MW-17 and MW-18) were installed downgradient of Carrier's existing storm water collection system and air stripper treatment system, near the storm sewers' discharge points to Sanders Creek. MW-17 was installed south of Outfall 010 and MW-18 was installed south of Outfall 011. Figure 2.1 is a site map of the Carrier facility, and shows the location of these wells.

Results of the samples collected from the two wells indicated concentrations of dissolved chlorinated solvents within the bedding material beneath the storm sewer outfalls at the Carrier facility. As part of continuing RFI activities at the Carrier facility, additional groundwater samples were collected from MW-17 and MW-18 in June 2002. A summary of all data collected from these two wells is presented in Table 2.1.

Table 2.1
Groundwater Data Summary for Wells MW-17 and MW-18
(all results in µg/L)

	MW-17 (@ Outfall 010)		MW-18 (@ Outfall 011)	
Compound	**07-13-01**	**06-26-02**	**07-13-01**	**06-26-02**
Acetone	6.0	ND	ND	ND
cis-1,2-dichloroethene (cis-1,2-DCE)	249	ND	7,020	2,770
trichloroethene (TCE)	42.6	ND	8,760	5,580
vinyl chloride	11.0	ND	505	233

3.0 DESCRIPTION OF CORRECTIVE MEASURE

The corrective measure at each outfall will incorporate a hydraulic barrier wall combined with a large diameter extraction well. The barrier walls will inhibit trench water from entering the creek and minimize the potential for creek water to be drawn into the trench during pumping. The extraction wells will be placed in the outfall trench upstream from the barrier wall to dewater the trench bedding material. Figures 4.1 through 4.5 show, diagrammatically, plan views and cross-sections of the existing outfalls and proposed recovery well layout.

Barrier Wall Construction – A barrier wall will be constructed between the extraction well and the outfall to inhibit trench water from flowing into the creek, thus allowing the extraction well to more effectively capture trench water. The barrier wall will be constructed by placing injection tubes into the granular bedding material. A polyurethane grout will then be injected into the bedding material. The polyurethane grout reacts with water and forms a foam , which fills the void spaces of the bedding material. The barrier wall formed will be approximately 1- to 2-foot thick.

Lithologic Borings

To investigate the lithologies outside the outfall bedding trenches, exploratory lithologic borings will be drilled and logged in the vicinity of each trench. These borings will be drilled in one end of the proposed hydraulic barrier wall to a depth of approximately 20 feet or slightly deeper than the extraction well depth. They will be continuously sampled and lithologically logged by an EnSafe geologist. If possible, they will be used as injection points for grout when the barrier wall is constructed.

Extraction Well Construction

At each outfall, the extraction well will be located upgradient of the barrier wall and the existing trench monitoring wells (MW-17 and MW-18). The extraction wells will be constructed of 6-inch diameter PVC screens and risers. They will be installed within – or as close as possible to – the trench backfill material using conventional hollow-stem augering techniques. The screens will be about 10-feet long with 0.040-inch slots and will extend into the water table.

Final well depth and screen length determinations will be made after the exploratory boreholes and barrier wall have been installed. However, the following preliminary requirements are evident. To ensure complete dewatering, the wells will be installed with at least 2-foot long sumps below the bottom of the gravel backfill trench. At Outfall 010, the extraction well will extend at least 16 feet below ground surface (bgs) which is 2 feet below the gravel backfill material. The extraction well at Outfall 011 will extend at least 17 feet bgs.

The wells will be completed with fine-pea-gravel filter packs that extend at least 2 feet above the screens. A 1-foot thick layer of bentonite pellets will be placed on top of the filter pack to form a seal. The remaining annular space will be filled with the concrete used to hold the surface vault in place.

Extraction Well Yield Testing

After installation but before surface completion, the wells will be yield tested to determine pump sizing. A 2- or 3-inch, portable, centrifugal pump will be used to dewater the wells for yield measurements. The pumping rate will be controlled with a ball valve installed in the pump discharge line. A totalizing flow meter placed in the discharge line will be used to measure the pumping rate. Water will be discharged to a frac tank or the nearest storm sewer that is upstream from the onsite treatment system.

Water levels in the trench will be monitored to ensure complete dewatering is achieved. Water levels will be measured before, during, and after pumping in the extraction wells themselves and existing wells MW-17 and MW-18.

Pumps and Piping

Based on the pumping rates determined during yield testing and a 2X factor of safety, 4-inch diameter, electric, submersible pumps will be selected for the extraction wells. Each pump will be placed about one foot from the bottom of the well in the 2-foot long sump at the bottom of the well. Alternatively, the pump may be housed in a concrete or cast-iron vault at ground level. A float switch will be used to deactivate/activate the pump when the water level in the well falls/rises to within a few inches of the trench bottom.

Each extraction well will be completed at the ground surface with a prefabricated, flush-mount vault to house piping and electrical connections, meters, and valves. A totalizing flow meter, placed in the discharge line, will be used to measure total gallons removed. A check valve will be installed in the discharge line to prevent back flow into the well. The discharge piping will be buried in a trench below the freeze line and routed to the nearest storm sewer that is upstream from the onsite treatment system.

Capacity of Existing Air Stripper Treatment System

All storm water from the Carrier Facility, with the exception of the property edges, is collected in nine storm water lines. The storm sewer system collects water through a series of surface intlets, roof drains, and infiltrating groundwater, while water at the property edges flows offsite as sheet flow. Collected storm water and infiltrating groundwater from eight of the lines (the ninth line is not included because there are no compliance issues with this discharge) flow to two collection wet wells (WW-1 and WW-2). From these wet wells, the water is pumped to a treatment system in the northeast part of Building TR-3, treated, and discharged via former Outfall 007 (now called 011) to Sanders Creek. During storm events that produce flows exceeding the capacity of the treatment system, excess flows are diverted to two outfalls that discharge directly to Sanders Creek. Each outfall is associated with one of the wet wells and is located near old Outfalls 002 and 007 (new outfalls 010 and 011).

The capacity of the existing treatment system to handle and treat increased flows and contaminant concentrations will be reviewed prior to construction activities. It is anticipated that during heavy storm events, the recovered groundwater will be routed and handled similarly to the collected storm water and infiltrating groundwater.

Similarly, Carrier's existing SPDES permit will be reviewed to determine if permit modifications are needed. While an air permit is not currently required for Carrier's treatment system, the need for one will be evaluated due to the projected additional flows to the treatment.

4.0 CORRECTIVE MEASURE OBJECTIVES AND MONITORING

As stated in Section 1, the purpose of this corrective measure is to significantly reduce or eliminate the discharge of VOC-contaminated groundwater into Sanders Creek. Quarterly water level measurements will be taken in the existing monitoring wells (MW-17 and MW-18) to determine if the recovery wells are operating effectively (i.e., capturing groundwater flow through the trench). The monitoring wells will also be sampled quarterly and analyzed for volatile organic compounds (VOCs). Prior to sampling, if no water is in the wells, the pumps will be turned off to allow groundwater to recharge the wells. Once sampling is completed, the pumps will be turned back on. The data will be continually evaluated to monitor the effectiveness of the remediation system in meeting stated goals. The monitoring schedule and/or system may be modified or terminated if its effectiveness or feasibility is not proven. Periodic reports will be submitted to NYSDEC with an assessment of this evaluation. The ongoing corrective action program will develop final corrective measures and identify media protection standards for the site.

