MONITORING, OPERATION, AND MAINTENANCE PLAN

GENERAL MOTORS POWERTRAIN GROUP
GMPT BAY CITY PLANT AND CROTTY STREET CHANNEL SITE
BAY CITY, MICHIGAN

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1.0 INTRODUCTION

A generalized Monitoring, Operation, and Maintenance (O&M Plan) Plan was submitted to Michigan Department of Environmental Quality (MDEQ) as part of the Remedial Action Plan (RAP), for the General Motors Powertrain Group, Bay City Plant (GMPT Plant Site), Bay City, Michigan. The Site location is presented on Figure 1.1.

The Site-specific Monitoring, Operation and Maintenance (O&M Plan) Plan presented herein is a continuation of the previous document detailing inspection and maintenance programs for specific aspects of the RAP, and is being submitted subsequent to the completion of the Remedial Action (RA) for the GMPT Plant Site and the Crotty Street Channel Site (Sites).

1.1 PURPOSE AND ORGANIZATION OF PLAN

The purpose of the O&M Plan is to provide a synopsis of the remedy and certification of the design and construction including the monitoring, operation, and maintenance requirements for the RA implemented at the Sites. The O&M Plan is organized as follows:

- Section 1.0 presents a general introduction to the Site and the purpose and organization of the O&M Plan;
- Section 2.0 presents a description of the remedial actions for the Sites, including an explanation of any modifications to the plans and why these were necessary;
- Section 3.0 presents the Site operation and maintenance activities;
- Section 4.0 presents the groundwater monitoring program;
- Section 5.0 presents the reporting requirements;
- Section 6.0 presents the institutional controls;
- Section 7.0 presents the Site Health and Safety Plan for long-term operation, maintenance, and monitoring activities; and
- Section 8.0 presents the Site Quality Assurance Project Plan, including sampling and analysis procedures, for the long-term Site monitoring requirements.

2.0 DESCRIPTION

A RAP for the GMPT Plant Site, Bay City, Michigan was submitted and approved by the MDEQ. A RAP was also submitted for the Crotty Street Channel Site. The Crotty Street RAP was also approved by the MDEQ. The Crotty Street RAP modified several components of the GMPT Plant Site RAP. An amendment to the Plant Site RAP was submitted to the MDEQ and approved. Other components of the RAP have been modified during construction based on field conditions. These modifications, which are outlined in Section 2.2 are the only modifications to the original approved RAP. All other Remedial Actions have been implemented as approved by the MDEQ.

2.1 REMEDIAL ACTIONS

The implemented remedial actions at the Sites are as follows:

- multi-layer cap;
- sheet pile wall;
- three groundwater extraction systems: Lagoon Area (LA), Machine Storage Area (MSA), and Crotty Street Channel Containment Area (CSC);
- existing stormwater collection systems modification;
- soil excavation;
- sediment removal or stabilization;
- lagoon liner replacement;
- paving;
- institutional controls;
- fencing;
- groundwater monitoring; and
- operation and maintenance.

The remedial actions will be maintained as described in this report. In addition, groundwater monitoring will be conducted as described in this report. The monitoring, operation, and maintenance activities described herein will be conducted for as long as chemicals pose a risk to public health, safety, welfare, and the environment. Monitoring, operation, and maintenance activities will be reassessed at least every 5 years.

2.2 REMEDIAL ACTION PLAN COMPONENTS AND MODIFICATIONS

The following sections described the remedial action components and modifications to the original GMPT Plant Site RAP due to the Crotty Street RAP and field conditions.

2.2.1 SHEET PILE WALL

The proposed location of the sheet pile wall in the GMPT on-Site RAP has been modified as follows. Beginning at the northern end of the Machine Storage Area (MSA), the wall was keyed into the MSA deep soil mixing (DSM) wall prior to leaving the shoreline in a westward direction. The sheet pile wall extends in a westerly direction across the mouth of the Crotty Street Channel, continuing west to within close proximity to the Crotty Street Property line continuing south down the west side of the Crotty Street Property, and then turns east and connects to the DSM wall on GM Property (As Recorded Drawing S-02AR).

The sheet pile wall across the mouth of the channel is of dual wall construction for structural stability. The backfill between the walls is clean imported clay. The remainder of the sheet pile wall down the west and south sides of the Crotty Street Property is a single wall. The design life of the sheet pile wall is 40 years.

The sheet pile wall was modified to include the Crotty Street Channel Containment Area. Across the mouth of the channel the piling has been extended to a depth of 55 feet with a top-of-wall elevation of 588 feet above mean sea level (AMSL).

2.2.2 MULTI-LAYER CAP

A multi-layer cap has been placed over the area contained by the sheet pile wall, and the MSA DSM wall. The cap will reduce stormwater infiltration and prevent direct contact to underlying soil. The cap is graded to direct stormwater runoff to two stormwater collection inlets on the western side of the MSA on the GMPT Plant property. The cap primarily covers the MSA and the Crotty Street Channel Property (As-Recorded Drawing C-08AR).

Two fuel tanks have been removed from the eastern portion of the MSA and the modified cap in this area has been graded and replaced with the typical multi-layer cap.

2.2.3 GROUNDWATER EXTRACTION SYSTEMS

In addition to the lagoon area (LA) and machine storage area (MSA) groundwater extraction systems required in the GMPT Plant Site RAP, a groundwater extraction system consisting of three sumps was constructed in the Crotty Street Channel containment area and discharges into the GMPT on-Site MSA groundwater extraction system. The LA groundwater extraction system consists of five extraction wells that discharge to the lagoons. The MSA groundwater extraction system consists of seven extraction wells that discharge to storm manhole ST-41, which then directs extracted water to the GMPT on-Site stormwater treatment plant (As-Recorded Drawing C-05AR). All waters (surface water and extracted groundwater) from the Crotty Street Channel are directed to the GMPT stormwater treatment plant via the GMPT on-Site MSA groundwater extraction system.

All extraction pumps in the MSA and LA are equipped with scale free units produced by Nexteq to reduce scaling due to high iron concentrations.

2.2.4 STORMWATER CONTROL

Stormwater from the MSA and Crotty Street Channel is directed to the swale along the western edge of the GMPT MSA by sheet flow and swales. This required an extension to the grading proposed in the GMPT on-Site RAP to include all surfaces over the Crotty Street Channel. The multi-layer cap over the MSA and the Crotty Street Channel is graded so that surface water flows are directed to two stormwater collection inlets in the MSA (As-Recorded Drawing C-08AR). Surface water that infiltrates through the soil layer of the cap will drain via the geonet layer, and collect in the two stormwater inlets. Collected stormwater is routed to the GMPT on-Site stormwater treatment plant where it will be treated and used as non-contact cooling water or discharged to the river under NPDES permit MI0001121.

3.0 OPERATION AND MAINTENANCE ACTIVITIES

The monitoring, operation, and maintenance activities at the Site are related to the exposure barriers (e.g., paving, or clay barriers), multi-layer cap, containment systems (e.g., deep soil mixing walls or sheetpiling), groundwater extraction systems, fences institutional controls, and monitoring wells and staff gauges.

3.1 EXPOSURE BARRIERS INSPECTION

Exposure barriers in conjunction with land use restrictions [which have been placed on impacted, subsurface soils and sediments located in the MSA, LA, Inlet Slip (IS), Support Facilities Area (SFA), and Crotty Street Channel Containment Area (CSC)], are designed to prevent human exposure to these materials. As part of Site inspection activities, each of the above-mentioned areas will be field-inspected for any signs of trespassing or disturbance that may have exposed subsurface soils or sediments. Disturbances to be observed during field inspections include impairment to new or existing pavement, grading, trenching, or excavating activities, or erosion of soils in restricted areas. In the IS, the field inspection will look for dredging or any other activities that may have impacted subsurface sediments. A maintenance activity checklist will document each Site field inspection. The checklist is presented in Appendix A along with all other Operation, Maintenance, and Monitoring forms. The checklist may be updated periodically as appropriate. Follow-up actions will be performed as visual inspections deem necessary.

Surface soil and pavement capping will be visually assessed during each Site inspection performed during the post-closure period to determine if any areas have been disturbed. The inspector will walk each area to check for signs of trespassing or disturbances such as unusual settlement, holes, tire tracks, or signs of digging. In areas where remedial actions included excavation and backfill, the backfilled area will be inspected to ensure fill is not eroded. Pavement in the SFA will be inspected for signs of cracking and integrity of caulked joints.

Pavement, backfill, and surface soil capping will be maintained as visual inspections deem necessary. If eroded or exposed areas are found, additional fill material will be placed to ensure continued protection from subsurface soils. In areas where the pavement has deteriorated, the area will be repaired in a timely manner during the construction season.

In addition, the UA will be inspected semi-annually to confirm the restrictions are being followed.

The City of Bay City's O&M obligations, as associated with the RAP for the UA are the following:

1. do not dig or disturb the soil in areas identified as areas not to be disturbed on Figure 3.1 without appropriate notifications, approvals by MDEQ, and Due Care;
2. do not drink or otherwise contact the groundwater;
3. notify GM of any intrusive work activities (disturbing of soil or digging) in the areas not to be disturbed in the UA at least 20 days prior to planned commencement, and shall endeavor to timely notify GM of any such activities in other portions of the UA;
4. maintain permanent markers on the fence;
5. allow GM access to perform inspections, groundwater monitoring and fence repairs;
6. do not disturb fences on the west and south sides of the parcel; and
7. comply with the Declaration of Restrictive Covenant as it applies to the UA.

3.2 MULTI-LAYER CAP INSPECTION

Land use restrictions placed on the multi-layer cap system located in the MSA and the CSC are designed to restrict any activities that might impair the integrity of the multi-layer cap. The multi-layer cap constructed in this area is designed to prevent direct contact exposure to subsurface soils, provide containment of subsurface soils, and minimize surface water infiltration. Inspection and maintenance of the multi-layer cap will maintain the integrity of the multi-layer cap system, which consists of the following layers (bottom to top):

- grading layer;
- 6-inch sand bedding;
- 40-mil HDPE liner;
- Geonet layer for subsurface drainage;
- 12-inch sand layer; and
- 6-inch vegetated, topsoil cover.

To assure the integrity of the cap, the condition of the multi-layer cap will be visually assessed during each Site inspection performed during the post-closure period to determine, if any, the extent of settlement, evidence of erosion or other disturbances, presence of stressed vegetation, and existence of a uniform vegetative growth. All permanent erosion control features will be monitored to ensure that they are serving the intended purpose.

Cap maintenance will be conducted as visual inspections deem necessary throughout the post-construction period and may include regrading, filling in animal burrows, and repairing settled or eroded areas. This work may include but is not limited to placement and compaction of fill in areas which have settled and are causing water to pond on the cap; repair and replacement of sections of HDPE liner which may have been impaired due to settlement or breaches in the material; and restoration of topsoil and vegetative cover including fertilizing disturbed areas and seeding the cap. Erosion and sediment control features will be maintained as needed during the post-construction period. Maintenance includes the removal of excess siltation and debris that may build up in the stormwater runoff channel or inlets.

3.3 CONTAINMENT SYSTEMS INSPECTION

Land use restrictions were placed on the areas where the containment structures are located (MSA, LA, CSC, and IS). These are designed to restrict any activities that may impair the integrity of the containment systems located in these areas. These containment systems include the Deep Soil Mixing Walls, Sheet Piling installed along the Saginaw River and west side of the Crotty Street Channel, and the Inlet Slip Isolation Wall.

Two separate Deep Soil Mixing Walls surround both the perimeter of the MSA and the perimeter of the LA to physically isolate soil and groundwater in these areas from the remainder of the GMPT Site and also from the adjacent Saginaw River. Both Deep Soil Mixing Walls extend into, and were completed within, the laterally persistent Clay Till that underlies the entire GMPT Site.

Tight-joint sheet piling was installed along the banks of the Saginaw River around the perimeter of the CSC and the LA and across the IS. The sheet piling is a minimum 27 feet long, extending from at least 2 feet into the intermediate confining unit to a top-of-wall elevation of 588 feet AMSL, except across the Crotty Street Channel mouth where the piling is 55 feet long with a top of wall elevation of 588 feet.

The condition of the sheet piling will be visually assessed during each Site inspection performed to look for signs of deterioration, rusting, deformation, excessive movement or visible leakage. All unusual sightings will be noted on the inspection log. Maintenance will be conducted as inspections deem necessary to maintain the integrity of the containment systems.

3.4 GROUNDWATER EXTRACTION SYSTEMS INSPECTIONS

Groundwater extraction systems installed within the areas contained by the Deep Soil Mixing (DSM) Walls in the MSA, in the LA, and within the area contained by the DSM wall and the sheetpile wall in the CSC are designed to reduce groundwater levels within each containment area and to maintain an inward hydraulic gradient. Both groundwater extraction systems are automated and operate when groundwater rises above a pre-set level and continues to operate until groundwater is below the pre-set level. The pump in each well is activated when the water level within the well reaches a certain elevation. All pumps have been set as deep as possible within each extraction well. These levels will be monitored remotely by water level indicators placed in monitoring well MW-1S in the MSA, LMW-2S in the LA; and MW-300S in the CSC. Each air operated extraction pump located in the MSA, LA and CSC systems will independently automatically start if the water level in the well rises above the pre-set level. As part of Site inspection activities, the groundwater extraction systems will require periodic inspections to ensure proper operation of pumps and controls. All O&M activities related to the groundwater extraction systems should be recorded in the O&M log. A copy of the log is presented in Appendix A.

The extraction systems consist of 15 shallow groundwater extraction wells (EW1 - EW15), five in the LA system (EW1 – EW5), seven in the MSA system (EW6 – EW12), and three in the CSC system (EW13 - EW15) as presented on Figure 3.2. Stratigraphic logs and well completion details for the extraction wells are presented in Appendix B. As-recorded, drawing C-08AR presents the locations of the extraction wells. The shallow extraction wells are screened at depths of 5 to 19 feet below ground surface in the shallow sand/fill. From the extraction wells, pump discharge lines are connected to a header pipe. Extracted groundwater from all systems discharges to the stormwater system for subsequent treatment at the GMPT on-Site stormwater treatment plant using sand filters then granular activated carbon filters. The end-of-pipe treatment system, is regularly inspected as part of an existing ongoing O&M program.

The groundwater extraction systems will be inspected in accordance to the frequency as outlined in Appendix A to ensure the system is operating properly. During each

groundwater monitoring event, water levels will be recorded from the shallow monitoring wells in the MSA, LA, and CSC. Water levels will also be measured at all extraction wells to ensure that groundwater levels are being maintained below the pre-set water level. Additionally, the daily volume of groundwater collected from CSC, MSA, and LA extraction systems will be recorded. If there is an excessive and consistent increase in the amount of groundwater collected which cannot be attributed to maintenance or seasonal fluctuation, then a plan will be submitted to determine the cause.

System maintenance will be performed as specified in the respective manufacturer's systems manual and/or as visual inspections deem necessary. Maintenance activities may include such activities as cleaning and repairing or replacing parts in the pumping, piping, and air supply systems.

3.5 O&M TASKS FOR GROUNDWATER EXTRACTION SYSTEMS

The following sections are a detailed description of data collection and documentation, and extraction well components which will require inspection and maintenance.

3.5.1 O&M LOG

The O&M log is to be completed each Site visit documenting data collection, maintenance, and visual observations. Copies of the O&M log are to be maintained on Site by technical staff as well as an office copy forwarded to Project Management for review and analysis of collected data.

3.5.2 EXTRACTION WELL WATER LEVELS

Water levels from the 15 extraction wells are to be recorded, as required to evaluate system operation, using a QED PRO MODEL 6000 static water level or equivalent to an accuracy of ±0.01 feet. Manufacturer product information is enclosed in Appendix C1. Pump elevation is to be adjusted accordingly to ensure an optimum operation. All collected data and adjustments are to be recorded in the O&M log.

3.5.3 EXTRACTION WELL INSPECTION

Extraction well vaults will be checked for deterioration of the structure, lids, system piping and any and all system components. Observation will be noted in the O&M log and any repairs will be made in a timely basis.

3.5.4 EXTRACTION WELL PUMP MAINTENANCE

The pumps in extraction wells are air driven pneumatic pumps, specifically QED model SOLO. Compressed air from the GMPT Plant is utilized for the pneumatic pumps in the MSA and CSC, and a compressor in the Raw Water Pump Station (RWPS) is utilized for the pumps in the LA. In conjunction with this, a Drypoint compressed air membrane dryer is used in the LA to ensure proper moisture content of the compressed air. Nexteq Scale free units, have been installed at each extraction well to ensure no scale buildup due to iron and hard water. Manufacturer production information for the QED SOLO, Drypoint Type Dryer, and Nexteq scale free unit are enclosed in Appendix C2, C3, and C4, respectively, as well as other extraction system components.

Pump maintenance will be completed as necessary. Observations will be noted in the O&M log including presence of iron accumulation, product, silt and any deterioration of the pump, hoses, fittings, and other appurtenances. Pump maintenance is to be conducted by service personnel in a safe and orderly manner, as outlined on Figure 3.3, wearing proper PPE and using appropriate tools. Waste, rinse water, spent solution and new solution is to be stored in appropriate containers with proper labeling. Storage and work areas are to be properly identified and secured, as necessary, to protect non O&M personnel. Disposal of pump maintenance by-products will be coordinated by O&M personnel.

Manufacturer product information for appurtenances of the extraction well system is included in Appendix C5 (Union ball check valves), C6 (transformer, disconnect and circuit breakers) and C7 (tubing).

3.5.5 GROUNDWATER LEVEL TRANSMITTER MAINTENANCE AND INSPECTION

The groundwater level transmitter is a Druck PTX 1830 submersible depth/level transmitter, coupled with a Druck STE 110 sensor termination enclosure. Product information is enclosed in Appendix C8. Visual inspection will be conducted by

removing protective cover and checking for any physical impairments and for the indicator color of the desiccant module. Blue indicates normal operation, pink indicates a saturated condition and required maintenance. Desiccant modules will be replaced, as necessary.

3.5.6 FLOWMETER MAINTENANCE AND INSPECTION

The Krohne Altoflux Model IFM 4080K magnetic flow meter was chosen to record flow volumes from the extraction wells, coupled with the Krohne IFC 090K signal convertor. Manufacturer product information is enclosed in Appendix C9. Inspection of the flowmeters and appurtenances is to be conducted by visually checking for level connections and property display and outputs. Meter calibration will be checked and reported at 6 month intervals. The system will be shut down and the meter zeroed.

3.5.7 CONTROL PANEL MAINTENANCE AND INSPECTION

Visual inspection of the control panel will be conducted by opening the well vault cover and checking for physical impairments. An integral part of the Control Panel is the Sensaphone 2000 by Phonetics; Manufacturers product information for the enclosed in Appendix C10. Data logged by the Sensaphone 2000 (including depth to groundwater and extraction well flow volumes) will be faxed on a weekly basis. Maintenance for the Sensaphone 2000 includes replacement of batteries and repair of faulty connections as necessary.

3.5.8 AIR SUPPLY MANIFOLD

Inspection of the air supply manifold will be visual for leaks and proper operation. Maintenance will require filter change outs as required.

3.5.9 LAGOON AREA AIR COMPRESSOR INSPECTION AND MAINTENANCE

Quincy Compressor Model QT-5 was installed in the LA for the extraction well system. Manufacturer product information is attached in Appendix C11. Visual inspection of the air compressors will include checking for leaks, oil level, and operation pressure and dryer operation. Maintenance will be routine oil and air filter changes as recommended

by the manufacturer. Inspection and maintenance of the LA air compressors is currently completed by GMPT Plant staff.

3.5.10 HEATER INSPECTION

Visual inspection will be conducted during operating season for proper heater functioning. Manufacturer product information is enclosed in Appendix C12.

3.5.11 EAST LAGOON SUMP PUMP INSPECTION AND MAINTENANCE

Inspection will be a visual inspection for operation and flow. Maintenance will involve cleaning pump and level switches when reduction of flow is detected.

3.6 STORMWATER COLLECTION SYSTEM INSPECTIONS

The storm sewer and recirculation system were identified as pathways for groundwater to exit the SFA and as the main contributors to dewatering of this area. Storm sewer lines and collected groundwater feed into the stormwater sewer pump lift station located south and west of the West Lagoon, from where collected water is lifted to the lagoons for storage and subsequent treatment at the GMPT on-Site Stormwater Treatment Plant. The end-of-pipe stormwater treatment system is regularly inspected as part of an ongoing O&M program by GM Plant personnel.

As part of the remedial action, changes in the MSA altered preexisting grades and changed stormwater runoff patterns. A new drainage channel and two stormwater inlets were installed adjacent to the Deep Soil Mixing Wall between the MSA and CSC. The multi-layer cap over the MSA and Crotty Street Channel is graded so that stormwater flows are directed by sheet flow and swales to the newly installed stormwater collection inlets. From the new stormwater collection inlets, stormwater will flow by gravity to the existing storm manhole ST-41 (located in the northwest corner of the SFA).

The condition of these stormwater collection inlets and storm manhole ST-41 will be inspected during Site inspection activities. Evidence of debris or excessive siltation or any damaged or crushed piping will be recorded. Maintenance will be performed as needed. Any collection system piping that has been crushed or damaged will be

replaced. Debris and excessive siltation will be removed from the culverts and drainage channels.

3.6.1 STORMWATER TREATMENT SYSTEM

Stormwater treatment system maintenance is being performed on a routine basis. This includes maintenance of all mechanical and electrical components of the system, all meters associated with the operation of the system, and the multi media sand filters and GAC contactors.

Maintenance of mechanical and electrical components of the system is summarized in Table 3.1. All meters associated with operation of the system are calibrated and inspected in accordance with manufacturer's specifications.

Each month the sand level within one filter is inspected. Sand is added to the filter as needed.

The multi-media sand filters are backwashed due to any of the following:

- Differential pressure cross filter reaches the maximum allowable;
- Effluent turbidity reaches the maximum allowable; or
- A set time since last backwash has been reached.

Sand filters are typically air scoured and backwashed with water.

GAC contactors are backwashed when the differential pressure across a contactor bed reaches the maximum allowable. The GAC contactors are manually air scoured and backwashed with water.

3.6.2 ARCHIMEDES SCREW PUMPS

Groundwater in and around the SFA flows toward the stormwater sewer pump lift station located south and west of the LA. Although the stormwater collection and sewer pump lift system was not originally intended as a groundwater remediation system, groundwater elevation data obtained at various times of the year support, on a consistent basis, the effectiveness of the existing stormwater collection and pumping system in providing year-round elimination of any groundwater migration potential. The stormwater sewer pump lift station located south and west of the LA will be inspected during Site inspections.

GM will provide verbal notification to the MDEQ within 2 business days followed by written notification within 7 days if the Archimedes screw pump system is shut down for any reason. The notification will specify, as appropriate, how the problem will be addressed and an implementation schedule.

3.6.3 CROTTY STREET 66-INCH SEWER

A 66-inch sewer pipe which previously discharged into the Crotty Street Channel has been blocked upstream from the channel, leaving a section of isolated sewer pipe. This sewer pipe will be inspected monthly to ensure no build up of water occurs. The results of the inspection are recorded on the maintenance activity checklist found in Appendix A. If a water buildup does occur, the water will be pumped to the on-Site stormwater treatment plant or containerized and treated off Site.

3.7 STAFF GAUGES AND MONITORING WELLS INSPECTION

During each monitoring event, monitoring wells will be inspected for signs of damage or wear and tear such as rusted or broken locks or bent well casings. Signs of an inadequate seal, such as a cracked or mounded concrete pad, a missing well cap, or a loose cover will also be noted. Additionally, total depths will be collected to check for signs of silting or erosion of the well screen. Any unusual conditions will be noted in the field notebook. An effort will be made to repair or replace any damaged item. If there is evidence of tampering or damage which could impair sample integrity, the well will not be sampled. Staff gauges and monitoring wells must be inspected and replaced if any damage occurs which makes them unusable.

3.8 REPORTING

A report summarizing Site inspection and maintenance activities shall be prepared by REALM and submitted to the MDEQ semi-annually for the first 2 years and annually for another 28 years. After this period of time, the plan will be re-evaluated but monitoring and O&M activities will continue until contaminants on Site no longer exceed applicable criteria. The semi-annual/annual reports will be provided, in accordance with the Consent Judgment.

The report shall document the results of the Site inspection and any necessary maintenance/repair activities. Appendix A provides a summary of O&M tasks.

4.0 GROUNDWATER AND STORMWATER MONITORING PROGRAM

4.1 OVERVIEW

Groundwater and stormwater monitoring will be undertaken at the Site in order to ensure that materials are not migrating off-Site. Groundwater and stormwater monitoring will be conducted to monitor the effectiveness of the implemented remedial actions in the MSA, LA, PB, Outer PB, SFA, and CSC.

4.2 MONITORING WELL SAMPLING

4.2.1 OVERVIEW

The purpose of the groundwater monitoring program is to monitor groundwater quality, and to evaluate the performance of remedial actions.

The groundwater monitoring program will be re-evaluated every 5 years and will consist of the following components:

i) hydraulic monitoring (all monitoring wells and staff gauges); and

ii) groundwater quality monitoring (33 selected monitoring wells).

The monitoring program will continue for the same duration as O&M activities continue for the Site. The following subsections identify the scope of work anticipated for each monitoring component.

4.2.2 HYDRAULIC MONITORING

Groundwater and staff gauge elevations will be determined on a monthly basis for 2 years (March, 1999 to March, 2001) and during groundwater sampling activities thereafter, for 59 monitoring wells and five staff gauges. The purpose of the hydraulic monitoring program is to evaluate the performance of groundwater containment remedial actions. This includes the groundwater extraction systems and the stormwater collection system. Figure 4.1 shows long-term monitoring well locations, staff gauge locations and shallow groundwater contours measured October 31, 2000. Monitoring well logs for these wells are presented in Appendix B.

For every hydraulic monitoring event, the following procedures will occur and be recorded for each of the above mentioned wells and staff gauges:

1. Monitoring wells will and staff gauges be inspected for signs of damage or wear and tear. If there is evidence of tampering or damage that could impair the ability to accurately measure the static water level, the water level within the well will not be measured, and all corrective measures will be taken to repair the damaged well.
2. Static water level measurements will be taken using an electronic water level indicator to a precision of 0.01 feet. The depth to water will be referenced from the top of the riser pipe. Each measurement will be converted into a mean sea level elevation.
3. The number of Archimedes screw pumps operating at the time of the event will be noted.

All static water level measurements for an event will be taken within a 24-hour period.

Groundwater elevations and staff gauge elevations will be plotted to define the horizontal and vertical flow patterns. Shallow groundwater contours are presented on Figure 4.1.

The monitoring well completion details and groundwater elevations are presented in Table 4.1. Table 4.2 presents the frequency of hydraulic monitoring.

4.2.3 GROUNDWATER QUALITY MONITORING

The groundwater quality monitoring program includes 33 monitoring wells and is summarized in Table 4.2.

4.2.3.1 LOCATION

Monitoring well sampling will consist of both shallow aquifer groundwater and deep sand aquifer groundwater. The proposed wells for groundwater sampling are presented in Table 4.2. Monitoring well logs for these wells are presented in Appendix B. Historical groundwater analytical data is presented in Appendix E.

4.2.3.2 SCHEDULE

The groundwater monitoring program will continue for 27 years. The first event took place prior to commencing construction activities (March 1999). The second event was completed upon completion of remedial action activities (September 2000). Subsequent events will take place every 6 months for the next year (until September 2001), then annually for the remaining 25 years. The program will be re-evaluated at least every 5 years. The parameter list, number of monitoring wells and their locations, frequency of sampling, and program necessity will be evaluated.

Monitoring reports will be prepared and submitted to the State within 60 days after receipt of analytical data from the sampling event.

4.2.3.3 ANALYTICAL PARAMETERS

All groundwater samples collected will be analyzed for polychlorinated biphenyls (PCBs). In addition, wells in the LA will be analyzed for volatile organic compounds (VOCs) and wells in the UA will be analyzed for metals. The analytical parameters for each well are detailed in Table 4.2.

4.2.4 GROUNDWATER SAMPLING PROCEDURES

Groundwater samples will be collected immediately following development or purging. All sampling equipment will be cleaned, prior to use.

All monitoring wells will be sampled according to the following protocols:

1. New disposable latex gloves will be used when sampling each well.
2. The sampler will measure and record the depth to water in each well to the nearest 0.01 foot using an electric tape. The electric tape will be cleaned prior to use in each well.
3. Standing water will be purged with a low flow pump designed for a flow rate between 0.1 L/min and 0.5 L/min, with a maximum drawdown of 0.3 feet. Temperature, pH, conductivity, turbidity, and DO will be recorded every ten minutes of purging until each water quality parameter has stabilized for three consecutive readings, and the water is deemed to be silt free. All waste groundwater not used for sampling will be treated in the GMPT on-Site stormwater treatment facility. Calibration of field instruments will be

undertaken prior to each sampling event or at the beginning of the day. In the event that a well is purged dry at a rate of 0.1 L/min, groundwater will be permitted to recover to a level sufficient for sample collection.

4. After purging, water samples will be collected using either a peristaltic pump or bladder pump with polyethylene tubing, except where samples will be analyzed for VOCs. Where VOCs will be analyzed, bladder pumps and dedicated teflon coated tubing will be used. Groundwater samples will be taken in appropriately preserved, laboratory supplied containers, using the appropriate pump with a flow rate between 0.1 L/min and 0.5 L/min.

5. Each pump will be cleaned prior to each use. The cleaning procedure consists of washing with distilled water and Alconox detergent, rinsing with distilled/deionized water, and air drying.

6. Containers for sample collection and preservation requirements will be determined as required by the analytical parameters. All sample bottles will be provided by the laboratory and will be prepared using standard laboratory validated washing procedures. The sample bottles will be delivered to the Site in sealed containers. The containers will be labeled with the sample ID, date, time, analysis requested, preservative added, and sampler's initials.

7. A blind field duplicate sample will be collected at a minimum frequency of 1 in 10 groundwater samples.

8. Samples for matrix spike/matrix spike duplicate analysis will be collected at a minimum frequency of 1 per 20 samples.

9. A rinsate blank sample will be collected at a minimum frequency of 1 in 10 groundwater samples. The rinsate sample will consist of deionized water pumped through and then sampled out of, a cleaned pump. This will provide a quality assurance check on the field decontamination procedures employed on the pumps.

10. All disposable gloves, and other solid waste materials will be placed in an appropriate landfill. All decontamination fluids will be treated in the GMPT on-Site stormwater treatment plant.

11. All samples will be placed in a cooler that maintains a temperature of approximately 4°C. Chain-of-custody forms will be completed in the field and will accompany the sample shipment to the analytical laboratory.

4.2.5 DATA EVALUATION AND REPORTING

Groundwater elevations and contours will be plotted to define the horizontal and vertical flow patterns in the vicinity of the LA, MSA, and CSC. These results will be reported following each sampling event.

The analytical results for groundwater quality monitoring, once received from the laboratory, will undergo a thorough inspection and data validation will be undertaken to determine if the data is acceptable for use in the monitoring program. If the data is deemed acceptable for use, the data will be entered into a computer database and submitted to the MDEQ following each sampling event.

The monitoring requirements will be re-evaluated at least every 5 years to ensure that appropriate monitoring activities are being conducted.

4.3 STORMWATER MONITORING

Stormwater sample collection will be conducted to monitor the effectiveness of the treatment system to eliminate contaminants found in stormwater collected.

The stormwater quality monitoring program allows the evaluation of loading on the SWTP and includes the collection of samples from the MSA, LA, and CSC extraction systems, Catch Basin 2 located in CSC Area and Influent from the Lagoons to the SWTP, and is summarized in Table 4.2.

Samples from the stormwater/non-contact cooling water treatment plant will also be collected and reported in accordance with the Plant's NPDES permit. Samples of wastewater discharging to the City POTW will be collected and reported in accordance with the Plant's Industrial Users Permit.

5.0 REPORTING

All reporting requirements have been outlined in Table 5.1.

5.1 OPERATION AND MAINTENANCE ACTIVITIES

A report summarizing Site inspection and maintenance activities shall be prepared by REALM and submitted to the MDEQ semi-annually for the first 2 years and annually for another 28 years. After this period of time, the plan will be re-evaluated but monitoring and O&M activities will continue until contaminants on-Site no longer exceed applicable criteria. The semi-annual/annual reports will be provided within 60 days of completion of inspections.

5.2 GROUNDWATER SAMPLING

Monitoring reports will be prepared and submitted to the State as part of the report identified in Section 5.1. The report will include static water level measurements and a corresponding groundwater flow map, analytical results in tabular form, and a discussion of results. The sampling event will be compared to historical results.

5.3 STATIC WATER LEVEL MONITORING

Monitoring reports will be prepared and submitted to the State as part of the report identified in Section 5.1. The report will include static water level measurements, a corresponding groundwater flow map, and a discussion of the results. The event will be compared to historical results.

5.4 STORMWATER MONITORING

Monitoring reports will be prepared and submitted to the State as part of the semi-annual report identified in Section 5.1. The report will include water level measurements, flow rates, analytical results, and a discussion of the results.

5.5 CONTINGENCY PLANS

In the event that either monitoring results indicate contaminant migration has occurred or if other significant changes occur, GM will verbally notify the MDEQ within 3 business days and submit a written proposal on how they plan to address the issue within 10 business days.

5.6 SITE MODIFICATIONS

Any intrusive site work which may adversely impact the intended remedy must be reported to and approved by the MDEQ prior to commencement.

5.7 ARCHIMEDES SCREW PUMP SYSTEM SHUTDOWN

GM will provide verbal notification to the MDEQ within 2 business days followed by written notification within 7 days if the Archimedes screw pump system is shut down for any reason. The notification will specify, as appropriate, how the problem will be addressed and an implementation schedule.

6.0 INSTITUTIONAL CONTROLS

This section presents the institutional controls which have been implemented as part of the remedy.

6.1 PURPOSE OF INSTITUTIONAL CONTROLS

Institutional controls have been implemented to ensure the integrity of the remedy.

6.2 IMPLEMENTATION OF INSTITUTIONAL CONTROLS

A land use agreement with MDEQ and a restrictive covenant is being recorded with the Bay County Register of Deeds. The institutional controls include:

i) restrict the use of soil and groundwater at the Site;

ii) prohibit general public access to and development of the Site;

iii) ensure the integrity of the cap is not compromised;

iv) ensure the property is used for industrial purposes only; and

v) be binding upon any and all persons who acquire title or any legal interest in property within the Site.

These restrictions shall remain in full force and effect until the MDEQ determines that the restrictions are no longer necessary to protect human health and the environment. Any person who owns or controls property subject to such deed restrictions may request of the MDEQ a determination that such restrictions are no longer required to protect human health and the environment.

These restrictions also include a land use agreement and declaration of restrictive covenant pursuant to Part 201, Section 324.20120b(3) and (4), and a Notice of Approved Environmental Remediation for the Parking Area and the PA (excluding location BH702) portions of the Site. These documents will ensure that long-term monitoring, O&M programs, land use or resource use restrictions, and financial assurances, if applicable, will be met on an ongoing basis to assure the effectiveness and integrity of the remedial measures to be implemented.

These restrictions also include a land use agreement and declaration of restrictive covenant for the UA to ensure Site-specific Recreational Use. GM will continue to be

responsible for groundwater monitoring O&M activities in the UA even though the City of Bay City is the current owner. The City is responsible for exercising due care with respect to the UA in general and particularly with respect to maintaining the integrity of those areas outlined in the restrictive covenant for the UA area.

7.0 SITE HEALTH AND SAFETY PLAN

The Health and Safety procedures for the long-term operation, maintenance, and monitoring activities at the Site are incorporated within the Site Health and Safety Plan (HASP) included as Appendix D to this Long-Term O&M Plan.

8.0 QUALITY ASSURANCE

A certified analytical laboratory will be retained to perform the analyses for the groundwater monitoring program. Samples will be analyzed as specified under Part 201 of Act 451.

Quality Control/Quality Assurance samples will be collected as part of the sampling program. These samples will consist of duplicates, equipment rinsate blanks, matrix spike and matrix spike duplicates, and trip blanks. One duplicate sample will be collected for every ten investigative samples. One equipment blank and duplicate will be collected for every ten investigative samples with a minimum of one per day. One matrix spike and one matrix spike duplicate will be collected for every 20 investigative samples. One trip blank will be collected with each shipment of VOCs.

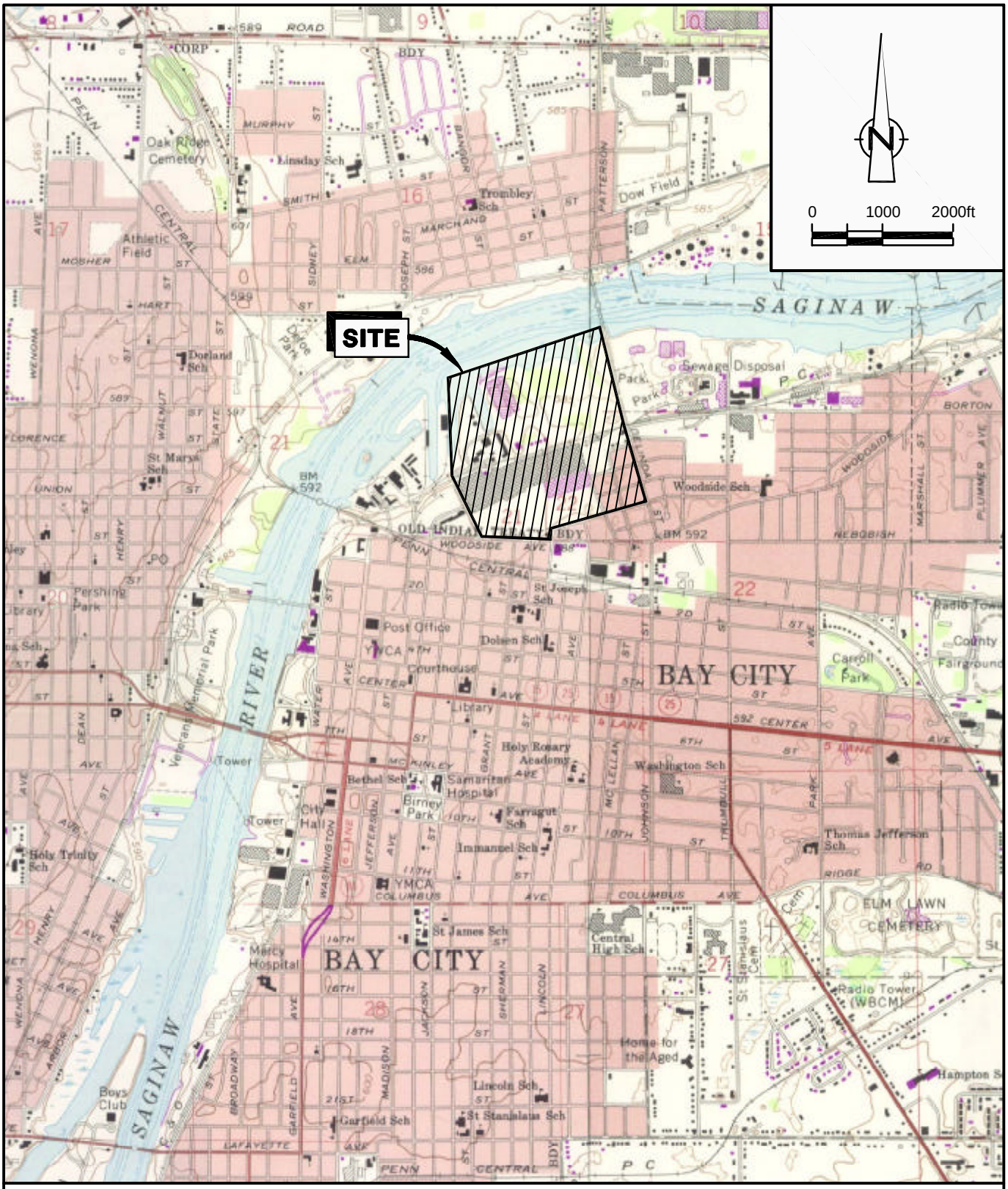
All sample parameters analyzed including analytical method numbers, and target detection limits are presented in Table 8.1.

9.0 RESPONSIBILITY

Mr. Joseph Medved of General Motors (GM) Worldwide Facilities Group (WFG) has overall responsibility for implementing RAP O&M activities.

Ms. Jennifer Bigelow will be responsible for O&M activities associated with operations (i.e., treatment plants, Archimedes screws, etc.) Mr. Medved will be responsible for O&M activities associated with historical activities (i.e., maintaining caps, extraction systems, sheet pile, wall, etc.). Any changes in personnel will be identified to the MDEQ within 30 days.

It is the responsibility of the City of Bay City to conduct certain O&M activities in the UA. If the City of Bay City fails to conduct these activities, GM will perform these activities following appropriate discussions and consultation with the MDEQ and City of Bay City; such performance by GM does not relieve the City of Bay City of its responsibilities.