Figures

NOTES:

ELEVATIONS REFERRED TO CITY OF SYRACUSE DATUM. ADD 362.00 FEET TO OBTAIN USGS DATUM OF 1929.

BENCHMARKS: (NOT SHOWN)

BM 164 (ELEV.=42.68)
IRON BOLT AT NORTHEAST CORNER OF CONCRETE SLAB, APPROX. 80 FEET NORTH AND APPROX. 30 FEET EAST OF THE SOUTHEAST CORNER OF BUILDING TR-4.

BM 500 (ELEV.=44.87)
CHISELED CROSS ON EAST NUT OF POSITION INDICATION VALVE, APPROX. 75 FEET NORTHWEST OF THE SOUTHWEST CORNER OF BUILDING TR-7 AND APPROX. 90 FEET NORTHEAST OF THE SOUTHEAST CORNER OF BUILDING TR-1.

HYDROPUNCH LOCATIONS (HP-01) ARE APPORXIMATE.

MONITORING WELL IDENTIFICATION KEY	
FORMER WELL IDENTIFICATION	NEW WELL IDENTIFICATION
MW-99-01	MW-10
MW-99-02	MW-11
MW-99-03	MW-12
MW-99-04	MW-13D
MW-00-5S	MW-14
MW-00-5D	MW-14D
MW-00-06	MW-15D
MW-00-BG	MW-16D

LEGEND

- TR-2 – BUILDING
- FORMER USTs
- MONUMENT
- MONITORING WELL
- FORMER HYDROPUNCH LOCATION
- SOIL AND/OR GROUNDWATER DPT SAMPLING LOCATION
- RFI AREA OF INVESTIGATION

300 0 300
GRAPHIC SCALE IN FEET

SOURCE:
PHILLIPS & ASSOCIATES
SURVEYORS, P.C.
LIVERPOOL, NEW YORK
(FILE 2700.001)

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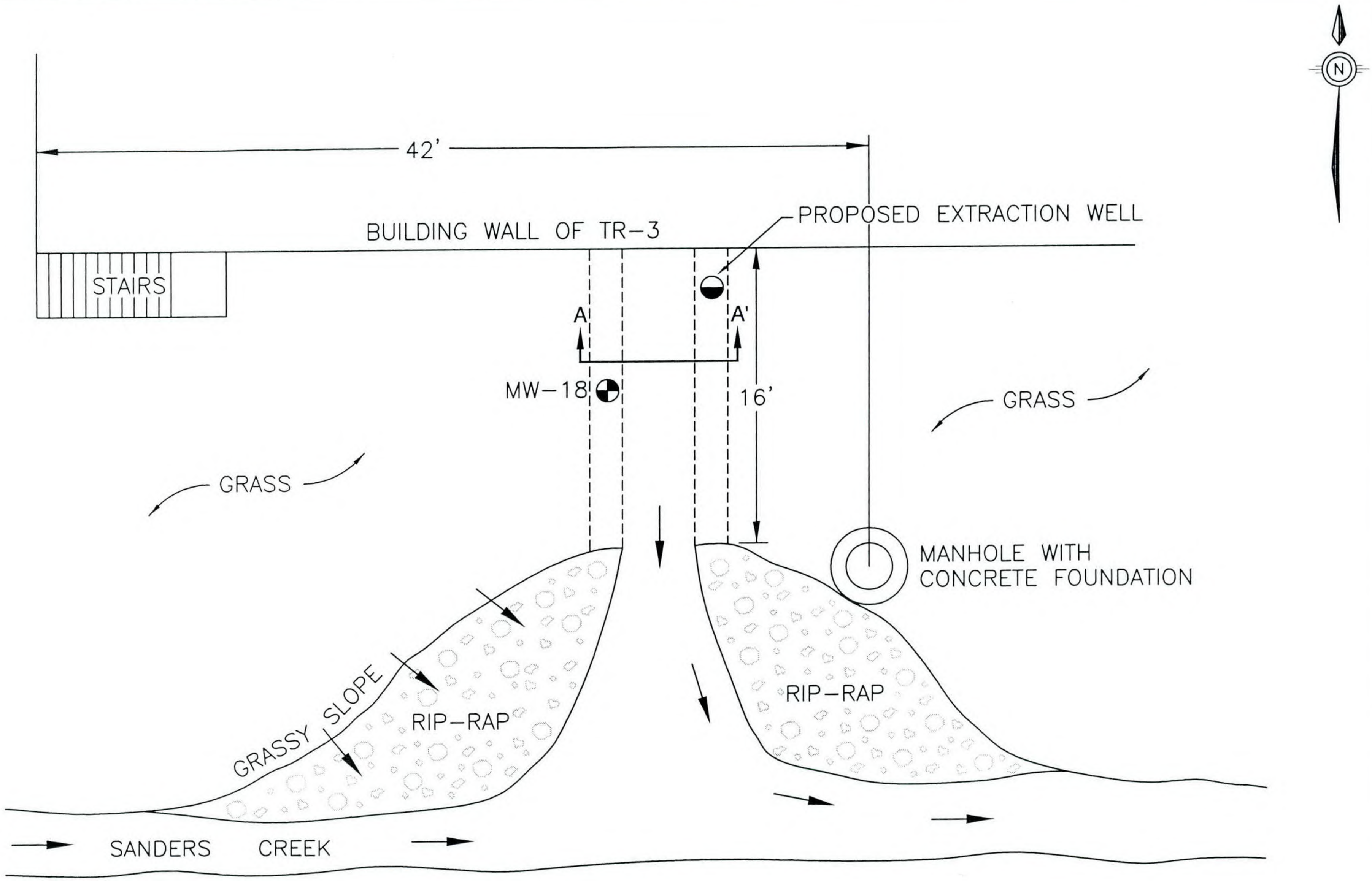
CHARLESTON,SC CINCINNATI,OH DALLAS,TX JACKSON,TN KNOXVILLE,TN
LANCASTER,PA NASHVILLE,TN NORFOLK,VA PADUCAH,KY PENSACOLA,FL
LITTLE ROCK,AR JACKSON,MS CLEVELAND,OH

FIGURE 2.1
SITE MAP
CARRIER CORPORATION
SYRACUSE, NEW YORK

DWG DATE: 09/09/02 DWG NAME:3133056R008



NOTE:
SEE FIGURE 4.2 FOR SECTION A-A'