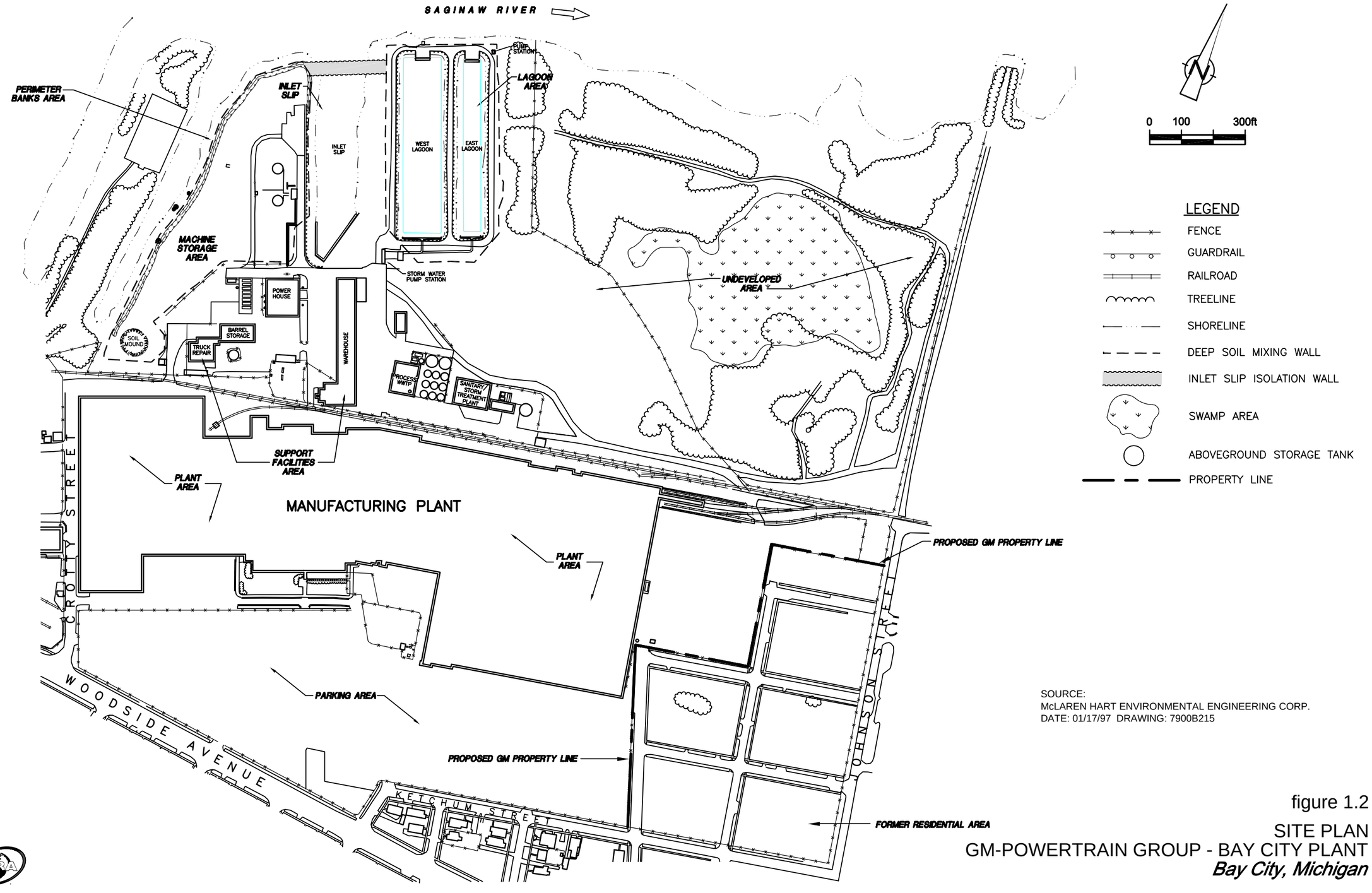


SOURCE: U.S.G.S. QUADRANGLE MAPS;
BAY CITY AND ESSEXVILLE, MICHIGAN
1967 (PHOTO REVISED 1973)

figure 1.1

SITE LOCATION
GM-POWERTRAIN GROUP - BAY CITY PLANT
Bay City, Michigan

12610-10(011)GN-WA002 NOV 23/2000

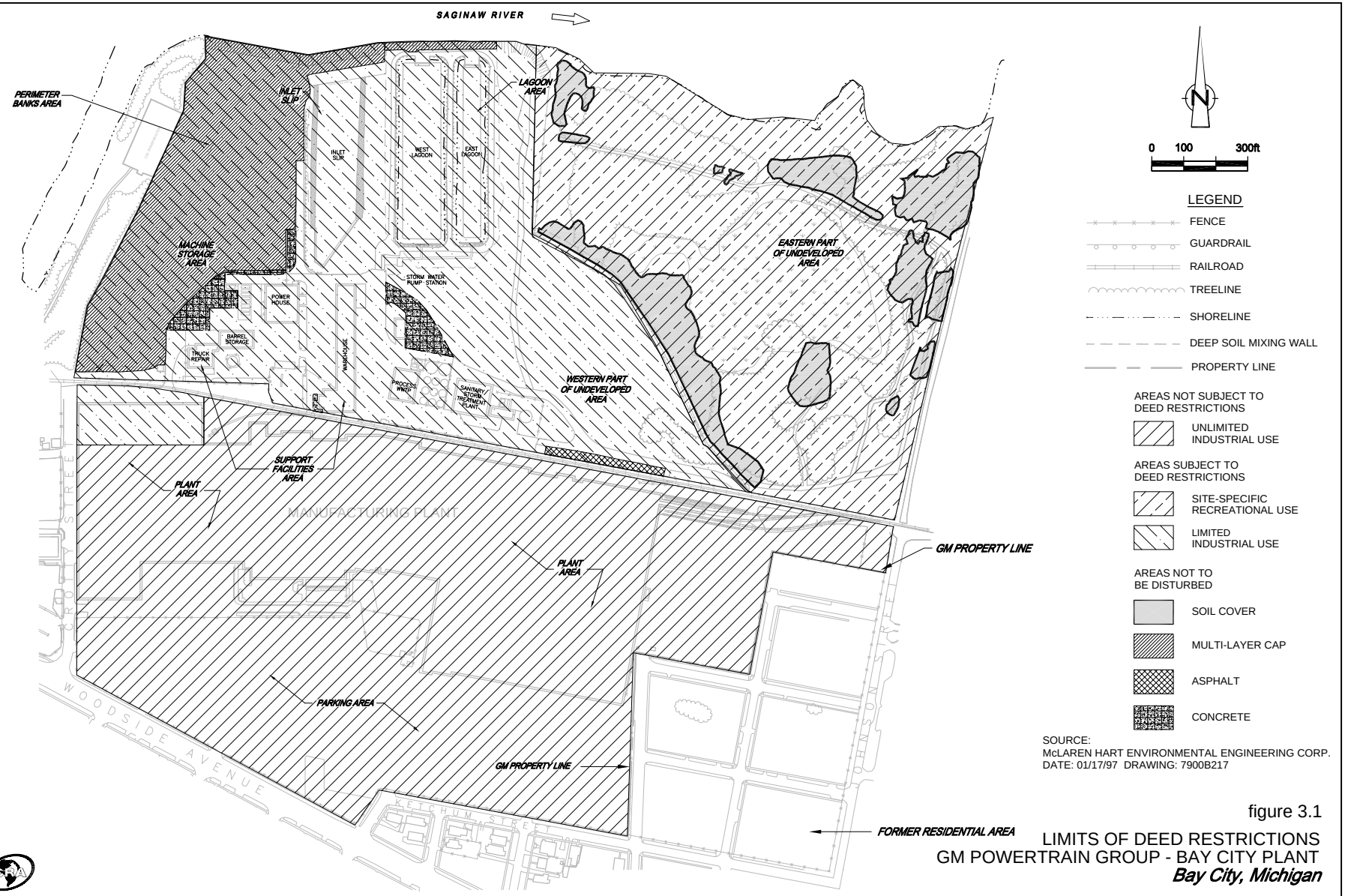


SOURCE:
McLAREN HART ENVIRONMENTAL ENGINEERING CORP.
DATE: 01/17/97 DRAWING: 7900B215

figure 1.2

SITE PLAN
GM-POWERTRAIN GROUP - BAY CITY PLANT
Bay City, Michigan

12610-10(011)GN-WA003 NOV 23/2000

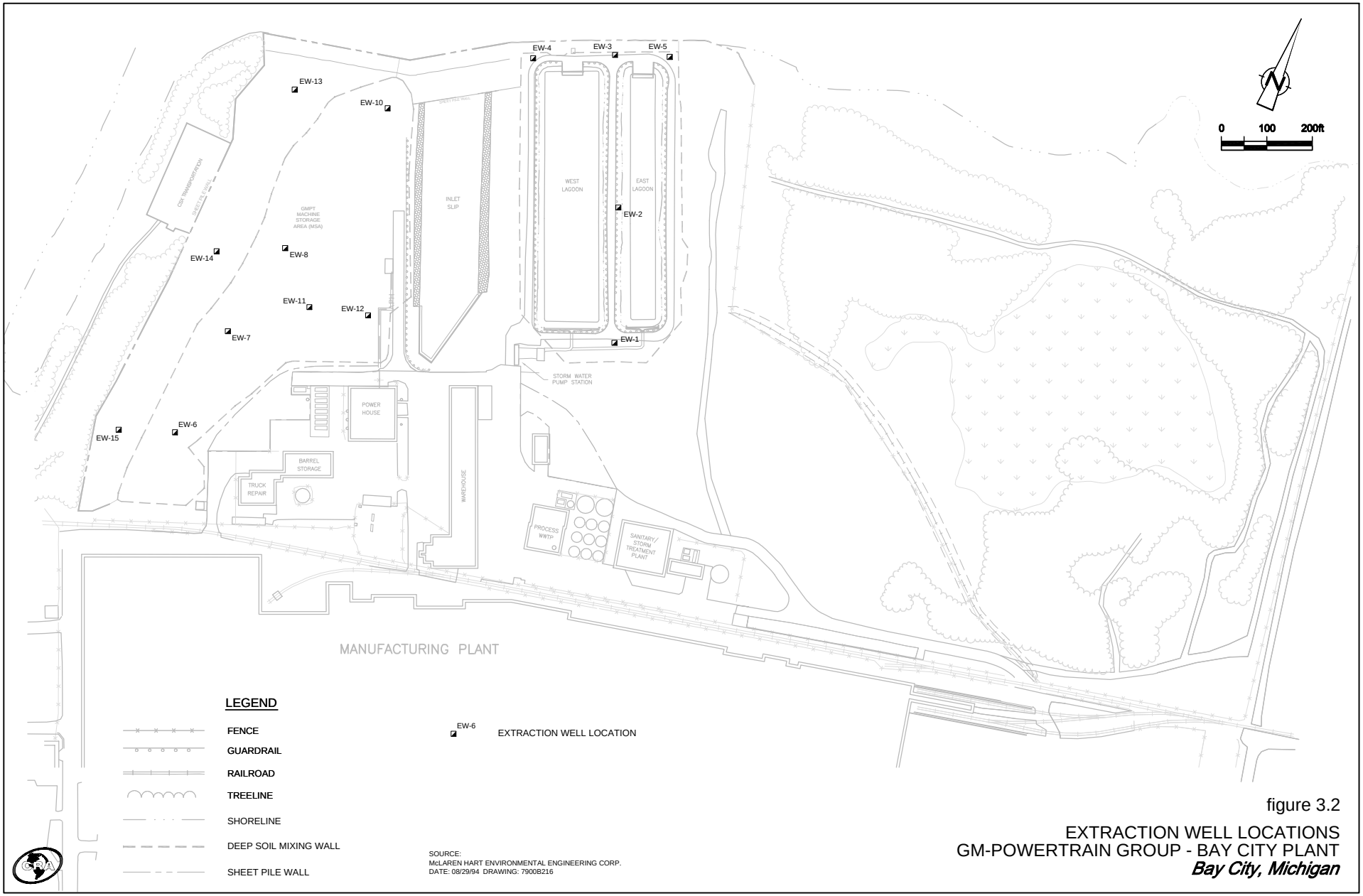


SOURCE:
McLAREN HART ENVIRONMENTAL ENGINEERING CORP.
DATE: 01/17/97 DRAWING: 7900B217

figure 3.1

LIMITS OF DEED RESTRICTIONS
GM POWERTRAIN GROUP - BAY CITY PLANT
Bay City, Michigan

12610-10(011)GN-WA012 JAN 03/2002



SOURCE:
McLAREN HART ENVIRONMENTAL ENGINEERING CORP.
DATE: 08/29/94 DRAWING: 7900B216

figure 3.2

EXTRACTION WELL LOCATIONS
GM-POWERTRAIN GROUP - BAY CITY PLANT
Bay City, Michigan

12610-10(011)GN-WA006 JAN 03/2002

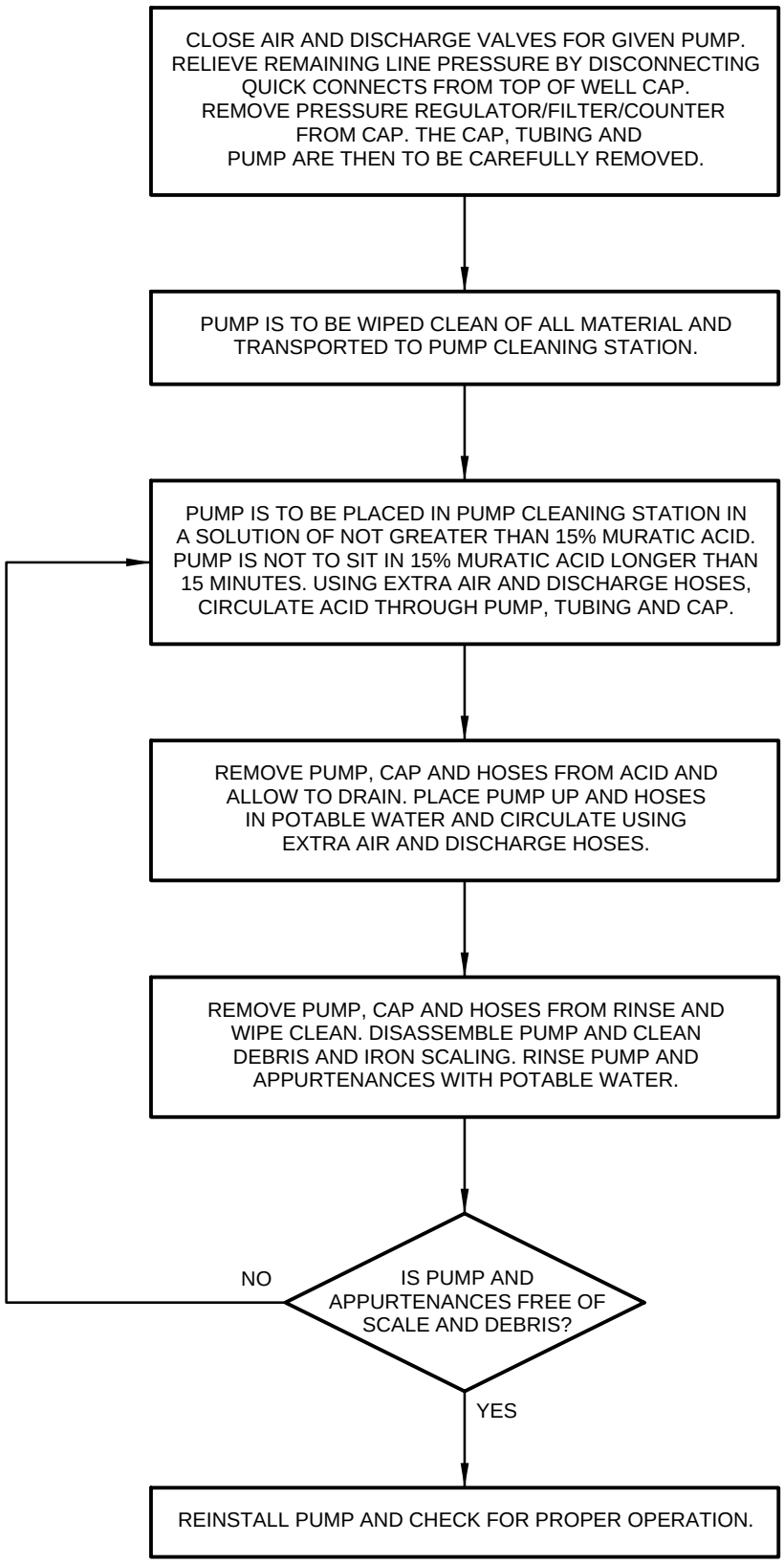


figure 3.3

PUMP MAINTENANCE
GM-POWERTRAIN GROUP - BAY CITY PLANT
Bay City, Michigan

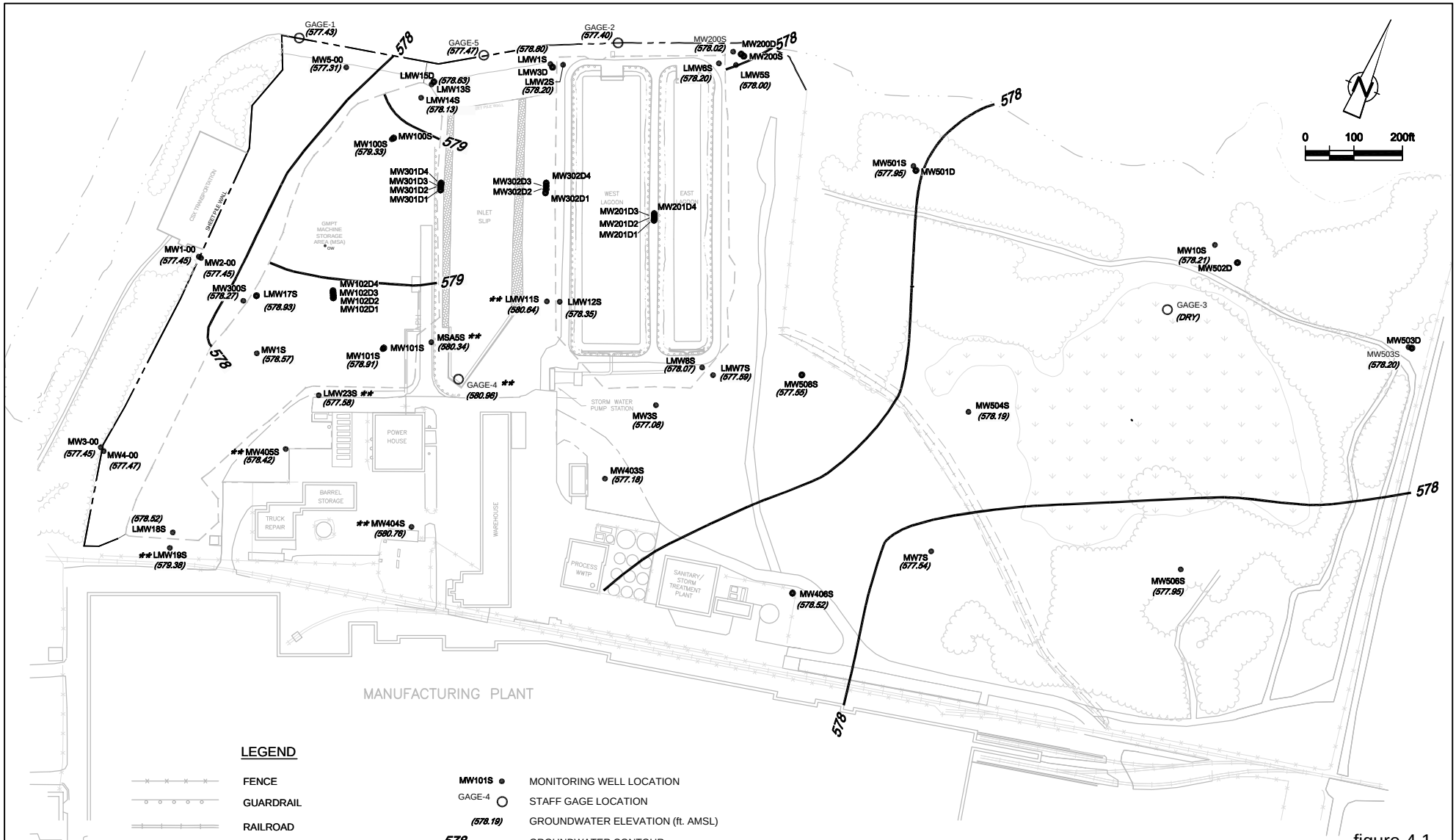


figure 4.1

WELL LOCATIONS FOR LONGTERM GROUNDWATER MONITORING AND SHALLOW GROUNDWATER CONTOURS, OCTOBER 31, 2000
GM-POWERTRAIN GROUP - BAY CITY PLANT
Bay City, Michigan

TABLE 3.1

SUMMARY OF STORMWATER SYSTEM MAINTENANCE ACTIVITIES
GM POWERTRAIN GROUP, BAY CITY PLANT, BAY CITY, MICHIGAN

Frequency					
Daily	***Weekly***	***Every 2 Weeks***	***Monthly***	***Semi-Annually***	***Annually***
MECHANICAL					
Inspect cooling tower pumps, valves & piping systems	Check oil level in pumps, and fill as necessary	Inspect & clean lagoon screens	Backwash GAC	--	--
Inspect and maintain pH pumps & piping systems	Inspect & clean storm water pumps		Inspect Sand Filters		
Inspect & maintain pumps & piping	Inspect Trybon lubrication systems, and fill as necessary		Inspect heating systems in water storage tanks		
Inspect groundwater extraction system, drain water from oil cooler & add oil twice daily	Clean screen on lagoon turbidity pump				
	Inspect air makeup units and change as necessary				
	Inspect filters on blowers and change as necessary				
ELECTRICAL					
--	--	--	Check undervoltage control for cooling supply pumps Operate Emergency Generator - Stand alone test Run air compressor for 1 hr	Check sacrificial anodes in Sand Filters Check anode in slurry tank	Run both portable diesel generators
OPERATIONS					
Log flows etc.	Clean turbidimeter in Archimedes Building	--	Clean Storm Plant Clarifier Tanks	--	--
Clean Process & Storm Plant turbidimeters			Power Wash Storm Press		

TABLE 4.1

MONITORING WELL COMPLETION DETAILS AND GROUNDWATER ELEVATIONS
GM POWERTRAIN DIVISION, BAY CITY, MICHIGAN

Well Location	*Top of Riser Elevation (ft AMSL)*	*Modified Top of Riser Elevation (ft AMSL)*	*Depth to Water (feet) 10/31/00*	*Depth of Well (feet)*	*Screen Length (feet)*	*Screen Type*	*Riser Type*	*Diameter of Screen (inches)*	*Groundwater Elevation (feet AMSL)*							
									03/08/99	*03/19/99*	*04/20/99*	*05/20/99*	*06/22/99*	*07/20/99*	*09/07/99*	*09/27/99*
Inlet Slip (IS)																
Gage 4	580	579.52	1.44	- -	- -	- -	- -	- -	584.79	584.54	584.68	583.67	Dry	581.40	n / a	n / a
Gage 5	582.72	569.47	8.00	- -	- -	- -	- -	- -	580.12	580.26	580.02	580.17	580.04	579.72	Dry	Dry
Lagoon Area (LA)																
LMW2S	590.16	589.48	11.28	19.25	10	SS	PVC	2	581.04	581.06	579.43	578.62	580.38	579.54	578.54	578.02
LMW6S	590.41	589.86	11.66	19.04	10	SS	PVC	2	581.52	581.46	577.85	576.01	579.05	576.95	577.49	577.14
LMW7S	592.04	591.47	13.88	18.52	10	SS	PVC	2	579.15	579.42	579.59	579.87	579.30	579.00	578.19	577.90
LMW8S	590.69	590.12	12.05	18.59	10	SS	PVC	2	581.61	581.69	579.17	577.29	580.33	578.83	577.95	577.54
LMW11S	591.49	590.61	9.97	19.54	10	SS	SS	2	580.92	580.69	580.90	579.74	577.27	580.20	582.42	582.29
LMW12S	590.43	589.59	11.24	18.99	10	SS	PVC	2	581.28	581.63	579.70	579.33	583.55	581.49	578.85	578.46
MW201D1	588.21	587.65	9.97	29.63	10	SS	SS	2	579.30	579.46	579.25	579.26	578.13	579.57	578.47	578.76
MW201D2	587.86	587.26	9.60	36.36	10	SS	SS	2	579.30	579.46	579.23	579.17	577.86	579.56	578.09	578.75
MW201D3	588.29	587.76	10.05	46.70	10	SS	SS	2	579.26	579.29	579.18	579.24	577.83	579.51	578.31	578.69
MW201D4	588.33	587.78	10.32	56.75	10	SS	SS	2	579.31	578.92	578.73	578.71	577.46	580.15	578.35	578.35
LMW5S	590.51	589.73	11.73	19.43	10	SS	PVC	2	579.71	579.68	579.66	579.66	579.30	579.29	578.93	578.35
Machine Storage Area (MSA)																
LMW13S	590.02	589.4	10.77	19.22	10	SS	PVC	2	582.56	583.17	582.65	581.42	579.23	579.68	580.02	580.55
LMW17S	589.77	589.31	10.38	19.83	10	SS	PVC	2	581.58	581.57	580.25	579.77	579.65	579.43	579.19	578.98
LMW18S	591.24	592.33	13.81	22.52	10	SS	PVC	2	579.44	579.44	579.78	579.39	579.45	579.57	577.89	577.51
LMW19S	589.22	588.61	9.23	19.32	10	SS	PVC	2	580.66	580.90	580.94	580.51	580.52	580.42	580.01	579.53
MW1S	591.94	591.08	12.51	12.95	2	SS	SS	2	584.12	584.35	579.49	579.29	578.64	--	578.58	578.51
MW100S	590.03	591.97	12.64	14.44	10	SS	SS	2	582.71	582.53	579.96	579.30	579.07	579.33	--	578.57
MW101S	594.17	593.34	14.43	19.22	10	SS	SS	2	586.44	586.50	580.44	579.19	578.71	578.83	579.18	579.04
MW102D1	594.13	594.86	16.99	30.99	10	SS	SS	2	582.32	582.38	579.34	579.27	576.82	579.69	578.29	577.64
MW102D2	594.08	594.93	17.08	36.21	10	SS	SS	2	581.93	582.03	579.39	579.34	576.78	579.68	578.15	577.50
MW102D3	594.14	594.91	17.11	46.74	10	SS	SS	2	581.84	581.92	579.35	579.25	576.80	579.66	578.20	577.55
MW102D4	594.06	594.9	17.17	56.85	10	SS	SS	2	581.45	581.54	579.21	579.13	576.70	579.56	578.05	577.40
MW300S	587.71	587.12	8.85	15.06	10	SS	SS	2	579.51	579.37	579.86	579.51	579.95	579.69	579.33	578.90
LMW14SR (Replaced LMW14S Jan / 00)	589.65	589.01	10.88	13.00	7	SS	SS	2	582.11	582.10	581.12	580.40	578.55	579.97	578.88	578.30
Perimeter Banks (PB)																
LMW1S	590.05	589.36	10.56	18.96	10	SS	PVC	2	579.94	581.03	579.27	579.26	579.36	579.71	579.48	581.14
LMW3D	590.02	589.46	11.80	32.84	5	SS	SS	2	580.72	580.87	579.27	579.17	577.70	579.66	579.78	578.77
LMW15D	589.06	588.34	10.71	32..8	10	SS	PVC	2	579.71	579.86	579.23	579.21	577.88	579.68	579.81	578.93
MW200D	588.12	587.35	10.28	63.15	10	SS	SS	2	578.93	578.87	578.60	578.69	577.84	579.12	579.08	578.14
MW200S	588.45	587.69	9.67	16.0	10	SS	55	2	n / a	n / a	n / a	579.67	579.29	579.41	579.76	578.65
MW301D1	590.15	589.54	(5)	27.50	10	SS	SS	2	579.29	579.40	579.32	579.22	575.75	579.73	579.67	578.99
MW301D2	589.77	589.16	(5)	37.24	10	SS	SS	2	579.23	579.35	579.28	579.19	576.11	579.69	579.62	578.93
MW301D3	589.83	589.22	(5)	44.04	10	SS	SS	2	579.23	579.38	579.25	579.18	576.13	579.65	579.59	578.90
MW301D4	589.92	589.33	(5)	55.95	10	SS	SS	2	579.18	579.37	579.26	579.17	576.08	579.62	579.52	578.85
MW302D1	589.38	588.76	10.99	29.18	10	SS	SS	2	579.28	579.53	579.38	579.48	575.78	579.72	580.61	578.96
MW302D2	589.4	588.78	11.03	35.70	10	SS	SS	2	579.27	579.40	579.29	579.20	576.28	579.70	580.98	578.95
MW302D3	589.56	588.96	11.24	45.97	10	SS	SS	2	579.26	579.41	579.24	579.29	576.28	579.66	580.64	578.90
MW302D4	589.36	588.7	11.19	55.94	10	SS	SS	2	579.17	579.21	579.12	579.02	576.16	579.46	580.05	578.71
Gage 2	Buried	569.4	8.00	- -	- -	- -	- -	- -	Buried	Buried	Buried	Buried	Buried	Buried	Buried	Buried

TABLE 4.1

MONITORING WELL COMPLETION DETAILS AND GROUNDWATER ELEVATIONS
GM POWERTRAIN DIVISION, BAY CITY, MICHIGAN

Well Location	*Top of Riser Elevation (ft AMSL)*	*Modified Top of Riser Elevation (ft AMSL)*	*Depth to Water (feet) 10/31/00*	*Depth of Well (feet)*	*Screen Length (feet)*	*Screen Type*	*Riser Type*	*Diameter of Screen (inches)*	*Groundwater Elevation (feet AMSL)*							
									03/08/99	*03/19/99*	*04/20/99*	*05/20/99*	*06/22/99*	*07/20/99*	*09/07/99*	*09/27/99*
Support Facilities Area (SFA)																
LMW23S	591.32	586.03	8.45	22.99	10	SS	PVC	2	578.14	578.32	578.32	578.32	Destroyed	Destroyed	Destroyed	Destroyed
MSA5S	589.28	588.6	8.26	18.98			SS	2	580.54	580.33	580.83	579.71	577.24	579.38	581.84	581.74
MW3S	590.25	589.64	12.56	13.00			SS	2	578.19	578.50	578.43	578.55	578.30	578.25	577.84	577.64
MW403S	588.55	587.89	10.71	20.82	10	SS	SS	2	578.34	578.10	578.33	578.24	577.07	578.35	578.45	578.06
MW404S	586.42	585.77	5.01	9.30	10	SS		2	n/a	581.52	581.85	581.63	581.68	581.62	581.29	580.99
MW405S	589.03	588.52	10.10	14.47	10	SS	SS	2	579.04	579.83	579.30	579.18	579.09	579.13	578.94	578.81
MW406S	590.14	589.5	10.98	17.45	10	SS	SS	2	579.54	579.59	579.83	580.14	579.84	579.80	579.27	579.29
Undeveloped Area (UA)																
MW7S	590.51	590.03	12.49	12.20				2	581.86	581.71	579.45	579.33	578.82	578.67	578.42	576.85
MW10S	589.85	589.17	10.96	12.19			PVC	2	583.01	583.05	580.56	580.45	580.00	579.77	579.37	578.97
MW501D	584.54	584.05	7.14	54.63	10	SS	SS	2	578.51	578.56	578.49	578.47	577.68	578.74	578.52	577.88
MW501S	584.39	583.62	5.67	14.86	10	SS	SS	2	579.80	579.79	579.91	579.72	579.25	579.25	578.82	578.35
MW502D	589.82	589.28	12.46	57.98	10	SS	SS	2	579.68	579.57	578.45	578.37	577.88	578.60	578.36	577.75
MW503D	588.94	588.54	11.58	56.60	10	SS	SS	2	578.60	578.45	578.49	578.39	578.02	578.60	578.38	577.78
MW503S	589.09	588.69	10.49	18.97	10	SS	SS	2	580.52	580.38	580.67	580.43	579.49	579.15	578.64	578.39
MW504S	586.2	585.54	7.35	14.33	10	SS	SS	2	581.51	581.65	n/a	579.70	579.39	579.20	578.76	578.47
MW506S	589.48	588.85	10.90	14.22	10	SS	SS	2	582.47	582.61	580.93	580.28	578.22	579.00	578.48	578.24
MW508SR (replaced MW508S Jan/00)	591.81	591.26	13.71	15.00	7	SS	SS	2	Buried	Buried	Buried	Buried	Buried	Buried	Buried	Buried
Gage 3	584.76	579.24	Dry	- -	- -	- -	- -	- -	584.06	584.06	584.21	584.26	584.26	584.26	Dry	Dry
Crotty Street Channel																
MW1-00	588.87	588.26	10.81	12.00	7	SS	SS	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW2-00	590.09	589.29	11.84	18.00	7	SS	SS	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW3-00	587.92	588.4	10.95	12.50	7	SS	SS	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW4-00	590.67	589.65	12.18	19.00	7	SS	SS	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW5-00	589.73	588.89	11.58	13.00	7	SS	SS	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Gage 1	569.43	569.43	8.00	- -	- -	- -	- -	- -	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed

Notes:

(1) Approximate value
(2) Lock Needs Replacing
(3) Gage needs to be relocated.
(4) Could not open due to liner attachment.
(5) Could not take water level, riser pipe needs extension
n/a - groundwater elevation not available

TABLE 4.1

MONITORING WELL COMPLETION DETAILS AND GROUNDWATER ELEVATIONS
GM POWERTRAIN DIVISION, BAY CITY, MICHIGAN

Well Location	*Top of Riser Elevation (ft AMSL)*	*Modified Top of Riser Elevation (ft AMSL)*	*Depth to Water (feet) 10/31/00*	*Depth of Well (feet)*	*Screen Length (feet)*	*Screen Type*	*Riser Type*	*Diameter of Screen (inches)*	*Groundwater Elevation (feet AMSL)*							
									10/25/99	*11/24/99*	*1/4/00*	*2/2/00*	*2/28/00*	*3/29/00*	*4/26/00*	*5/30/00*
Inlet Slip (IS)																
Gage 4	580	579.52	1.44	- -	- -	- -	- -	- -	n / a	582.72	582.17	578.50	582.22	583.22	583.18	583.14
Gage 5	582.72	569.47	8.00	- -	- -	- -	- -	- -	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Lagoon Area (LA)																
LMW2S	590.16	589.48	11.28	19.25	10	SS	PVC	2	577.91	577.53	577.60	577.48	578.01	577.88	578.24	578.67
LMW6S	590.41	589.86	11.66	19.04	10	SS	PVC	2	577.33	576.92	577.22	577.23	578.23	577.90	578.67	579.43
LMW7S	592.04	591.47	13.88	18.52	10	SS	PVC	2	577.94	577.80	577.84	577.86	578.42	578.71	578.99	580.13
LMW8S	590.69	590.12	12.05	18.59	10	SS	PVC	2	577.59	577.36	577.77	577.73	578.36	578.12	578.83	579.86
LMW11S	591.49	590.61	9.97	19.54	10	SS	SS	2	582.46	582.43	582.14	581.43	582.16	582.85	582.89	582.90
LMW12S	590.43	589.59	11.24	18.99	10	SS	PVC	2	578.13	577.91	578.29	578.05	578.86	578.78	579.15	580.05
MW201D1	588.21	587.65	9.97	29.63	10	SS	SS	2	578.44	577.23	577.91	No Access	578.39	578.36	578.67	578.79
MW201D2	587.86	587.26	9.60	36.36	10	SS	SS	2	578.43	577.22	577.91	No Access	578.40	578.46	578.68	578.78
MW201D3	588.29	587.76	10.05	46.70	10	SS	SS	2	578.37	577.17	577.86	No Access	578.33	578.33	578.85	578.74
MW201D4	588.33	587.78	10.32	56.75	10	SS	SS	2	578.04	576.83	577.54	No Access	578.10	578.09	578.67	578.50
LMW5S	590.51	589.73	11.73	19.43	10	SS	PVC	2	579.21	578.86	578.98	578.68	579.60	579.54	579.96	580.86
Machine Storage Area (MSA)																
LMW13S	590.02	589.4	10.77	19.22	10	SS	PVC	2	581.26	580.68	580.08	579.27	581.74	581.27	581.81	581.63
LMW17S	589.77	589.31	10.38	19.83	10	SS	PVC	2	579.69	579.71	579.47	579.08	579.96	579.91	580.19	580.06
LMW18S	591.24	592.33	13.81	22.52	10	SS	PVC	2	577.62	577.32	577.37	577.09	577.80	577.66	578.09	578.10
LMW19S	589.22	588.61	9.23	19.32	10	SS	PVC	2	579.95	579.58	580.30	579.70	581.39	580.73	581.25	580.96
MW1S	591.94	591.08	12.51	12.95	2	SS	SS	2	579.11	579.15	579.07	579.05	579.18	579.28	579.29	579.26
MW100S	590.03	591.97	12.64	14.44	10	SS	SS	2	578.77	578.09	577.49	577.09	576.69	576.87	577.07	577.79
MW101S	594.17	593.34	14.43	19.22	10	SS	SS	2	579.81	579.65	579.61	579.61	579.86	579.21	580.14	580.39
MW102D1	594.13	594.86	16.99	30.99	10	SS	SS	2	577.47	576.38	576.80	576.81	577.23	577.25	577.60	577.70
MW102D2	594.08	594.93	17.08	36.21	10	SS	SS	2	577.33	576.24	576.67	576.80	577.08	577.12	577.44	577.58
MW102D3	594.14	594.91	17.11	46.74	10	SS	SS	2	577.35	576.26	576.71	576.88	577.12	577.16	577.47	577.59
MW102D4	594.06	594.9	17.17	56.85	10	SS	SS	2	577.21	576.12	576.56	575.70	576.98	577.01	577.34	577.45
MW300S	587.71	587.12	8.85	15.06	10	SS	SS	2	578.87	579.91	579.27	578.55	No Access	579.73	580.18	579.89
LMW14SR (Replaced LMW14S Jan / 00)	589.65	589.01	10.88	13.00	7	SS	SS	2	578.58	Damaged	Damaged	578.58	578.55	578.99	578.91	579.22
Perimeter Banks (PB)																
LMW1S	590.05	589.36	10.56	18.96	10	SS	PVC	2	578.60	579.90	579.74	579.33	580.31	580.27	580.68	580.63
LMW3D	590.02	589.46	11.80	32.84	5	SS	SS	2	578.30	577.05	577.93	578.70	578.40	578.66	578.58	578.66
LMW15D	589.06	588.34	10.71	32..8	10	SS	PVC	2	578.49	577.18	577.95	578.23	578.56	578.56	578.74	578.88
MW200D	588.12	587.35	10.28	63.15	10	SS	SS	2	577.96	576.77	577.64	577.72	578.05	578.00	579.08	578.38
MW200S	588.45	587.69	9.67	16.0	10	SS	55	2	579.33	578.92	579.09	578.79	579.73	579.65	579.73	580.94
MW301D1	590.15	589.54	(5)	27.50	10	SS	SS	2	578.63	577.42	578.05	578.28	578.56	578.59	578.85	578.80
MW301D2	589.77	589.16	(5)	37.24	10	SS	SS	2	578.57	577.35	577.99	578.22	578.51	578.54	578.77	578.89
MW301D3	589.83	589.22	(5)	44.04	10	SS	SS	2	578.54	577.32	577.96	578.18	578.48	578.49	578.74	578.85
MW301D4	589.92	589.33	(5)	55.95	10	SS	SS	2	578.47	577.27	577.90	578.14	578.43	578.45	578.69	578.76
MW302D1	589.38	588.76	10.99	29.18	10	SS	SS	2	578.60	577.39	578.05	578.26	578.52	578.58	578.82	578.93
MW302D2	589.4	588.78	11.03	35.70	10	SS	SS	2	578.56	577.37	578.03	578.22	578.52	578.54	578.78	578.90
MW302D3	589.56	588.96	11.24	45.97	10	SS	SS	2	578.51	577.32	577.99	578.19	578.47	578.50	578.73	578.84
MW302D4	589.36	588.7	11.19	55.94	10	SS	SS	2	578.33	577.14	577.82	578.01	578.30	578.32	578.58	578.68
Gage 2	Buried	569.4	8.00	- -	- -	- -	- -	- -	Buried	Buried	Buried	Buried	Buried	Buried	Buried	Buried