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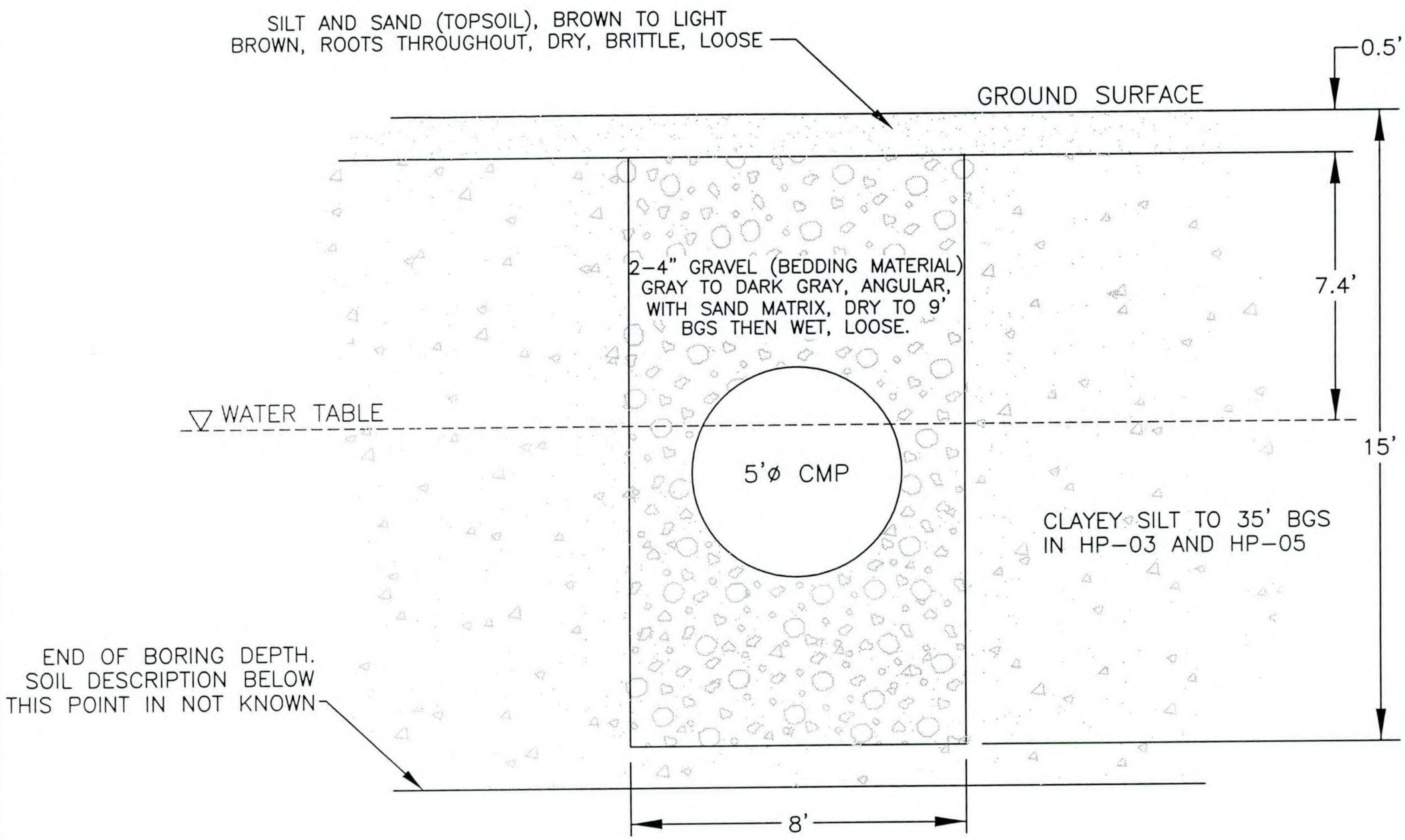
FIGURE 4.1
OUTFALL 011
PLAN VIEW SCHEMATIC
CARRIER CORPORATION
SYRACUSE, NEW YORK

DWG DATE: 09/09/02 | DWG NAME: 3133056R002



CONCEPTUAL

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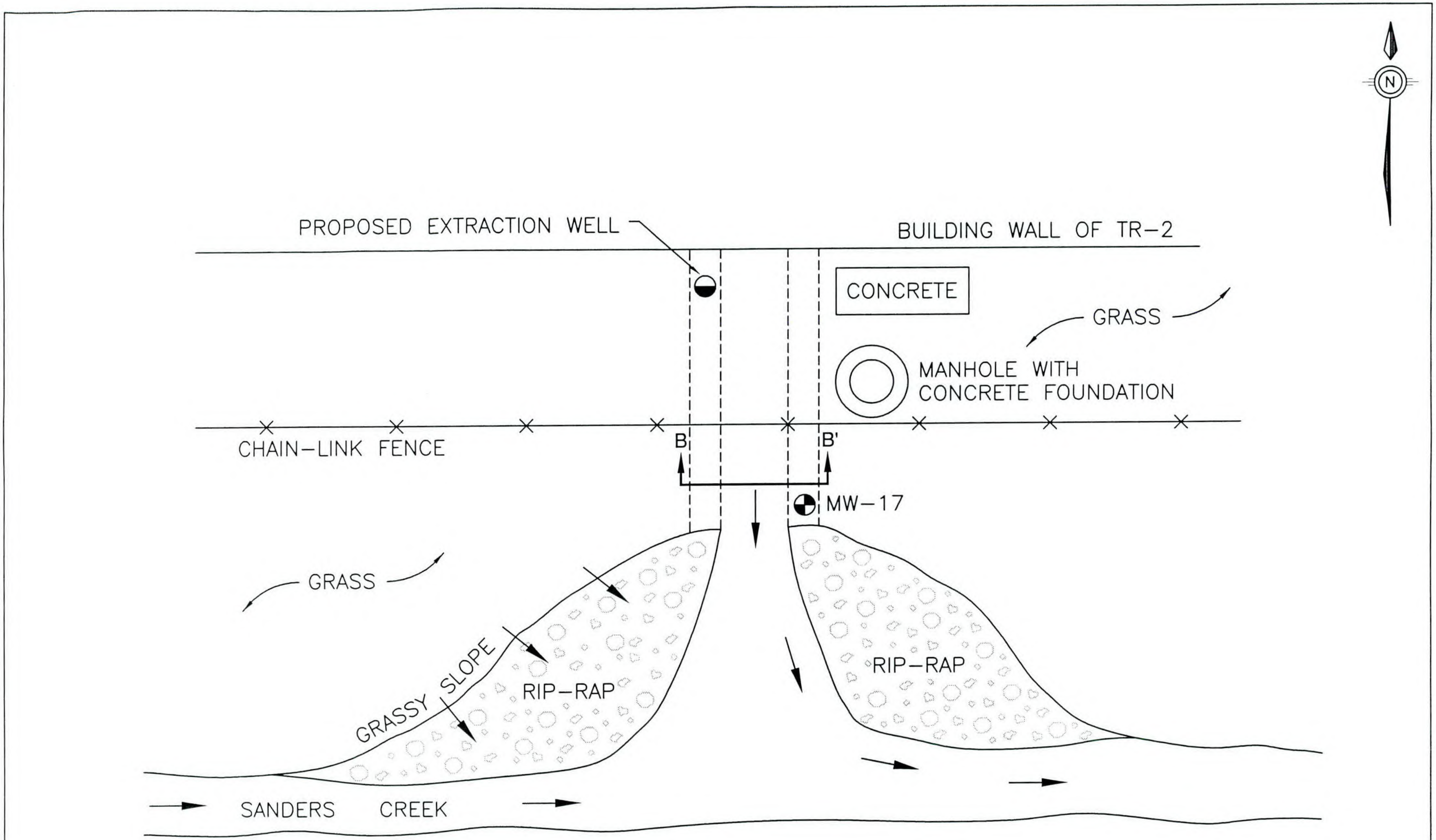
FIGURE 4.2
OUTFALL 011
CROSS-SECTION A-A' SCHEMATIC
CARRIER CORPORATION
SYRACUSE, NEW YORK

DWG DATE: 09/06/02 | DWG NAME: 3133056R003



NOTE:
SEE FIGURE 4.4 FOR SECTION B–B'

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FIGURE 4.3
OUTFALL 010
PLAN VIEW SCHEMATIC
CARRIER CORPORATION
SYRACUSE, NEW YORK

DWG DATE: 09/16/02 DWG NAME: 3133056R006

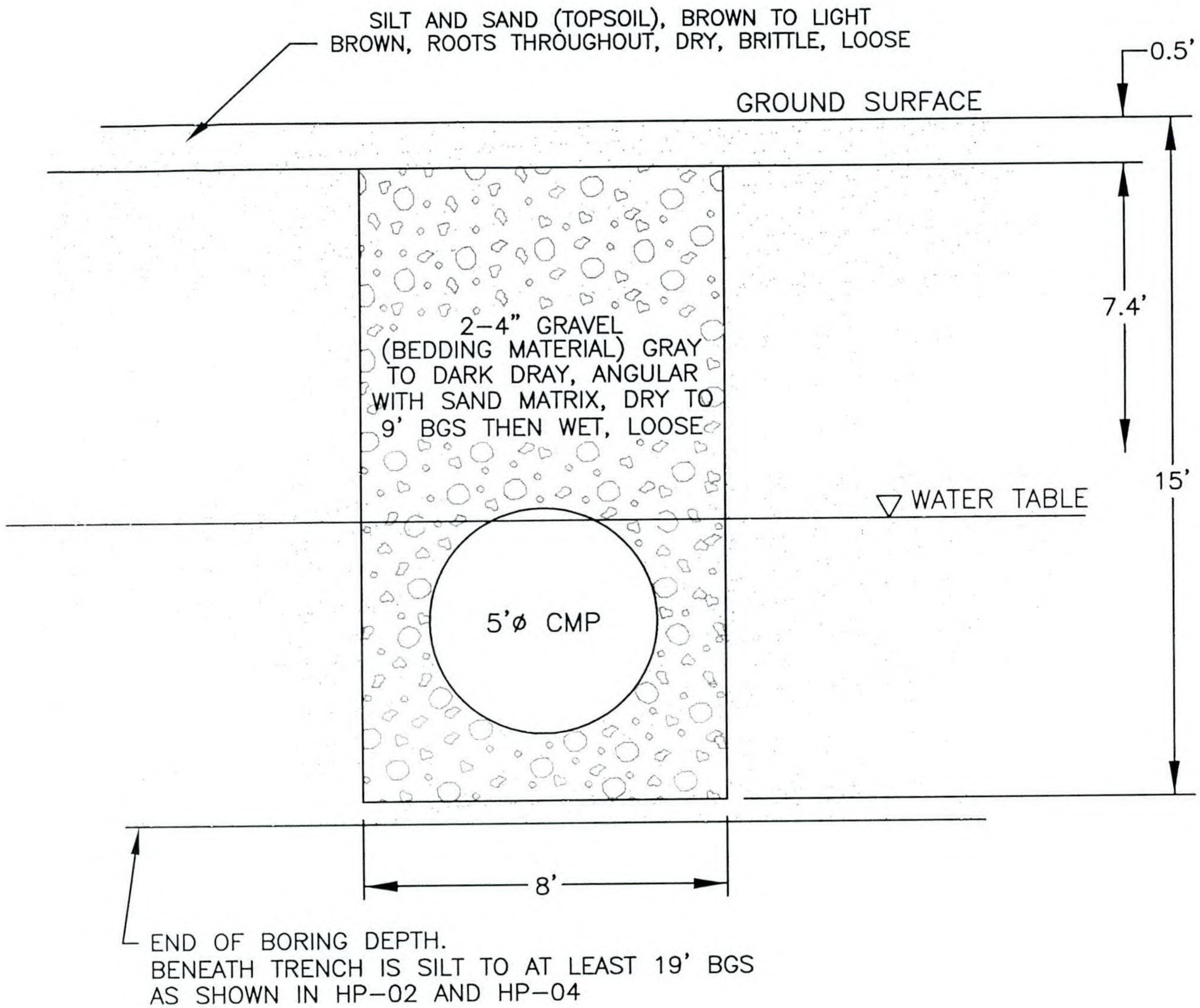

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FIGURE 4.4
OUTFALL 010
CROSS-SECTION B-B' SCHEMATIC
CARRIER CORPORATION
SYRACUSE, NEW YORK