TABLE 4.1

MONITORING WELL COMPLETION DETAILS AND GROUNDWATER ELEVATIONS
GM POWERTRAIN DIVISION, BAY CITY, MICHIGAN

Well Location	*Top of Riser Elevation (ft AMSL)*	*Modified Top of Riser Elevation (ft AMSL)*	*Depth to Water (feet) 10/31/00*	*Depth of Well (feet)*	*Screen Length (feet)*	*Screen Type*	*Riser Type*	*Diameter of Screen (inches)*	*Groundwater Elevation (feet AMSL)*							
									10/25/99	*11/24/99*	*1/4/00*	*2/2/00*	*2/28/00*	*3/29/00*	*4/26/00*	*5/30/00*
Support Facilities Area (SFA)																
LMW23S	591.32	586.03	8.45	22.99	10	SS	PVC	2	Destroyed	Destroyed	Destroyed	**582.74** (2)	582.88	582.94	583.13	583.25
MSA5S	589.28	588.6	8.26	18.98			SS	2	581.77	581.70	581.42	580.96	582.13	580.62	582.37	582.22
MW3S	590.25	589.64	12.56	13.00			SS	2	n/a	577.40	Dry	Dry	Dry	577.82	577.97	578.63
MW403S	588.55	587.89	10.71	20.82	10	SS	SS	2	578.19	577.59	577.63	577.61	577.72	577.84	578.29	578.44
MW404S	586.42	585.77	5.01	9.30	10	SS		2	581.58	--	No Access	No Access	No Access	No Access	582.24	Covered
MW405S	589.03	588.52	10.10	14.47	10	SS	SS	2	578.99	579.04	579.15	579.13	579.25	579.16	579.25	579.30
MW406S	590.14	589.5	10.98	17.45	10	SS	SS	2	579.24	578.71	578.59	578.39	578.85	579.01	579.20	580.11
Undeveloped Area (UA)																
MW7S	590.51	590.03	12.49	12.20				2	578.29	579.00	578.16	577.87	578.63	578.63	579.08	579.92
MW10S	589.85	589.17	10.96	12.19			PVC	2	579.23	579.07	579.11	578.80	579.67	579.65	580.59	580.79
MW501D	584.54	584.05	7.14	54.63	10	SS	SS	2	577.68	576.42	577.18	577.26	577.62	577.44	577.87	577.99
MW501S	584.39	583.62	5.67	14.86	10	SS	SS	2	579.06	578.86	578.93	575.69	579.82	579.11	579.66	579.89
MW502D	589.82	589.28	12.46	57.98	10	SS	SS	2	577.59	576.43	577.09	577.14	577.58	577.43	577.87	577.97
MW503D	588.94	588.54	11.58	56.60	10	SS	SS	2	577.63	576.56	577.18	577.17	577.69	577.46	578.06	578.15
MW503S	589.09	588.69	10.49	18.97	10	SS	SS	2	578.85	578.66	579.00	578.77	580.38	579.91	580.76	581.37
MW504S	586.2	585.54	7.35	14.33	10	SS	SS	2	579.15	579.08	579.24	578.87	580.16	579.43	579.94	580.31
MW506S	589.48	588.85	10.90	14.22	10	SS	SS	2	578.85	578.59	578.79	578.59	580.07	579.73	580.55	581.12
MW508SR (replaced MW508S Jan/00)	591.81	591.26	13.71	15.00	7	SS	SS	2	Buried	Buried	Buried	578.03	578.57	578.99	579.55	580.78
Gage 3	584.76	579.24	Dry	- -	- -	- -	- -	- -	Dry	Dry	Dry	Dry	584.16	584.16	584.06	583.76
Crotty Street Channel																
MW1-00	588.87	588.26	10.81	12.00	7	SS	SS	2	n/a	n/a	n/a	577.89	578.89	578.04	578.42	578.68
MW2-00	590.09	589.29	11.84	18.00	7	SS	SS	2	n/a	n/a	n/a	579.11	578.11	577.26	577.65	Not Accessable
MW3-00	587.92	588.4	10.95	12.50	7	SS	SS	2	n/a	n/a	n/a	578.27	579.25	578.40	578.79	579.05
MW4-00	590.67	589.65	12.18	19.00	7	SS	SS	2	n/a	n/a	n/a	577.03	578.03	577.18	577.60	Not Accessable
MW5-00	589.73	588.89	11.58	13.00	7	SS	SS	2	n/a	n/a	n/a	577.63	578.36	578.66	578.86	579.12
Gage 1	569.43	569.43	8.00	- -	- -	- -	- -	- -	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed

Notes:

(1) Approximate value
(2) Lock Needs Replacing
(3) Gage needs to be relocated.
(4) Could not open due to liner attachment.
(5) Could not take water level, riser pipe needs extension
n/a - groundwater elevation not available

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MONITORING WELL COMPLETION DETAILS AND GROUNDWATER ELEVATIONS
GM POWERTRAIN DIVISION, BAY CITY, MICHIGAN

Well Location	*Top of Riser Elevation (ft AMSL)*	*Modified Top of Riser Elevation (ft AMSL)*	*Depth to Water (feet) 10/31/00*	*Depth of Well (feet)*	*Screen Length (feet)*	*Screen Type*	*Riser Type*	*Diameter of Screen (inches)*	*Groundwater Elevation (feet AMSL)*				
									6/30/00	*07/18/00*	*08/29/00*	*09/11/00*	*10/31/00*
Inlet Slip (IS)													
Gage 4	580	579.52	1.44	- -	- -	- -	- -	- -	581.98	582.72	580.68	582.22	580.96
Gage 5	582.72	569.47	8.00	- -	- -	- -	- -	- -	n / a (3)	n / a (3)	578.02	577.87	577.47
Lagoon Area (LA)													
LMW2S	590.16	589.48	11.28	19.25	10	SS	PVC	2	578.65	577.85	577.78	577.72	578.20
LMW6S	590.41	589.86	11.66	19.04	10	SS	PVC	2	579.40	578.50	578.48	578.29	578.20
LMW7S	592.04	591.47	13.88	18.52	10	SS	PVC	2	580.11	579.08	578.29	578.11	577.59
LMW8S	590.69	590.12	12.05	18.59	10	SS	PVC	2	579.52	578.63	578.53	578.48	578.07
LMW11S	591.49	590.61	9.97	19.54	10	SS	SS	2	581.94	582.28	580.63	581.39	580.64
LMW12S	590.43	589.59	11.24	18.99	10	SS	PVC	2	580.21	579.01	577.04	578.69	578.35
MW201D1	588.21	587.65	9.97	29.63	10	SS	SS	2	578.81	578.50	578.05	578.00	577.68
MW201D2	587.86	587.26	9.60	36.36	10	SS	SS	2	578.82	578.46	578.00	577.96	577.66
MW201D3	588.29	587.76	10.05	46.70	10	SS	SS	2	578.79	578.49	578.06	577.99	577.71
MW201D4	588.33	587.78	10.32	56.75	10	SS	SS	2	578.56	577.83	577.81	577.75	577.46
LMW5S	590.51	589.73	11.73	19.43	10	SS	PVC	2	580.30	578.84	578.43	578.13	578.00
Machine Storage Area (MSA)													
LMW13S	590.02	589.4	10.77	19.22	10	SS	PVC	2	580.62	580.11	578.90	578.90	578.63
LMW17S	589.77	589.31	10.38	19.83	10	SS	PVC	2	579.85	579.09	579.20	579.24	578.93
LMW18S	591.24	592.33	13.81	22.52	10	SS	PVC	2	577.80	578.52	579.03	578.67	578.52
LMW19S	589.22	588.61	9.23	19.32	10	SS	PVC	2	580.56	579.45	580.13	579.34	579.38
MW1S	591.94	591.08	12.51	12.95	2	SS	SS	2	579.31	578.34	578.38	578.43	578.57
MW100S	590.03	591.97	12.64	14.44	10	SS	SS	2	578.03	579.85	579.66	579.57	579.33
MW101S	594.17	593.34	14.43	19.22	10	SS	SS	2	580.22	579.02	579.04	578.99	578.91
MW102D1	594.13	594.86	16.99	30.99	10	SS	SS	2	577.62	578.71	578.15	578.16	577.87
MW102D2	594.08	594.93	17.08	36.21	10	SS	SS	2	577.48	578.67	578.13	578.13	577.85
MW102D3	594.14	594.91	17.11	46.74	10	SS	SS	2	577.52	578.63	578.09	578.08	577.80
MW102D4	594.06	594.9	17.17	56.85	10	SS	SS	2	577.38	578.55	578.02	578.00	577.73
MW300S	587.71	587.12	8.85	15.06	10	SS	SS	2	n / a (4)	n / a (2)	578.24	578.16	578.27
LMW14SR (Replaced LMW14S Jan / 00)	589.65	589.01	10.88	13.00	7	SS	SS	2	579.32	579.19	578.21	578.16	578.13
Perimeter Banks (PB)													
LMW1S	590.05	589.36	10.56	18.96	10	SS	PVC	2	580.76	579.60	579.11	579.05	578.80
LMW3D	590.02	589.46	11.80	32.84	5	SS	SS	2	578.79	578.02	578.04	577.99	577.66
LMW15D	589.06	588.34	10.71	32..8	10	SS	PVC	2	n / a (4)	578.43	578.03	577.94	577.63
MW200D	588.12	587.35	10.28	63.15	10	SS	SS	2	578.46	577.87	578.14	577.43	577.07
MW200S	588.45	587.69	9.67	16.0	10	SS	55	2	580.28	578.87	578.68	578.16	578.02
MW301D1	590.15	589.54	(5)	27.50	10	SS	SS	2	579.37	578.65	578.88	(5)	(5)
MW301D2	589.77	589.16	(5)	37.24	10	SS	SS	2	578.80	578.56	578.47	(5)	(5)
MW301D3	589.83	589.22	(5)	44.04	10	SS	SS	2	578.80	578.56	578.32	(5)	(5)
MW301D4	589.92	589.33	(5)	55.95	10	SS	SS	2	578.78	578.48	578.48	(5)	(5)
MW302D1	589.38	588.76	10.99	29.18	10	SS	SS	2	578.91	578.61	577.32	578.11	577.77
MW302D2	589.4	588.78	11.03	35.70	10	SS	SS	2	578.95	578.58	577.68	578.08	577.75
MW302D3	589.56	588.96	11.24	45.97	10	SS	SS	2	578.88	578.54	577.75	578.06	577.72
MW302D4	589.36	588.7	11.19	55.94	10	SS	SS	2	578.73	578.32	577.38	577.82	577.51
Gage 2	Buried	569.4	8.00	- -	- -	- -	- -	- -	Buried (3)	Buried (3)	578.04	577.80	577.40

TABLE 4.1

MONITORING WELL COMPLETION DETAILS AND GROUNDWATER ELEVATIONS
GM POWERTRAIN DIVISION, BAY CITY, MICHIGAN

Well Location	*Top of Riser Elevation (ft AMSL)*	*Modified Top of Riser Elevation (ft AMSL)*	*Depth to Water (feet) 10/31/00*	*Depth of Well (feet)*	*Screen Length (feet)*	*Screen Type*	*Riser Type*	*Diameter of Screen (inches)*	*Groundwater Elevation (feet AMSL)*				
									6/30/00	*07/18/00*	*08/29/00*	*09/11/00*	*10/31/00*
Support Facilities Area (SFA)													
LMW23S	591.32	586.03	8.45	22.99	10	SS	PVC	2	583.08	577.63	577.71	577.73	577.58
MSA5S	589.28	588.6	8.26	18.98			SS	2	581.17	581.32	580.41	580.56	580.34
MW3S	590.25	589.64	12.56	13.00			SS	2	578.46	578.02	577.58	577.46	577.08
MW403S	588.55	587.89	10.71	20.82	10	SS	SS	2	578.22	577.58	577.37	577.38	577.18
MW404S	586.42	585.77	5.01	9.30	10	SS		2	582.21	581.02	581.43	581.05	580.76
MW405S	589.03	588.52	10.10	14.47	10	SS	SS	2	579.08	578.51	578.46	576.33	578.42
MW406S	590.14	589.5	10.98	17.45	10	SS	SS	2	580.03	579.01	577.77	578.68	578.52
Undeveloped Area (UA)													
MW7S	590.51	590.03	12.49	12.20				2	579.36	578.24	577.86	577.68	577.54
MW10S	589.85	589.17	10.96	12.19			PVC	2	580.11	578.75	578.46	578.22	578.21
MW501D	584.54	584.05	7.14	54.63	10	SS	SS	2	577.82	577.88	577.35	577.30	576.91
MW501S	584.39	583.62	5.67	14.86	10	SS	SS	2	579.22	577.90	577.97	577.62	577.95
MW502D	589.82	589.28	12.46	57.98	10	SS	SS	2	577.96	577.49	577.24	577.11	576.82
MW503D	588.94	588.54	11.58	56.60	10	SS	SS	2	578.07	577.70	577.45	577.36	576.96
MW503S	589.09	588.69	10.49	18.97	10	SS	SS	2	580.30	579.00	578.58	578.29	578.20
MW504S	586.2	585.54	7.35	14.33	10	SS	SS	2	579.49	578.07	578.25	577.82	578.19
MW506S	589.48	588.85	10.90	14.22	10	SS	SS	2	580.04	578.58	578.19	577.95	577.95
MW508SR (replaced MW508S Jan / 00)	591.81	591.26	13.71	15.00	7	SS	SS	2	580.38	579.11	578.19	577.95	577.55
Gage 3	584.76	579.24	Dry	- -	- -	- -	- -	- -	583.76	580.24	Dry	Dry	Dry
Crotty Street Channel													
MW1-00	588.87	588.26	10.81	12.00	7	SS	SS	2	579.57	577.71	577.60	577.36	577.45
MW2-00	590.09	589.29	11.84	18.00	7	SS	SS	2	578.67	577.65	577.59	577.36	577.45
MW3-00	587.92	588.4	10.95	12.50	7	SS	SS	2	578.46	578.68	577.60	577.37	577.45
MW4-00	590.67	589.65	12.18	19.00	7	SS	SS	2	578.87	577.62	577.57	577.34	577.47
MW5-00	589.73	588.89	11.58	13.00	7	SS	SS	2	n / a (4)	n / a (4)	578.01	577.91	577.31
Gage 1	569.43	569.43	8.00	- -	- -	- -	- -	- -	Destroyed (3)	Destroyed (3)	578.05	577.93	577.43

Notes:

(1) Approximate value
(2) Lock Needs Replacing
(3) Gage needs to be relocated.
(4) Could not open due to liner attachment.
(5) Could not take water level, riser pipe needs extension
n / a - groundwater elevation not available

TABLE 4.2

SUMMARY OF LONG-TERM GROUNDWATER AND STORMWATER MONITORING ACTIVITIES
GM POWERTRAIN GROUP, BAY CITY PLANT, BAY CITY, MICHIGAN

		Groundwater Quality Monitoring		*Static Water Level Monitoring (1)*
Plant Area	***Location***	***Parameters***	***Frequency***	***Frequency***
Inlet Slip (IS)				
IS	Gage 4 (2)	- -	- -	annually
IS	Gage 5 (2)	- -	- -	annually
Lagoon Area (LA)				
LA	LMW1S	PCBs, VOCs	annually	annually
LA	LMW2S (3)	- -	- -	annually
LA	LMW6S (3)	- -	- -	annually
LA	LMW8S (3)	- -	- -	annually
LA	LMW12S (3)	- -	- -	annually
LA	MW201D1	PCBs, VOCs	annually	annually
LA	MW201D2	PCBs, VOCs	annually	annually
LA	MW201D3	PCBs, VOCs	annually	annually
LA	MW201D4	PCBs, VOCs	annually	annually
Machine Storage Area (MSA)				
MSA	LMW17S	- -	- -	annually
MSA	LMW18S (3)	- -	- -	annually
MSA	LMW19S	- -	- -	annually
MSA	MW1S (3)	- -	- -	annually
MSA	MW100S (3)	- -	- -	annually
MSA	MW101S (3)	- -	- -	annually
MSA	MW102D1	PCBs	annually	annually
MSA	MW102D2	PCBs	annually	annually
MSA	MW102D3	PCBs	annually	annually
MSA	MW102D4	PCBs	annually	annually
MSA	MW300S	PCBs	annually	annually
MSA	LMW14S	--	--	annually
Perimeter Banks (PB)				
PB	LMW3D	PCBs	annually	annually
PB	LMW5S	PCBs	annually	annually
PB	LMW13S	PCBs	annually	annually
PB	LMW15D	PCBs	annually	annually
PB	MW200D	PCBs	annually	annually
PB	MW200S	- -	- -	annually
PB	MW301D1	PCBs	annually	annually
PB	MW301D2	PCBs	annually	annually
PB	MW301D3	PCBs	annually	annually
PB	MW301D4	PCBs	annually	annually
PB	MW302D1	PCBs	annually	annually
PB	MW302D2	PCBs	annually	annually
PB	MW302D3	PCBs	annually	annually
PB	MW302D4	PCBs	annually	annually
PB	Gage 2	- -	- -	annually
Support Facilities Area (SFA)				
SFA	LMW7S	- -	- -	annually
SFA	LMW11S	- -	- -	annually
SFA	LMW23S	- -	- -	annually
SFA	MSA5S	- -	- -	annually
SFA	MW3S	- -	- -	annually
SFA	MW403S	- -	- -	annually
SFA	MW404S	- -	- -	annually
SFA	MW405S	- -	- -	annually
SFA	MW406S	- -	- -	annually

TABLE 4.2

SUMMARY OF LONG-TERM GROUNDWATER AND STORMWATER MONITORING ACTIVITIES
GM POWERTRAIN GROUP, BAY CITY PLANT, BAY CITY, MICHIGAN

		Groundwater Quality Monitoring		*Static Water Level Monitoring (1)*
Plant Area	***Location***	***Parameters***	***Frequency***	***Frequency***
Undeveloped Area (UA)				
UA	MW7S	PCBs, metals	annually	annually
UA	MW10S	PCBs, metals	annually	annually
UA	MW501D	PCBs, metals	annually	annually
UA	MW501S	PCBs, metals	annually	annually
UA	MW502D	PCBs, metals	annually	annually
UA	MW503D	PCBs, metals	annually	annually
UA	MW503S	PCBs, metals	annually	annually
UA	MW504S	PCBs, metals	annually	annually
UA	MW506S	PCBs, metals	annually	annually
UA	MW508SR	PCBs, metals	annually	annually
UA	Gage 3 (2)	- -	- -	annually
Crotty Street Channel (CSC)				
CSC	MW1	- -	- -	annually
CSC	MW2	- -	- -	annually
CSC	MW3	- -	- -	annually
CSC	MW4	- -	- -	annually
CSC	MW5	- -	- -	annually
CSC	Gage 1 (2)	- -	- -	annually
Stormwater System(3)				
MSA(5)	Extraction System	PCBs	Semi-annually	- -
LA(5)	Extraction System	PCBs	Semi-annually	- -
CSC(5)	Extraction System	PCBs	Semi-annually	- -
SWTP(4)	Influent from Lagoons	PCBs	Semi-annually	- -
CSC(5)	CB2	PCBs	Semi-annually	- -

Notes:

(1) Static water level monitoring refers to independent monitoring program to evaluate containment. Static water level measurements will also be collected at all groundwater quality monitoring wells to evaluate groundwater flow directions.
(2) Staff gauge.
(3) Extraction system monitoring.
(4) To be sampled by plant personnel.
(5) To be samled by REALM personnel.

TABLE 5.1

REPORTING REQUIREMENTS
MONITORING, OPERATION, AND MAINTENANCE ACTIVITIES
GM POWERTRAIN GROUP, BAY CITY PLANT
BAY CITY, MICHIGAN

Action	***Requirements for Reporting***
Site inspection and maintenance activity report	Within 60 days of completion of activities. Semi-annually for 2 years and annually for an other 28 years.
Static Water Level Monitoring	Within 45 days following each static water level monitoring event. Monthly until March 2001, then in conjunction with groundwater sampling events.
Groundwater Sampling	Within 60 days of receiving validated sampling event analytical data. Semi-annually until September 2001, and annually for an other 25 years.
Contingency Plan	If needed due to contaminant migration or other significant changes, verbal notification to MDEQ within 3 business days, and written proposal of contingencies within 10 business days.
Site Modifications	Any intrusive work must be reported and approved prior to commencement.
Archimedes Screw Pump System is shut down	Verbal notification to MDEQ within 2 business days, followed by written notification within 7 days.

TABLE 8.1

ANALYTICAL PARAMETERS
GM POWERTRAIN GROUP, BAY CITY PLANT
BAY CITY, MICHIGAN

Sample Parameters	*Sample Method*	*Target Detection Limits (ug/l)*
Metals		
Antimony	SW-846 6020	2.0
Arsenic	SW-846 6020	2.0
Barium	SW-846 6020	1.0
Beryllium	SW-846 6020	1.0
Cadmium	SW-846 6020	1.0
Chromium	SW-846 6020	2.0
Cobalt	SW-846 6020	1.0
Copper	SW-846 6020	2.0
Lead	SW-846 6020	1.0
Mercury	SW-846 7470A	0.2
Nickel	SW-846 6020	2.0
Selenium	SW-846 6020	2.0
Silver	SW-846 6020	1.0
Thallium	SW-846 6020	1.0
Tin	SW-846 6020	10.0
Vanadium	SW-846 6020	10.0
Zinc	SW-846 6010B	20.0
PCBs		
Aroclor-1016	SW-846 8082	0.2
Aroclor-1221	SW-846 8082	0.2
Aroclor-1232	SW-846 8082	0.4
Aroclor-1242	SW-846 8082	0.2
Aroclor-1248	SW-846 8082	0.2
Aroclor-1254	SW-846 8082	0.2
Aroclor-1260	SW-846 8082	0.2
Appendix IX Volatile Organic Carbons		
1,1,1,2-Tetrachloroethane	SW-846 8260B	1.0
1,1,1-Trichloroethane	SW-846 8260B	1.0
1,1,2,2-Tetrachloroethane	SW-846 8260B	1.0
1,1,2-Trichloroethane	SW-846 8260B	1.0
1,1-Dichloroethane	SW-846 8260B	1.0
1,1-Dichloroethene	SW-846 8260B	1.0
1,2,3-Trichloropropane	SW-846 8260B	1.0

TABLE 8.1

ANALYTICAL PARAMETERS
GM POWERTRAIN GROUP, BAY CITY PLANT
BAY CITY, MICHIGAN

Sample Parameters	*Sample Method*	*Target Detection Limits (ug/l)*
Appendix IX Volatile Organic Carbons (cont'd.)		
1,2-Dibromo-3-chloropropane (DBCP)	SW-846 8260B	1.0
1,2-Dibromoethane (EDB)	SW-846 8260B	1.0
1,2-Dichloroethane	SW-846 8260B	1.0
1,2-Dichloroethene (total)	SW-846 8260B	1.0
1,2-Dichloropropane	SW-846 8260B	1.0
1,4-Dioxane	SW-846 8260B	50.0
2-Butanone	SW-846 8260B	10.0
2-Hexanone	SW-846 8260B	10.0
4-Methyl-2-pentanone	SW-846 8260B	10.0
Acetone	SW-846 8260B	10.0
Acetonitrile	SW-846 8260B	20.0
Acrolein	SW-846 8260B	20.0
Acrylonitrile	SW-846 8260B	20.0
Allyl chloride	SW-846 8260B	2.0
Benzene	SW-846 8260B	1.0
Bromodichloromethane	SW-846 8260B	1.0
Bromoform	SW-846 8260B	1.0
Bromomethane	SW-846 8260B	1.0
Carbon disulfide	SW-846 8260B	1.0
Carbon tetrachloride	SW-846 8260B	1.0
Chlorobenzene	SW-846 8260B	1.0
Chloroethane	SW-846 8260B	1.0
Chloroform	SW-846 8260B	1.0
Chloromethane	SW-846 8260B	1.0
Chloroprene	SW-846 8260B	2.0
cis-1,3-Dichloropropene	SW-846 8260B	1.0
Dibromochloromethane	SW-846 8260B	1.0
Dibromomethane	SW-846 8260B	1.0
Dichlorodifluoromethane (CFC-12)	SW-846 8260B	1.0
Ethyl methacrylate	SW-846 8260B	1.0
Ethylbenzene	SW-846 8260B	1.0
Iodomethane	SW-846 8260B	1.0
Isobutyl alcohol	SW-846 8260B	50.0
Methyl acrylonitrile	SW-846 8260B	2.0
Methyl methacrylate	SW-846 8260B	2.0
Methylene chloride	SW-846 8260B	1.0
Propionitrile (Ethyl cyanide)	SW-846 8260B	4.0
Styrene	SW-846 8260B	1.0
Tetrachloroethene	SW-846 8260B	1.0
Toluene	SW-846 8260B	1.0
trans-1,3-Dichloropropene	SW-846 8260B	1.0
trans-1,4-Dichloro-2-butene	SW-846 8260B	1.0
Trichloroethene	SW-846 8260B	1.0
Trichlorofluoromethane (CFC-11)	SW-846 8260B	1.0
Vinyl acetate	SW-846 8260B	2.0
Vinyl chloride	SW-846 8260B	1.0
Xylene (total)	SW-846 8260B	1.0

APPENDIX A

OPERATION, MAINTENANCE, AND MONITORING FORMS

MAINTENANCE ACTIVITY CHECKLIST
GM POWERTRAIN GROUP, BAY CITY PLANT
BAY CITY, MICHIGAN

Description	*Frequency*	*Inspected By (Print)*	*Date*	*Inspection Results (1)*	*Nature of Maintenance/Repairs (1)*
O&M Log	Monthly				
Site Log Book	Monthly				
Extraction Well					
Water Levels	Monthly				
Inspection	Monthly				
Maintenance	Monthly - As Required				
Level Transmitter					
Inspection	Monthly				
Maintenance	Monthly - As Required				
Calibration	Semi-Annually				
Control Panel					
Inspection	Monthly				
Maintenance	Monthly - As Required				
Air Supply Manifold					
Inspection	Monthly				

MAINTENANCE ACTIVITY CHECKLIST
GM POWERTRAIN GROUP, BAY CITY PLANT
BAY CITY, MICHIGAN

Description	*Frequency*	*Inspected By (Print)*	*Date*	*Inspection Results (1)*	*Nature of Maintenance/Repairs (1)*
Air Compressor Maintenance	Monthly - As Required				
Heater Check	Monthly (Winter Season)				
East Lagoon Sump Pump Inspection	Monthly				
Maintenance	Monthly - As Required				
Monitoring Well Sampling	As Required				
Water Levels	As Required				
General Maintenance	As required				
Force Main Cleaning	As required				
Flowmeter Cleaning	As required				
Spare Parts Inventory	As used				

MAINTENANCE ACTIVITY CHECKLIST
GM POWERTRAIN GROUP, BAY CITY PLANT
BAY CITY, MICHIGAN

Description	*Frequency*	*Inspected By (Print)*	*Date*	*Inspection Results (1)*	*Nature of Maintenance/Repairs (1)*
Staff Gauges Water Levels	As Required				
Exposure Barriers	Monthly				
SFA Pavement	Monthly				
Multi-Layer Cap	Monthly				
Containment System	Monthly				
Stormwater Collection System	Monthly				
Crotty Street Channel Abondoned 60" Sewer	Monthly				

* Note: All of the suggested frequencies are minimums and additional maintenance may be required
(1) - Attach additional documentation.

O&M LOG
GM POWERTRAIN GROUP, BAY CITY PLANT
BAY CITY, MICHIGAN

EW#		NAME (print)	DATE	NAME (print)	DATE	NAME (print)	DATE	NOTES, DESCRIPTION OF MAINT., SPARE PARTS USED
EW-1	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-2	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-3	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-4	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-5	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
FQIT-02	FLOW (gpm) TOTAL (gal.)							
LT-02								
CP-02								
AIR SUPPLY MANIFOLD								
LAGOON SUMP								
AIR COMPRESSOR								
HEATER								

O&M LOG
GM POWERTRAIN GROUP, BAY CITY PLANT
BAY CITY, MICHIGAN

EW#		NAME (print)	DATE	NAME (print)	DATE	NAME (print)	DATE	NOTES, DESCRIPTION OF MAINT., SPARE PARTS USED
EW-6	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-7	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-8	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-9	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-10	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-11	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-12	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
FQIT-01	FLOW (gpm) TOTAL (gal.)							

O&M LOG
GM POWERTRAIN GROUP, BAY CITY PLANT
BAY CITY, MICHIGAN

EW#		NAME (print)	DATE	NAME (print)	DATE	NAME (print)	DATE	NOTES, DESCRIPTION OF MAINT., SPARE PARTS USED
LT-01								
CP-01								
AIR SUPPLY MANIFOLD								
FUEL STORAGE AREA SUMP								
HEATER								
EW-13	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-14	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
EW-15	VISUAL							
	COUNTER							
	WATER LEVEL (ft.)							
	PUMP MAINT. (y / n)							
FQIT-03	FLOW (gpm) TOTAL (gal.)							
HEATER								

SAMPLE COLLECTION DATA SHEET - GROUNDWATER SAMPLING PROGRAM

PROJECT NAME GMPT Bay City PROJECT NO. 12610-10/20

SAMPLING CREW MEMBERS

DATE OF SAMPLE COLLECTION

[Note: For 1"(0.04gal), 2"(0.16gal), 3"(0.37gal), 4"(0.65gal), 5"(1.02gal), 6"(1.47gal),8"(2.61gal), 10"(4.08gal), 12"(5.88gal) per foot of water column]

Sample I.D. Number	*Well Number*	*Reference Elevation (ft.AMSL)*	*Water Depth (ft.btor)*	*Groundwater Elevation (ft.AMSL)*	*Bottom Depth (ft.btor)*	*Well Volume (gal.)*	*Volume Purged (gal.)*	*Field pH*	*Sample Parameters*	*Field Temp. (^{o}C)*	*Field DO*	*Field Comments*
	MW502D	589.28							PCB / Metal			Bladder Pump
	MW503D	588.54							PCB / Metal			Bladder Pump
	MW503S	588.69							PCB / Metal			Bladder Pump
	MW504S	585.54							PCB / Metal			Bladder Pump
	MW506S	588.85							PCB / Metal			Bladder Pump
	MW508SR	591.26							PCB / Metal			Bladder Pump
	MW1-00	588.26										--
	MW2-00	589.29										--
	MW3-00	588.4										--
	MW4-00	589.65										--
	MW5-00	588.89										--
	GAGE-1	569.43										Top of Gage
	GAGE-5	569.47										Top of Gage
	GAGE-2	569.4										Top of Gage
	GAGE-4	579.52										Top of Gage
	GAGE-3	579.24										Top of Gage

Additional Comments:

Copies to:

CRA

APPENDIX B

MONITORING AND EXTRACTION WELL LOGS

APPENDIX C

MANUFACTURER PRODUCT INFORMATION

APPENDIX C

MANUFACTURER PRODUCT INFORMATION INDEX

1. Static Water Level Meter.
2. Extraction Well Pumps and Counters.
3. Membrane Dryer for RWPS.
4. Nexteq Scale Free Units.
5. Union Ball Check Valves.
6. Transformer, Disconnect, and Circuit Breakers.
7. Extraction System Tubing.
8. Pressure Transmitter.
9. Magnetic Flow Meters for groundwater extraction systems.
10. Remote Access Sensaphone 2000 Data Logger.
11. Quincy QT and PLT Series Compressors.
12. Heater for Extraction Well Meter.

APPENDIX D

HEALTH AND SAFETY PLAN

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1.0 INTRODUCTION

The Health and Safety Plan (HASP) presented herein describes the health and safety procedures and emergency response guidelines to be implemented during the Monitoring, Operation, and Maintenance Plan (O&M Plan) at the General Motors Powertrain Group, Bay City Plant (Site) located in Bay City, Michigan. Figures D1.1 and D1.2 present the Site location and Site layout, respectively.

The scope of work to be completed during the O&M Plan includes the following work activities:

i) mobilization and demobilization of labor, materials, and equipment to and from the Site;

ii) Machine Storage Area:
   - a) inspection and maintenance of multi-layer cap,
   - b) groundwater monitoring,
   - c) inspection and maintenance of the groundwater extraction system and appurtenances;

iii) Lagoon Areas:
   - a) groundwater monitoring,
   - b) inspection and maintenance of the groundwater extraction system and appurtenances;

iv) Perimeter Banks:
   - a) groundwater monitoring,
   - b) multi-layer cap inspection and maintenance,
   - c) inspection and maintenance of sheet pile wall;

v) Support Facilities Area:
   - a) inspection and maintenance of paved areas,
   - b) water level measurements;

vi) Undeveloped Area:
   - a) groundwater monitoring,
   - b) inspection and maintenance of cover;

vii) Crotty Street Channel:
   - a) inspection and maintenance of multi-layer cap,
   - b) groundwater monitoring,

c) inspection and maintenance of the groundwater extraction system and appertenances,

d) inspection and maintenance of sheet pile wall; and

vii) decontamination activities.

During a portion of these activities, personnel may come in contact with soils and groundwater, which may contain hazardous substances. This HASP has been developed to minimize direct contact by Site personnel with materials potentially having chemical presence by ensuring:

i) that Site personnel are not adversely exposed to the compounds of concern;

ii) that public health and the environment are not adversely impacted by materials with elevated chemical presence which may potentially migrate off-Site during O&M activities at the Site;

iii) compliance with applicable governmental and non-governmental (American Conference of Governmental Industrial Hygienists [ACGIH]) regulations and guidelines. In particular, the amended rules of the Occupational Safety and Health Administration (OSHA) for Subpart H of Part 1910 (Title 29 Code of Federal Regulations [CFR] Part 1910.120) will be implemented for all Site work; and

iv) initiation of proper emergency response procedures to minimize the potential for any adverse impact to Site workers, the general public, or the environment.

For the purpose of this HASP, activities performed on Site involving contact with materials with potentially elevated chemical presence will be considered contaminated operations requiring Personal Protective Equipment (PPE). A detailed description of the PPE required is presented in Section 6.1.

The applicability of this HASP extends to all personnel who will be on Site, including State and Federal Agency personnel, contractors, subcontractors, and visitors to the Site. Subcontractors who will work with CRA Services at the Site will be required to prepare and implement a HASP for their Site personnel. They may contractually adopt this HASP.

All O&M activities at the Site will be conducted in accordance with the provisions of an approved Site-specific HASP. A copy of this HASP and employer-specific Standard Operating Procedures (SOPs) will be maintained on Site whenever activities are in progress.

2.0 SITE CHARACTERIZATION AND POTENTIALLY HAZARDOUS COMPOUNDS

Previous Site investigations have detected the presence of chemicals on Site. Table D2.l presents a list of the potential chemical compounds of concern at the Site. The exposure routes and regulatory time weighted average (TWA) exposure levels for these compounds of concern are also listed in Table D2. 1. These levels are set to protect the health of workers.

3.0 BASIS FOR DESIGN

Regulations set forth by OSHA in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926) form the basis of this HASP. Emphasis is placed on Sections 1910.120 (Hazardous Waste Operations and Emergency Response), 1910 Subpart I (Personal Protective Equipment), and 1910 Subpart Z (Toxic and Hazardous Substances). In addition, current Threshold Limit Values (TLVs) formulated by the ACGIH have been considered in the development of the selection of PPE. Some of the specifications within this section are in addition to the OSHA regulations, and reflect the positions of the United States Environmental Protection Agency (USEPA), the National Institute for Occupational Safety and Health (NIOSH), and the United States Coast Guard (USCG) regarding safe operating procedures at hazardous waste sites.

The health and safety of the public and Site personnel and the protection of the environment will take precedence over cost and schedule considerations for all project work.

4.0 RESPONSIBILITIES AND ADMINISTRATION

The Construction Superintendent shall be responsible, along with the HSO, for all decisions regarding operations and work stoppage due to health and safety considerations. The HSO will have prior experience in working at hazardous waste sites.

The on-Site HSO responsibilities include:

i) supervision and enforcement of safety equipment usage, including the required use of extra equipment if appropriate;

ii) supervision and inspection of equipment cleaning;

iii) supervision of decontamination;

iv) conduct the on-Site personnel safety indoctrination session for potential hazards, personal hygiene principles, confined space entry procedures, all other SOPs, safety equipment usage, emergency procedures, and location of first aid kits and identification of personnel trained in first aid and cardiopulmonary resuscitation (CPR);

v) maintain Exclusion Zone (EZ) and Contaminant Reduction Zone (CRZ) work areas;

vi) review and modify the HASP as more information becomes available or conditions warrant;

vii) issue a confined space entry permit as required;

viii) authority to suspend work activity due to unsafe working conditions;

ix) coordination of emergency procedures;

x) be responsible for performing air monitoring;

xi) ensure that all on-Site personnel have obtained the required medical examination prior to arrival at the Site, have met the OSHA training requirements, and have been fit tested for the respiratory equipment they may use;

xii) maintain the on-Site Hazard Communication Program including copies of Material Safety Data Sheets (MSDSs); and

xiii) conduct brief daily safety meetings.

5.0 WORKER TRAINING AND EDUCATION

Prior to commencing Site activities, a Health and Safety / Site Indoctrination Session will be presented. Attendance is mandatory for all personnel who will be or who are expected to be involved with project activities.

The training program will stress the importance that each attendee understands the basic principles of personnel protection and safety, be able to perform their assigned job tasks in a safe and environmentally responsible manner, and be prepared to respond in an appropriate manner to any emergency which may arise. A brief history of the Site will be included and the various components of the project HASP will be presented followed by an opportunity to ask questions to ensure that each attendee understands the HASP. Personnel not successfully completing this training program will not be permitted to enter or work in potentially contaminated areas of the Site.

This training will be given in addition to the basic training required under OSHA and is not intended to meet the requirements of 29 CFR 1910.120. Prior to working in or entering an EZ environment (as defined in Section 6.0), all personnel will be required to provide documentation to the HSO indicating successful completion of the training requirements of 29 CFR 1910.120.

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

This section of the HASP describes the requirements for PPE and the specific levels of protection required for each work task to be conducted at the Site during project activities. Basic PPE in all Site areas will consist of hard hats, safety glasses, and safety boots / shoes.

6.1 PROTECTION LEVELS

Personnel will wear protective equipment when project activities involve potential exposure to chemicals from vapors, gases, or particulates that may be generated on Site or when direct contact with potentially hazardous substances may occur. Chemical resistant clothing protects the skin from contact with skin-destructive and absorbable chemicals. Respirators protect lungs, the gastrointestinal tract, and if a full-face respirator is worn, the eyes, against airborne toxicants. Respiratory protection levels will be based on the real-time air monitoring results and the action levels that are presented in Section 6.5.

Protection levels are selected based upon the following:

i) measured concentrations of the Site chemicals and expected concentrations in the ambient atmosphere compared to allowable exposure levels (Table D2.1);

ii) potential for exposure to chemicals in air, splashes of liquids, or other contact due to the nature of work tasks; and

iii) Site chemical toxicity, route of exposure, and chemical matrix.

The specific protection levels to be employed at the Site for each work task are listed in Table D6.1. All project activities conducted at the Site will require the use of one of the following levels of PPE.

Level B (Not Expected to be Worn):

i) supplied air respirator (Mine Safety and Health Administration [MSHA] / NIOSH approved). Respirators may be positive pressure-demand, self-contained breathing apparatus (SCBA) or positive pressure-demand airline respirator (with escape bottle for Immediately Dangerous to Life and Health [IDLH] or potential for IDLH atmosphere);

ii) polycoated tyvek® or saranex® coveralls;

iii) steel toe work boots and disposable boot covers or rubber boots;

iv) disposable nitrile inner gloves;

v) outer nitrile work gloves;

vi) hearing protection as necessary;

vii) personal floatation device as necessary; and

viii) hard hat.

Level C:

i) tyvek® coveralls [polycoated tyvek® when handling or working with liquids (e.g., decontamination)];

ii) steel toe work boots disposable boot covers or rubber boots;

iii) disposable cotton inner gloves as necessary;

iv) outer nitrile work gloves;

v) half-face or full-face air purifying respirator (APR), equipped with combination cartridges for organic vapors and particulates (P-100);

vi) hearing protection device as necessary;

vii) personal floatation device as necessary; and

viii) hard hat.

Modified Level D:

i) tyvek® coveralls (polycoated tyvek® when handling or working with liquids);

ii) steel toe work boots;

iii) disposable cotton inner gloves as necessary;

iv) outer nitrile work gloves;

v) safety glasses;

vi) splash shields as necessary;

vii) hearing protection as necessary;

viii) personal floatation device as necessary; and

ix) hard hat.

Level D:

i) standard work uniform or coveralls;

ii) steel toe work boots;

iii) gloves as necessary;

iv) safety glasses;

v) splash shield as needed;

vi) hearing protection as necessary;

vii) personal floatation device as necessary; and

viii) hard hat.

PPE will be maintained in a clean sanitary condition and ready for use. Disposable coveralls shall be discarded when torn and as an employee leaves the EZ. Hard hats shall be thoroughly cleaned after leaving the EZ. Respirators shall be cleaned after each day's use and cartridges discarded. A sufficient quantity of potable water shall be supplied for washing, cleaning PPE, and drinking. A potable water supply for washing and cleaning PPE will be maintained adjacent to the decontamination area described in Section 9.0. Fresh potable water for drinking will be supplied on a daily basis and be maintained at a location removed from the active work area.

6.2 REASSESSMENT OF PROTECTION LEVELS

Protection levels provided by PPE selection shall be upgraded or downgraded based upon a change in Site conditions or the review of the results of air monitoring.

When a significant change occurs, the hazards should be reassessed. Some indicators of the need for reassessment are:

i) commencement of a new work phase;

ii) change in job tasks during a work phase;

iii) change of season / weather;

iv) when temperature extremes or individual medical considerations limit the effectiveness of PPE;

v) chemicals other than those expected to be encountered are identified;

vi) change in ambient levels of chemicals; and

vii) change in work scope which effects the degree of contact with areas of potentially elevated chemical presence.

All proposed changes to protection levels and PPE requirements will be reviewed and approved prior to their implementation by the HSO.

6.3 DURATION OF WORK TASKS

The duration of project activities involving the usage of PPE will be established by the HSO or his designee based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE (heat stress and cold stress, see Section 12.3 - Environmental Control), and limitations of the protective equipment (i.e., ensemble permeation rates, life expectancy of air-purifying respirator cartridges, etc.). As a minimum, rest breaks will be observed at the following intervals:

i) 15 minutes midway between shift startup and lunch;

ii) 1/2 to 1 hour for lunch; and

iii) 15 minutes in the afternoon, between lunch and shift end.