DWG DATE: 09/06/02 DWG NAME: 3133056R004

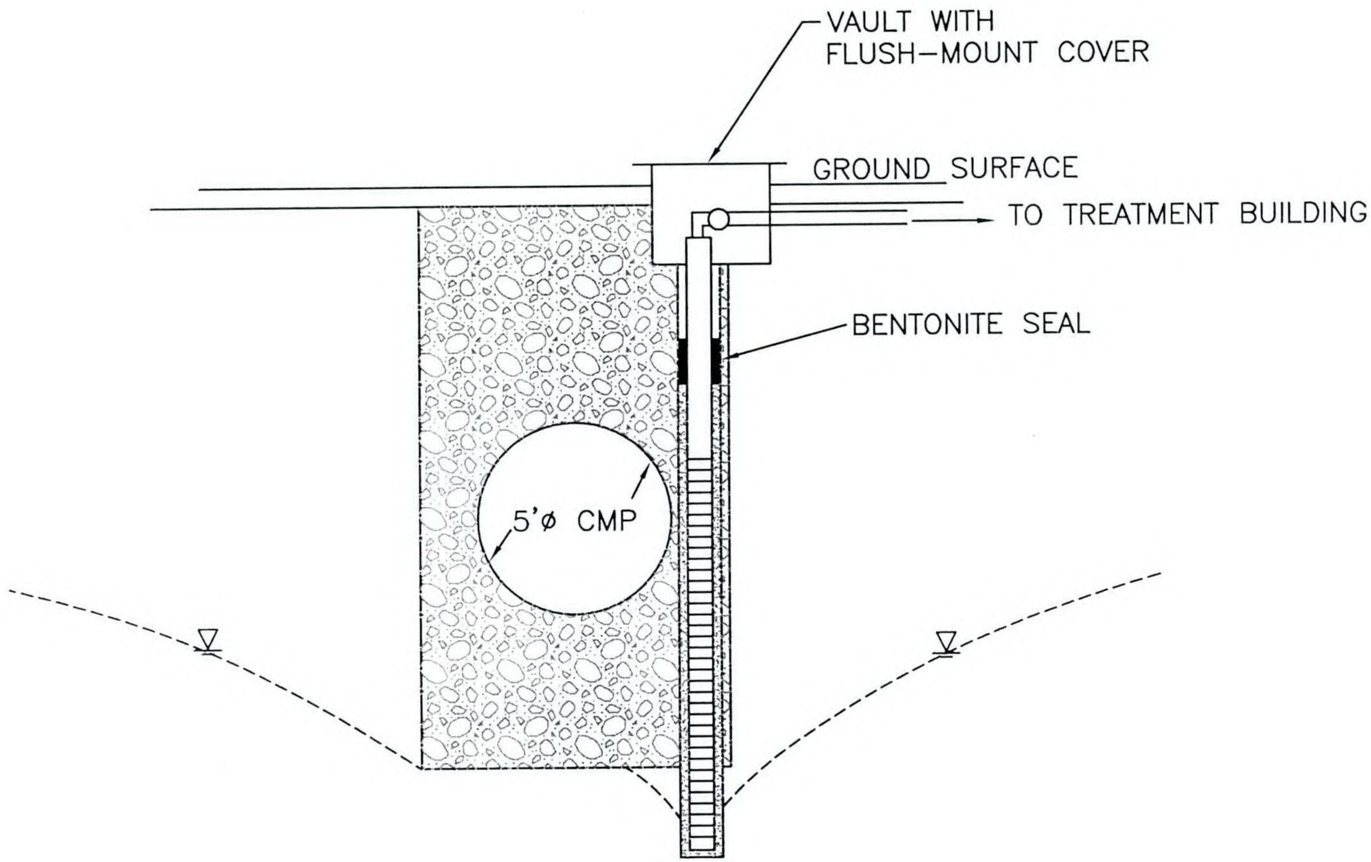

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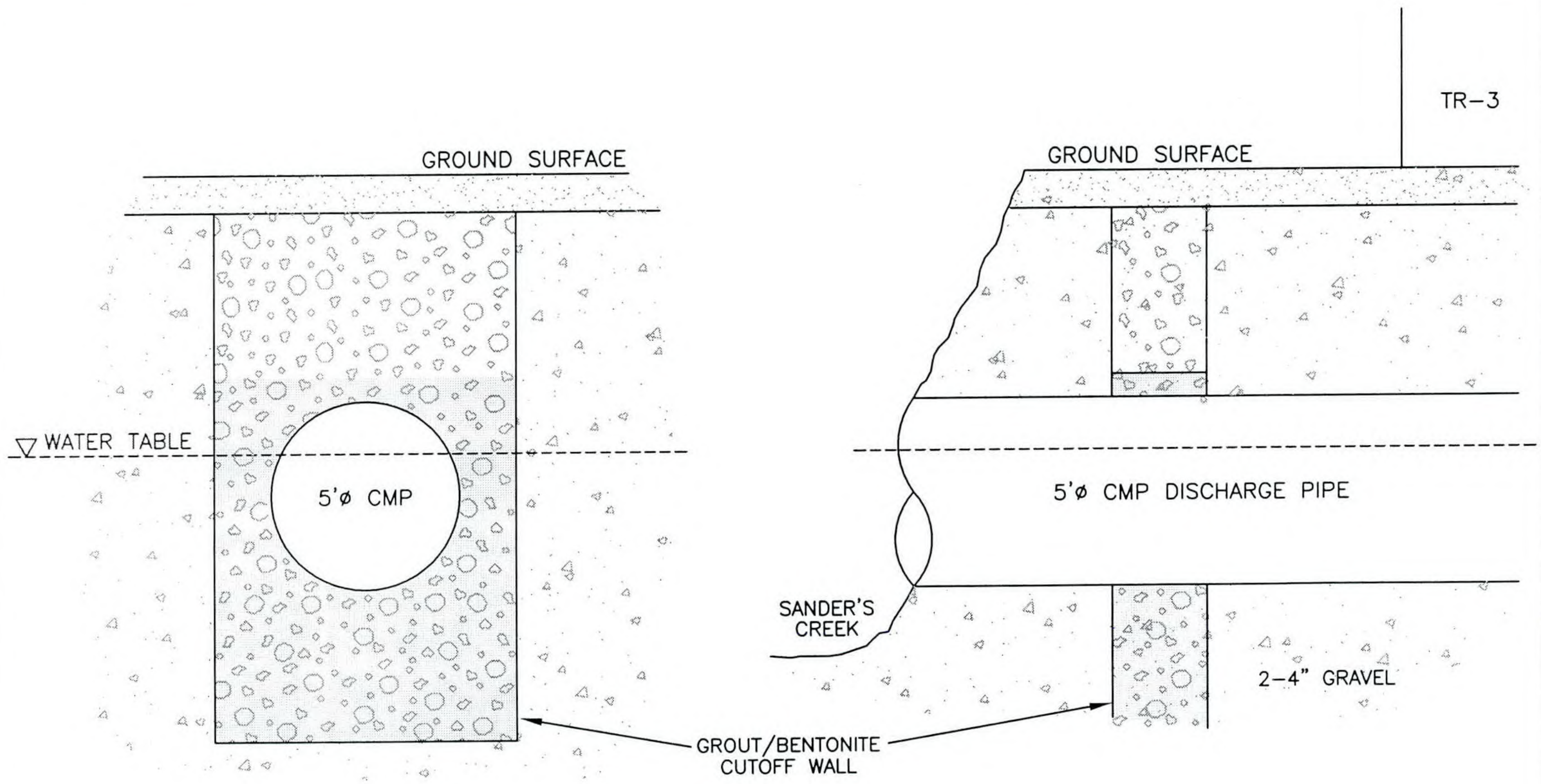
FIGURE 4.6
EXTRACTION WELL DETAIL
CARRIER CORPORATION
SYRACUSE, NEW YORK

DWG DATE: 09/09/02 | NAME: 3133056R007



CONCEPTUAL

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FIGURE 4.5
CROSS-SECTION OF GROUT WALL AT OUTFALL
CARRIER CORPORATION
SYRACUSE, NEW YORK

DWG DATE: 09/09/02 DWG NAME: 3133056R005

Outfall 010/011 Photographs

Photo 1

Outfall 011 – eastern-most outfall at treatment building.

Photo 2

Outfall 011

Photo 3

Outfall 011 looking west (Sanders Creek west). Concrete structure is manhole, not outfall. Outfall is to the left absorbent boom.

Photo 4

Approach to Outfall 011 from west side of Building TR-3.

Photo 5

Outfall 011 looking east. Distance from top of riprap to building wall approximately 16 feet.

Photo 6

Outfall 011. Standing on west side of outfall looking upstream toward the east.

Photo 7

Outfall 011 facing west. View of grassing area (and monitoring well MW-18) on top of and near outfall piping.

Photo 8

Outfall 011. Standing west of Outfall 011 and looking west. Fire hydrant in Photo 7 can be seen in background. Match with fire hydrant in lower left corner of this photo.

Photo 9

Outfall 010. Outfall is at bottom of brush-covered slope. 5-foot diameter pipe. MW-17 in grassy area just beyond break in slope.