All rest breaks will be taken in a clean area (e.g., support zone) after full decontamination and PPE removal. Additional rest breaks will be observed, based upon the heat stress monitoring guidelines presented in the CRA Services Health and Safety SOPs.

6.4 LIMITATIONS OF PROTECTIVE CLOTHING

PPE ensembles designated for use during project activities have been selected to provide protection against chemicals at known or anticipated concentrations in the soil and groundwater. However, no protective garment, glove, or boot is chemical-proof, nor will it afford protection against all chemical types. Permeation of a given chemical through PPE is a complex process governed by the chemical concentrations, environmental conditions, physical condition of the protection garment, and the resistance of a garment to a specific chemical; chemical permeation may continue even after the source of the chemical has been removed from the garment.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all Site personnel using PPE:

i) when using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift;

ii) inspect all clothing, gloves, and boots both prior to and during use for:

   a) imperfect seams,

b) non-uniform coatings,

c) tears,

d) poorly functioning closures; and

iii) inspect reusable garments, boots, and gloves both prior to and during use for:

a) visible signs of chemical permeation,

b) swelling,

c) discoloration,

d) stiffness,

e) brittleness,

f) cracks,

g) any sign of puncture, and

h) any sign of abrasion.

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit elevated concentrations of chemicals will not be reused.

Additional PPE usage guidelines are as follows:

i) ankles / wrists will be secured tightly with the use of duct tape;

ii) prescription eyewear used on Site shall be safety glasses equipped with side shields when full-face respirators are not required. Contact lenses shall not be used;

iii) all EZ workers will have received training in the usage of full-face air purifying respirators and SCBA which may be required in an emergency;

iv) steel toe leather footwear shall be covered with neoprene overboots prior to entering the EZ and immediately upon entering the CRZ; and

v) safety footwear and hard hats are to be worn by Site personnel at all times.

EZ personnel also carry certain responsibilities for their own health and safety, and are required to observe the following safe work practices:

i) familiarize themselves with this HASP;

ii) use the "buddy system" when working in a contaminated operation;

iii) use the safety equipment in accordance with training received, labeling instructions, and common sense;

iv) maintain safety equipment in good condition and proper working order;

v) refrain from activities that would create additional hazards (i.e., smoking, eating, etc., in restricted areas, leaning against dirty, contaminated surfaces);

vi) smoking, eating, and drinking will be prohibited except in designated areas. These designated areas may change during the duration of the project to maintain adequate separation from the active work area(s). Designation of these areas will be the responsibility of the HSO; and

vii) soiled disposable outerwear shall be removed and placed into a covered container prior to washing hands and face, eating, using lavatory facilities, or leaving the Site.

6.5 RESPIRATORY PROTECTION PROGRAM

Prior to arriving at the Site, all on-Site personnel will have received training in the use of, and have been fit tested for a full-facepiece respirator. All on-Site personnel will be required to comply with their employer specific written respiratory protection program developed in accordance with OSHA 29 CFR 1910.134.

Respiratory protection may be required during some of the project activities. This is to ensure worker protection from potentially contaminated particulates and volatile organic compounds (VOCs).

A photoionization detector (PID) will be used to determine if organic vapors are present. A background reading will be established prior to commencing work activities at each active work area.

Action levels to determine the level of respiratory protection necessary during Project activities are based on the concentration of the Site chemicals measured within the breathing zone. The action levels and appropriate respiratory protection for these Site activities are as follows:

Sustained Organic Vapor Reading Above Background Within Worker Breathing Zone in Pans Per Million (ppm)	*Action Taken*
0 or Background	Full-Face Respirator Available
1-50	Wear Full-Face Respirator
>50	Must Wear Supplied Air Respiratory / Implement Additional Engineering Controls

All efforts will be made to implement additional engineering controls to minimize the need to wear a supplied air respirator. If the ambient concentrations of organic vapors are due to identifiable substances, the level of respiratory protection may be altered by the HSO.

The appropriate air purifying respirator cartridge to be used at the Site is a combination organic vapor and P-100 particulate cartridge. The cartridge used must be of the same manufacturer as the respiratory face piece.

6.6 SITE CONTROL

A temporary fence will be installed to prevent unauthorized access to the project work areas. Powertrain personnel may gain access to the other side of the fence only if they are escorted. The intention is to keep them out of the EZ. Designated work areas will be set up as appropriate inside the fence during the Site field activities, as required. The purpose of these procedures is to limit access to areas with potentially elevated chemical presence, and prevent the migration of potentially hazardous materials into adjacent clean areas. These areas are described in the following:

i) The Exclusion Zone (EZ) is the area immediately surrounding the active work area. Sufficient area will be provided for efficient movement of personnel and equipment as well as chemical control. Boundaries are modifiable depending on operational requirements. The HSO will be responsible for maintaining the boundaries of this area. Personnel entering this area are required to wear the PPE as defined previously. A wind direction indication device (i.e., flagging, windsock, etc.) will be mounted in the area of any EZ during Site activities.

   All personnel (including visitors) entering the EZ or CRZ using respiratory protection must have successfully passed a qualitative respirator fit test in accordance with OSHA 29 CFR 1910.134. Documentation of fit testing is the responsibility of each employer.

In the event that unauthorized personnel enter the EZ, work will stop. Work will not resume until the unauthorized personnel have been removed from the EZ or have been moved to an acceptable on-Site area. A log of all visitors to the Site, including those entering the EZ, will be maintained.

ii) The Contaminant Reduction Zone (CRZ) will provide a location for removal of PPE which has contacted material with elevated chemical presence and final removal and decontamination of personnel and equipment. Supplemental safety equipment, such as fire extinguishers, portable eyewash, and extra quantities of PPE may be stored in this area. The order in which safety equipment is to be donned is as follows:

a) tyvek® suit;

b) rubber boot;

c) gloves;

d) respirator (if required); and

e) hard hat.

The following order applies when removing safety equipment:

a) wash off boots and outer gloves prior to removal;

b) tyvek® suit

c) hard hat;

d) respirator; and

e) inner gloves.

iii) The Support Zone (SZ) is situated in clean areas where there is a minimal risk of encountering hazardous materials or conditions. PPE beyond standard construction safety equipment is therefore not required.

7.0 ACTIVITY HAZARD/RISK ANALYSIS

This section identifies the general hazards associated with specific project activities and presents the documented or potential health and safety hazards that exist at the Site. Every effort will be made to reduce or eliminate these hazards. Those which cannot be eliminated must be guarded against by use of engineering controls and/or PPE. Table D7.1 presents the anticipated hazards/risks and hazard controls.

In addition to the chemical hazards presented in Section 2.0 of this HASP**,** physical hazards including uneven terrain, steep slopes, slippery surfaces, potential confined spaces, the use of heavy equipment, potential drowning from working in and on the River, the use of decontamination equipment and potential heat and cold stress exist at the Site. It will be the responsibility of each on-Site contractor and their personnel to identify the physical hazards posed by the various Site project activities and implement preventative and corrective action.

7.1 CHEMICAL EXPOSURE

Preventing exposure to toxic chemicals is a primary concern. Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systematically, causing a toxic effect at a part of the body distant from the point of initial contact.

Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from acute exposures usually occur during or shortly after exposure to a sufficiently high concentration of a chemical. The concentration required to produce such effects varies widely from chemical to chemical. The term "chronic exposure" generally refers to exposures to "low" concentrations of a contaminant over a long period of time. The "low" concentrations required to produce symptoms of chronic exposure depend upon the chemical, the duration of each exposure, and the number of exposures. For a given chemical, the symptoms of an acute exposure may be completely different from those resulting from chronic exposure.

For either chronic or acute exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any such warning signs (this is a particular concern for chronic exposures to low concentrations). Health effects such as cancer or respiratory disease

may not become manifest for several years or decades after exposure. In addition, some toxic chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious physiological sensations. Thus, a worker's senses or feelings cannot be relied upon in all cases to warn of potential toxic exposure.

The effects of exposure not only depend on the chemical, its concentration, route of entry, and duration of exposure, but may also be influenced by personal factors such as the individual's smoking habits, alcohol consumption, medication use, nutrition, age, and sex.

An important exposure route of concern at the Site is inhalation. The lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Some toxic chemicals present in the atmosphere may not be detected by human senses (i.e., they may be colorless, odorless, and their toxic effects may not produce any immediate symptoms). Respiratory protection is therefore extremely important if there is a possibility that the work site atmosphere may contain such hazardous substances. Chemicals also can enter the respiratory tract through punctured eardrums. Where this is a hazard, individuals with punctured eardrums should be medically evaluated specifically to determine if such a condition would place them at an unacceptable risk and preclude their working at the task in question.

Direct contact of the skin and eyes by hazardous substances is another important route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where they are transported to vulnerable organs. Skin absorption is enhanced by abrasions, cuts, heat, and moisture. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye). Wearing protective equipment, not using contact lenses in chemical atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing con tact with liquid and solid chemicals can help protect against skin and eye contact.

Although ingestion should be the least significant route of exposure at the Site, it is important to be aware of how this type of exposure can occur. Deliberate ingestion of chemicals is unlikely, however, personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics at the Site may provide a route of entry for chemicals.

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (i.e., by stepping or tripping and falling onto contaminated sharp objects). Wearing safety shoes, avoiding physical hazards, and taking common sense precautions are important protective measures against injection.

8.0 AIR MONITORING

During the progress of project activities, monitoring of organic vapors will be taken by the HSO. Additionally, oxygen and combustible gas levels will need to be taken if personnel enter into any confined space.

The following air monitoring instrumentation will be used for this purpose:

i) a PID detector; and

ii) a combination oxygen/combustible gas instrument.

All monitoring equipment will be calibrated on a daily basis in accordance with the manufacturer's guidelines, and such calibrations will be recorded in the Site daily log book. Results of all daily air monitoring also will be recorded in the Site daily log book.

Air monitoring will be conducted hourly in the breathing zone of workers in the EZ or as deemed necessary by the HSO based on Site-specific conditions. Background measurements immediately upwind of the EZ will be taken before activities commence. Respiratory action levels for organic vapors are discussed in Section 6.5.

Immediately upon identifying sustained elevated levels of organic vapors (greater than 50 ppm within the Work Zone, the air monitoring results will be reported to the Site Superintendent and work activities will be shut down. The HSO will determine the cause of the sustained elevated levels of organic vapors and alternate work methods or engineering controls will be implemented to rectify the release of elevated concentrations of organic vapors, or upgrade levels of PPE as required.

CRA will implement a personnel air monitoring program for workers having the highest potential for exposure to chemicals present on Site. Samples would be collected during the startup of activities, at locations were personnel would face potential exposure, to verify the adequacy of personal protection and to document the actual exposure level to the selected chemicals of concern. Samples will be collected and analyzed for the presence of the compounds of concern as determined by the HSO. It is expected that samples will be collected and analyzed for PCBs, lead, arsenic, and mercury. Appropriate NIOSH procedures and methods will be followed and all samples are to be sent to an American Industrial Hygiene Association (AIHA) accredited laboratory. Results of the air sampling program will be posted for personnel to review.
Monitoring for oxygen and combustible gas levels will be continuous according to the confined space entry permit if personnel have to enter into any confined space.

9.0 DECONTAMINATION PROCEDURES

In general, everything that enters the EZ at the Site must either be decontaminated or properly discarded upon exit from the EZ. All personnel, including any State and local officials, must enter and exit the EZ through the decontamination area. Prior to demobilization, potentially contaminated equipment will be decontaminated and inspected by the HSO before it is moved into the clean zone.

The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for this Site is Liquinox (soap) for equipment and for any reusable PPE.

9.1 EQUIPMENT DECONTAMINATION PROCEDURES

All equipment must be decontaminated within the CRZ or on the decontamination pad by a pressure washer upon exit from the EZ. Decontamination procedures should include: knocking soil/mud from machines; water rinsing using a solution of water and Liquinox; scraping and brushing to remove remaining soils and a final water rinse. Personnel shall wear Level C protection when decontaminating equipment Runoff will be collected and stored until appropriate disposal arrangements are made. Following decontamination and prior to equipment removal from the Site, the HSO shall be responsible for ensuring that the equipment has been properly cleaned. This inspection shall be included in the Site log book.

9.2 PERSONNEL DECONTAMINATION PROCEDURES

Personnel decontamination will be completed in accordance with the CRA Health and Safety SOP for personnel decontamination.

10.0 GENERAL SAFETY AND PERSONAL HYGIENE

1. Eating at the Site is prohibited except in specifically designated areas. Designation of eating areas will be the responsibility of the HSO. The location of these areas may change during the duration of the project to maintain adequate separation from the active work area(s).
2. Smoking at the Site is prohibited except in specifically designated areas.
3. Individuals getting wet to the skin with effluent from the washing operation must wash the affected area immediately. If clothes in contact with skin are wet, then these must be changed.
4. Hands must be washed with soap and water before eating, drinking, smoking, and before using toilets.
5. All disposable coveralls and soiled gloves will be placed in covered containers at the end of every shift or sooner, if deemed necessary by the HSO. Wastes will be stored until proper disposal arrangements have been made.
6. Personnel working on Site will not be permitted to wear facial hair that interferes with the mask-to-face seal on air-purifying respirators.

11.0 MEDICAL SURVEILLANCE

In accordance with the requirements detailed in 29 CPR 1910.120 and 29 CFR 1910.134, all Site personnel who will come in contact with materials with potentially elevated chemical presence will have received, within 1 year prior to starting field activities, medical surveillance by a licensed physician or physician's group.

Medical records for all on-Site personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work.

The medical records will be available to the employee or his/her designated representative upon written request, as outlined in 29 CFR 1910.1020.

Each employer will provide certifications to the HSO that its personnel involved in Site activities will have all necessary medical examinations and will have obtained medical certification prior to commencing work which requires respiratory protection or potential exposure to hazardous materials. Personnel not obtaining medical certification will not perform work within the CRZ and EZ.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to any Site activity or when accidental exposure to elevated concentrations of chemicals occur.

12..0 ENVIRONMENTAL CONTROL PROGRAM

This section of the HASP outlines measures to be implemented at the Site to prevent hazards associated with environmental conditions.

12.1 WEATHER MONITORING

The HSO or Site Superintendent will be responsible for checking weather forecasts for the next day and week of work to provide advance notification of any severe weather conditions. Severe weather conditions (e.g., heavy rains) may cause unsafe conditions at the site and in some situations work may have to be stopped.

12.2 RAIN AND SNOW

Excessive amounts of precipitation may cause potential safety hazards for all work tasks. The hazards would be most commonly associated with slipping, tripping, or falling due to slippery surfaces and further hazards are detailed by work task (Table D7.1).

Severe weather conditions will result in work stoppage and the implementation of further emergency measures, as described in CRA's Health and Safety SOP.

12.3 TEMPERATURE

The construction activities are expected to be conducted year round. Low and high temperatures may be experienced which require measures to be implemented to prevent health and safety hazards from occurring. Potential hazards arising from temperature extremes are heat stress and cold exposure.

The potential hazard due to worker heat stress is particularly important if high protection levels of PPE are in use (e.g., respirators). A detailed monitoring program and prevention measures to implement to reduce heat stress are detailed in CRAs Health and Safety SOP. It is the responsibility of the HSO to determine which measures are appropriate to implement to prevent heat stress; these will depend largely on daily Site conditions.

Exposure to cold is similar to heat stress in that the HSO must determine the appropriate preventative measures to implement. Some of the measures which may be implemented include: more frequent breaks, additional clothing, and partial enclosure of work areas. Detailed cold exposure prevention measures are also included in CRAs Health and Safety SOPs.

12.4 WIND

High winds may be encountered at the Site and these can cause hazards that may affect Site personnel health and safety. Preventative measures that will be implemented if necessary are as follows:

i) restricted Site activity;

ii) battening down light equipment or building materials;

iii) partially enclosing work areas; and

iv) reduction or stoppage of work activities.

12.5 WORKING IN AND ON THE RIVER

Working close to the River or from a barge stationed in the River can be dangerous. The River has a strong current and could carry any individual quite a distance if one falls into the River. Preventative measures that will be implemented when working in and / or on the River are as follows:

i) all personnel working from a boat, barge, and directly along the shoreline will wear a personal flotation device;

ii) a small boat will be immediately available to aid in any rescue attempt if personnel were to fall into the River; and

iii) the HSO will be consulted prior to anchoring any boat barge, or equipment in the River.

13.0 CONFINED SPACE ENTRY PROCEDURE

A confined space provides the potential for unusually high concentrations of contaminants, explosive atmospheres, oxygen deficient atmospheres, limited visibility, and restricted movement. This section establishes requirements for safe entry into, continued work in, and safe exit from confined spaces. Additional information regarding confined space entry can be found in 29 CFR 1926.21, 29 CFR 1910.146, and NIOSH-106. Entry into a confined space will only be undertaken after remote methods have been tried and found not to be successful. If confined space entry is required, such work will only be undertaken following the guidelines presented in the CRAs Health and Safety SOPs.

14.0 EMERGENCY RESPONSE

It is essential that Site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate. All emergencies will be reported to the GMPT Emergency Response Team. They will give CRA Services further direction as to the responsibilities during any emergency situation. It is possible they may wish to take the lead or they may ask us to take the lead.

14.1 EMERGENCY CONTACTS

Fire:	911 or Bay City Fire Department @ 517-892-8601
Police:	911 or Bay City Police Department @ 517-892-8571
Ambulance:	911 or 517-894-3122
Hospital:	Bay Medical Center 1900 Columbus Avenue Bay City, Michigan Telephone: 517-894-3000

Directions to the Hospital: Travel east out of the Site along Woodside Avenue to the Truman Parkway. Turn right (south) onto Truman Parkway. Travel along the parkway which changes to Trumbell Street. Proceed along Trumbell Street for three quarters of a mile. The Hospital is on the corner of Trumbell Street and Columbus Avenue. Figure D14.1 provides the emergency route from the Site.

14.2 ADDITIONAL EMERGENCY NUMBERS

National Response Center (NRC) 800-424-8802
Agency for Toxic Substances and Disease Registry .....404-488-4100(24 Hours)
GM Emergency Response 517-894-7288
USEPA Emergency Response.....800-424-8802
Project Manager (Ian Richardson) 519-884-0510
State of Michigan Emergency Response Commission 517-373-8481
CRA Services Manager of Safety and Health (Craig Gebhardt).....716-297-2160

14.3 EMERGENCY EQUIPMENT AVAILABLE ON SITE

Communication Equipment	***Location***
Emergency Alarms / Horns	CRZ
Medical Equipment	
OSHA Approved First Aid Kit	CRZ or Support Zone
Portable Emergency Eyewash	
Fire Fighting Equipment	
One 20-Pound ABC Type Dry Chemical Fire Extinguishers	CRZ

14.4 PROJECT PERSONNEL RESPONSIBILITIES DURING EMERGENCIES

HEALTH AND SAFETY OFFICER (HSO)

As the administrator of the HASP, the HSO has primary responsibility for responding to and correcting emergency situations. The HSO will:

i) take appropriate measures to protect personnel including: withdrawal from the EZ, total evacuation and securing of the Site or upgrading or downgrading the level of protective clothing and respiratory protection;

ii) take appropriate measures to protect the public and the environment including isolating and securing the Site, preventing runoff to surface waters and ending or controlling the emergency to the extent possible;

iii) ensure that appropriate Federal, State, and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted;

iv) ensure that appropriate decontamination treatment or testing for exposed or injured personnel is obtained;

v) determine the cause of the incident and make recommendations to prevent the recurrence; and

vi) ensure that all required reports have been prepared.

14.5 MEDICAL EMERGENCIES

Any person who becomes ill or injured in the EZ must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed as much as possible without causing further harm to the patient, and first aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the HSO and Site Superintendent.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a listing of the contaminants of concern to which they may have been exposed.

Any vehicle used to transport contaminated personnel will be cleaned or decontaminated as necessary.

14.6 FIRE OR EXPLOSION

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the HSO or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on Site.

If it is safe to do so, Site personnel may:

i) if hazardous, report to the Agency On-Scene Coordinator and/or Project Manager;

ii) use fire fighting equipment available on Site; or

iii) remove or isolate flammable or other hazardous materials which may contribute to the fire.

14.7 SPILLS OR CONTAINER LEAKS

In the event of a spill or leak, Site personnel will:

i) report spills and releases to the Agency On-Scene Coordinator, Project Manager, the NRC, and State Emergency Response Commission (SERC);

ii) locate the source of the spillage and stop the flow if it can be done safely; and

iii) begin containment and recovery of the spilled materials.

15.0 RECORDKEEPING

The HSO shall establish and maintain records of all necessary and prudent monitoring activities as described below:

i) name and job classification of the employees involved on specific tasks;

ii) records of qualitative fit testing and physical examination, results for Site personnel;

iii) records of all OSHA training certification for Site personnel;

iv) records of training acknowledgment forms; and

v) emergency reports describing any incidents or accidents.

TABLE D2.1

POTENTIAL CHEMICAL COMPOUNDS OF CONCERN
GENERAL MOTORS POWERTRAIN GROUP
BAY CITY PLANT
BAY CITY, MICHIGAN

Substance	*IDLH (ppm)*	*TLV* (ppm)*	*I.P. (eV)*	*Acute Effects*
Volatile Organic Compounds				
Acetone	2500	500	9.7	Irritation of eyes, nose, and throat. Headache, dizziness, and dermatitis. Inhalation, ingestion, and skin contact hazard.
Benzene	500	0.5 (Carc, S)	9.2	Irritation of eyes, skin, nose, and respiratory system. Headache, dizziness, giddiness, nausea, and dermatitis. Inhalation, ingestion, skin absorption, and skin contact hazard.
Chlorobenzene	1000	10	9.1	Irritation of eyes, skin, and nose. Drowsiness and in coordination. Inhalation, ingestion, and skin contact hazard.
Chloroethane	3800 (LEL)	100 (S)	11.0	In coordination and abdominal cramps. Inhalation, ingestion, skin absorption, and skin contact hazard.
Chloroform	500	10	11.4	Irritation of eyes and skin. Dizziness, mental dullness, nausea, confusion, headache, and fatigue. Inhalation, ingestion, skin absorption, and skin contact hazard.
1,1-Dichloroethane	3000	100	11.1	Skin irritation. Inhalation, ingestion, and skin contact hazard.
1,2-Dichloroethene	1000	200	9.6	Irritation to eyes and respiratory system. Inhalation, ingestion, and skin contact hazard.

TABLE D2.1

POTENTIAL CHEMICAL COMPOUNDS OF CONCERN
GENERAL MOTORS POWERTRAIN GROUP
BAY CITY PLANT
BAY CITY, MICHIGAN

Substance	*IDLH (ppm)*	*TLV* (ppm)*	*I.P. (eV)*	*Acute Effects*
Ethylbenzene	800 (LEL)	100	8.8	Irritation to eyes, skin, and mucous membranes. Headache and dermatitis. Inhalation, ingestion, and skin contact hazard.
Methylene chloride	2300	25	11.3	Irritation to eyes and skin. Fatigue, weakness, light-headedness, numbness, and nausea. Inhalation, ingestion, skin absorption, and skin contact hazard.
4-Methyl-2-pentanone (synonym-Hexone)	500	50	9.3	Irritation to eyes, skin, and mucous membranes. Headache and dermatitis. Inhalation, ingestion, and skin contact hazard.
Toluene	500	50 (S)	8.8	Irritation to eyes and nose. Fatigue, weakness, confusion, euphoria, dizziness, headache, nervousness, and dermatitis. Inhalation, ingestion, skin absorption, and skin contact hazard.
1,1,1-Trichloroethane	700	350	11.0	Irritation to eyes and skin. Headache, weakness, exhaustion, and dermatitis. Inhalation, ingestion, and skin contact hazard.
Trichloroethene	1000	50	9.4	Irritation to eyes and skin. Headache, vertigo, fatigue, giddiniess, tremor, nausea, vomiting, and dermatitis. Inhalation, ingestion, skin absorption, and skin contact hazard.

TABLE D2.1

POTENTIAL CHEMICAL COMPOUNDS OF CONCERN
GENERAL MOTORS POWERTRAIN GROUP
BAY CITY PLANT
BAY CITY, MICHIGAN

Substance	*IDLH (ppm)*	*TLV* (ppm)*	*I.P. (eV)*	*Acute Effects*
Vinyl chloride	-	1 (Carc)	10.0	Weakness and abdominal pain. Contact with liquid may cause frostbite. Inhalation and skin contact hazard.
Xylene (o, m, p isomers)	900	100	8.5	Irritation to eyes, skin, nose, and throat. Dizziness, excitement, drowsiness, in coordination, nausea, vomiting, abdominal pain, and dermatitis. Inhalation, ingestion, skin absorption, and skin contact hazard.
Semi-Volatile Organic Compounds				
Benzo(b)fluoranthrene	80 mg/m^3	0.2 mg/m^3 (Carc)	NA	NA
bis(2-Ethylhexyl)phthalate	NA	5 mg/m^3	NA	NA
Fluoranthrene	80 mg/m^3	0.2 mg/m^3	NA	NA
Methylnaphthalene	NA	NA	NA	NA
Naphthalene	250	10	8.1	Irritation to eyes. Headache, confusion, excitement, malaise, nausea, vomiting, abdominal pain, and dermatitis. Inhalation, ingestion, skin absorption, and skin contact hazard.
Phenanthrene	80 mg/m^3	0.2 mg/m^3	NA	NA

TABLE D2.1

POTENTIAL CHEMICAL COMPOUNDS OF CONCERN
GENERAL MOTORS POWERTRAIN GROUP
BAY CITY PLANT
BAY CITY, MICHIGAN

Substance	*IDLH (ppm)*	*TLV* (ppm)*	*I.P. (eV)*	*Acute Effects*
Pyrene	80 mg/m^3	0.2 mg/m^3	NA	NA
Polychlorinated Biphenyls				
Aroclor 1248	5 mg/m^3	0.5 mg/m^3 (S)	NA	Eye irritation. Chloracne. Inhalation, ingestion, skin absorption, and skin contact hazard.
Arcolor 1254	5 mg/m^3	0.5 mg/m^3 (S)	NA	Eye irritation. Chloracne. Inhalation, ingestion, skin absorption, and skin contact hazard.
Metals				
Aluminum	NA	10 mg/m^3	NA	Irritation to eyes, skin, and respiratory system. Inhalation and skin contact hazard.
Antimony	50 mg/m^3	0.5 mg/m^3	NA	Irritation to eyes, skin, nose, throat, and mouth. Cough, dizziness, headache, nausea, vomiting, diarrhea, stomach cramps. Inhalation, ingestion, and skin contact
Arsenic	5 mg/m^3	0.01 mg/m^3 (Carc)	NA	Irritation of respiratory system. Dermatitis. Inhalation, ingestion, skin absorption, and skin contact hazard.
Barium	50 mg/m^3	0.5 mg/m^3	NA	Irritation to eyes, skin, and upper respiratory system. Inhalation, ingestion, and skin contact hazard.

TABLE D2.1

POTENTIAL CHEMICAL COMPOUNDS OF CONCERN
GENERAL MOTORS POWERTRAIN GROUP
BAY CITY PLANT
BAY CITY, MICHIGAN

Substance	*IDLH (ppm)*	*TLV* (ppm)*	*I.P. (eV)*	*Acute Effects*
Beryllium	4 mg / m3	0.002 mg / m^3 (Carc)	NA	Irritation to eyes. Weakness, chest pains, and cough. Inhalation and skin contact hazard.
Cadmium	9 mg / m^3	0.002 mg / m^3 (Carc)	NA	Cough, tightness in chest, headache, chills, muscle aches, nausea, vomiting, and diarrhea. Inhalation and ingestion hazard.
Chromium	250 mg / m^3	0.5 mg / m^3	NA	Irritation to eyes, skin, and lungs. Inhalation, ingestion, and skin contact hazard.
Cobalt	20 mg / m^3	0.02 mg / m^3	NA	Cough, wheezing, and dermatitis. Inhalation, ingestion, and skin contact hazard.
Copper	100 mg / m^3	1 mg / m^3	NA	Irritation to eyes, nose, and pharnyx. Metallic taste and dermatitis. Inhalation, ingestion, and skin contact
Cyanides	25 mg / m^3	5 mg / m^3	NA	Irritation to eyes and skin. Headache, confusion, nausea, and vomiting. Inhalation, ingestion, skin absorption, and skin contact hazard.
Iron	2500 mg / m^3	5 mg / m3	NA	Inhalation hazard.
Lead	100 mg / m^3	0.05 mg / m^3	NA	Irritation to eyes. Weakness, exhaustion, and abdominal pain. Inhalation, ingestion, and skin contact hazard.

TABLE D2.1

POTENTIAL CHEMICAL COMPOUNDS OF CONCERN
GENERAL MOTORS POWERTRAIN GROUP
BAY CITY PLANT
BAY CITY, MICHIGAN

Substance	*IDLH (ppm)*	*TLV* (ppm)*	*I.P. (eV)*	*Acute Effects*
Manganese	500 mg/m^3	0.2 mg/m^3	NA	Dry throat, cough, chest tightness, vomiting, malaise, and fatigue. Inhalation and ingestion hazard.
Mercury	10 mg/m^3	0.025 mg/m^3	NA	Irritation to eyes and skin. Coughing, chest pain, headache, fatigue, and weakness. Inhalation, ingestion, skin absorption, and skin contact hazard.
Nickel	10 mg/m^3	1 mg/m^3	NA	hazard.
Vanadium	35 mg/m^3	0.05 mg/m^3	NA	Irritation to eyes, skin, and throat. Metallic taste in mouth. Inhalation, ingestion, and skin contact hazard.
Zinc	500 mg/m^3	10 mg/m^3	NA	Chills, muscle ache, nausea, fever, dry throat, cough, weakness, exhaustion, vomiting, fatigue, tight chest, and metallic taste in mouth. Inhalation hazard.

Notes:
(Carc) The chemical substance is classified by ACGIH as a confined or suspected human carcinogen.
* The TLV is determined by the lowest documented level between OSHA and ACGIH.
(S) There is potential significant contribution to the overall exposure by direct skin contact with vapors and/or liquid.
(LEL) The IDLH is designated since 10 percent of the LEL will be reached at that substance concentration.

TABLE D6.1

SPECIFIC PERSONAL PROTECTION LEVELS
POTENTIAL CHEMICAL COMPOUNDS OF CONCERN
GENERAL MOTORS POWERTRAIN GROUP
BAY CITY PLANT

Work Tasks	*Maximum Protection Level* (1)	*Alternate Protection Level* (2)
Mobilization and Demobilization of Labor, Materials, and Equipment to and From the Site	Modified D	D
Surveying Activities	Modified D	D
Machine Storage Area:		
• Groundwater monitoring	Modified D	Modified D
• Multi-layer cap and groundwater extraction system maintenance	Modified D	D
Lagoon Area:		
• Groundwater monitoring	Modified D	Modified D
• Groundwater extraction system maintenance	Level C	Modified D
Outer Perimeter Banks:		
• Groundwater monitoring	Modified D	Modified D
• Multi-layer cap maintenance	Modified D	Level D
• Sheet pile wall maintenance	Modified D	Level D
Inlet Slip:		
• Soil erosion protection measures maintenance	Modified D	Level D
Support Facilities Area:		
• Water level measurements	Modified D	Modified D
Undeveloped Area		
• Groundwater monitoring	Modified D	Modified D
Decontamination activities	Level C	Modified D

Notes:
Specific requirements for protection levels are detailed in Section 6.1.

(1) Level C: To be worn when the criterion for using air-purifying respirators (APRs) are met and a lesser level of skin protection is needed.
Modified D: To be worn when dermal protection is required, however, no respiratory hazards are present. It provides minimal protection against chemical hazards.

(2) Alternate protection levels will be used if monitoring indicates that conditions are appropriate or the HSO and Site Superintendent agree that there is a reduced potential of exposure.

TABLE D7.1

ANTICIPATED HAZARDS/RISKS AND APPROPRIATE PRECAUTIONS
POTENTIAL CHEMICAL COMPOUNDS OF CONCERN
GENERAL MOTORS POWERTRAIN GROUP
BAY CITY PLANT

	Activity	*Anticipated Hazards/Risks*	*Appropriate Precautions*
1.	Mobilization and Demobilization Activities	• slip / trip / fall hazards • potential back injuries from lifting heavy objects • potential heat or cold stress • severe weather • electrical hazards from power sources • moving or backing vehicles • cuts to hands from working with sharp objects or fencing material • potential drowning from working in and / or on the River	• Modified D or Level D personal protection • practice safe lifting techniques • participate in on-Site training programs • practice good personal hygiene principles • use a spotter around moving or backing equipment • work activities will be reduced or suspended during severe weather conditions • ground fault circuit interrupters (GFCIs) should be used to reduce the hazard of electrical shock. Do not stand in water when handling equipment. Electrical equipment will be approved. • keep first aid supplies readily available • wear leather gloves when working with sharp objects • wear personal floatation devices when working in or on the River
2.	Machine Storage Area: - Groundwater monitoring - Multi-layer cap and groundwater extraction system maintenance Lagoon Area: - Groundwater monitoring - Groundwater extraction system maintenance	• slip / trip / fall hazards • potential back injuries from lifting heavy objects • potential heat or cold stress • severe weather • electrical hazards from power sources • moving or backing vehicles and equipment • personnel injuries from sharp objects, falling debris, or pinch points • direct contact with potentially contaminated soils and groundwater • hazards presented by the use of heavy equipment • overhead and underground hazards (i.e., electrical lines, gas, or water lines) • potential burns from hot equipment • hazards presented by the use of specialized equipment (e.g., decontamination equipment)	• Level C and Modified D based on real-time air monitoring or established protection levels (see Table 6.1 • practice safe lifting techniques • participate in all on-Site training programs • be trained with all appropriate equipment SOPs • wear leather gloves when working with sharp objects • practice good personal hygiene principles • take proper precautions in unsafe areas • use the "Buddy System" • perform an underground utilities location • only essential personnel allowed in work areas • if performing confined space entry work, make sure perr system is in place and workers have participated in a training program • use a spotter around moving or backing equipment • identify all high temperature objects or equipment

TABLE D7.1

ANTICIPATED HAZARDS/RISKS AND APPROPRIATE PRECAUTIONS
POTENTIAL CHEMICAL COMPOUNDS OF CONCERN
GENERAL MOTORS POWERTRAIN GROUP
BAY CITY PLANT

Activity	*Anticipated Hazards/Risks*	*Appropriate Precautions*
Outer Perimeter Banks: - Groundwater monitoring - Multi-layer cap maintenance - Sheet pile wall maintenance Inlet Slip: - Soil erosion protection maintenance Support Facilities Area: - Water level measurements Undeveloped Area: - Groundwater monitoring Decontamination activities	• hazards presented by entry into a confined space (i.e., oxygen deficient, working in small tight areas, and falling overhead objects) • reduced field of vision from wearing full-face respirators • potential drowning from working in and / or on the River	• work activities will be reduced or suspended during severe weather conditions • GFCIs should be used to reduce the hazard of electrical shock. Do not stand in water when handling equipment Electrical equipment will be approved. • keep first aid supplies readily available • wear personal floatation devices when working in or on

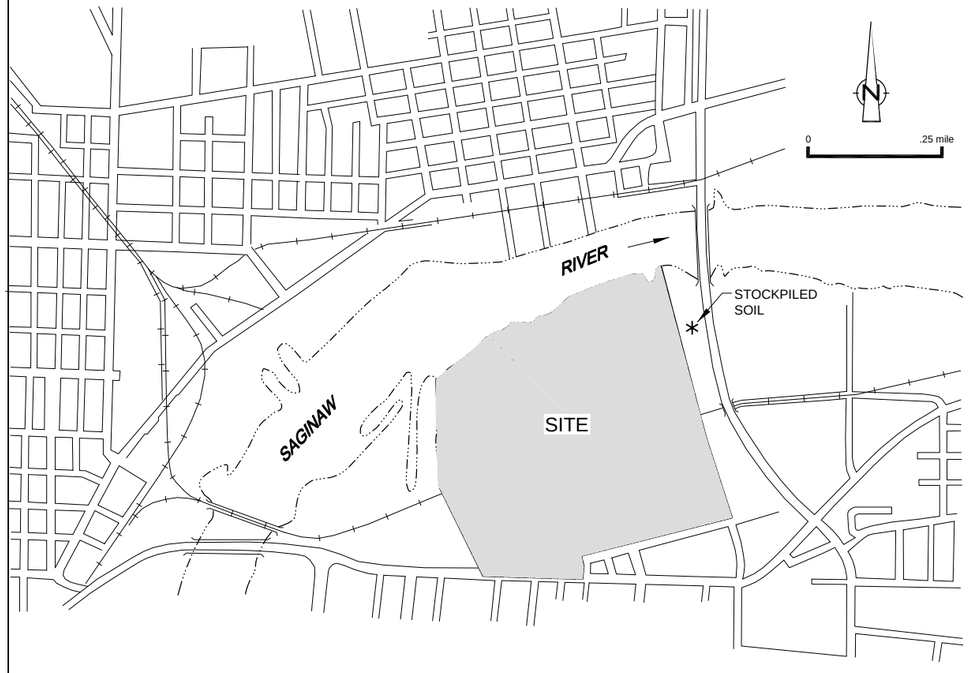
APPENDIX E

HISTORICAL GROUNDWATER DATA

APPENDIX F

AS-RECORDED DRAWINGS

REMEDIAL ACTION PLAN
AS RECORDED DRAWINGS - SEPTEMBER 2000
GM POWERTRAIN DIVISION
AND CROTTY STREET CHANNEL SITE
BAY CITY, MICHIGAN



KEY PLAN

DRAWING INDEX

GENERAL

DWG.No.			DRAWING TITLE
GN-WA001	G-01AR	SH01	COVER SHEET/DRAWING INDEX
GN-WA005	G-02AR	SH02	ABBREVIATIONS AND DETAIL DESIGNATIONS
GN-WA004	G-03AR	SH03	CIVIL, STRUCTURAL, AND ARCHITECTURAL LEGEND
GN-WA007	G-04AR	SH04	MECHANICAL LEGEND
GN-WA009	G-05AR	SH05	INSTRUMENTATION AND CONTROL LEGEND
GN-WA006	G-06AR	SH06	ELECTRICAL LEGEND
GN-WA010	G-07AR	SH07	CIVIL STANDARD DETAILS
GN-WA002	G-08AR	SH08	FENCING
GN-WA008	G-09AR	SH09	DISTRIBUTION PIPING
GN-WA011	G-10AR	SH10	GENERAL SITE PRE-CONSTRUCTION PLAN
GN-WA012	G-11AR	SH11	WEST SIDE PRE-CONSTRUCTION PLAN
GN-WA013	G-12AR	SH12	EAST SIDE PRE-CONSTRUCTION PLAN

CIVIL

CI-WA017	C-01AR	SH13	MONITORING WELLS ABANDONED
CI-WA013	C-02AR	SH14	EXISTING MONITORING WELLS
CI-WA004	C-03AR	SH15	WELL EXTENSION DETAILS
CI-WA001	C-04AR	SH16	SOIL EXCAVATION LOCATIONS AND RESULTS
CI-WA012	C-05AR	SH17	GROUNDWATER EXTRACTION SYSTEM
CI-WA005	C-06AR	SH18	GROUNDWATER EXTRACTION SYSTEM DETAILS
CI-WA006	C-07AR	SH19	GROUNDWATER EXTRACTION WELL 13, 14, AND 15 DETAILS
CI-WA003	C-08AR	SH20	SITE CAPPING
CI-WA007	C-09AR	SH21	CAP DETAILS
CI-WA008	C-10AR	SH22	EAST LAGOON LINER PLAN
CI-WA009	C-11AR	SH23	EAST LAGOON LINER DETAILS - 1 OF 2
CI-WA010	C-12AR	SH24	EAST LAGOON LINER DETAILS - 2 OF 2
CI-WA021	C-13AR	SH25	INLET SLIP LINER PLAN AND DETAILS
CI-WA019	C-14AR	SH26	WEST SUPPORT FACILITIES AREA PAVEMENT PLAN
CI-WA018	C-15AR	SH27	EAST SUPPORT FACILITIES AREA PAVEMENT PLAN
CI-WA011	C-16AR	SH28	SUPPORT FACILITIES AREA DETAILS
CI-WA020	C-17AR	SH29	EAST AREA PLAN DRAINAGE
CI-WA022	C-18AR	SH30	MANHOLE AND CATCHBASIN DETAILS

STRUCTURAL

DWG.No.			DRAWING TITLE
ST-WA002	S-01AR	SH31	SHEET PILING 1+0 TO 12+78.87
ST-WA003	S-02AR	SH32	SHEET PILING 10+50 TO 25+46
ST-WA001	S-03AR	SH33	SHEET PILING DETAILS SHEET 1 OF 2
ST-WA004	S-04AR	SH34	SHEET PILING DETAILS SHEET 2 OF 2

ELECTRICAL (BY MURDOCK ENGINEERING)

EL-ME001	E-01AR	SH35	ELECTRICAL SITE PLAN
EL-ME002	E-02AR	SH36	EQUIPMENT STORAGE AREA POWER DISTRIBUTION 1 OF 3
EL-ME003	E-03AR	SH37	EQUIPMENT STORAGE AREA POWER DISTRIBUTION 2 OF 3
EL-ME004	E-04AR	SH38	EQUIPMENT STORAGE AREA POWER DISTRIBUTION 3 OF 3
EL-ME005	E-05AR	SH39	CONTROL SCHEMATIC CP1
EL-ME006	E-06AR	SH40	EQUIPMENT STORAGE AREA CONTROL PANEL LAYOUT (CP1)
EL-ME007	E-07AR	SH41	LAGOON AREA POWER DISTRIBUTION 1 OF 2
EL-ME008	E-08AR	SH42	LAGOON AREA POWER DISTRIBUTION 2 OF 2
EL-ME009	E-09AR	SH43	CONTROL SCHEMATIC CP2
EL-ME010	E-10AR	SH44	EQUIPMENT STORAGE AREA CONTROL PANEL LAYOUT (CP2)
EL-ME011	E-11AR	SH45	POWER DISTRIBUTION SINGLE LINE
EL-ME012	E-12AR	SH46	BUILDING ELECTRICAL LAYOUT AND DETAILS

GM POWERTRAIN
GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.	SHEET No.
PE-H-96	SH01

AS RECORDED SEPTEMBER 2000

REF. PE-E-81

REALM Remediation and Liability Management Company, Inc.