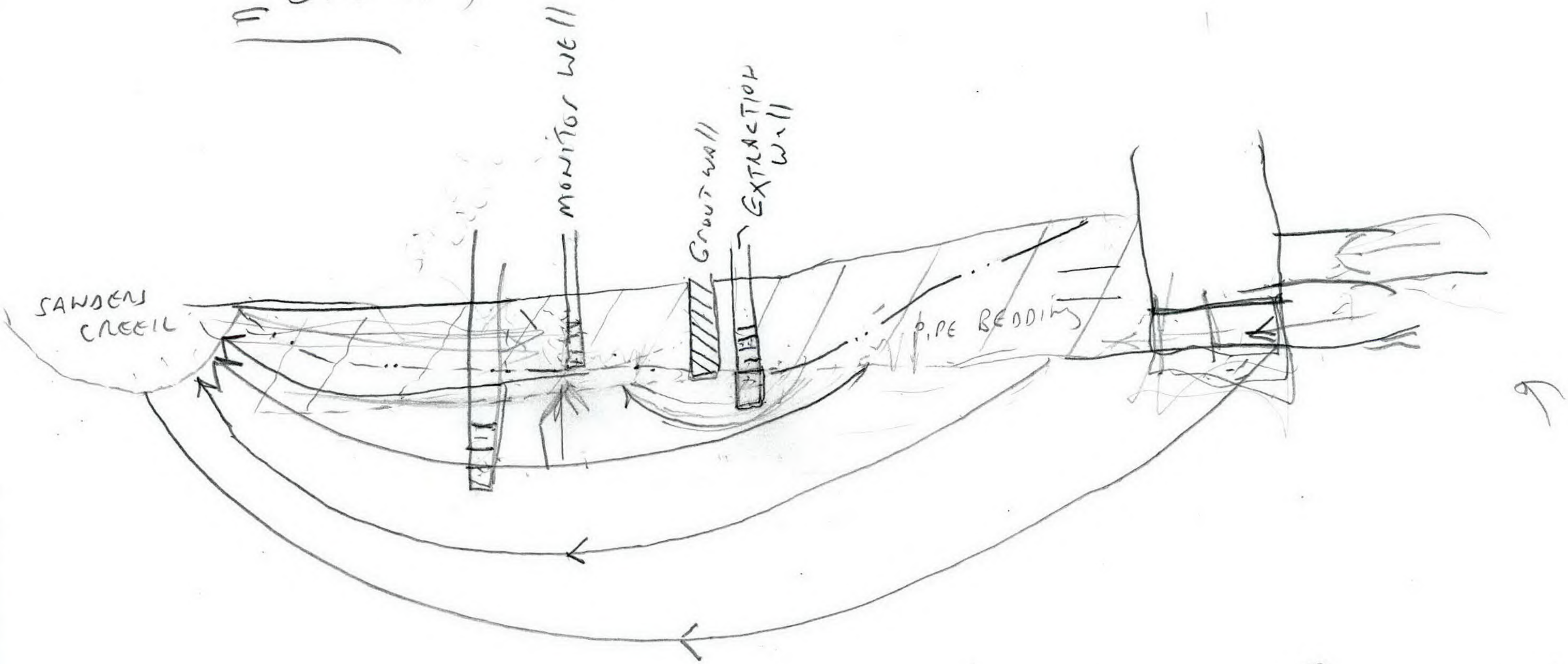
Photo 10

Outfall 010. Ground over western-most outfall. Facing east, Sanders Creek to left of phone on left side of chain-link fence.

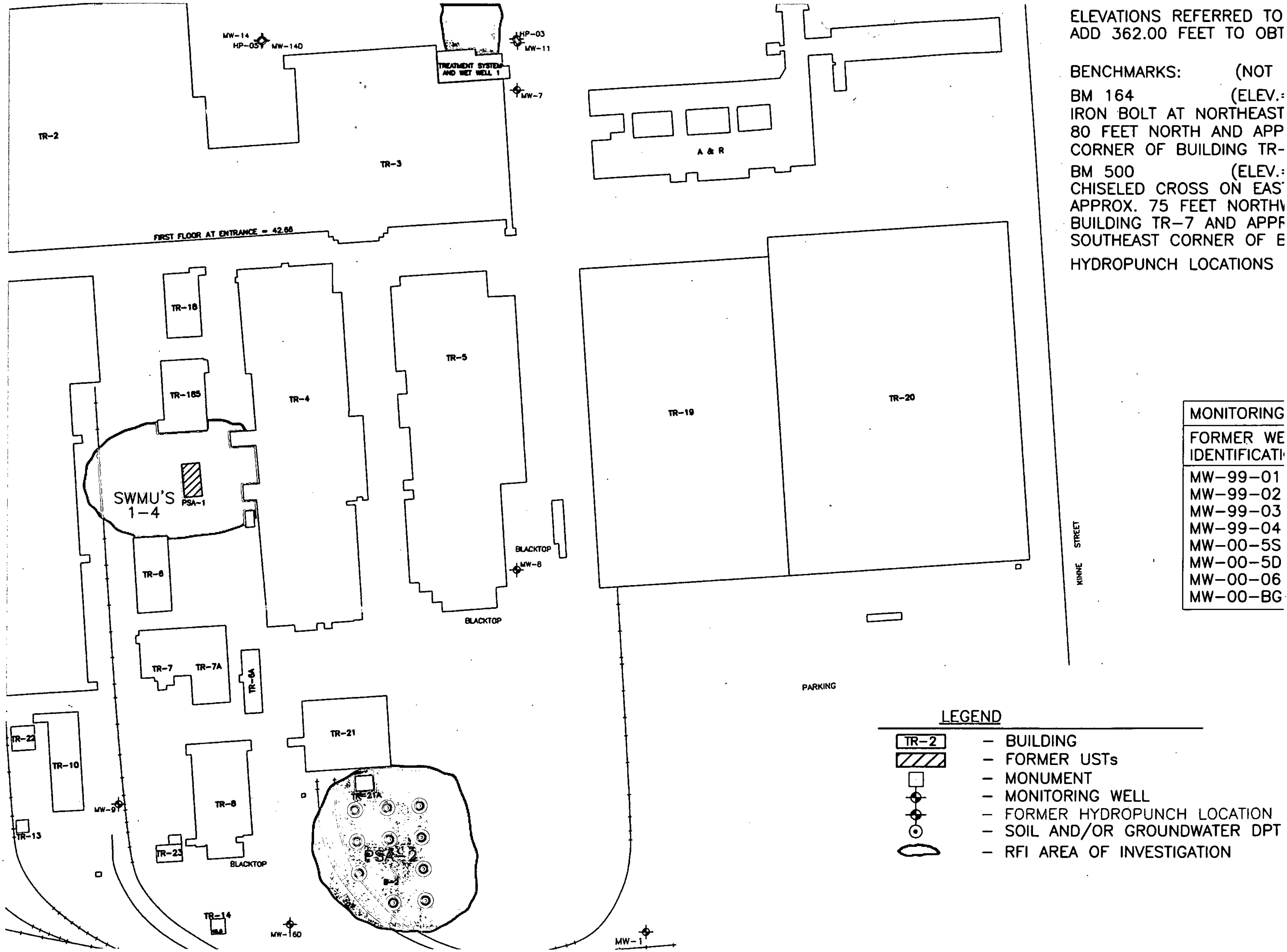
Photo 11

Outfall 010 facing west. Creek approximately 20 feet to right of chain-link fence.

full CHEMISTRY



full chemical Parameters (field mostly)
Rethink monitoring
Long TERM FIX NEEDS TO BE ASSESSED