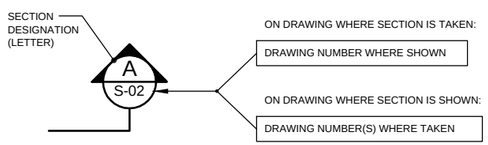
CRA CONESTOGA-ROVERS & ASSOCIATES

ABBREVIATIONS

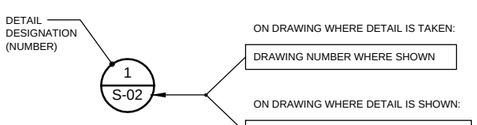
3/C	CONDUCTORS, NUMBER OF (3)
AAP	ALARM ANNUNCIATOR PANEL
AAV	AUTOMATIC AIR VENT
AB	ANCHOR BOLT
ABAN	ABANDON(ED)
ABS	ABSOLUTE
ABV	ABOVE
AC	ALTERNATING CURRENT
ACCUM	ACCUMULATOR
ACNV	AUTOMATIC CONTROL VALVE
ACOUS	ACOUSTICAL
ACP	ASPHALTIC CONCRETE PAVING
ACTR	ACTUATOR
ADDL	ADDITIONAL
ADDM	ADDENDUM
ADH	ADHESIVE
ADJ	ADJUSTABLE
ADJC	ADJACENT
ADPTR	ADAPTOR
AF	AFTER FILTER
AGGR	AGGREGATE
AHR	ANCHOR
AHU	AIR HANDLING UNIT
AL	ALUMINUM
ALM	ALARM
ALT	ALTERNATE
AMB	AMBIENT
AMSL	ABOVE MEAN SEA LEVEL
ANLG	ANALOG
AP	ACID PROOF
APPROX.	APPROXIMATELY
APPX	APPENDIX
APT	APARTMENT
ARCH	ARCHITECT(URAL)
ASL	ABOVE SEA LEVEL
ASPH	ASPHALT(IC)
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ASU	AIR SUPPLY UNIT
ASW	AUXILIARY SWITCH
ASYM	ASYMMETRICAL
AT	AIR TIGHT
ATS	AUTOMATIC TRANSFER SWITCH
AVE	AVENUE
AWG	AMERICAN WIRE GAGE
AZ	AZIMUTH
B&B	BALLED AND BURLAPPED
B&B	BELL AND BELL
B&F	BELL AND FLANGE
B&S	BELL AND SPIGOT
B/B	BACK TO BACK
BAF	BAFFLE
BAL	BALANCE
BAT	BATTERY
BBRG	BALL BEARING
BBS	BOTTOM OF BACKSLOPE
BC	BACK OF CURB
BC	BOLT CIRCLE
BE	BELL END
BETW	BETWEEN
BEV	BEVEL
BF	BOTH FACES
BFS	BOTTOM OF FORESLOPE
BFV	BUTTERFLY VALVE
BFW	BOILER FEED WATER
BGS	BELOW GROUND SURFACE
BHP	BRAKE HORSEPOWER
BI	BLACK IRON
BITUM	BITUMINOUS
BL	BASE LINE
BLDG	BUILDING
BLK	BLOCK
BLKHD	BULKHEAD
BLO	BLOWER
BLR	BOILER
BLW	BELOW
BM	BEAM
BM	BENCH MARK
BOT	BOTTOM
BP	BASE PLATE
BRG	BEARING
BRK	BRICK
BRKR	BREAKER
BRL	BARREL
BRS	BRASS
BRZ	BRONZE
BS	BOTH SIDES
BSHG	BUSHING
BSMT	BASEMENT
BSP	BLACK STEEL PIPE
BSTR	BOOSTER
BTFL	BUTTERFLY
BTU	BRITISH THERMAL UNIT
BV	BALL VALVE
BW	BOTH WAYS
Cu	COPPER
C&G	CURB AND GUTTER
C/C	CENTER TO CENTER
CAL	CALIBRATE
CAP	CAPACITY
CAT	CATALOG
CB	CATCH BASIN
CCPD	COUPLING CAPACITOR POTENTIAL DEVICE
CCW	COUNTER CLOCKWISE
CER	CERAMIC
CFP	CHEMICAL FEED PUMP
CHAN	CHANNEL
CHEM	CHEMICAL
CHFR	CHAMFER
CHK	CHECK
CHKV	CHECK VALVE
CI	CAST IRON
CIMJ	CAST IRON MECHANICAL JOINT
CIP	CAST IRON PIPE
CIR	CIRCLE
CIRC	CIRCULAR
CISP	CAST IRON SOIL PIPE
CJ	CONSTRUCTION JOINT
CKT	CIRCUIT
CL	CENTER LINE
CLDI	CONCRETE LINED DUCTILE IRON
CLJ	CONTROL JOINT
CLL	COLUMN LINE
CLP	CLAMP
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CND	CONDUIT
CNR	CORNER
CNTFLG	CENTRIFUGAL
CO	CLEANOUT
COAX	COAXIAL CABLE
COL	COLUMN
COMM	COMMUNICATION
CONC	CONCRETE
CONN	CONNECTION
CONSTR	CONSTRUCTION
CONT	CONTINUOUS (CONTINUATION)
COORD	COORDINATE
COV	COVER
CP	CANDLE POWER
CP	CONCRETE PIPE
CP	CONTROL PANEL
CPLG	COUPLING
CR	CONCENTRIC REDUCER
CRCMF	CIRCUMFERENCE
CRN	CROWN
CRS	COLD ROLLED STEEL
CSP	CONCRETE SEWER PIPE
CT	COOLING TOWER
CTV	CABLE TELEVISION
CU	COPPER
CV	CONTROL VALVE
C/W	COMPLETE WITH
CW	COLD WATER
CWP	CIRCULATING WATER PIPE
CYL	CYLINDER
DAT	DATUM
DBC	DIAMETER BOLT CIRCLE
DC	DIRECT CURRENT
DCI	DUCT COVERING INSULATION
DEMO	DEMOLITION
DET	DETAIL
DF	DIESEL FUEL
DI	DUCTILE IRON
DIA	DIAMETER
DIFF	DIFFERENCE
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DIST	DISTANCE
DIV	DIVISION
DIW	DEIONIZED WATER
DL	DEAD LOAD
DLI	DUCT LINER INSULATION
DLV	DOOR LOUVER
DMH	DROP MANHOLE
DMPF	DAMPPROOFING
DMPR	DAMPER
DN	DOWN
DP	DEW POINT
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DR	DRAIN
DS	DOWNSPOUT
DT	DRAIN TILE
DUPL	DUPLICATE
DW	DISTILLED WATER
DWG	DRAWING
DWL	DOWEL
DWV	DRAIN WASTE & VENT
E	EAST
ECC	ECCENTRIC
EF	EACH FACE
EFL	EFFLUENT
EL	EASEMENT LINE
EL	ELEVATION
ELB	ELBOW
ELEC	ELECTRICAL
EMER	EMERGENCY
ENCL	ENCLOSURE
ENG	ENGINE
ENGR	ENGINEER
ENTR	ENTRANCE
EP	EDGE OF PAVEMENT
EP	ELECTRICAL PANEL
EPRF	EXPLOSION PROOF
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
ES	EDGE OF SHOULDER
ESMT	EASEMENT
ESP	EMERGENCY SWITCH PANEL
EST	ESTIMATE
EVAP	EVAPORATE
EW	EACH WAY
EWH	ELECTRICAL WATER HEATER
EXC	EXCAVATE (EXCAVATION)
EXCH	EXCHANGER
EXH	EXHAUST
EXP	EXPANSION
EXT	EXTERIOR
F/F	FACE TO FACE
FA	FIRE ALARM
FC	FOOTCANDLE
FD	FLOOR DRAIN
FDMPR	FIRE DAMPER
FDN	FOUNDATION
FDR	FEEDER
FEC	FIRE EXTINGUISHER CABINET
FEM	FEMALE
FEXT	FIRE EXTINGUISHER
FGL	FIBERGLASS
FHC	FIRE HOSE CABINET
FHY	FIRE HYDRANT
FIN	FINISH(ED)
FIN FL	FINISH(ED) FLOOR
FIN GR	FINISH(ED) GRADE
FL	FLASHING
FLA	FULL LOAD AMPS
FLEX C	FLEXIBLE CONNECTION
FLG	FLANGE
FLOC	FLOCCULATOR
FLR	FLOOR(ING)
FLSW	FLOW SWITCH
FLTR	FILTER
FN	FENCE
FO	FUEL OIL
FOC	FACE OF CONCRETE
FP	FREEZING POINT
FPT	FEMALE PIPE THREAD
FR	FIRE RATING
FR	FRAME
FREQ	FREQUENCY
FSTNR	FASTENER
FTG	FITTING
FTG	FOOTING
FU	FUSE
FUR	FURNACE
FUT	FUTURE
FV	FOOT VALVE
FXTR	FIXTURE
G	GAS
GA	GAGE
GAL	GALLON
GALV	GALVANIZED
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTOR
GL	GLASS
GLV	GLOBE VALVE
GLZ	GLAZING
GND	GROUND
GOVT	GOVERNMENT
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GALLONS PER SECOND
GR	GRADE (GRADING)
GR LN	GRADE LINE
GRL	GRILLE
GRTG	GRATING
GSKT	GASKET
GSNK	GOOSENECK
GT	GREASE TRAP
GT	GROUT
GTV	GATE VALVE
GUT	GUTTER
GVL	GRAVEL
GWH	GAS WATER HEATER
H	HIGH
HB	HOSE BIB
HD	HEAD
HDPE	HIGH DENSITY POLYETHYLENE
HDWE	HARDWARE
HEX	HEAT EXCHANGER
HGT	HEIGHT
HH	HANDHOLE
HM	HOLLOW METAL
HMD	HOLLOW METAL DOOR
HMF	HOLLOW METAL FRAME
HNDRL	HAND RAIL
HNDWL	HANDWHEEL
HOA	HAND-OFF-AUTO
HORIZ	HORIZONTAL
HP	HIGH PRESSURE
HP	HORSEPOWER
HPT	HIGH POINT
HR	HOUR
HSB	HIGH STRENGTH BOLT
HT	HEAT
HTG	HEATING
HTR	HEATER
HV	HOSE VALVE
HVAC	HEATING, VENTILATION, AIR CONDITIONING
HVY	HEAVY
HW	HOT WATER
HWB	HOT WATER BOILER
HWCP	HOT WATER CIRCULATING PUMP
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HWT	HOT WATER TANK
HWY	HIGHWAY
HYD	HYDRANT
HYDR	HYDRAULIC
HZ	HERTZ
ID	INSIDE DIAMETER
IF	INSIDE FACE
IGN	IGNITION
ILLUM	ILLUMINATION
IN WC	INCHES (WATER COLUMN)
IND	INDICATOR
INDL	INDUSTRIAL
INF	INFLUENT
INL	INLET
INSTL	INSTALLATION
INSTR	INSTRUMENT
INSUL	INSULATION
INTLK	INTERLOCK
INTR	INTERIOR
INV	INVERT
INV EL	INVERT ELEVATION
IP	IRON PIPE
IPS	INTERNATION PIPE STANDARD
IPT	IRON PIPE THREAD
ISO	ISOMETRIC
JAN	JANITOR
JB	JUNCTION BOX
JCT	JUNCTION
KOP	KNOCKOUT PANEL
KPL	KICK PLATE
KSF	KIPS PER SQUARE FOOT
KSI	KIPS PER SQUARE INCH
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KVAR	KILOVAR (RESISTANCE)
KW	KILOWATT
KWH	KILOWATT HOUR
L	LEFT
LAB	LABORATORY
LAD	LADDER
LATL	LATERAL
LAV	LAVATORY
LB	POUND
LBL	LABEL
LBR	LUMBER
LDPE	LOW DENSITY POLYETHYLENE
LG	LONG (LENGTH)
LH	LEFT HAND
LIM SW	LIMIT SWITCH
LIN	LINEAR
LKR	LOCKER
LL	LIVE LOAD
LNTL	LINTEL
LO	LUBRICATING OIL
LOC	LOCATION
LONG	LONGITUDINAL
LP	LIGHT POLE
LP	LOW PRESSURE
LPT	LOW POINT
LPV	LUBRICATED PLUG VALVE
LRG	LARGE
LT	LIGHT
LTG	LIGHTING
LTG PNL	LIGHTING PANEL
LV	LOW VOLTAGE
LVL	LEVEL(ER)
LVR	LOUVER
LWC	LIGHTWEIGHT CONCRETE
M	METER
MA	MILLIAMPERE
MACH	MACHINE
MAINT	MAINTENANCE
MAN	MANUAL
MAS	MASONRY
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MBTU	THOUSAND BRITISH THERMAL UNITS
MC	MOMENTARY CONTACT
MCC	MOTOR CONTROL CENTER
MD	MANUAL DAMPER
MECH	MECHANICAL
MET	METAL
MEZZ	MEZZANINE
MFG	MANUFACTURING
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MHT	MEAN HIGH TIDE
MI	MALLEABLE IRON
MI	MILE
MID	MIDDLE
MIN	MINIMUM
MIN	MINUTE
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MK	MARK
MKR	MARKER
MLT	MEAN LOW TIDE
MLWK	MILLWORK
MMDD	MODIFIED MAXIMUM DRY DENSITY
MOBIL	MOBILIZATION
MOD	MOTOR OPERATED DAMPER
MON	MONITOR
MON	MONUMENT
MOT	MOTOR
MOV	MOTOR OPERATED VALVE
MPH	MILES PER HOUR
MPT	MALE PIPE THREAD
MS	MOTOR STARTER
MTD	MOUNTED
MV	MEGAVOLT
MW	MEGAWATT
N	NORTH
NA	NOT APPLICABLE
NAT	NATURAL
NC	NATIONAL COARSE THREAD
NC	NORMALLY CLOSED
NEG	NEGATIVE
NEUT	NEUTRAL
NF	NATIONAL FINE THREAD
NIC	NOT IN CONTRACT
NIP	NIPPLE
NKL	NICKEL
NO	NORMALLY OPEN
NO	NUMBER
NOM	NOMINAL
NOZ	NOZZLE
NPF	NATIONAL PIPE THREAD
NPL	NAMEPLATE
NPT	NATIONAL TAPER PIPE THREAD
NRCP	NON-REINFORCED CONCRETE PIPE
NRS	NON-RISING STEM
NTS	NOT TO SCALE
O/O	OUT TO OUT
OA	OVERALL
OC	ON CENTER
OD	OUTSIDE DIAMETER
OHGW	OVERHEAD GUY WIRE
O/L	OVER LOAD
OPNG	OPENING
OPP	OPPOSITE
ORD	OVERFLOW ROOF DRAIN
ORF	ORIFICE
ORIG	ORIGINAL
OVFL	OVERFLOW
OXY	OXYGEN
OZ	OUNCE
P	PUMP
PA	PIPE ANCHOR
PAR	PARALLEL
PARG	PARGING
PAT	PATTERN
PB	PULL BOX
PB	PUSH BUTTON
PC	PIECE
PC	POINT OF CURVE
PC	PORTLAND CEMENT
PCC	POINT OF COMPOUND CURVE
PCF	POUNDS PER CUBIC FOOT
PED	PEDESTAL
PERF	PERFORATED
PERIM	PERIMETER
PERM	PERMANENT
PERP	PERPENDICULAR
PF	POWER FACTOR
PH	PHASE
PHOTO	PHOTOGRAPH
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
PIVC	POINT OF INTERSECTION FOR VERTICAL CURVE
PKG	PACKAGE
PKWY	PARKWAY
PL	PLATE
PL	PROPERTY LINE
PLAT	PLATFORM
PLBG	PLUMBING
PLYWD	PLYWOOD
PNEU	PNEUMATIC
PNL	PANEL
PNT	PAINT
POLY	POLYETHYLENE
PORT	PORTABLE
POS	POSITIVE
PPM	PARTS PER MILLION
PR	PAIR
PRC	POINT OF REVERSE CURVE
PRCST	PRECAST
PRCVC	POINT OF REVERSE CURVE VERTICAL CURVE
PREFAB	PREFABRICATED
PREFIN	PREFINISHED
PRELIM	PRELIMINARY
PRI	PRIMARY
PRKG	PARKING
PROJ	PROJECT
PROP	PROPERTY
PRV	PRESSURE REDUCING VALVE
PRV	PRESSURE RELIEF VALVE
PS CONC	PRESTRESSED CONCRETE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAGE
PST	POINT OF SPIRAL TANGENT
PT	PIPE TAP
PT	POINT OF TANGENCY
PTD	PAINTED
PV	PAVED
PVC	POINT OF VERTICAL CURVE
PVC	POLYVINYL CHLORIDE
PVG	PAVING
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVT	POINT OF VERTICAL TANGENCY
PWR	POWER
QCV	QUICK COUPLER VALVE
QTR	QUARTER
QTY	QUANTITY
QUAL	QUALITY
R	RISER
RAD	RADIUS
RBR	RUBBER
RC	REINFORCED CONCRETE
RD	ROAD
RD	ROOF DRAIN
RDC	REDUCER
REC	RECESSED
RECIRC	RECIRCULATE
RECPT	RECEPTACLE
RECT	RECTANGULAR
REF	REFERENCE
REINF	REINFORCE(D)(ING)(MENT)
REM	REMOVABLE
REQD	REQUIRED
RESIL	RESILIENT
RET	RETURN
RF	RAISED FACE
RFG	ROOFING
RGLTR	REGULATOR
RH	RELATIVE HUMIDITY
RH	RIGHT HAND
RLF	RELIEF
RLG	RAILING
RM	ROOM
RND	ROUND
RO	ROUGH OPENING
ROW	RIGHT-OF-WAY
RPM	REVOLUTIONS PER MINUTE
RPS	REVOLUTIONS PER SECOND
RR	RAILROAD
RV	RELIEF VALVE
RV	ROOF VENT
S	SOUTH
SA	SUPPLY AIR
SALV	SALVAGE
SAN	SANITARY
SAT	SATURATION
SCHED	SCHEDULE
SCRN	SCREEN
SD	STORM DRAIN
SDL	SADDLE
SDMH	STORM DRAIN MANHOLE
SEC	SECOND
SECT	SECTION
SEG	SEGMENT
SF	SAFETY FACTOR
SF	SUPPLY FAN
SGL	SINGLE
SHLDR	SHOULDER
SHR	SHOWER
SHT	SHEET(ING)
SHTNG	SHEATHING
SIG	SIGNAL
SIM	SIMILAR
SK	SINK
SLP	SLOPE
SLV	SLEEVE
SM	SHEET METAL
SM	SMOOTH
SMDD	STANDARD MAXIMUM DRY DENSITY
SMLS	SEAMLESS
SOLV	SOLENOID VALVE
SP	SINGLE POLE
SP	SOIL PIPE
SP	SPACE(ING)
SP GR	SPECIFIC GRAVITY
SP VOL	SPECIFIC VOLUME
SPDT	SINGLE POLE DOUBLE THROW
SPEC	SPECIFICATION
SPKLR	SPRINKLER
SPKR	SPEAKER
SPLY	SUPPLY
SPRT	SUPPORT
SPST	SINGLE POLE SINGLE THROW
SQ	SQUARE
SQ FT	SQUARE FEET
SQ IN	SQUARE INCH
SQ KM	SQUARE KILOMETER
SQ M	SQUARE METER
SQ MM	SQUARE MILLIMETER
SQ YD	SQUARE YARD
SS	SANITARY SEWER
SSK	SERVICE SINK
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STAG	STAGGERED
STD	STANDARD
STIF	STIFFENER
STIR	STIRRUP
STK	STAKE
STL	STEEL
STOR	STORAGE
STR	STRAIGHT
STRUCT	STRUCTURAL
SUCT	SUCTION
SURF	SURFACE
SURV	SURVEY
SV	SAFETY VALVE
SW	SIDEWALK
SWP	SAFE WORKING PRESSURE
SWR	SEWER
SYM	SYMBOL
SYMM	SYMMETRICAL
SYS	SYSTEM
T	TEE
T	THERMOSTAT
T	TREAD
T&B	TOP AND BOTTOM
G&G	TONGUE AND GROOVE
TAN	TANGENT
TB	TOP OF BEAM
TBM	TEMPORARY BENCH MARK
TC	TOP OF CONCRETE
TC	TOP OF CURB
TDH	TOTAL DYNAMIC HEAD
TE	TOP ELEVATION
TE	TOTALLY ENCLOSED
TECH	TECHNICAL
TEL	TELEPHONE
TEMP	TEMPERATURE
TEMP	TEMPORARY
TERM	TERMINAL
TF	TOP OF FOOTING
TFF	TOP OF FINISHED FLOOR
THD	THREAD(ED)
THERM	THERMAL
THK	THICK(NESS)
THRU	THROUGH
TNL	TUNNEL
TOT	TOTAL
TP	TOP OF PAVEMENT
TP	TOTAL PRESSURE
TRANS	TRANSPARENT
TSF	TONS PER SQUARE FOOT
TSL	TOP OF SLAB
TST	TOP OF STEEL
TTB	TELEPHONE TERMINAL BOARD
TV	TELEVISION
TW	TOP OF WALL
TYP	TYPICAL
U	HEAT TRANSFER UNIT
UG	UNDERGROUND
UH	UNIT HEATER
ULT	ULTIMATE
UN	UNION
UNEX	UNEXCAVATED
UNFIN	UNFINISHED
UNIF	UNIFORM
UNIV	UNIVERSAL
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTIBLE POWER SUPPLY
UTIL	UTILITY
UV	ULTRAVIOLET
V	SANITARY VENT
V	VALVE
V	VOLT
VAC	VACUUM
VAC	VOLTS ALTERNATING CURRENT
VAP	VAPOR
VB	VALVE BOX
VEH	VEHICLE
VEL	VELOCITY
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VFPE	VERY FLEXIBLE POLYETHYLENE
VIB	VIBRATION
VIN	VINYL
VISC	VISCOSITY
VOL	VOLUME
VP	VACUUM PUMP
W	WASTE
W	WATT
W	WEST
W/O	WITHOUT
W/W	WALL TO WALL
WB	WET BULB
WC	WATER CLOSET
WD	WIDTH
WD	WOOD
WDW	WINDOW
WF	WIDE FLANGE
WG	WATER GAGE
WHA	WATER HAMMER ARRESTOR
WHTR	WATER HEATER
WI	WROUGHT IRON
WL	WATER LINE
WL	WATER LEVEL
WLD	WELDED
WP	WORKING POINT
WPR	WORKING PRESSURE
WR	WATER RESISTANT
WT	WEIGHT
WTR	WATER
WTRPRF	WATERPROOF(ING)
WW	WASTE WATER
WWF	WELDED WIRE FABRIC
X ARM	CROSS ARM
X SECT	CROSS SECTION
XFMR	TRANSFORMER
XFR	TRANSFER
YD	YARD DRAIN
YH	YARD HYDRANT

STANDARD DETAIL DESIGNATION

SECTION DESIGNATION



DETAIL DESIGNATION



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

NOTES:

1. THIS IS A STANDARD LEGEND LIST, THEREFORE SOME SYMBOLS OR ABBREVIATIONS MAY APPEAR ON THIS LIST AND NOT ON THE DRAWINGS.
2. CONTACT ENGINEER FOR ABBREVIATIONS NOT LISTED.

REALM **Remediation and Liability Management Company, Inc.**

GM **POWERTRAIN**

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH02

AS RECORDED MAY 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

ABBREVIATIONS AND DETAIL DESIGNATIONS

CRA **CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	MAY 2000	
Scale: NO SCALE	Project N №: 12610-10	Report N №: 016	Drawing N №: G-02AR

12610-10(016)GN-WA005 APR 16/2002

TOPOGRAPHICAL

MUNICIPAL SYMBOLS

- PROPERTY BOUNDARY
- SITE BOUNDARY
- FENCE
- DITCH, SWALE
- 100 — GROUND CONTOUR
- 100 — GROUNDWATER ELEVATION CONTOUR (PIEZOMETRIC OR POTENTIOMETRIC SURFACE)
- 100 — SOIL EXCAVATION CONTOUR
- 100 — FINAL CONTOUR
- LIMIT OF REFUSE DISPOSAL
- SLOPED SURFACE (TOP OF BANK)
- BUILDING
- RAILWAY
- SHORELINE
- ACCESS ROAD
- W — WATERMAIN
- SAN — SANITARY SEWER
- STM — STORM SEWER
- PS — PROCESS SEWER
- AHP — AIR, HIGH PRESSURE
- G — GAS MAIN
- T — TELEPHONE LINE
- E — ELECTRIC CABLE
- U/G — UNDERGROUND CONDUIT
- O/H — OVERHEAD CABLE, WIRE
- GUARDRAIL
- SHALLOW GROUNDWATER EXTRACTION SYSTEM
- DEEP GROUNDWATER EXTRACTION SYSTEM
- DEEP SOIL MIXING WALL
- EXCAVATE AND DISPOSE IN MSA
- + 588.00 — SPOT ELEVATION

PROPOSED MONITORING

- STM — PROPOSED STORM SEWER
- GW — PROPOSED GROUNDWATER EXTRACTION SYSTEM

PROPOSED RELIEF DRAIN

- PROPOSED RELIEF DRAIN

- S.I.B. — STANDARD IRON BAR
- I.B. — IRON BAR
- R.I.B. — ROUND IRON BAR
- MONUMENT — MONUMENT/BENCHMARK
- C.C. — CUT CROSS
- I.P. — IRON PIPE
- NAIL — NAIL/CONTROL
- S1 — SANITARY MANHOLE
- ST1 — STORM MANHOLE
- P1 — PROCESS MANHOLE
- C.B. — CATCHBASIN
- D.C.B. — DOUBLE CATCHBASIN
- W.V. — WATER VALVE
- V.C. — VALVE CHAMBER
- C.S. — CURB STOP
- HYD. — HYDRANT
- D.I. — DITCH INLET CATCHBASIN
- R.S. — ROAD SIGN
- U.P. — UTILITY POLE
- GUY ANCHOR
- G.V. — GAS VALVE
- TEL PED. — TELEPHONE PEDESTAL
- TEL CHAMBER — TELEPHONE CHAMBER
- H.H. — HAND HOLE
- ELEC M.H. — ELECTRICAL MANHOLE
- L.S. — LIGHT STANDARD
- 100Ø — DECIDUOUS TREE AND DIAMETER
- 100Ø — CONIFEROUS TREE AND DIAMETER
- 100Ø — SHRUB AND DIAMETER
- 100Ø STUMP — TREE STUMP AND DIAMETER
- 3-100Ø — DECIDUOUS CLUMP TREES AND DIAMETER
- 3-100Ø — CONIFEROUS CLUMP TREES NUMBER AND DIAMETER

PROPOSED MUNICIPAL SYMBOLS

- MHA1 — PROPOSED SANITARY MANHOLE
- MH1 — PROPOSED STORM MANHOLE
- CB — PROPOSED CATCHBASIN
- W.V. — PROPOSED WATER VALVE
- VC — PROPOSED VALVE CHAMBER
- HYD. — PROPOSED HYDRANT
- DCB — PROPOSED DOUBLE CATCHBASIN
- U.P. — PROPOSED UTILITY POLE

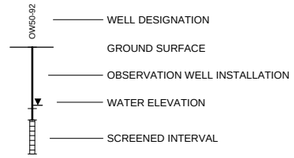
MONITORING

- BH — BOREHOLE
- SS — SURFACE SOIL SAMPLE
- SP — STANDPIPE
- MW — OBSERVATION/MONITORING WELL
- SW — SURFACE WATER MONITORING LOCATION
- WS — WATER SUPPLY WELL
- PZ — PIEZOMETER
- BP — BUNDLE PIEZOMETER
- EW — EXTRACTION WELL
- WP — WELL POINT
- TP — TEST PIT
- IW — INJECTION WELL
- GP — GAS PROBE
- GV — GAS VENT
- HA — HAND AUGER BORING LOCATION
- MPE — MULTI-PHASE EXTRACTION WELL
- VE — VAPOR EXTRACTION WELL
- AS — AIR SPARGING WELL
- OF — OUTFALL LOCATION

PROPOSED MONITORING

- BH — PROPOSED BOREHOLE
- SS — PROPOSED SURFACE SOIL SAMPLE
- SP — PROPOSED STANDPIPE
- MW — PROPOSED OBSERVATION/MONITORING WELL
- SW — PROPOSED SURFACE WATER MONITORING LOCATION
- WS — PROPOSED WATER SUPPLY WELL
- PZ — PROPOSED PIEZOMETER
- BP — PROPOSED BUNDLE PIEZOMETER
- EW — PROPOSED EXTRACTION WELL
- TP — PROPOSED TEST PIT
- IW — PROPOSED INJECTION WELL
- GP — PROPOSED GAS PROBE
- GV — PROPOSED GAS VENT
- HA — PROPOSED HAND AUGER BORING LOCATION
- MPE — PROPOSED MULTI-PHASE EXTRACTION WELL
- VE — PROPOSED VAPOR EXTRACTION WELL
- AS — PROPOSED AIR SPARGING WELL
- OF — PROPOSED OUTFALL LOCATION

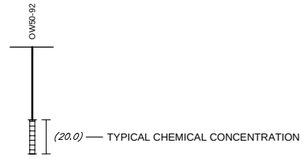
GEOLOGIC & HYDROGEOLOGIC SECTIONS



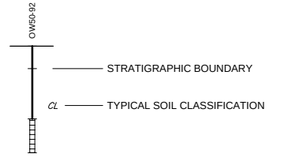
TYPICAL WELL INSTALLATION

MEASURED WATER LEVEL

MONITORING OR SAMPLING LOCATION



MEASURED CHEMICAL CONCENTRATION



SOIL CLASSIFICATIONS

MATERIAL

- CAP
- CONTAINMENT CAP
- SAND
- SEDIMENT
- SAND AND GRAVEL
- RUBBLE AND DEBRIS
- FILL
- WASTE, REFUSE
- RIPRAP
- P-STONE
- BEDROCK
- SWAMP
- TOPSOIL
- ASPHALT
- CONCRETE
- EAST LAGOON LINER
- BRICK MASONRY
- RIGID INSULATION
- WOOD, ROUGH NON-BATT INSULATION
- CONTINUOUS
- ROCK SURFACE
- EARTH SURFACE
- GRATING

ARCHITECTURAL

- ACTIVE / INACTIVE — INDICATES PAIR OF DOORS
- 1 — DOOR NUMBER
- 1 — LINTEL NUMBER

MISCELLANEOUS

- SEED AND MULCH, VEGETATION COVER, GRASS
- GRADE, TOP OF GROUND
- GEOTEXTILE

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

NOTES:

1. THIS IS A STANDARD LEGEND LIST, THEREFORE SOME SYMBOLS OR ABBREVIATIONS MAY APPEAR ON THIS LIST AND NOT ON THE DRAWINGS.
2. CONTACT ENGINEER FOR ABBREVIATIONS AND SYMBOLS NOT LISTED.

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96
SHEET No. SH03

AS RECORDED MAY 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

CIVIL, STRUCTURAL AND ARCHITECTURAL LEGEND

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	MAY 2000	
Scale: NO SCALE	Project N º: 12610-10	Report N º: 016	Drawing N º: G-03AR

12610-10(016)GN-WA004 APR 16/2002

PIPE AND PIPE FITTING SYMBOLS

FITTING	SINGLE LINE FLANGED	SINGLE LINE SCREWED	SINGLE LINE WELDED	DOUBLE LINE FLANGED
STRAIGHT CROSS				
ELBOW 11.25°				
ELBOW 22.5°				
ELBOW 45°				
ELBOW 90°				
ELBOW UP				
ELBOW DOWN				
CAPPED END				
LATERAL				
CONCENTRIC REDUCER				
ECCENTRIC REDUCER				
TEE-STRAIGHT SIZE				
TEE-OUTLET UP				
TEE-OUTLET DOWN				
UNION				
WELD NECK				
EXISTING PIPE				
NEW PIPE				
EXISTING PIPE TO BE ABANDONED				
EXISTING PIPE TO BE REMOVED				

VALVE SYMBOLS

- MULTIPORT BALL VALVE (BALL VALVE SHOWN. ARROWS INDICATE PATTERN, SEAT PORTS ARE IMPLIED)
- FOUR WAY VALVE
- AIR AND VACUUM VALVE
- ANGLE GATE VALVE
- ANGLE GLOBE VALVE
- GLOBE VALVE
- GATE VALVE
- KNIFE GATE VALVE
- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- DIAPHRAGM VALVE
- NEEDLE VALVE
- PLUG VALVE
- SEAT PORT — ECCENTRIC PLUG VALVE
- PRV — PRESSURE REDUCING VALVE
- PINCH VALVE
- PRESSURE RELIEF VALVE
- SELF-CONTAINED PRESS. REGULATOR
- VALVE WITH ACTUATOR
- SOLENOID VALVE OPERATOR
- FI — FLOW INDICATOR
- TEMP. CONTROL VALVE
- CONTROL VALVE — FLOW DIRECTION — VALVE SYMBOL
- HOSE VALVE OR BIBB
- SP — SAMPLE PORT
- F — FLUSH

PIPE MATERIAL

CS	CARBON STEEL
CI	CAST IRON
CLDI	CEMENT LINED DUCTILE IRON
CPVC	CHLORINATED POLYVINYL CHLORIDE
CU	COPPER
DI	DUCTILE IRON
ELS	EPOXY LINED STEEL
FRP	FIBERGLASS REINFORCED PLASTIC
GALVS	GALVANIZED STEEL
HDPE	HIGH DENSITY POLYETHYLENE
PVC	POLYVINYL CHLORIDE
SST	STAINLESS STEEL

METER SYMBOLS

- M — MAGNETIC FLOW METER
- POSITIVE DISPLACEMENT FLOW METER
- TURBINE FLOW METER
- VORTEX FLOW METER
- WEIR

PROCESS PIPE IDENTIFICATION

AC	ACID
AI	AIR, INSTRUMENT
ALP	AIR, LOW PRESSURE
AHP	AIR, HIGH PRESSURE
AS	AIR SCOUR
BD	BLOWDOWN
BW	BACKWASH WASTE
CD	CONDENSATE DRAIN
CG	CHLORINE GAS
D	DECANT
DDS	DEWATERED DIGESTED SLUDGE
DG	DIGESTER GAS
DR	DRAIN
DS	DIGESTED SLUDGE
EXH	EXHAUST
FC	FERRIC CHLORIDE
GW	GROUNDWATER
M	METHANOL
N	NUTRIENT
O	OXYGEN
OF	OVERFLOW
P	POLYMER
PW	POLISHED WATER
RAS	RETURN ACTIVATED SLUDGE
RW	RAW WATER
S	SUPERNATANT
SA	SAMPLE
SL	SLUDGE
SPD	SUMP PUMP DISCHARGE
TBS	THICKENED BOTTOM SLUDGE
TWAS	THICKENED WASTE ACTIVATED SLUDGE
WAS	WASTE ACTIVATED SLUDGE
WW	WASH WATER
W1	SERVICE WATER, NON-POTABLE
W2	TREATED EFFLUENT USED FOR SERVICE, NON-POTABLE

PIPING DESIGNATION: 16"-CLDI-RAS

- 16" - CLDI - RAS
- PIPE USE IDENTIFICATION LEGEND
- PIPE MATERIAL
- NOMINAL PIPE DIAMETER (INCH)

EQUIPMENT SYMBOLS

- SG — SIGHT GLASS
- TRANSDUCER MOUNTING
- DISSOLVED OXYGEN ANALYZER
- INLINE MIXER
- INLINE CIRCULATING PUMP
- DIAPHRAGM PUMP
- CENTRIFUGAL PUMP OR BLOWER
- GEAR PUMP OR POS DISPLACEMENT BLOWER

LEVEL SENSOR SYMBOLS

- LEVEL SWITCH
- ULTRASONIC LEVEL TRANSMITTER
- FLOAT SWITCH

MISCELLANEOUS PIPING SYMBOLS

- BFP — BACKFLOW PREVENTOR
- DIRECTION OF SLOPE
- DIRECTION OF FLOW
- INSULATED LINE
- INSULATED LINE w/STEAM TRACE
- ELEC — INSULATED LINE w/ELECTRICAL TRACE
- L R F — LUBRICATOR, REGULATOR, FILTER

GATE SYMBOLS

EL. VIEW / PLAN VIEW

- SLUICE
- BUTTERFLY
- FLAP
- SHEAR
- FABRICATED SLIDE

HVAC SYMBOLS

- OED — OPEN END DUCT
- T — ROOM THERMOSTAT
- T G — ROOM THERMOSTAT w/GUARD
- SUPPLY AIR DUCT SECTION UP
- SUPPLY AIR DUCT SECTION DOWN
- RETURN/EXHAUST AIR DUCT SECTION UP
- RETURN/EXHAUST AIR DUCT SECTION DOWN
- FLEXIBLE CONNECTION
- TURNING VANES
- SUPPLY AIR DIFFUSER
- INSULATED DUCT
- OPPOSED BLADE DAMPER
- FD — FIRE DAMPER
- BDD — BACKDRAFT DAMPER
- BD — BALANCING DAMPER
- M — DAMPER MOTOR
- DG — DOOR GRILLE
- UH — UNIT HEATER

BUILDING SERVICES PIPE IDENTIFICATION

HOT WATER	
HOT WATER RECIRCULATION	
COLD WATER	
S	COLD WATER (SOFT)
SAN	SANITARY SEWER
STM	STORM SEWER
PS	PROCESS SEWER
RWL	RAIN WATER LEADER
V	VENT
G	GAS
F	FIRE STANDPIPE
SPK	SPRINKLER
HWS	HEATING WATER SUPPLY
HWR	HEATING WATER RETURN
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
LPS	LOW PRESSURE STEAM
LPC	GRAVITY STEAM CONDENSATE
FT	FLOAT & THERMOSTATIC TRAP
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
RD	ROOF DRAIN
CO	CLEANOUT
FD	FLOOR DRAIN
HD	HUB DRAIN

GENERAL PIPING NOTES

1. SYMBOLS SHOWN HERE FOR SINGLE LINE FITTINGS ARE GENERIC ONLY. REFER TO PIPING SPECIFICATIONS FOR SPECIFIC END CONNECTIONS FOR SINGLE LINE PIPE AND FITTINGS.
2. EXISTING PIPE AND EQUIPMENT IS SHOWN THIN-LINED AND/OR SCREENED AND IS NOTED AS EXISTING. NEW PIPING AND EQUIPMENT IS SHOWN HEAVY-LINED.
3. ONLY FLANGED END CONNECTIONS ARE SHOWN HERE FOR DOUBLE LINE FITTINGS.
4. SIZE OF FITTINGS SHOWN ON PLANS SHALL CORRESPOND TO ADJACENT STRAIGHT RUN OF PIPE, UNLESS OTHERWISE INDICATED. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS SHOWN FOR ADJACENT STRAIGHT RUN OF PIPE.
5. ALL FLEXIBLE CONNECTORS OR FLANGED ADAPTERS SHALL BE PROVIDED WITH THRUST TIES, BLOCKS, OR ANCHORS, UNLESS NOTED OTHERWISE. THRUST PROTECTION SHALL BE ADEQUATE FOR PRESSURES SPECIFIED.
6. NUMBER AND LOCATION OF UNIONS SHOWN ON DRAWINGS IS ONLY APPROXIMATE. PROVIDE ALL UNIONS NECESSARY TO FACILITATE CONVENIENT REMOVAL OF VALVES AND MECHANICAL EQUIPMENT.

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

NOTES:

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REALM — Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH04

AS RECORDED MAY 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

MECHANICAL LEGEND

CRA — CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	MAY 2000	
Scale: NO SCALE	Project N №: 12610-10	Report N №: 016	Drawing N №: G-04AR

12610-10(016)GN-WA007 APR 16/2002

PRIMARY ELEMENT SYMBOLS

- TURBINE FLOW METER
- MAGNETIC FLOW METER
- POSITIVE DISPLACEMENT FLOW METER
- WEIR
- VORTEX FLOW METER
- ROTAMETER
- ULTRASONIC LEVEL TRANSMITTER
- FLOAT
- OPEN DRAIN OR SEWER
- CLOSED DRAIN OR SEWER
- SPECIFICATION CHANGE
- CAP
- HOSE CONNECTION
- BLIND FLANGE
- STRAINER
- INLINE MIXER
- FLEXIBLE PIPE

PUMP AND COMPRESSOR SYMBOLS

- CENTRIFUGAL PUMP (DRY PIT)
- CENTRIFUGAL WET PIT PUMP OR TURBINE PUMP
- CHEMICAL FEED PUMP
- DIAPHRAGM PUMP
- GEAR PUMP OR BLOWER (POSITIVE DISPLACEMENT)
- PISTON PUMP
- PROGRESSIVE CAVITY PUMP
- SUBMERSIBLE SUMP PUMP
- COMPRESSOR (CENTRIFUGAL) BLOWER OR TURBINE
- COMPRESSOR (PISTON)
- EJECTOR

NOTE:
ON LOSS OF PRIMARY POWER (PNEUMATIC, ELECTRICAL, OR HYDRAULIC)
XX: AS = ADJUSTABLE SPEED
CS-1 = CONSTANT SPEED (SINGLE SPEED)
CS-2 = CONSTANT SPEED (TWO SPEED)

ACTUATOR SYMBOLS

- PNEUMATIC WITH POSITIONER
- PHEUMATIC WITH SOLENOID
- ELECTRIC
- ELECTRIC WITH POSITIONER
- ELECTROHYDRAULIC
- HYDRAULIC
- PNEUMATIC WITH VOLUME BOOSTER
- SOLENOID
- MANUAL

NOTE:
ON LOSS OF PRIMARY POWER (PNEUMATIC, ELECTRICAL, OR HYDRAULIC)
XX: FD = FAIL OPEN
FC = FAIL CLOSED
FLP = FAIL TO LAST POSITION

INTERFACE SYMBOLS

- PROCESS INTERFACE
- SIGNAL INTERFACE
- A INTERFACE LETTER
- D DESTINATION DRAWING NUMBER
- S SOURCE DRAWING NUMBER

INTERFACE TO/FROM PROCESS EXTERNAL TO PROJECT

INSTRUMENTATION SYMBOLS

- PROGRAMMABLE LOGIC CONTROL FIELD MOUNTED
- PROGRAMMABLE LOGIC CONTROL NORMALLY ACCESSIBLE (BOARD MOUNTED)
- PROGRAMMABLE LOGIC CONTROL BEHIND BOARD MOUNTED
- PROGRAMMABLE LOGIC CONTROL AUX. LOCATION
- DISCRETE INSTRUMENT/ELECTRICAL DEVICE FIELD MOUNTED
- DISCRETE INSTRUMENT/ELECTRICAL DEVICE NORMALLY ACCESSIBLE (BOARD MOUNTED)
- DISCRETE INSTRUMENT/ELECTRICAL DEVICE BEHIND BOARD MOUNTED
- DISCRETE INSTRUMENT/ELECTRICAL DEVICE AUX. LOCATION
- SHARED DISPLAY/CONTROL DEVICE FIELD MOUNTED
- SHARED DISPLAY/CONTROL DEVICE NORMALLY ACCESSIBLE (BOARD MOUNTED)
- SHARED DISPLAY/CONTROL DEVICE BEHIND BOARD MOUNTED
- SHARED DISPLAY/CONTROL DEVICE AUX. LOCATION
- LOCAL INDICATOR LIGHT R - RED, Y - YELLOW, G - GREEN
- INDICATOR LIGHT NORMALLY ACCESSIBLE
- UNDEFINED COMPLEX INTERCONNECTING LOGIC

INSTRUMENTATION LINES

- ELECTRIC ANALOG SIGNAL
- ELECTRIC BINARY SIGNAL
- PNEUMATIC SIGNAL
- PNEUMATIC BINARY SIGNAL
- INTERNAL SYSTEM LINK

ISA LETTER COMBINATIONS

First-Letters	Initiating or Measured Variable	Controllers: Recording	Controllers: Indicating	Controllers: Blind	Controllers: Self-Actuated Control Valves	Readout Devices: Recording	Readout Devices: Indicating	Switches and Alarm Devices *: High **	Switches and Alarm Devices *: Low	Switches and Alarm Devices *: Comb	Transmitters: Recording	Transmitters: Indicating	Transmitters: Blind	Solenoids, Relays, Computing Devices	Primary Element	Test Point	Well or Probe	Viewing Device, Glass	Safety Device	Final Element
A	Analysis	ARC	AIC	AC		AR	AI	ASH	ASL	ASHL	ART	AIT	AT	AY	AE	AP	AW			AV
B	Burner/Combustion	BRC	BIC	BC		BR	BI	BSH	BSL	BSHL	BRT	BIT	BT	BY	BE		BW	BG		BZ
C	User's Choice																			
D	User's Choice																			
E	Voltage	ERC	EIC	EC		ER	EI	ESH	ESL	ESHL	ERT	EIT	ET	EY	EE					EZ
F	Flow Rate	FRC	FIC	FC	FCV, FICV	FR	FI	FSH	FSL	FSHL	FRT	FIT	FT	FY	FE	FP		FG		FV
FQ	Flow Quantity	FQRC	FQIC			FQR	FQI	FQSH	FQSL			FQIT	FQT	FQY	FQE					FQV
FF	Flow Ratio	FFRC	FFIC	FFC		FFR	FFI	FFSH	FFSL						FE					FFV
G	User's Choice																			
H	Hand		HIC	HC						HS										HV
I	Current	IRC	IIC			IR	II	ISH	ISL	ISHL	IRT	IIT	IT	IY	IE					IZ
J	Power	JRC	JIC			JR	JI	JSH	JSL	JSHL	JRT	JIT	JT	JY	JE					JV
K	Time	KRC	KIC	KC	KCV	KR	KI	KSH	KSL	KSHL	KRT	KIT	KT	KY	KE					KV
L	Level	LRC	LIC	LC	LCV	LR	LI	LSH	LSL	LSHL LSHH	LRT	LIT	LT	LY	LE		LW	LG		LV
M	User's Choice																			
N	User's Choice																			
O	User's Choice																			
P	Pressure/Vacuum	PRC	PIC	PC	PCV	PR	PI	PSH	PSL	PSHL	PRT	PIT	PT	PY	PE	PP			PSV, PSE	PV
PD	Pressure, Differential	PDRC	PDIC	PDC	PDCV	PDR	PDI	PDSH	PDSL		PDRT	PDIT	PDT	PDY	PE	PP				PDV
Q	Quantity	QRC	QIC			QR	QI	QSH	QSL	QSHL	QRT	QIT	QT	QY	QE					QZ
R	Radiation	RRC	RIC	RC		RR	RI	RSH	RSL	RSHL	RRT	RIT	RT	RY	RE		RW			RZ
S	Speed/Frequency	SRC	SIC	SC	SCV	SR	SI	SSH	SSL	SSHL	SRT	SIT	ST	SY	SE					SV
T	Temperature	TRC	TIC	TC	TCV	TR	TI	TSH	TSL	TSHL	TRT	TIT	TT	TY	TE	TP	TW		TSE	TV
TD	Temperature, Differential	TDRC	TDIC	TDC	TDCV	TDR	TDI	TDSH	TDSL		TDRT	TDIT	TDT	TDY	TE	TP	TW			TDV
U	Multivariable					UR	UI							UY						UV
V	Vibration/Machinery Analysis					VR	VI	VSH	VSL	VSHL	VRT	VIT	VT	VY	VE					VZ
W	Weight/Force	WRC	WIC	WC	WCV	WR	WI	WSH	WSL	WSHL	WRT	WIT	WT	WY	WE					WZ
WD	Weight/Force, Differential	WDRC	WDIC	WDC	WDCV	WDR	WDI	WDSH	WDSL		WDRT	WDIT	WDT	WDY	WE					WDZ
X	Unclassified																			
Y	Event/State/Presence		YIC	YC		YR	YI	YSH	YSL				YT	YY	YE					YZ
Z	Position/Dimension	ZRC	ZIC	ZC	ZCV	ZR	ZI	ZSH	ZSL	ZSHL	ZRT	ZIT	ZT	ZY	ZE					ZV
ZD	Gauging/Deviation	ZDRC	ZDIC	ZDC	ZDCV	ZDR	ZDI	ZDSH	ZDSL		ZDRT	ZDIT	ZDT	ZDY	ZDE					ZDV

Note: This table is not all-inclusive.
* A, alarm, the annunciating device, may be used in the same fashion as S, switch, the actuating device.

** The letters H and L may be omitted in the undefined case.

Other Possible Combinations:

FO	(Restriction Orifice)	PFR	(Ratio)
FRK, HIK	(Control Stations)	KQI	(Running Time Indicator)
FX	(Accessories)	QQI	(Indicating Counter)
TJR	(Scanning Recorder)	WKIC	(Rate-of-Weight-Loss Controller)
LLH	(Pilot Light)	HMS	(Hand Momentary Switch)
LCH	(Level Control High)	LCL	(Level Control Low)

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

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2. CONTACT ENGINEER FOR ABBREVIATIONS AND SYMBOLS NOT LISTED.
3. COMPONENTS AND PANELS SHOWN WITH AN ARE TO BE FURNISHED AS PART OF A PACKAGE SYSTEM.

REALM Remediation and Liability Management Company, Inc.

GM POWERTRAIN
GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

SHEET No.
PE-H-96 SH05

AS RECORDED MAY 2000

SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

INSTRUMENTATION AND CONTROL LEGEND

CRA CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	MAY 2000	
Scale: NO SCALE	Project N №: 12610-10	Report N №: 016	Drawing N №: G-05AR

12610-10(016)GN-WA009 APR 16/2002

GROUNDING SYMBOLS

- GROUND ROD
- GROUND CABLE CONNECTION AND GROUND STUB
- ROD ELECTRODE AND GROUND INSPECTION WELL
- ROD GROUNDING ELECTRODE
- CORNER SET GROUNDING ELECTRODES
- GROUND CABLE EMBEDDED OR BURIED, CABLE UP
- GROUND CABLE EXPOSED, CABLE DOWN
- GROUND CABLE CONNECTION TO EQUIPMENT
- GROUND CABLE CONNECTION TO BUILDING STEEL COLUMN

CIRCUIT SYMBOLS

- RECTIFIER BRIDGE
- RESISTOR
- 15 SECS. — TIME DELAY CAPSULE N/O
- 10 SECS. — TIME DELAY CAPSULE N/C
  1. ENTER TIME DELAY REQ'D. (e.g. 10 SECS.)
- NORMALLY OPEN RELAY CONTACT
- NORMALLY CLOSED RELAY CONTACT
- CR — RELAY COIL
- AM — METER: CTR–COUNTER
  AM–AMMETER
  VM–VOLTMETER
  WHM–WAT (HOURMETER)
- T1 — TRANSFORMER
- R — PILOT LIGHT (LENS COLOUR)
- POLARIZED CAPACITOR
- FIXED CAPACITOR
- LIGHT EMITTING DIODE
- ZENER DIODE
- DIODE
- ARC SUPPRESSOR
- 5A — FUSE
- BATTERY
- 1A — TERMINAL WITH DESIGNATION
- GROUND
- BREAKER STABS
- THERMAL OVERLOAD
- MOTOR OVERLOAD
- MAGNETIC OVERLOAD
- CIRCUIT BREAKER
- XX — MOTOR
- 100A — MOTOR
- XX / XX / XX — WIRE LABELING

SWITCH SYMBOLS

- LIMIT SWITCH N/O
- LIMIT SWITCH N/C
- TIME DELAY N/O DELAY ON CLOSING
- TIME DELAY N/C DELAY ON OPENING
- TIME DELAY N/C DELAY ON CLOSING
- TIME DELAY N/O DELAY ON OPENING
- TIME DELAY COIL
- PROXIMITY LIMIT SWITCH N/O
- PROXIMITY LIMIT SWITCH N/C
- FOOT OPERATED L/S CLOSED
- FOOT OPERATED L/S OPEN
- FLOW OPERATED L/S CLOSED
- FLOW OPERATED L/S OPEN
- FLOAT OPERATED L/S CLOSED
- FLOAT OPERATED L/S OPEN
- PRESSURE OPERATED L/S CLOSED
- PRESSURE OPERATED L/S OPEN
- TEMPERATURE OPERATED L/S CLOSED
- TEMPERATURE OPERATED L/S OPEN
- 2 POSITION SELECTOR SWITCH
- 3 POSITION SELECTOR SWITCH
- SOLENOID
- PUSHBUTTON CLOSED
- PUSHBUTTON OPEN
- DISCONNECT SWITCH N/O
- MAINTAINED EMERGENCY STOP
- H O A — HAND–OFF AUTO SELECTOR SWITCH

LAYOUT SYMBOLS

- PHOTOCELL EMITTER
- PHOTOCELL RECEIVER
- HORN
- BUZZER
- BELL
- SENSING ELEMENT
- A — PILOT LIGHT C/W TEST SWITCH (LENS COLOUR)
- $ — SWITCH SINGLE POLE 120V
- $2 — SWITCH DOUBLE POLE 120V
- $3 — SWITCH THREE WAY 120V
- DUPLEX RECEPTACLE 120V, 20A;
- GF — DUPLEX RECEPTACLE WITH GROUND FAULT PROTECTION, 120V, 20A
- WP — DUPLEX RECEPTACLE WEATHER PROOF, 120V, 20A
- TW — TWIST LOCK RECEPTACLE 120V
- T — THERMOSTAT
- E.U.H. 2.0 A — KW, RATING REQUIRED. 'A' DENOTES ELECTRIC UNIT HEATER, C/W CEILING–MOUNTED BRACKETS.
- MOTORIZED DOOR OPERATOR
- T1 — POWER TRANSFORMER – T1
- WELDING RECEPTACLE
- TELEPHONE OUTLET MOUNTED 12" ABOVE FINISHED FLOOR LEVEL
- TELEPHONE OUTLET MOUNTED 4'–6" ABOVE FINISHED FLOOR LEVEL
- SINGLE PHASE MANUAL MOTOR STARTER
- THREE PHASE MANUAL MOTOR STARTER/DISCONNECT SWITCH
- START–STOP PUSHBUTTON AND PILOT LIGHT
- LOCKABLE DISCONNECT SWITCH
- FIRE ALARM PULL STATION MOUNTED 4'–6" ABOVE FINISHED FLOOR LEVEL
- P / E — PHOTO ELECTRIC SMOKE DETECTOR
- SPRINKLER FLOW ALARM SWITCH CONNECTED TO FIRE ALARM SYSTEM
- SV — SOLENOID VALVE CONNECTED TO FIRE ALARM SYSTEM
- GFI / A-1 — 115V, DUPLEX RECEPTACLE
  GFI – GROUND FAULT CIRCUIT INTERUPTER
  WP – WEATHERPROOF
- DATA GRADE TELEPHONE OUTLET
- CS01 — LOCAL CONTROL STATION
- H — HEAT DETECTOR
- F — FIRE BELL
- S — FIRE ALARM STROBE
- FIRE ALARM INTEGRATED BELL AND LIGHT UNIT

LIGHTING SYMBOLS

- S — STROBE LIGHT – TYPE S
- A — LIGHTING FIXTURE – TYPE A
- FLUORESCENT LIGHTING FIXTURE – TYPE F
- A — LIGHTING FIXTURE WALL MOUNTED TYPE A
- EXIT LIGHT AND CEILING MOUNTED OUTLET BOX. DIRECTIONAL ARROWS AS INDICATED. SHADED AREAS DENOTE FACES.
- B — EMERGENCY BATTERY PACK WITH CHARGER AND SEALED BEAM HEADS
- B — EMERGENCY BATTERY PACK WITH CHARGER, EXIT LIGHT AND SEALED BEAM HEADS
- G — EMERGENCY LIGHTING REMOTE HEAD
- EXIT LIGHT – WALL MOUNTED
- FIRE ALARM PANEL
- DP01 — LIGHTING OR DISTRIBUTION PANEL 208/120V, 3ø, 4W – PANEL ID NUMBER AS SHOWN
- UPS01 — DISTRIBUTION PANEL 240/120V, 1ø, 3W – PANEL ID NUMBER AS SHOWN

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

NOTES:

1. THIS IS A STANDARD LEGEND LIST, THEREFORE SOME SYMBOLS OR ABBREVIATIONS MAY APPEAR ON THIS LIST AND NOT ON THE DRAWINGS.
2. CONTACT ENGINEER FOR ABBREVIATIONS AND SYMBOLS NOT LISTED.

REALM **Remediation and Liability Management Company, Inc.**

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96 — SHEET No. SH06

AS RECORDED MAY 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

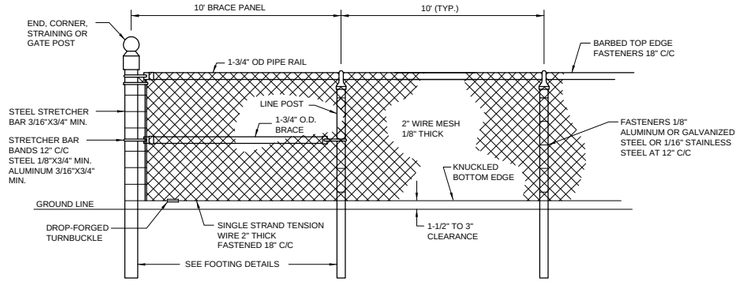
ELECTRICAL
LEGEND

CRA **CONESTOGA-ROVERS & ASSOCIATES**

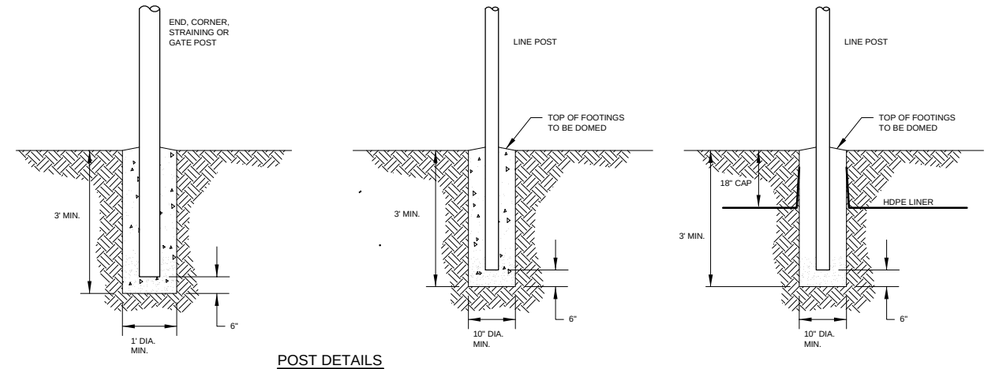
Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	MAY 2000	
Scale: NO SCALE	Project N º: 12610-10	Report N º: 016	Drawing N º: G-06AR

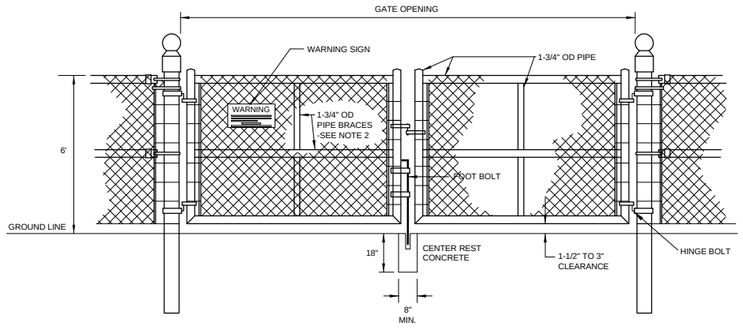
12610-10(016)GN-WA006 APR 16/2002



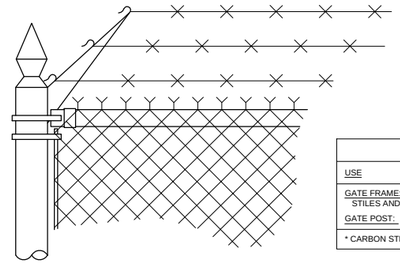
CORNER BRACE



POST DETAILS



DOUBLE GATE



BARBED WIRE CORNER

POST AND RAIL SIZES - FENCE

USE	FABRIC HEIGHT	O.D.*	LBS/FT	BOTTOM PLATE
INTERMEDIATE POSTS	BELOW 9'	2-1/2"	3.65	5"x5"x5/16"
CORNER, END, GATE AND BRACE POSTS	BELOW 9'	3"	5.79	7"x7"x3/8"
RAILS	ALL	1-3/4"	2.27	

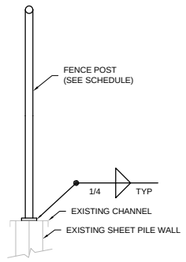
* CARBON STEEL PIPE - ASTM A-20, SCH 40

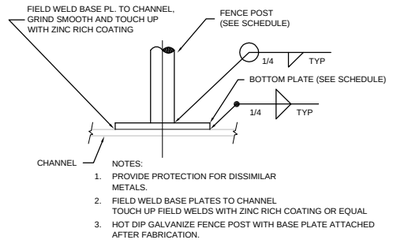
POST AND RAIL SIZES - GATES

USE	LEAF WIDTH		FABRIC HGT	O.D.*		LBS/FT
	DOUBLE	MANGATE		DOUBLE	MANGATE	
GATE FRAME: STILES AND RAILS	2x8'	2x4'	6'	2"	2"	2.27
GATE POST:	16'	4'	6'	6"	4"	18.97/9.11

* CARBON STEEL PIPE - SCHED. 40

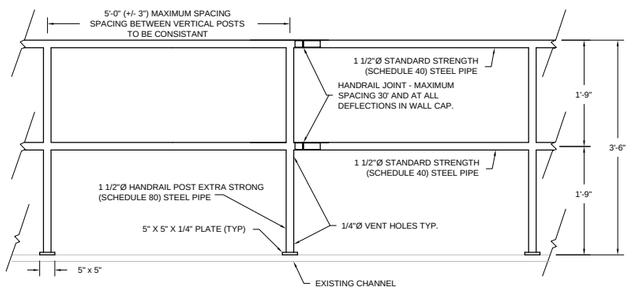
SITE FENCING AND GATES



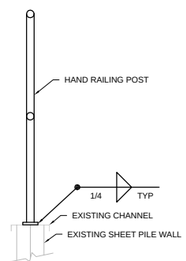


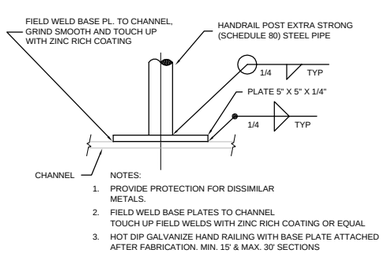
NOTES:
1. PROVIDE PROTECTION FOR DISSIMILAR METALS.
2. FIELD WELD BASE PLATES TO CHANNEL TOUCH UP FIELD WELDS WITH ZINC RICH COATING OR EQUAL
3. HOT DIP GALVANIZE FENCE POST WITH BASE PLATE ATTACHED AFTER FABRICATION.

FENCE POST ANCHORAGE TO STEEL



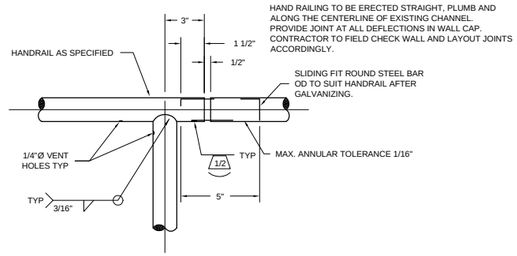
HANDRAIL DETAIL





NOTES:
1. PROVIDE PROTECTION FOR DISSIMILAR METALS.
2. FIELD WELD BASE PLATES TO CHANNEL TOUCH UP FIELD WELDS WITH ZINC RICH COATING OR EQUAL
3. HOT DIP GALVANIZE HAND RAILING WITH BASE PLATE ATTACHED AFTER FABRICATION. MIN. 15' & MAX. 30' SECTIONS

HANDRAIL POST ANCHORAGE TO STEEL



TYPICAL HAND RAIL JOINT
TYPICAL FOR TOP AND MIDDLE RAILS

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

REALM **Remediation and Liability Management Company, Inc.**

GM **POWERTRAIN**

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH07

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

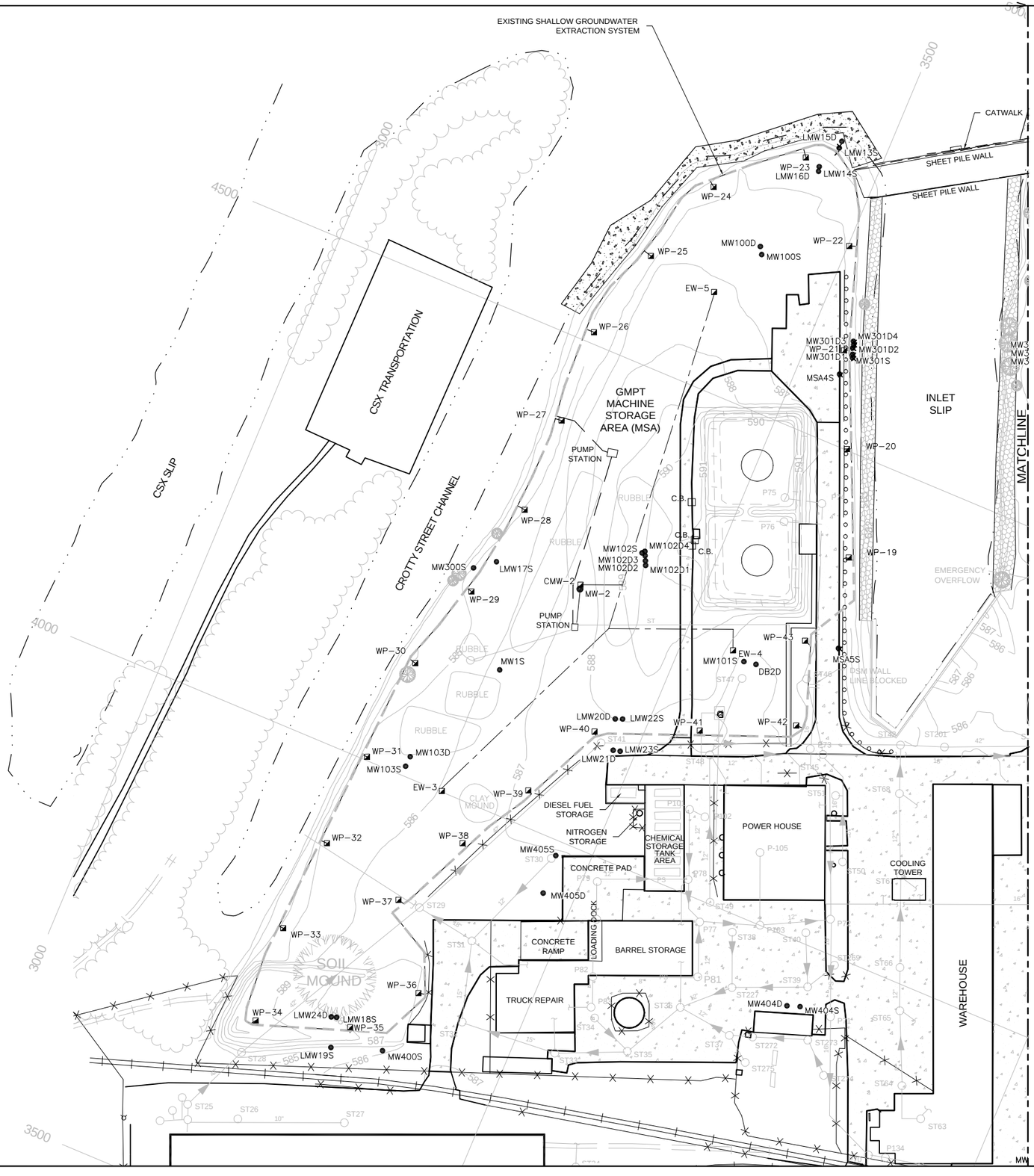
CIVIL
STANDARD DETAILS

CRA **CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: AS SHOWN	Project No.: 12610-10	Report No.: 016	Drawing No.: G-07AR

12610-10(016)GN-WA010 APR 16/2002



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

NOTES:
1. FOR LEGEND SYMBOLS SEE DWG. G-03 AND G-04.
2. BENCHMARKS:
-CUT CROSS ON RIM OF STORM MANHOLE 292 - ELEV. 586.97 FT. AMSL
-SW CORNER WATER TOWER BASE - ELEV. 587.67 FT. AMSL
-SW CORNER ARCHIMEDES SCREW PUMP STATION - ELEV. 587.97 FT. AMSL

0 20 60ft

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH11

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

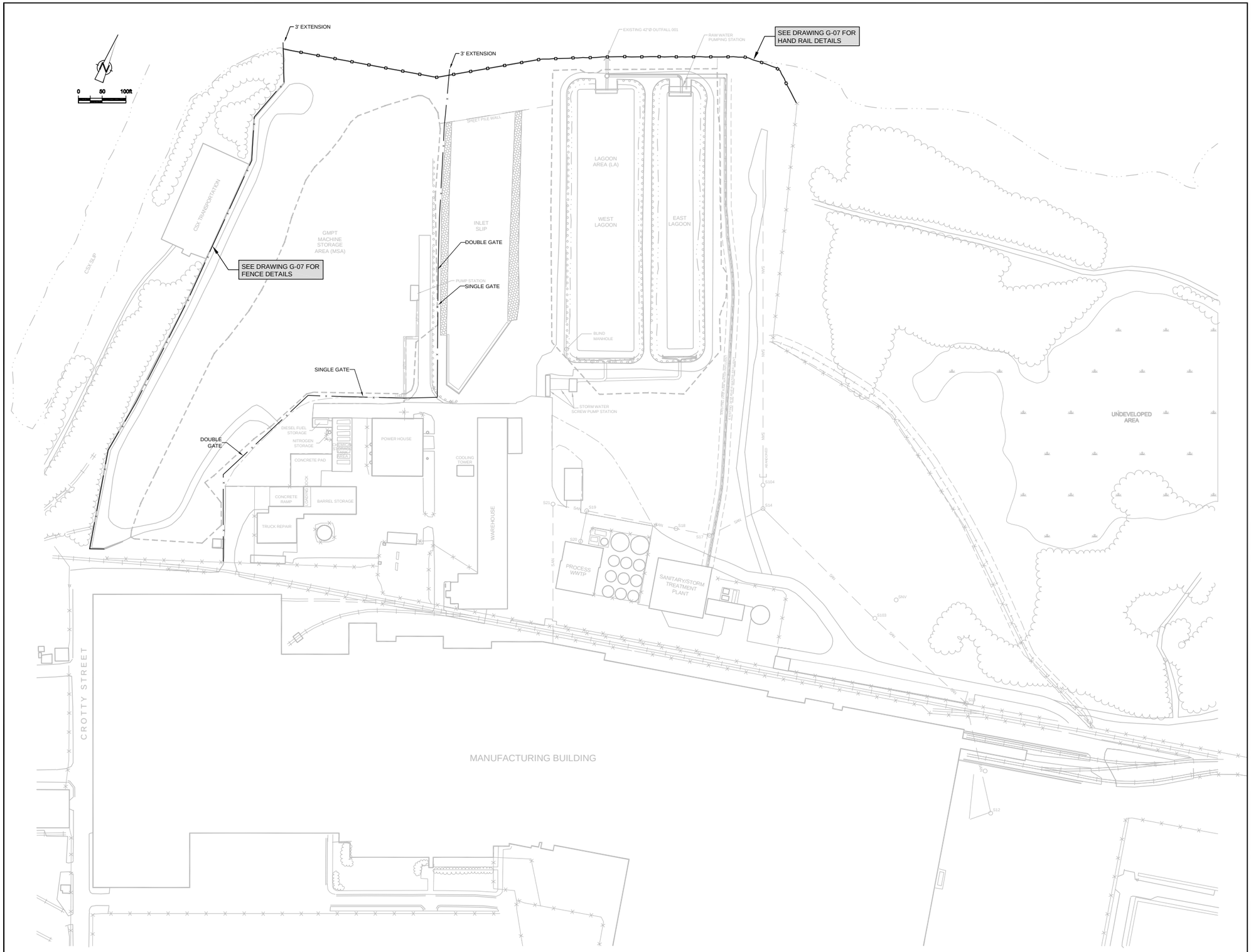
WEST SITE PLAN
PRE-CONSTRUCTION CONDITIONS

CRA CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
CRA AP001, 12610R RAW OCTOBER 1999

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=60'	Project No.: 12610-10	Report No.: 016	Drawing No.: G-11AR

12610-10(016)GN-WA012 APR 16/2002



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

LEGEND

- HANDRAIL
- NEW FENCE
- ALL OTHER FENCES PREVIOUSLY SHOWN

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH08

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

AS RECORDED

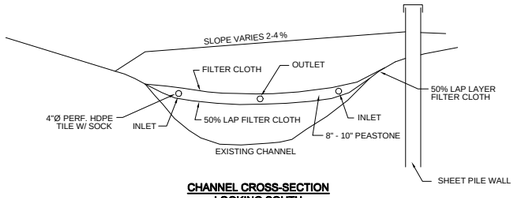
FENCING

CONESTOGA-ROVERS & ASSOCIATES

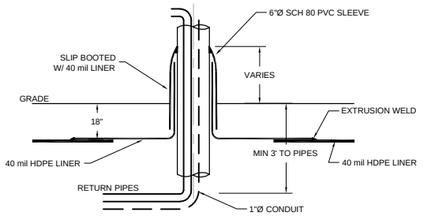
Source Reference:
SPICER GROUP, SAGINAW, MICHIGAN, DRAWING D-352414, SEPTEMBER 2000

Project Manager:	Reviewed By:	Date:	
MRT	AW	JUNE 2000	
Scale: 1"=100'	Project N º: 12610-10	Report N º: 016	Drawing N º: G-08AR

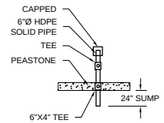
12610-10(016)GN-WA002 APR 16/2002



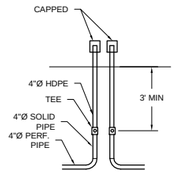
CHANNEL CROSS-SECTION LOOKING SOUTH
N.T.S.



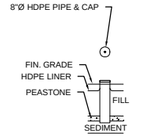
VERTICAL ACCESS INLET AND OUTLET LINER ATTACHMENT
N.T.S.



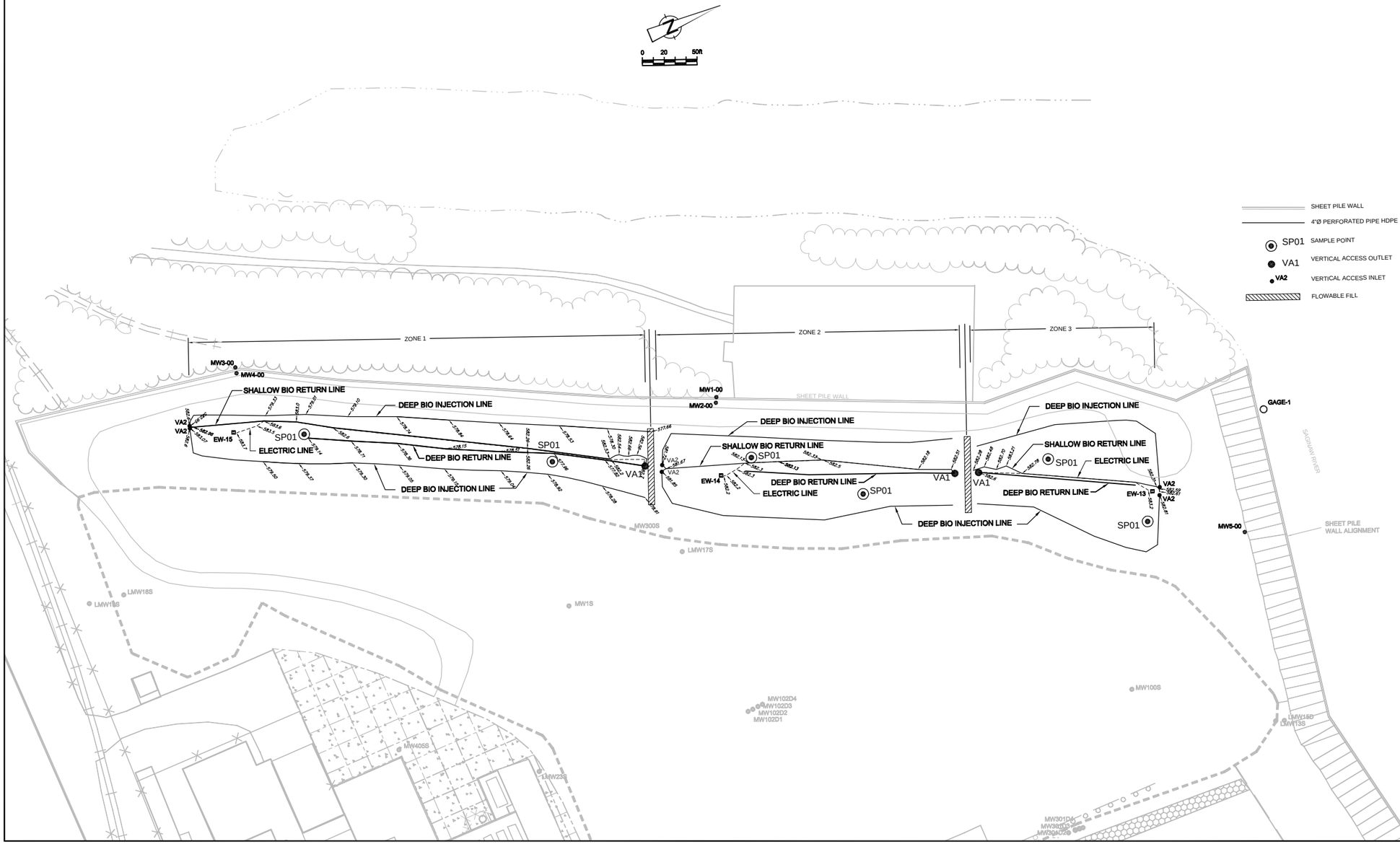
VERTICAL ACCESS OUTLET VA1



VERTICAL ACCESS INLET VA2



SAMPLE POINT SP01



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH09

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

AS RECORDED

DISTRIBUTION PIPING

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
SPICER GROUP, SAGINAW, MICHIGAN, DRAWING D352413 AND D352410, MAY 2000

Project Manager:	Reviewed By:	Date:	
MRT	MRT	MAY 2000	
Scale: 1"=50'	Project N º: 12610-10	Report N º: 016	Drawing N º: G-09AR

12610-10(016)GN-WA008 APR 16/2002

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

NOTES:
1. FOR LEGEND SYMBOLS SEE DWG. G-03 AND G-04.
2. BENCHMARKS:
-CUT CROSS ON RIM OF STORM MANHOLE 292 - ELEV. 586.97 FT. AMSL
-SW CORNER WATER TOWER BASE - ELEV. 587.67 FT. AMSL
-SW CORNER ARCHIMEDES SCREW PUMP STATION - ELEV. 587.97 FT. AMSL

0 50 100ft

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH10

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

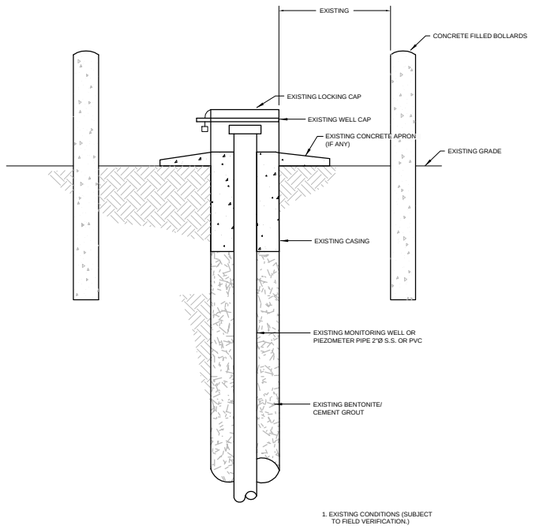
PRE-CONSTRUCTION CONDITIONS

CRA CONESTOGA-ROVERS & ASSOCIATES

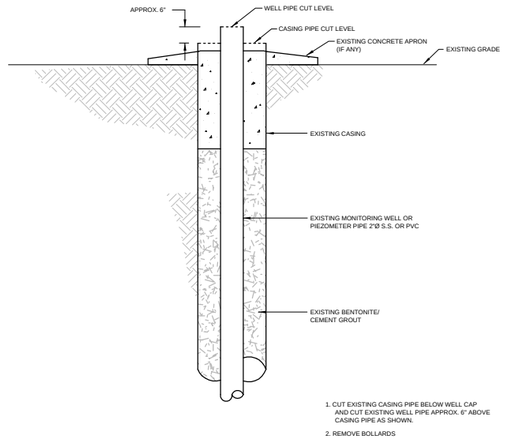
Source Reference:
CRA AP001, 12610R RAW OCTOBER 1999

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=100'	Project N º: 12610-10	Report N º: 016	Drawing N º: G-10AR