ELEVATIONS REFERRED TO
ADD 362.00 FEET TO OBT

BENCHMARKS: (NOT

BM 164 (ELEV.=
IRON BOLT AT NORTHEAST
80 FEET NORTH AND APP
CORNER OF BUILDING TR-

BM 500 (ELEV.=
CHISELED CROSS ON EAST
APPROX. 75 FEET NORTHW
BUILDING TR-7 AND APPR
SOUTHEAST CORNER OF E

HYDROPUNCH LOCATIONS

MONITORING
FORMER WE IDENTIFICATI
MW-99-01
MW-99-02
MW-99-03
MW-99-04
MW-00-5S
MW-00-5D
MW-00-06
MW-00-BG

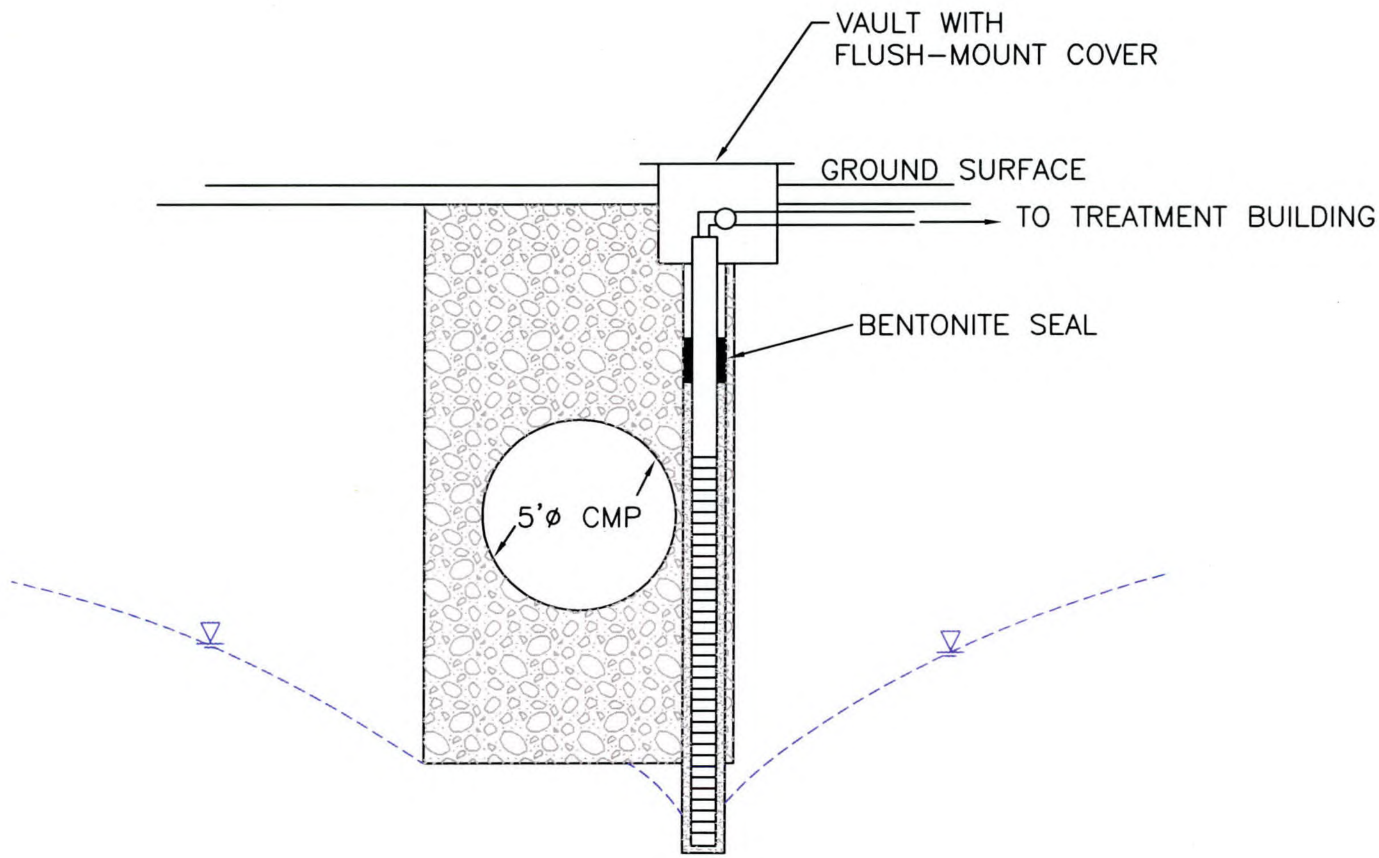


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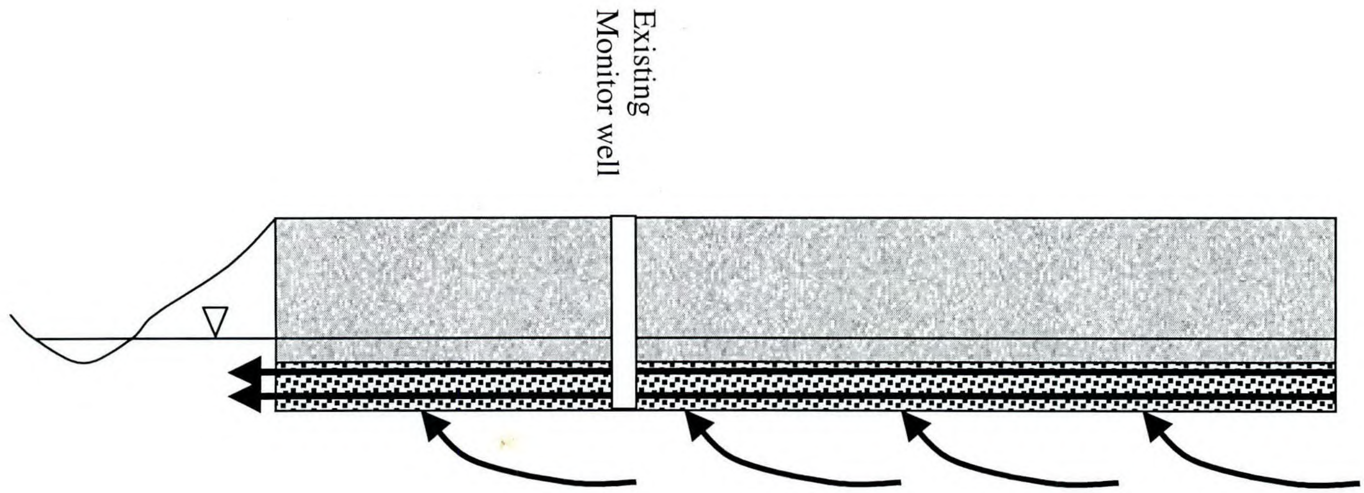
FIGURE 4.6
EXTRACTION WELL DETAIL
CARRIER CORPORATION
SYRACUSE, NEW YORK

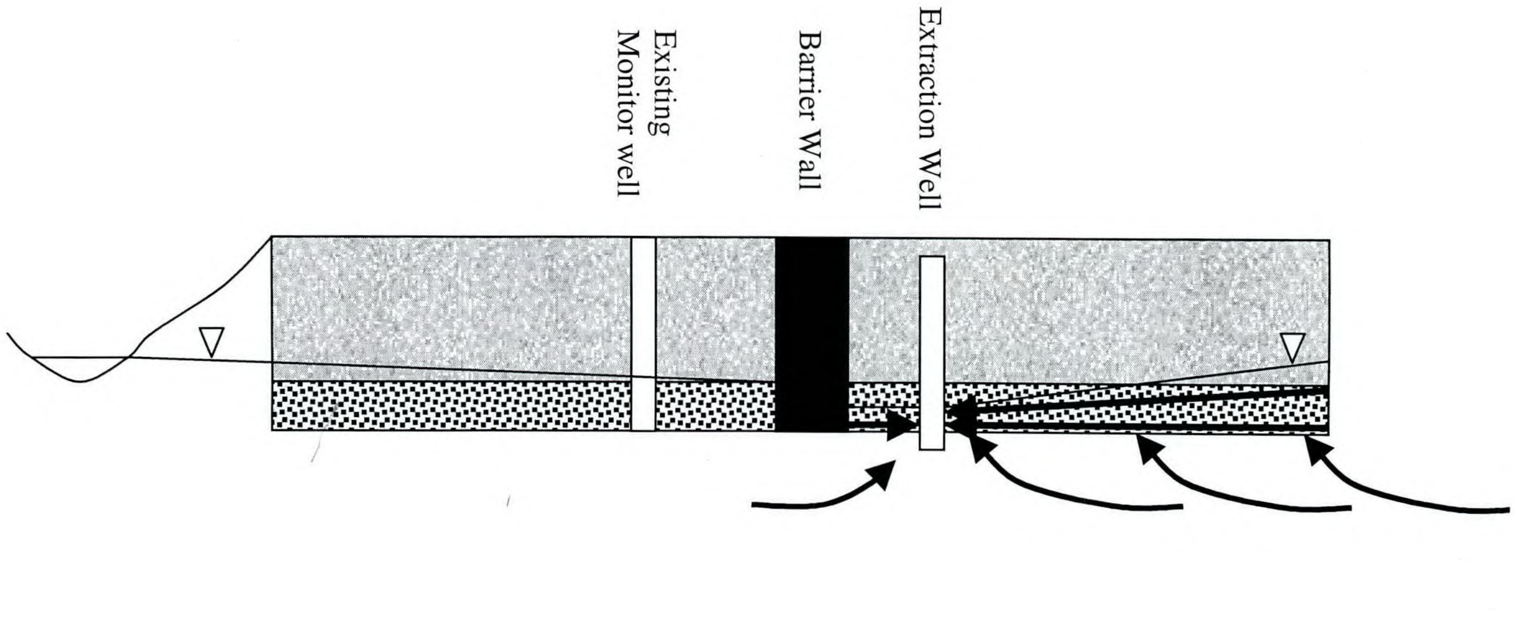
DWG DATE: 09/09/02 | NAME: 3133056R007

Carrier Corp Proposed Barrier Wall in Pipe Bedding
Flow Lines showing static / dynamic conditions