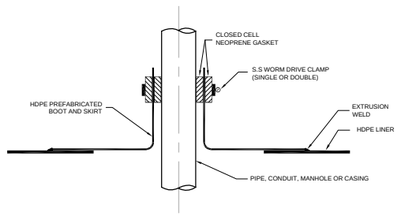
12610-10(016)GN-WA011 APR 16/2002



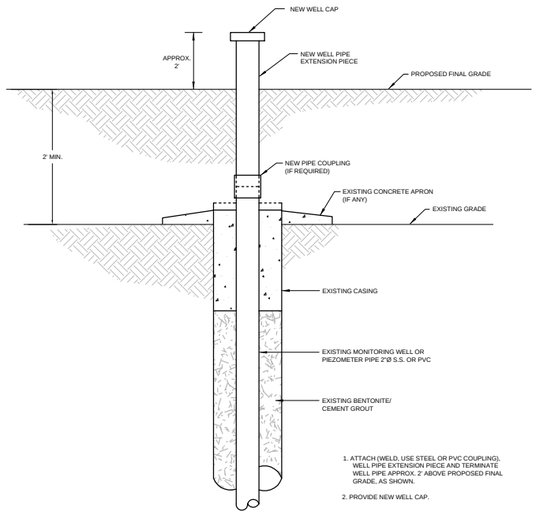
STEP 1



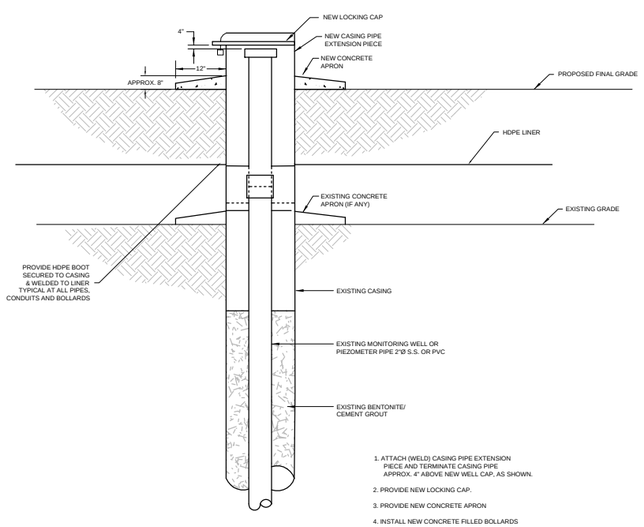
STEP 2



HDPE LINER PENETRATION DETAIL



STEP 3



STEP 4

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH15

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

REMEDIAL ACTION PLAN

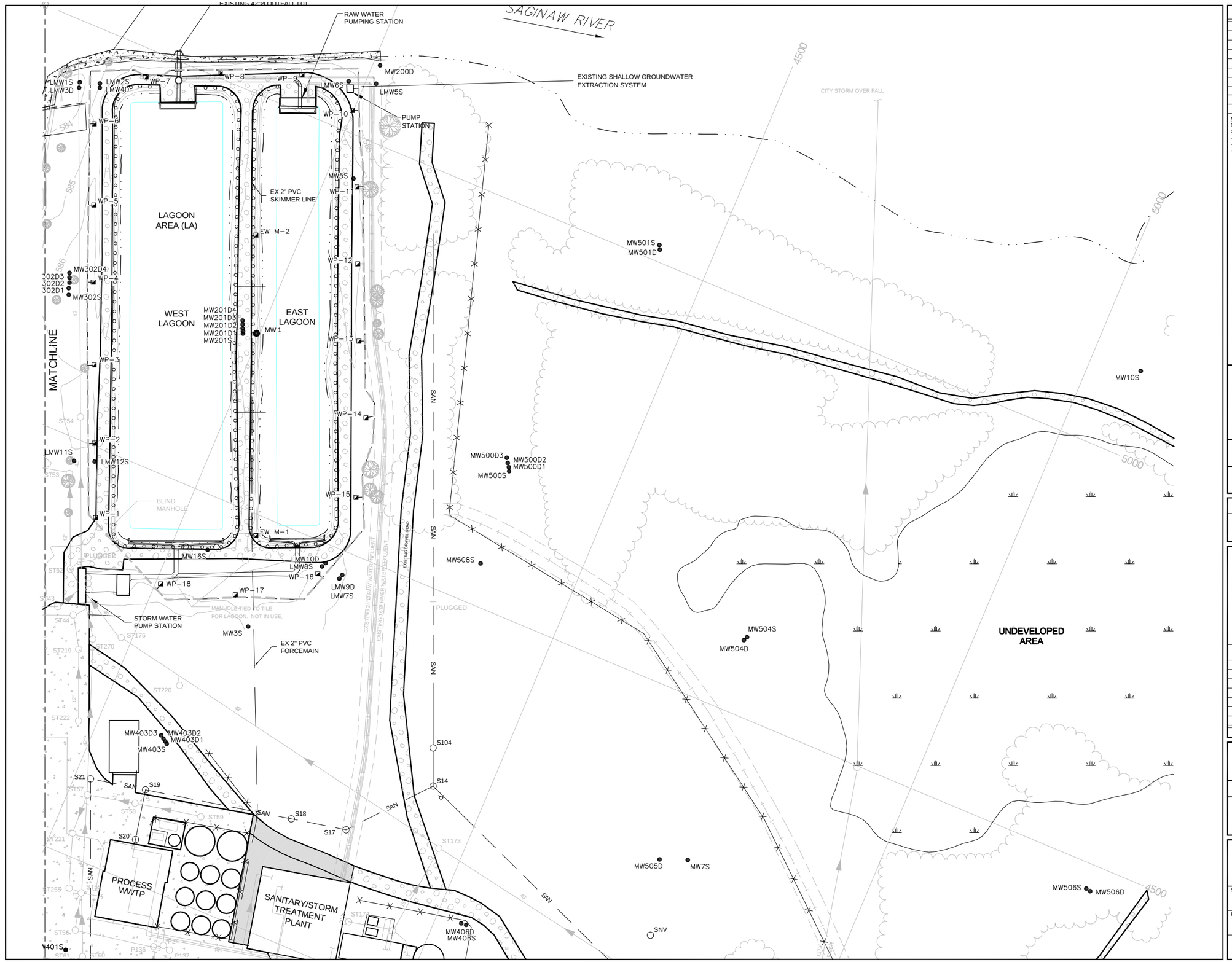
WELL EXTENSION DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	MRT	JUNE 2000	
Scale: NTS	Project № 12610-10	Report № 016	Drawing № C-03AR

12610-10(016)CI-WA004 APR 16/2002



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

NOTES:
1. FOR LEGEND SYMBOLS SEE DWG. G-03 AND G-04.
2. BENCHMARKS:
-CUT CROSS ON RIM OF STORM MANHOLE 292 - ELEV. 586.97 FT. AMSL
-SW CORNER WATER TOWER BASE - ELEV. 587.67 FT. AMSL
-SW CORNER ARCHIMEDES SCREW PUMP STATION - ELEV. 587.97 FT. AMSL

N

0 20 60ft

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH12

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

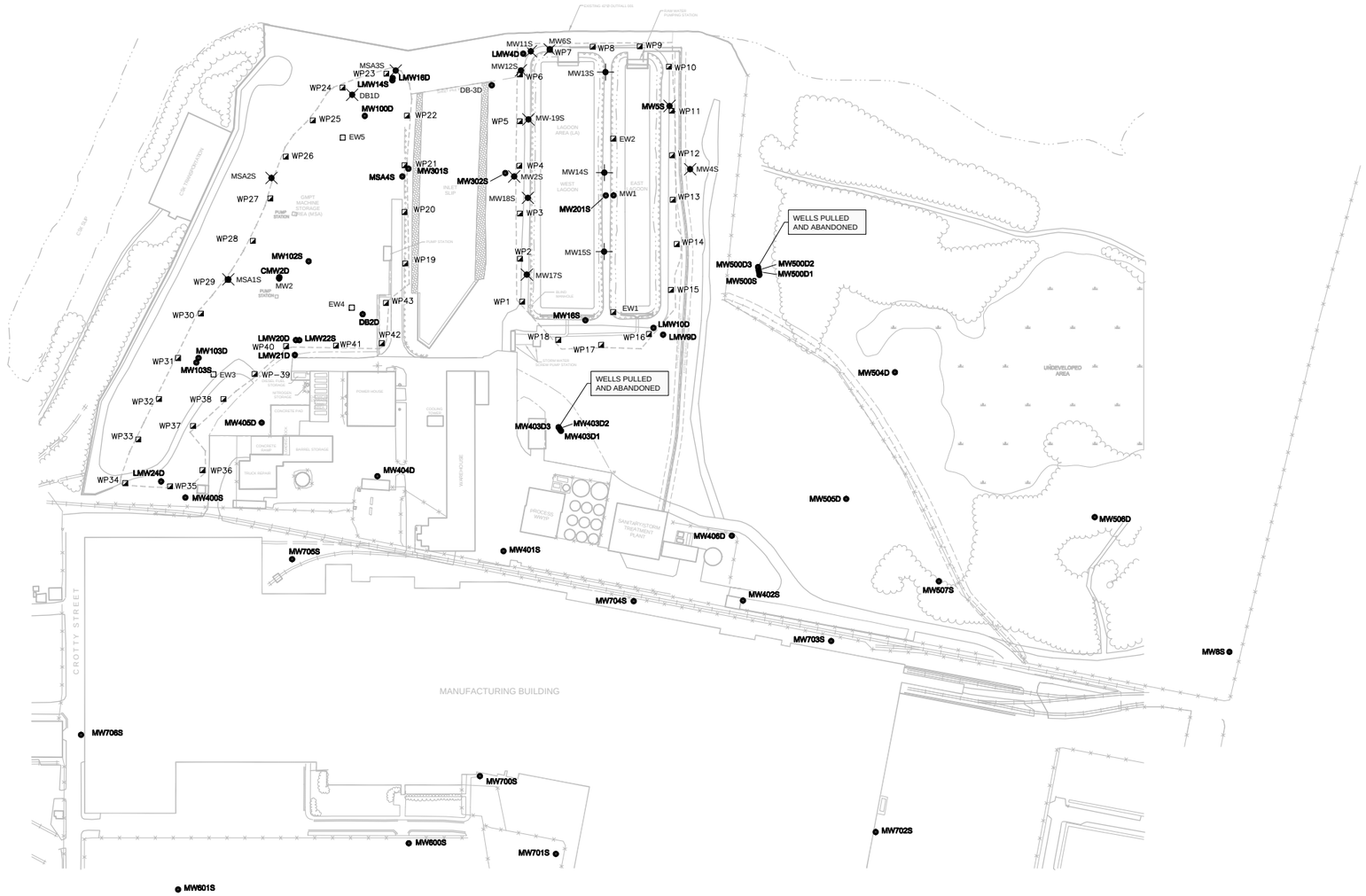
EAST SITE PLAN
PRE-CONSTRUCTION CONDITIONS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
CRA AP001, 12610R RAW OCTOBER 1999

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=60'	Project No.: 12610-10	Report No.: 016	Drawing No.: G-12AR

12610-10(016)GN-WA013 APR 16/2002



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

NOTES:
1. FOR LEGEND SYMBOLS SEE DWG. G-03 AND G-04.
2. BENCHMARKS:
-CUT CROSS ON RIM OF STORM MANHOLE 292 - ELEV. 586.97 FT. AMSL
-SW CORNER WATER TOWER BASE - ELEV. 587.67 FT. AMSL
-SW CORNER ARCHIMEDES SCREW PUMP STATION - ELEV. 587.97 FT. AMSL

LEGEND

MW501D	ABANDONED MONITORING WELL
WP3	ABANDONED EXTRACTION WELL
MSA2S	DESTROYED OR LOST MONITORING WELL
MW14S	CUT OFF AND BURIED MONITORING WELL

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH13

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

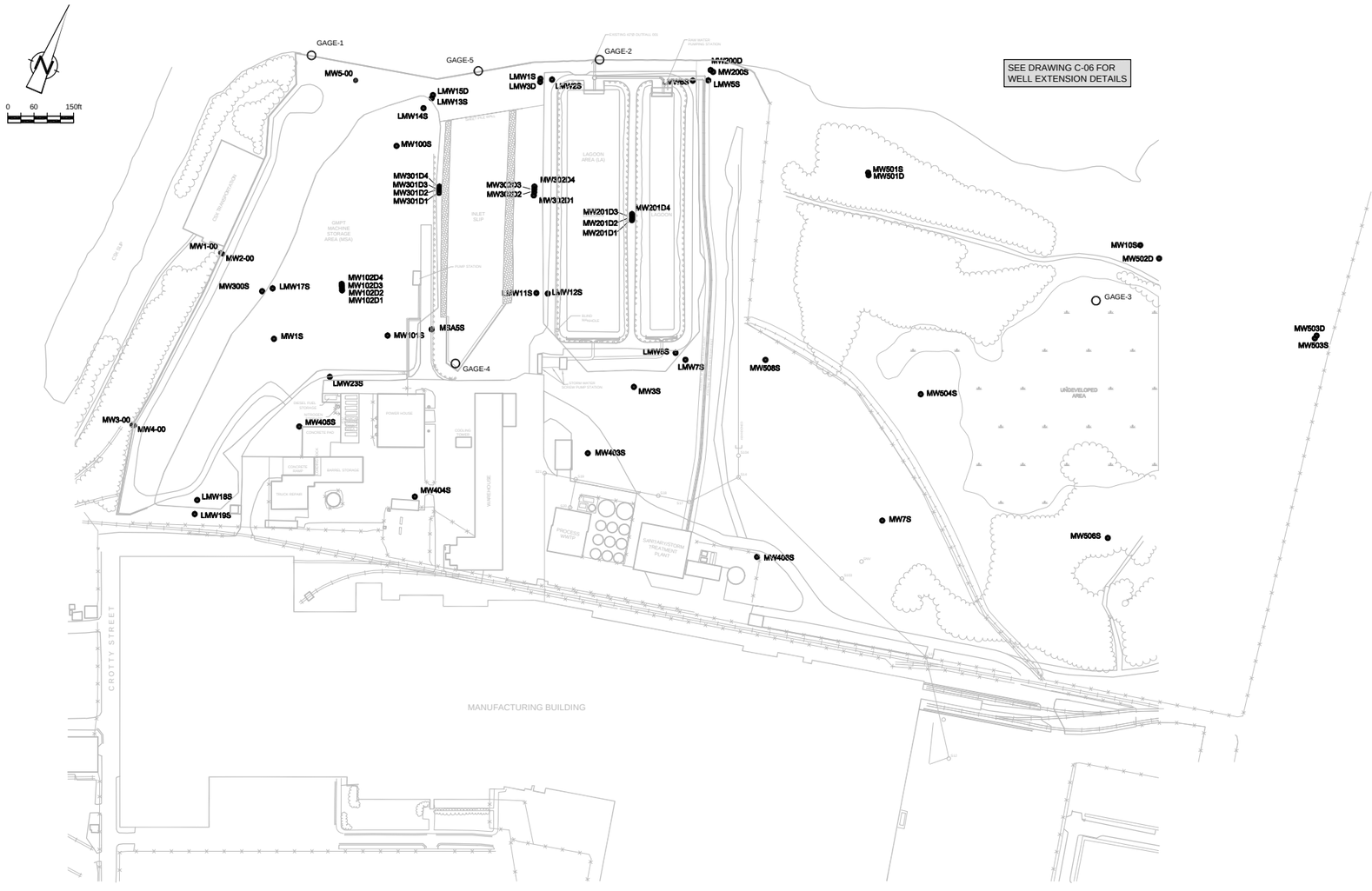
MONITORING WELLS
ABANDONED

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: SPICER GROUP

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=150'	Project N №: 12610-10	Report N №: 016	Drawing N №: C-01AR

12610-10(016)CI-WA017 APR 16/2002



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

LEGEND

● MW501D EXISTING MONITORING WELL

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96

SHEET No.: SH14

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

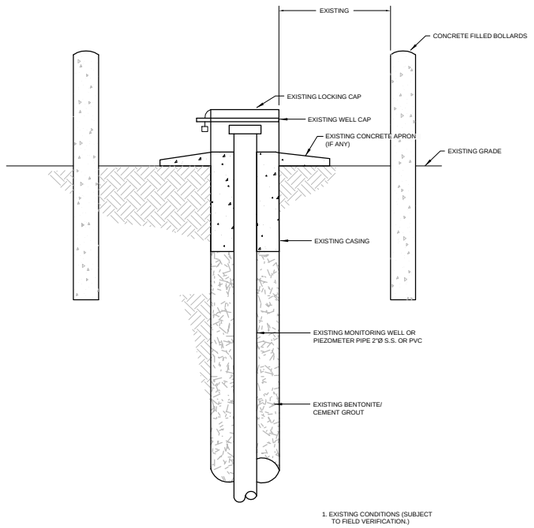
EXISTING MONITORING WELLS

CONESTOGA-ROVERS & ASSOCIATES

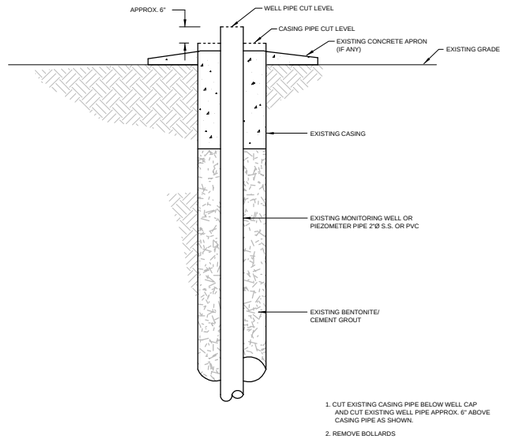
Source Reference:
NOVA CONSULTANTS, INC., SEPTEMBER 2000

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1" = 150'	Project N №: 12610-10	Report N №: 016	Drawing N №: C-02AR

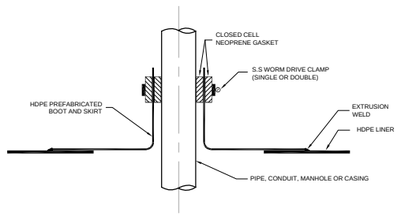
12610-10(016)CI-WA013 APR 16/2002



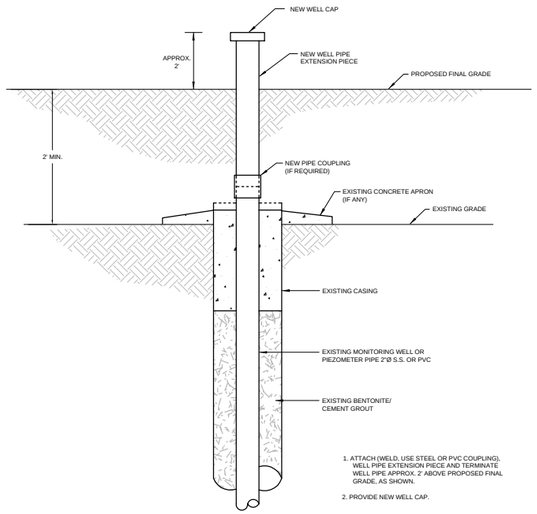
STEP 1



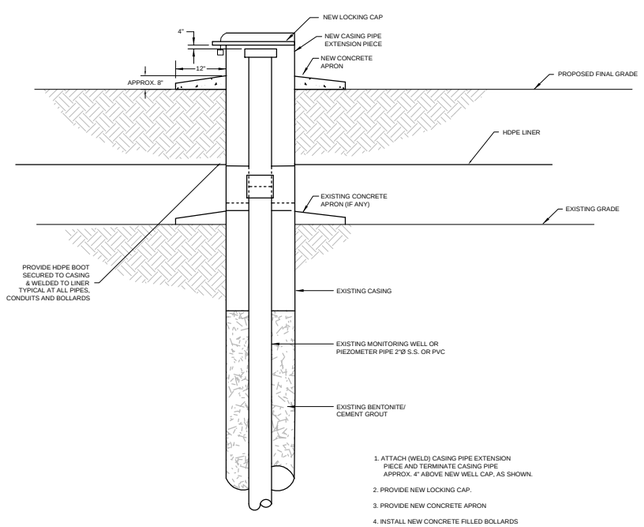
STEP 2



HDPE LINER PENETRATION DETAIL



STEP 3



STEP 4

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH15

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

REMEDIAL ACTION PLAN

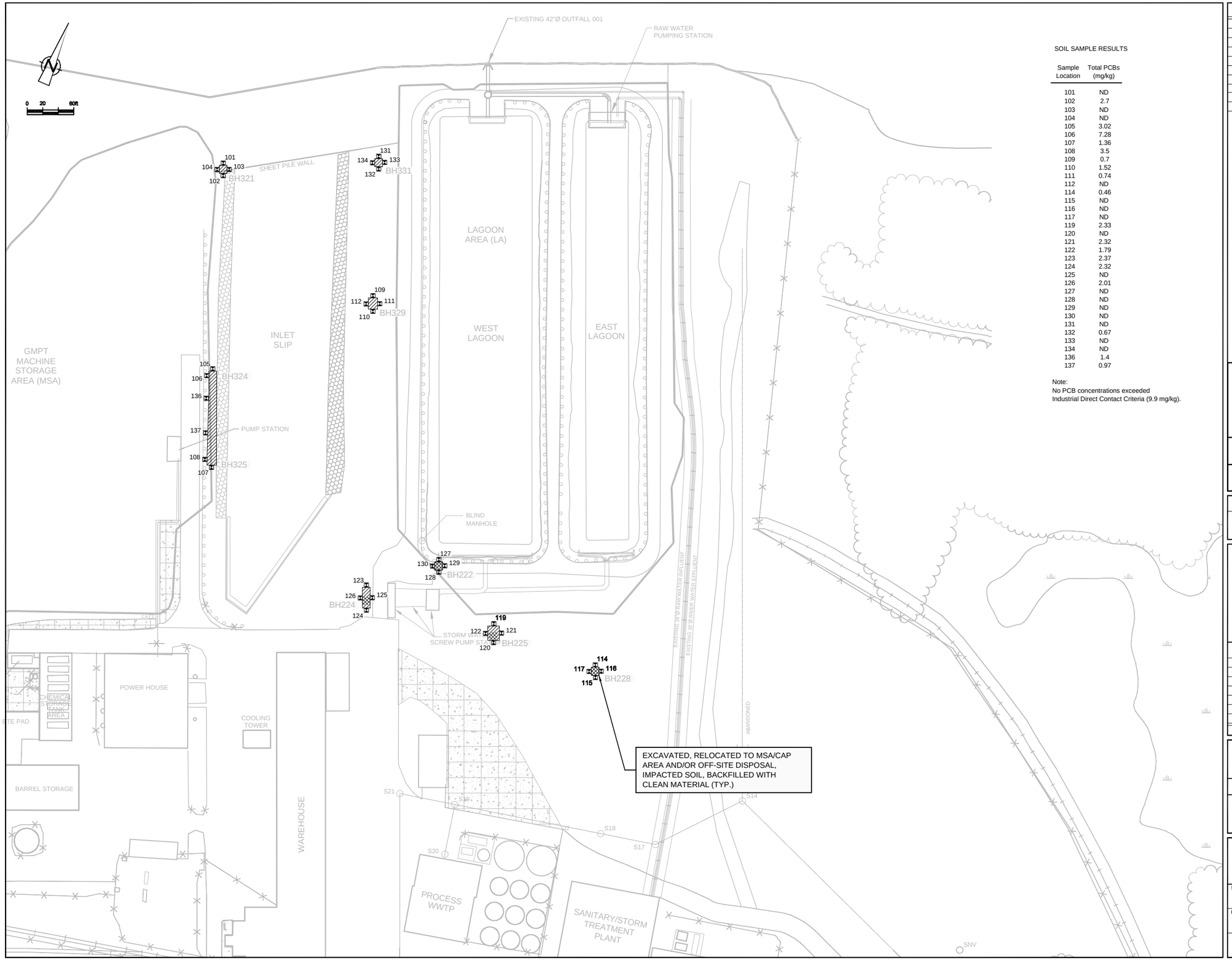
WELL EXTENSION DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	MRT	JUNE 2000	
Scale: NTS	Project № 12610-10	Report № 016	Drawing № C-03AR

12610-10(016)CI-WA004 APR 16/2002



SOIL SAMPLE RESULTS

Sample Location	Total PCBs (mg/kg)
101	ND
102	2.7
103	ND
104	ND
105	3.02
106	7.28
107	1.36
108	3.5
109	0.7
110	1.52
111	0.74
112	ND
114	0.46
115	ND
116	ND
117	ND
119	2.33
120	ND
121	2.32
122	1.79
123	2.37
124	2.32
125	ND
126	2.01
127	ND
128	ND
129	ND
130	ND
131	ND
132	0.67
133	ND
134	ND
136	1.4
137	0.97

Note:
No PCB concentrations exceeded Industrial Direct Contact Criteria (9.9 mg/kg).

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

LEGEND

114 / 117 116 / 115 BH228 — VERIFICATION SAMPLE ID NUMBER; BOREHOLE ID NUMBER

S-12610-990315-SSH-___ SOIL SAMPLE ID

NOTE
1. FINAL LIMITS OF IMPACTED SOIL EXCAVATION WILL BE DETERMINED IN FIELD.

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH16

AS RECORDED MAY 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

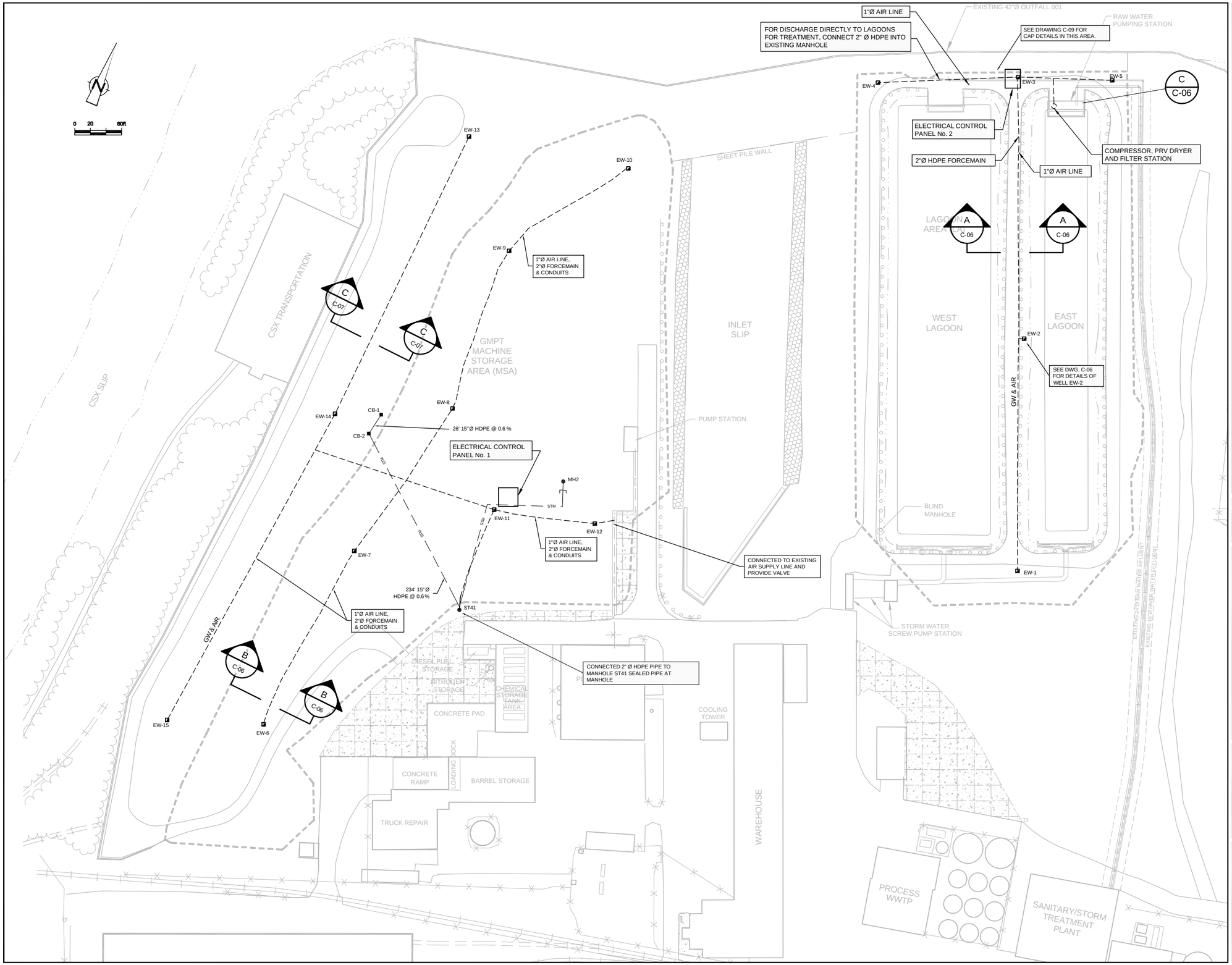
AS RECORDED

SOIL EXCAVATION LOCATIONS AND RESULTS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: SPICER GROUP			
Project Manager: MRT	Reviewed By: MRT	Date: MAY 2000	
Scale: 1"=60'	Project N №: 12610-10	Report N №: 016	Drawing N №: C-04AR

12610-10(016)CI-WA001 APR 16/2002



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

NOTES:
1. SEE DRAWING C-09 FOR EXTRACTION WELL DETAILS

LEGEND
- AIR EXTRACTION LINE
- GROUNDWATER EXTRACTION LINE

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96
SHEET No. SH17

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

AS RECORDED

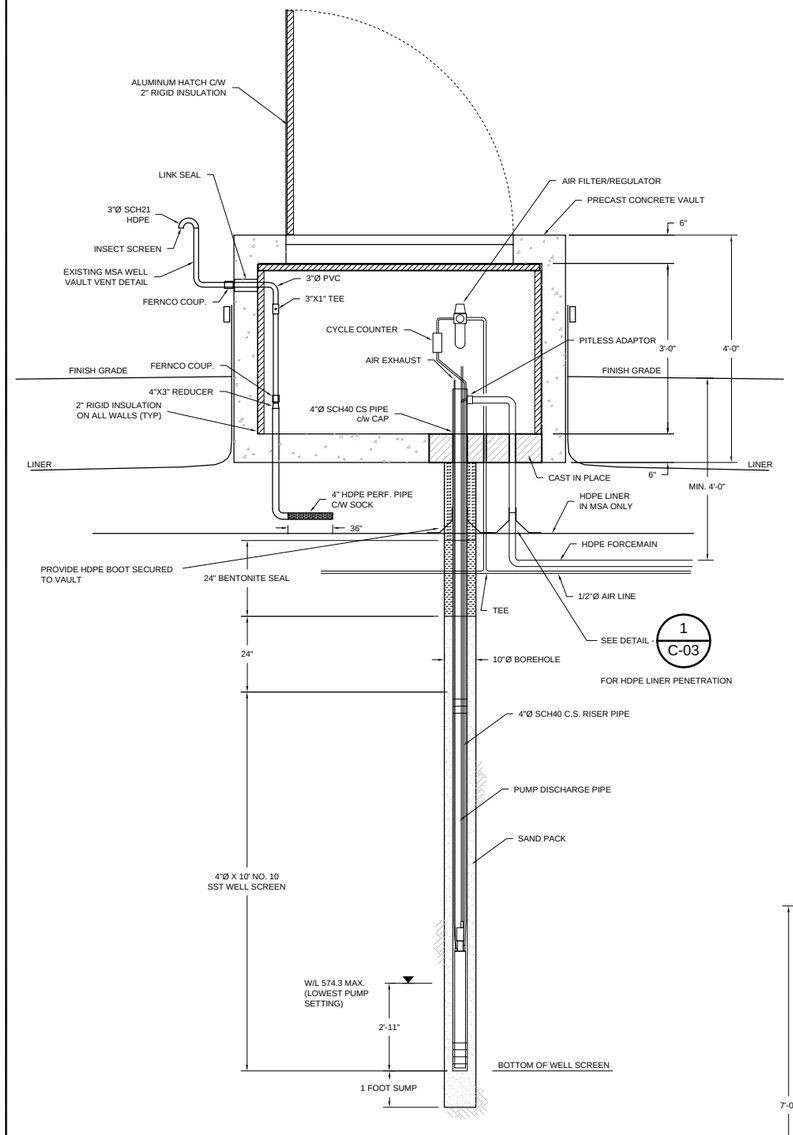
GROUNDWATER EXTRACTION SYSTEM

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
SPICER GROUP, SAGINAW, MICHIGAN, DRAWING D352042, MAY 1999

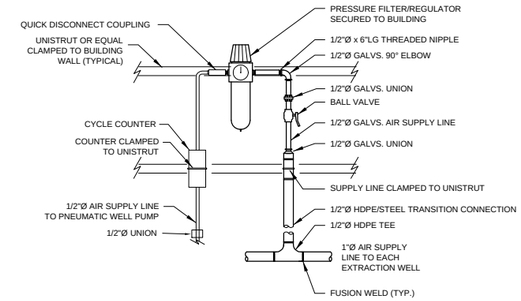
Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=60'	Project № 12610-10	Report № 016	Drawing № C-05AR

12610-10(016)CI-WA012 APR 16/2002



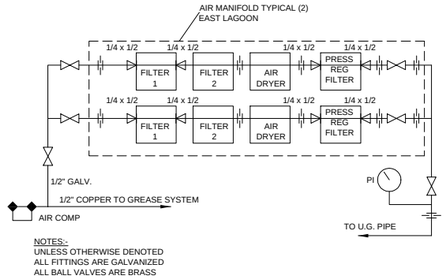
EXTRACTION WELL DETAIL
EW-1 TO EW-12

SECTION A C-06



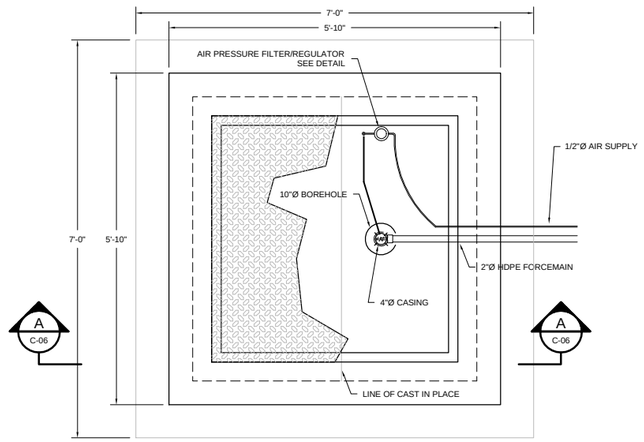
NOTE:
1. CONTRACTOR TO PROVIDE ALL GALVANIZED STEEL SUPPORTS, BRACING AND BRACKETS TO SECURE ALL PIPING, VALVES, EQUIPMENT, ETC. TO BUILDING WALL AS REQUIRED TO FULL SATISFACTION OF OWNER.

PRESSURE FILTER/REGULATOR MOUNTING DETAIL

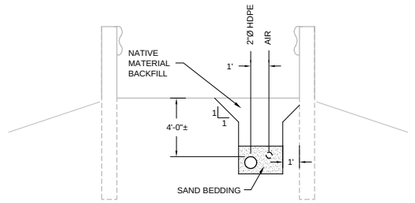


NOTES:-
UNLESS OTHERWISE DENOTED
ALL FITTINGS ARE GALVANIZED
ALL BALL VALVES ARE BRASS

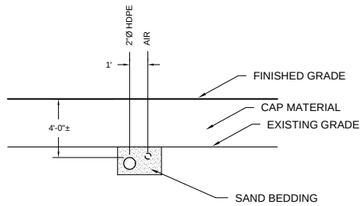
AIR SUPPLY SCHEMATIC AT EAST LAGOON



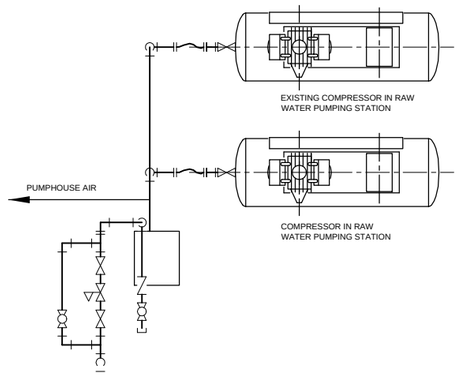
PLAN EW-1 TO EW-12



SECTION A C-05



SECTION B C-05
TYPICAL



PIPE LAYOUT C C-05

EXTRACTION WELL No.	EXTRACTION WELL ELEVATION SUMMARY						
	BOTTOM SCREEN ELEV. (AMSL)	TOP SCREEN ELEV. (AMSL)	PROPOSED FINISHED GRADE (AMSL)	TOTAL WELL DEPTH (FT)	NORTHING	EASTING	TOP I.C.U. (BASED ON McH SURVEY) (AMSL)
EW-1	572.00	582.00	587.0±	15.00	11082.90	11169.05	573.3
EW-2	572.00	582.00	587.0±	15.00	11412.85	11164.37	574.0
EW-3	572.00	582.00	587.0±	15.00	11716.82	11166.09	572.0
EW-4	572.00	582.00	587.0±	15.00	11712.89	10991.27	573.0
EW-5	572.00	582.00	587.0±	15.00	11716.82	11302.96	574.4
EW-6	572.0	582.0	591.5	19.5	10882.30	10202.46	574.0
EW-7	572.0	582.0	589.3	17.3	11110.53	10315.92	573.0
EW-8	572.0	582.0	589.6	17.6	11295.32	10444.85	573.7
EW-9	572.0	582.0	589.3	17.3	11493.36	10521.46	574.0
EW-10	572.0	582.0	589.0	17.0	11598.64	10673.23	575.0
EW-11	575.0	585.0	592.0	17.0	11104.64	10464.00	577.5
EW-12	572.0	582.0	591.5	19.5	11098.01	10626.08	572.5

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

SEE DRAWING E-10 FOR ELECTRICAL

REALM Remediation and Liability Management Company, Inc.