Under current (static) conditions, upward vertical gradients were recorded at the site boundary and no contamination was detected in deep horizons in vicinity of site boundary. Preferential flow path in the natural materials is horizontal. The outfall trench is gravel filled and has a much higher hydraulic conductivity than the surrounding silt and fine-sand aquifer. Disregarding head differences, groundwater flow generally seeks the path of least resistance. Therefore, the trench acts as a groundwater sink, draining the aquifer even during static conditions. The preferential flowpath in the natural materials surrounding the storm water line bedding materials is toward the more permeable bedding material, both laterally (as depicted in the site's shallow groundwater maps) and vertically (as shown below).



Under dynamic (pumping) conditions, preferential flow would still be horizontal within the native material. The horizontal and vertical flow path toward the bedding material would increase due to the reduced head and withdraw stresses imposed by the extraction well. In addition, the head in the permeable materials would be lowered and the upward flow gradient would increase. By installing an extraction well and maintaining total drawdown in the trench, we can ensure that it is a sink. As long as the water level in the trench is below the water table in the aquifer, groundwater will flow form the aquifer and the creek to the trench and recovery well. Therefore, deeper monitoring should not necessary.



Carrier Outfall - Groundwater Monitoring

The intent of the monitoring is to evaluate the adequacy of the remedial action The remedial action's purpose is to reduce or eliminate off-site migration via the outfall piping bedding material into Sanders Creek. Complicating the scenario of monitoring the remedial action's activity is the hydraulic barrier being installed. The purpose of the barrier is twofold - limit migration from the outfall to the creek, thereby enhancing capture AND limit migration from the creek to the extraction well

There is no ideal quantification of the remedial action's success - no way to demonstrate satisfying the purpose in a physical sense. Carrier believes that the most reliable indication of reduced off-site migration would involve the installation of monitoring well on the downgradient (Sander's Creek) side of the hydraulic barrier and then physically monitored and compared to the water level in the extraction well sump.

The following schematics portray the groundwater flowlines under static and dynamic conditions. Based on the physical setting and groundwater concepts, it is not believed that there is a concern with the migration of deeper groundwater circumventing the extraction system.

camyn

United Technologies Corporation
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Hartford, CT 06101
(860) 728-7000

United Technologies

November 1, 2002

Mr. Angus Eaton, Section Chief
NYSDEC
Division of Water
625 Broadway
Albany, NY 12233-3505

RECEIVED
NOV 12 2002
BUREAU OF SOLID WASTE & LAND MANAGEMENT
DIVISION OF SOLID & HAZARDOUS MATERIALS

RE: Carrier Corporation, Syracuse - Thompson Road Facility
SPDES Permit # NY – 0001163
Influent Modifications

Dear Mr. Eaton:

Carrier Corporation currently operates state-permitted surface water discharges at its Syracuse Thompson Road facility. As part of an ongoing voluntary Corrective Action program with the NYSDEC, Carrier would like to implement certain remedial activities at its plant that will affect the volume of its currently regulated influent flows. Carrier does not believe that implementation of its proposed remedial activities will create a new source of influent at its plant, but instead will merely convert existing passive groundwater collection systems to active collection systems at two limited locations.

Carrier's current SPDES permit identifies the following regulated influent sources: springs, storm water, AC condensate, leak testing, condensate, infiltration cooling, and drinking water fountains. The "springs" and "storm water" categories of influent have historically included a significant amount of ground water that is passively collected throughout Carrier's storm sewer collection and discharge system. Pursuant to the terms of an existing Consent Order with the NYDEC, Carrier previously consolidated its permitted outfalls to two locations and installed a treatment system to remove VOCs from collected influent (excect during high flow periods). Since the installation of the treatment system, the facility has not exceeded its permit limitations for VOCs.

Sampling recently performed under the voluntary Corrective Action program at Carrier's facility has detected VOCs in the bedding material of the storm water lines found at the plant's two active outfalls. In a remedial action plan submitted by Carrier to the NYSDEC, Carrier proposed to install extraction wells adjacent to these storm water lines next to the outfalls to collect contaminated groundwaters migrating along the more permeable bedding material. This extracted groundwater represents the same groundwater that is passively infiltrating on a smaller scale into the storm water lines. Carrier is planning to collect this extracted groundwater and process it through its existing wastewater treatment facility before it is discharged.

Presently, there is no specific information regarding flow volumes or contaminant concentrations that will result from these bedding material extraction wells. The flow volume to and out of the VOC treatment system is expected to increase during non-precipitation periods. However, it is not certain what the effect of continued pumping in the extraction wells will have on contaminant concentrations. It is likely that the VOC concentrations will drop significantly at first and then continue to gradually decrease over time until equilibrium has been established.

Carrier believes the source of the additional inputs (contaminated groundwater) are consistent with the source inputs currently received by the treatment system and as such would not require a permit modification. A pilot test is scheduled for December 2002 to better understand the flows and concentrations that will be involved with these extraction wells. This evaluation will also assess the efficacy of the VOC treatment system with the new flow concentrations. During the pilot test, a pump will withdraw water from the extraction well. Extracted water will be periodically sampled to assess VOC concentrations. The water withdrawn will be handled in one of two manners, either:

1. Water will be processed through a series of carbon canisters prior to discharge to the existing storm water collection system. The series of carbon canisters are expected to reduce concentrations in the flows to those observed at the storm water treatment system.

2. Water will be collected after extraction and placed into a large holding tank. The tank will be sampled and after the results are known, a flow rate will be selected to gradually feed the flows into these waters into the storm water treatment system

Carrier is requesting the state, under a temporary authorization or emergency discharge permit, to allow the water extracted during the pilot test to be discharged to the treatment system by either of the two scenarios described above. Upon completion of the pilot test, Carrier would like to operate the system under a temporary permit for purposes of collecting additional information on the flows and influent concentrations. This information would allow Carrier and the NYSDEC to more thoroughly evaluate any future required SPDES permit changes.

Please contact me at 860.728.6542 to discuss this letter and Carrier's request for a temporary or emergency discharge permit.

Sincerely,
United Technologies Corporation

W Penn

William E. Penn
Senior Program Manager

Cc: Ms. Sandra Lizlovs (DEC)
Mr. Larry Rosenman (DEC)
Mr. Tim Digulio (DEC)
Mr. Steven Venezia (EPA)
Mr. Larry Gross (DEC)
Ms. Beth Hubben (Carrier)
Mr. Pat Perrelli (Carrier)