GM POWERTRAIN
GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96
SHEET No. SH18

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

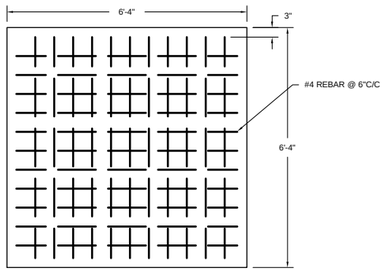
GROUNDWATER EXTRACTION SYSTEM DETAILS

CRA CONESTOGA-ROVERS & ASSOCIATES

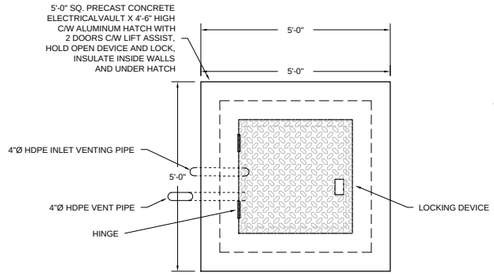
Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NTS	Project N №: 12610-10	Report N №: 016	Drawing N №: C-06AR

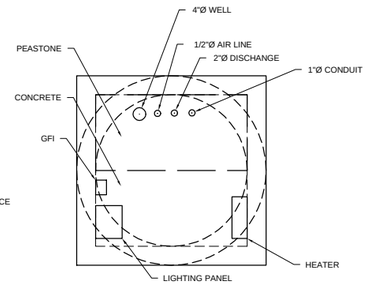
12610-10(016)CI-WA005 APR 16/2002



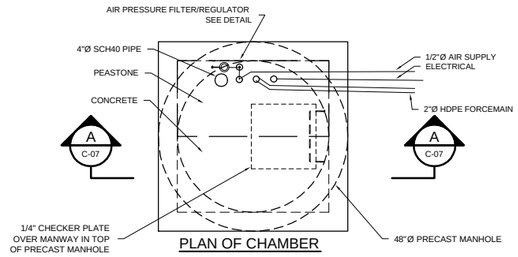
PLAN EXTRACTION WELL BASE SLAB



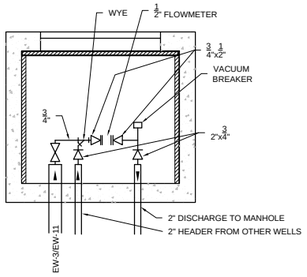
PLAN EW-13, EW-14 AND EW-15



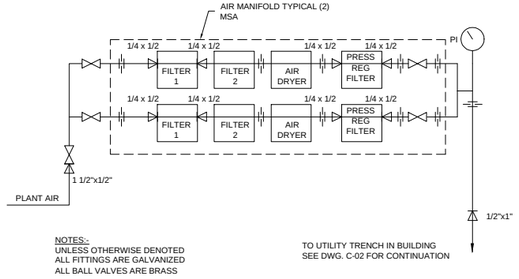
PLAN OF CHAMBER AT BASE



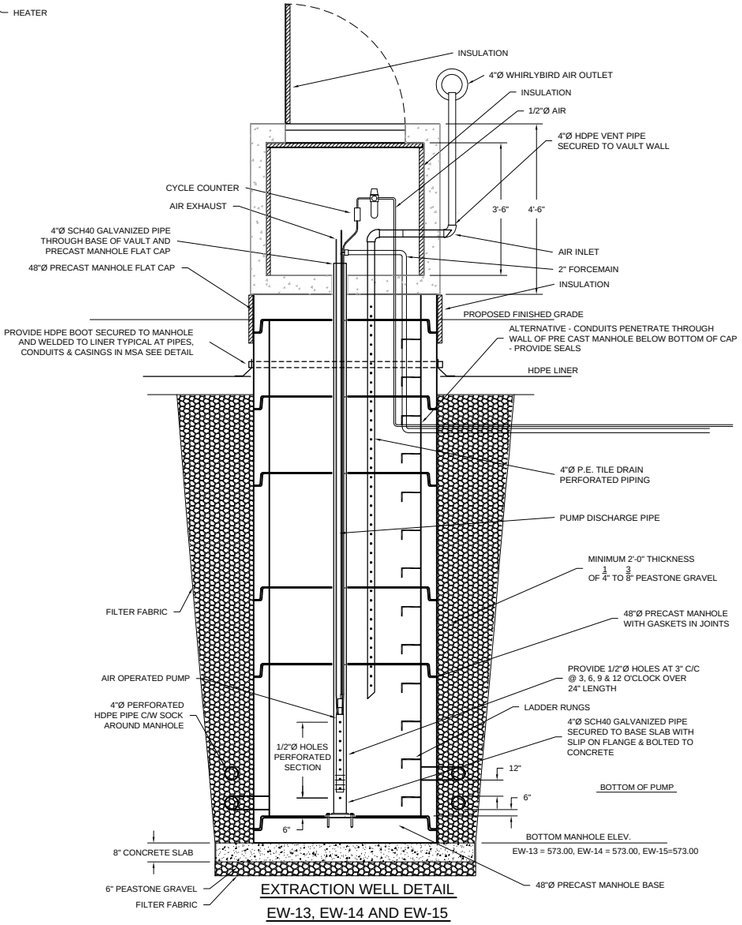
PLAN OF CHAMBER



EW-3 & EW-11 WELL DETAIL

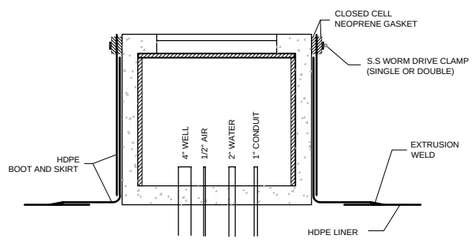


AIR SUPPLY SCHEMATIC AT MSA

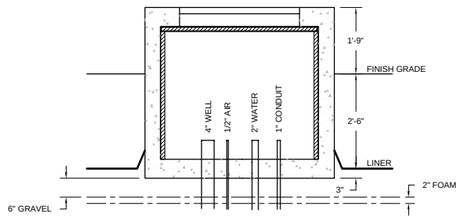


EXTRACTION WELL DETAIL
EW-13, EW-14 AND EW-15

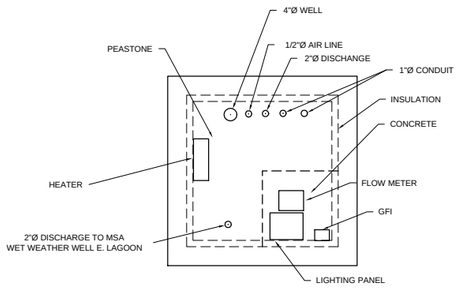
SECTION A / C-07



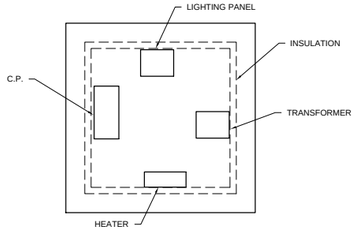
EXTRACTION WELL PENETRATION DETAIL
FOR EW-13, EW-14 AND EW-15



MSA AREA WELL VAULT DETAIL (TYPICAL)



TYPICAL WELL VAULT WITH FLOW METER (2)



TYPICAL ELECTRICAL VAULT (2)

EXTRACTION WELL No.	EXTRACTION WELL ELEVATION SUMMARY						
	TOP MANHOLE CASING (FT AMSL)	BOTTOM MANHOLE ELEV. (FT AMSL)	TOTAL WELL DEPTH (FT)	DEPTH TO PUMP INLET (FT BTOC)	PUMP INLET ELEV. (FT AMSL)	NORTHING	EASTING
EW-13	587.80	571.1284	16.67	15.50	572.30	11666.81	10478.35
EW-14	586.00	569.502	16.50	15.08	570.92	11276.70	10293.17
EW-15	587.43	570.7615	16.67	15.67	571.76	10893.08	10082.45

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

SEE DRAWING E-1 to E-04 FOR ELECTRICAL

REALM **Remediation and Liability Management Company, Inc.**

GM **POWERTRAIN**

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH19

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

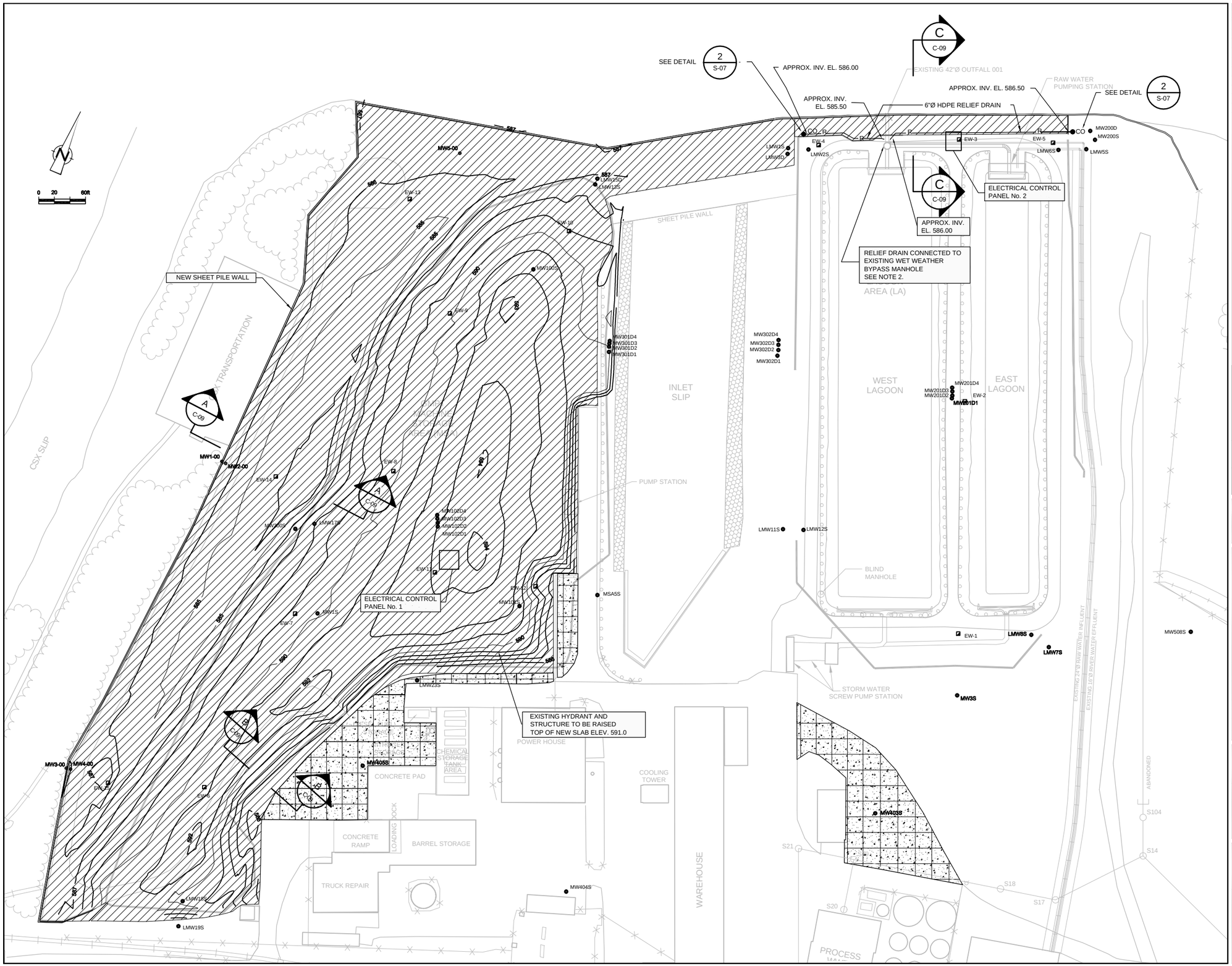
GROUND EXTRACTION WELL
13, 14 AND 15 DETAILS

CRA **CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NTS	Project N º: 12610-10	Report N º: 016	Drawing N º: C-07AR

12610-10(016)CI-WA006 APR 16/2002



NOTES:

1. FOR HDPE LINER ATTACHMENT TO THE TANK CONCRETE PAD FUEL STORAGE AREA SEE TYPICAL DETAILS DWG. C-17.
2. EXACT LOCATION AND INVERT EL. FOR 6"Ø HDPE RELIEF DRAIN WILL BE FINALIZED IN THE FIELD.

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH20

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

AS RECORDED

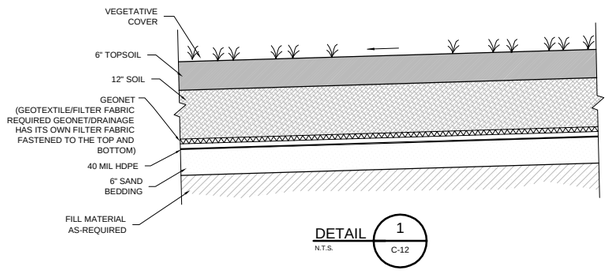
SITE CAPPING

CONESTOGA-ROVERS & ASSOCIATES

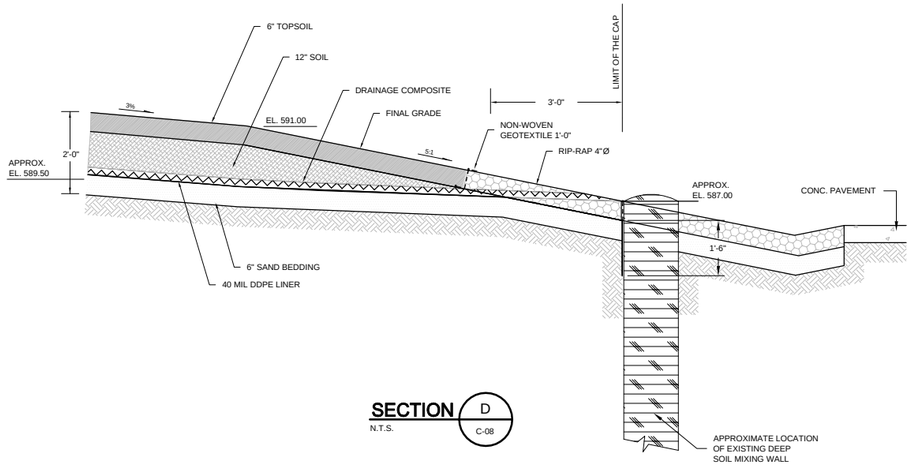
Source Reference:
NOVA CONSULTANTS, INC. SEPTEMBER 2000

Project Manager:	Reviewed By:	Date:	
MRT	AW	JUNE 2000	
Scale: 1"=60'	Project N º: 12610-10	Report N º: 016	Drawing N º: C-08AR

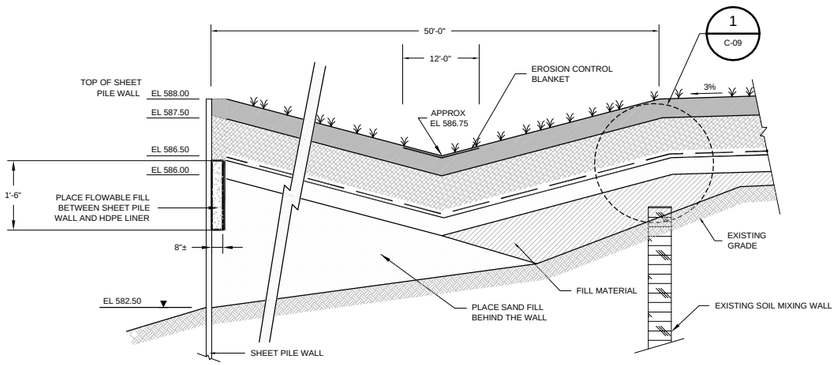
12610-10(016)CI-WA003 APR 16/2002



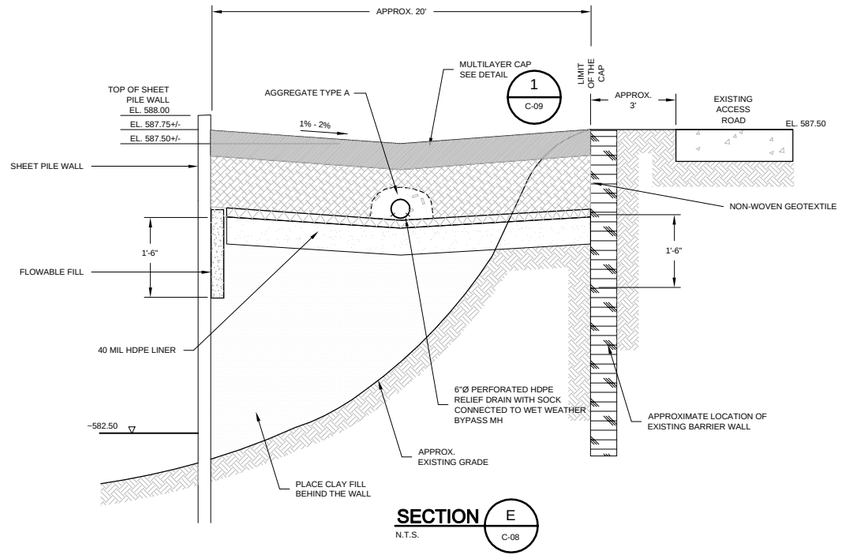
DETAIL 1 / C-12
N.T.S.



SECTION D / C-08
N.T.S.



SECTION A / C-08
N.T.S.



SECTION E / C-08
N.T.S.

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

REALM **Remediation and Liability Management Company, Inc.**

GM **POWERTRAIN**

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH21

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

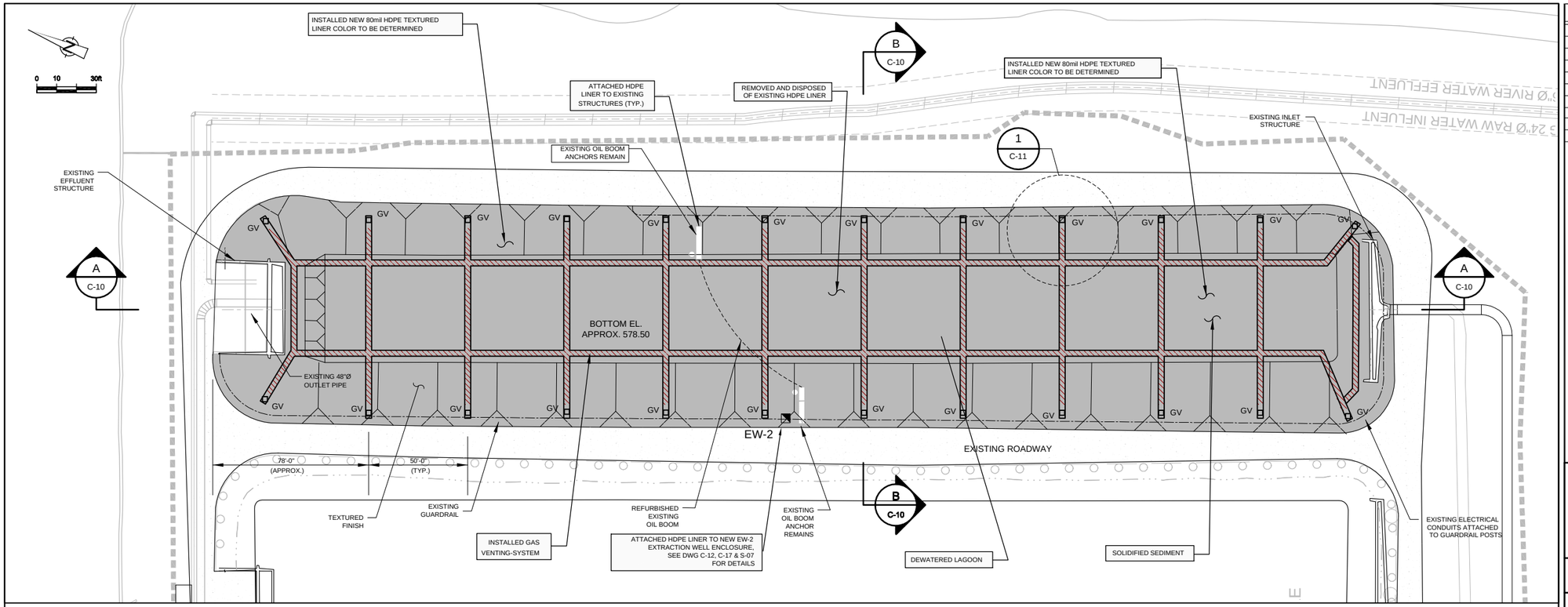
CAP DETAILS

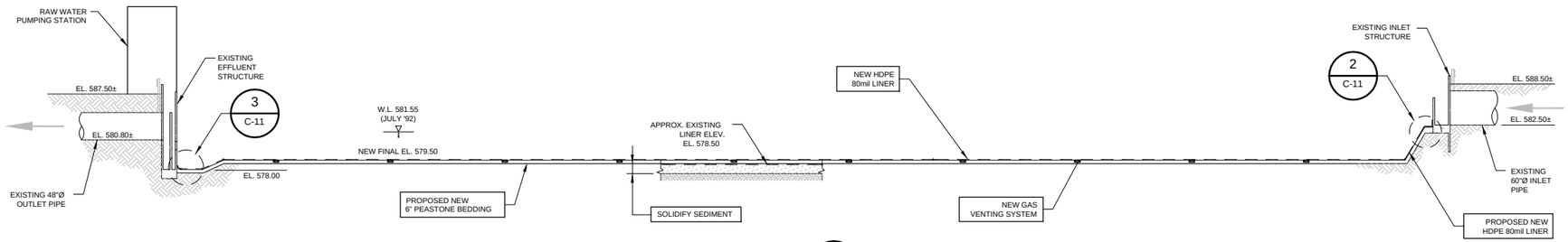
CRA **CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:

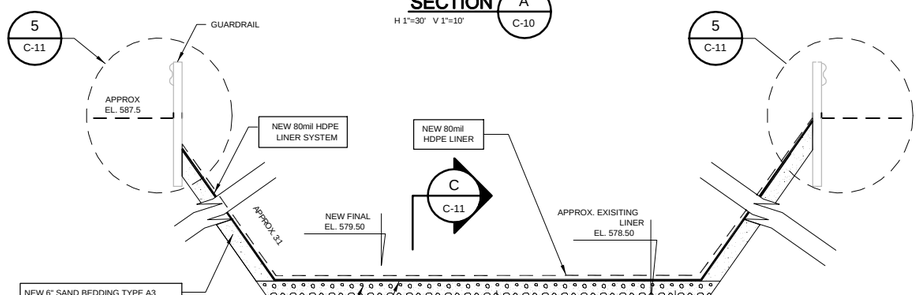
Project Manager:	Reviewed By:	Date:	
MRT	AW	JUNE 2000	
Scale: NO SCALE	Project N º: 12610-10	Report N º: 016	Drawing N º: C-09AR

12610-10(016)CI-WA007 APR 16/2002





SECTION A
H 1"=30' V 1"=10'



SECTION B
H 1"=10' V 1"=2'

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

LEGEND

- EXISTING ROADWAY
- EXISTING GUARDRAIL
- EXISTING ELECTRICAL CONDUIT
- NEW LIMIT OF HDPE LINER
- NEW GAS VENT SYSTEM
- GV NEW GAS VENT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH22

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

AS RECORDED

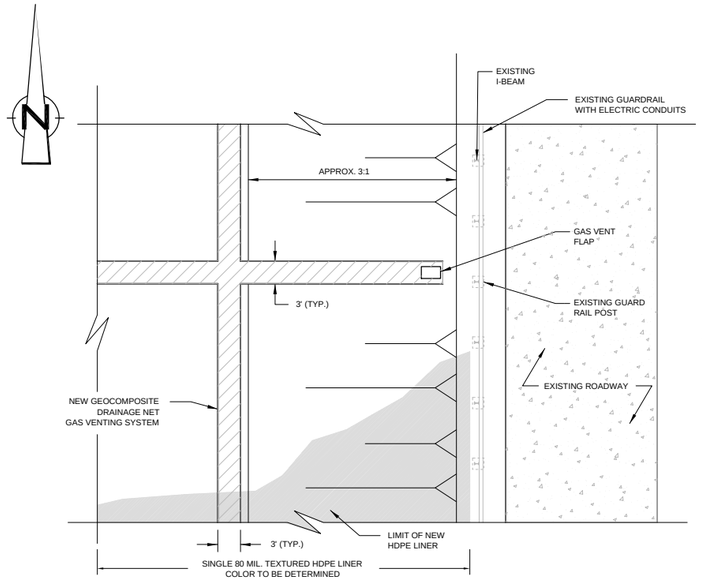
EAST LAGOON LINER PLAN

CRA CONESTOGA-ROVERS & ASSOCIATES

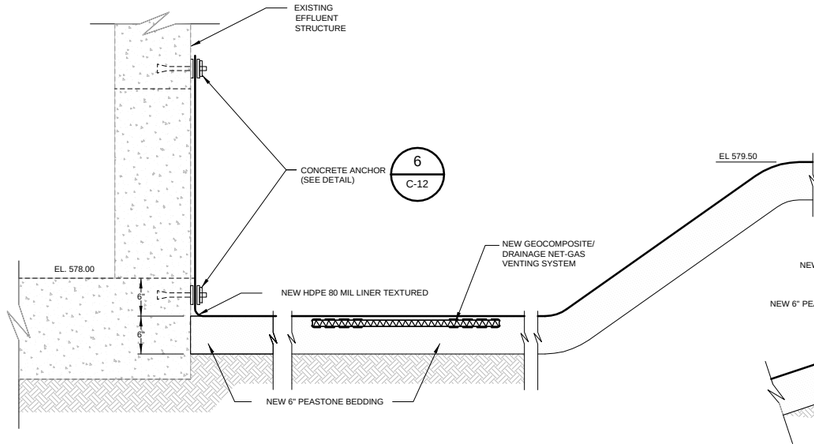
Source Reference: SPICER GROUP

Project Manager:	Reviewed By:	Date:	
MRT	AW	JUNE 2000	
Scale: AS SHOWN	Project N º: 12610-10	Report N º: 016	Drawing N º: C-10AR

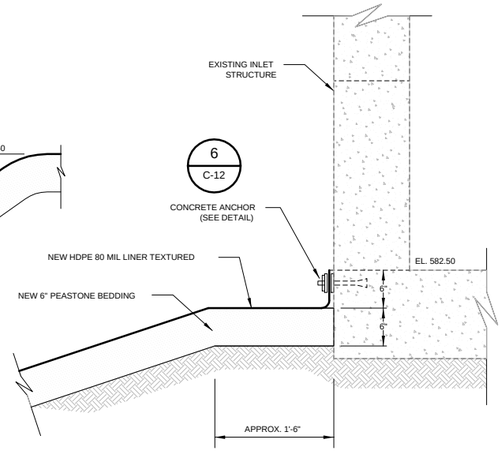
12610-10(016)CI-WA008 APR 16/200



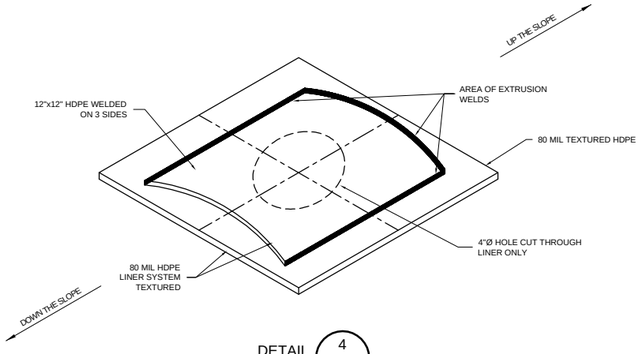
DETAIL 1 / C-10 N.T.S.



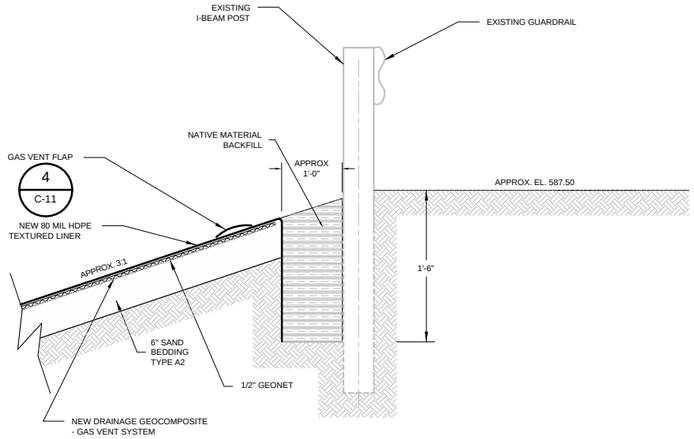
DETAIL 3 / C-10 N.T.S.



DETAIL 2 / C-10 N.T.S.

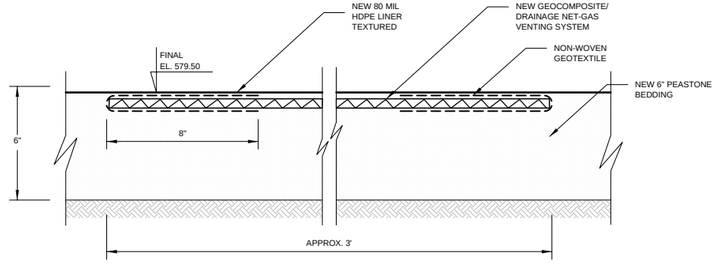


DETAIL 4 / C-11 N.T.S.



SECTION

DETAIL 5 / C-10 N.T.S.



SECTION C / C-10

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

REALM — Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH23

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

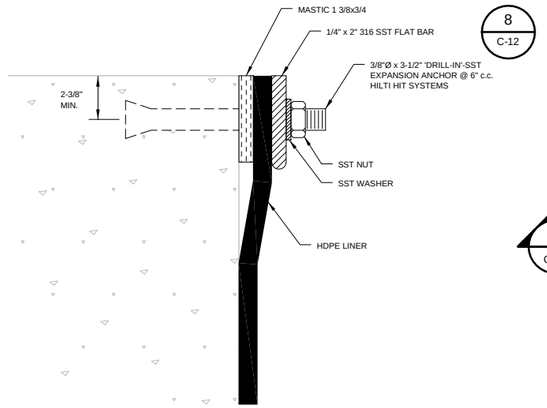
EAST LAGOON LINER DETAILS - 1 OF 2

CRA — CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	AW	JUNE 2000	
Scale: NOT TO SCALE	Project № 12610-10	Report № 016	Drawing № C-11AR

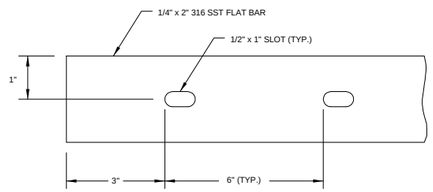
12610-10(016)CI-WA009 APR 16/2002



DETAIL 6 / C-11

HDPE LINER ATTACHMENT TO CONCRETE DETAIL

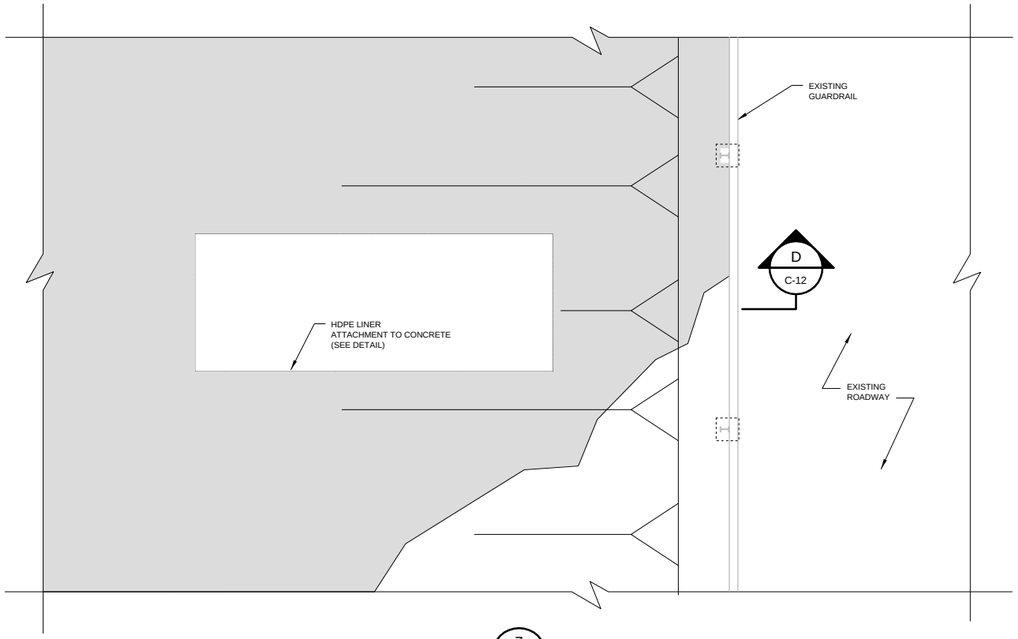
N.T.S.



DETAIL 8 / C-12

HDPE LINER ATTACHMENT TO CONCRETE DETAIL

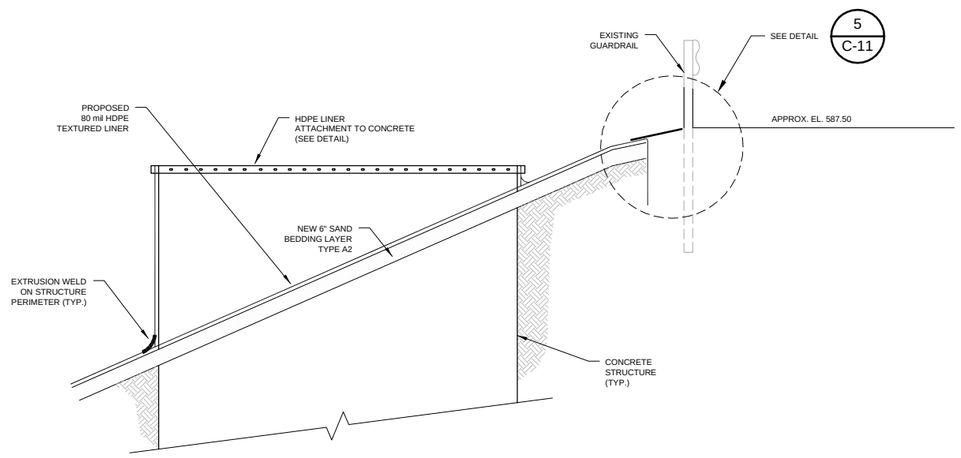
N.T.S.



DETAIL 7 / C-12

LINER ATTACHMENT TO EXISTING STRUCTURES TYPICAL DETAIL PLAN VIEW

N.T.S.



SECTION D / C-12

N.T.S.

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH24

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

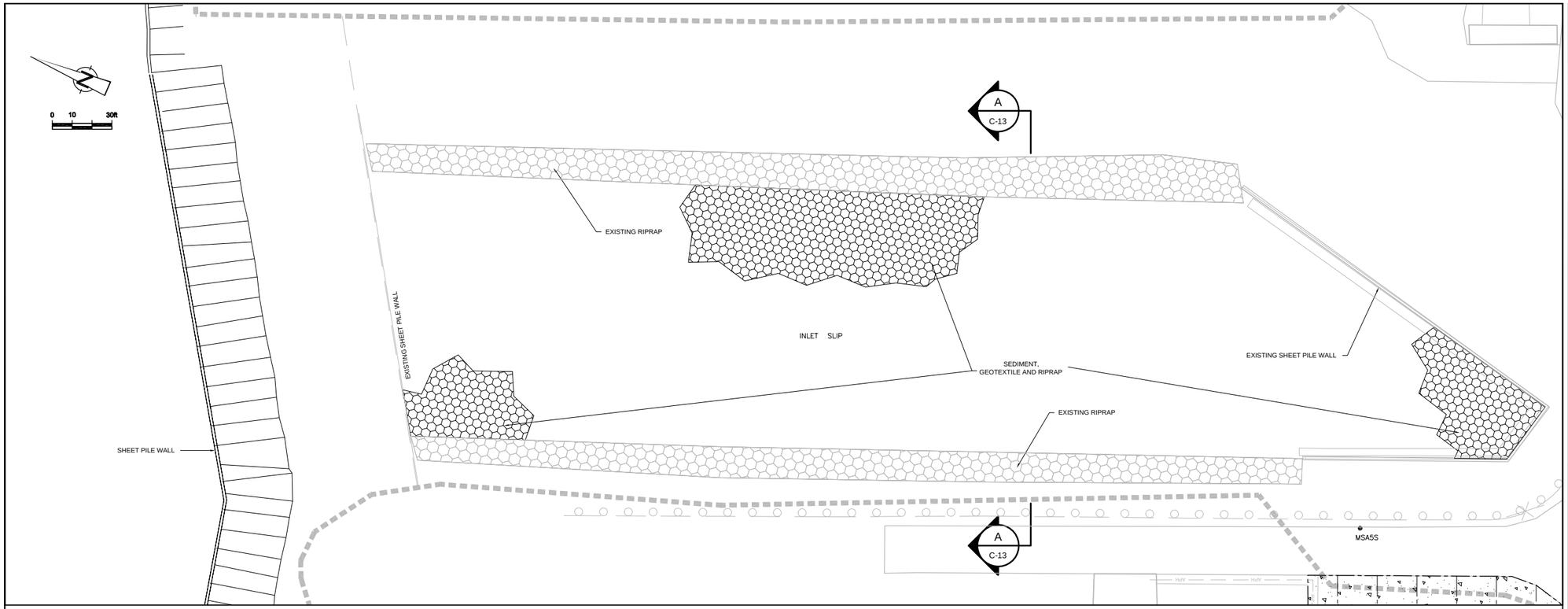
EAST LAGOON LINER DETAILS - 2 OF 2

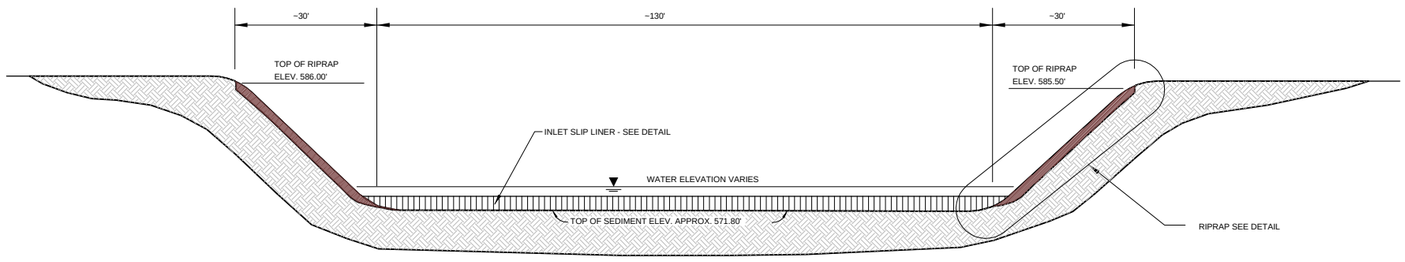
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

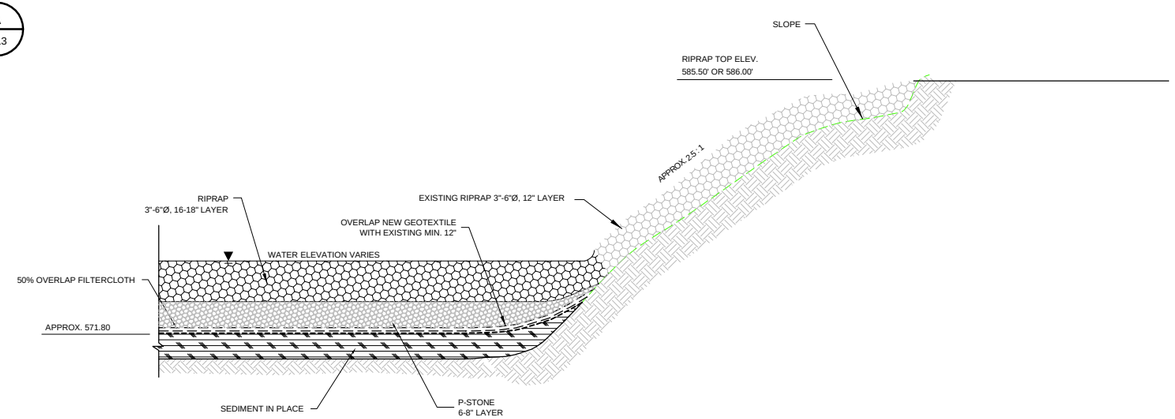
Project Manager:	Reviewed By:	Date:	
MRT	AW	JUNE 2000	
Scale: NOT TO SCALE	Project № 12610-10	Report № 016	Drawing № C-12AR

12610-10(016)CI-WA010 APR 16/2002





SECTION A / C-13
NTS



INLET SLIP LINER DETAIL
N.T.S.

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

REALM **Remediation and Liability Management Company, Inc.**

GM **POWERTRAIN**

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96
SHEET No. SH25

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

AS RECORDED

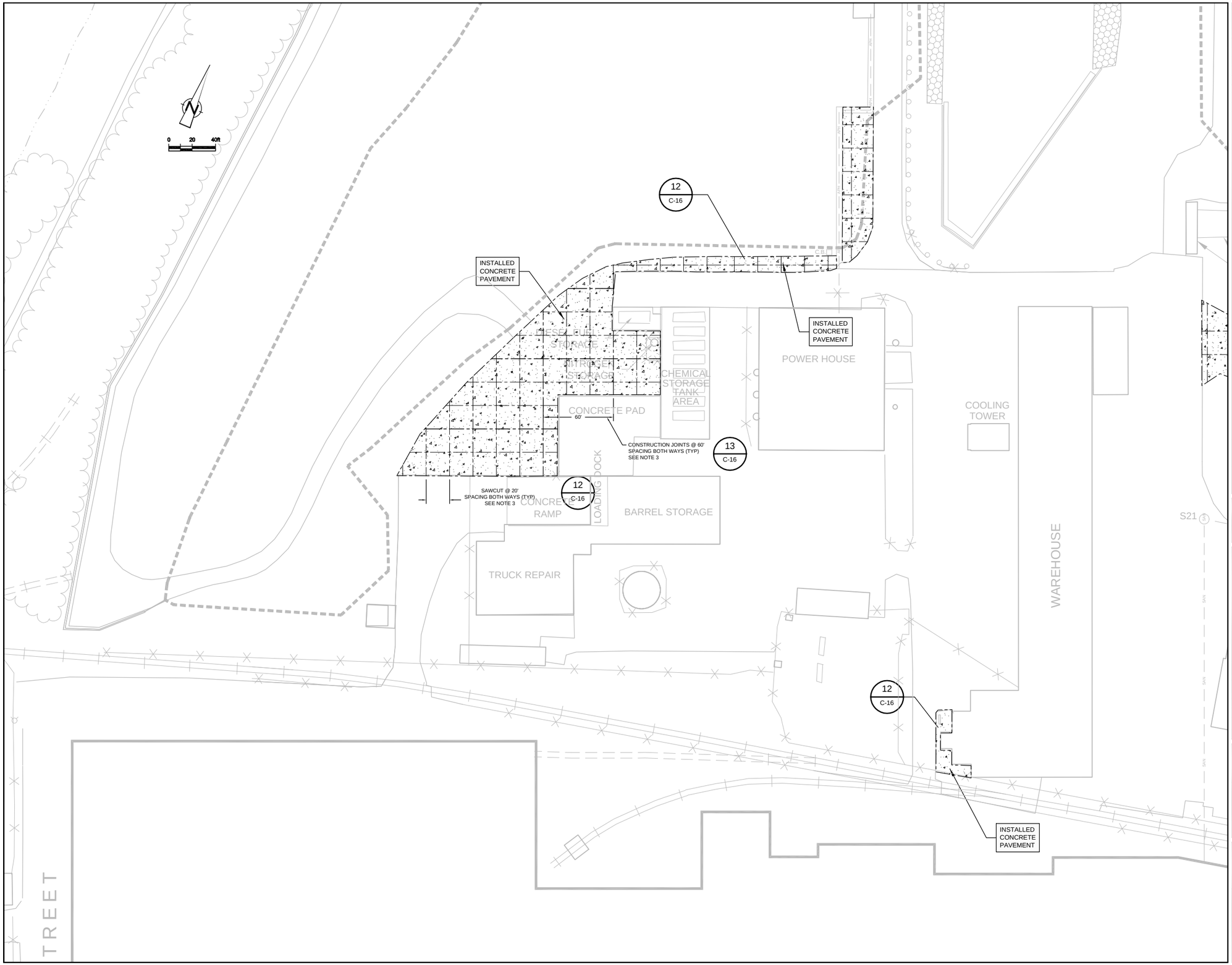
INLET SLIP LINER PLAN AND DETAILS

CRA **CONESTOGA-ROVERS & ASSOCIATES**

Source Reference: SPICER GROUP

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: AS SHOWN	Project No.: 12610-10	Report No.: 016	Drawing No.: C-13AR

12610-10(016)CI-WA021 APR 16/2002



NOTES:

1. PAVEMENT FINAL ELEVATIONS AND GRADES WILL BE DETERMINED IN FIELD.
2. ADJUST PAVEMENT TO MATCH EXISTING GRADES, MANHOLES AND STRUCTURES.
3. FINAL LOCATION AND SPACING FOR SAWCUT AND CONSTRUCTION JOINTS WILL BE DETERMINED IN FIELD.

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

REALM Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH26

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

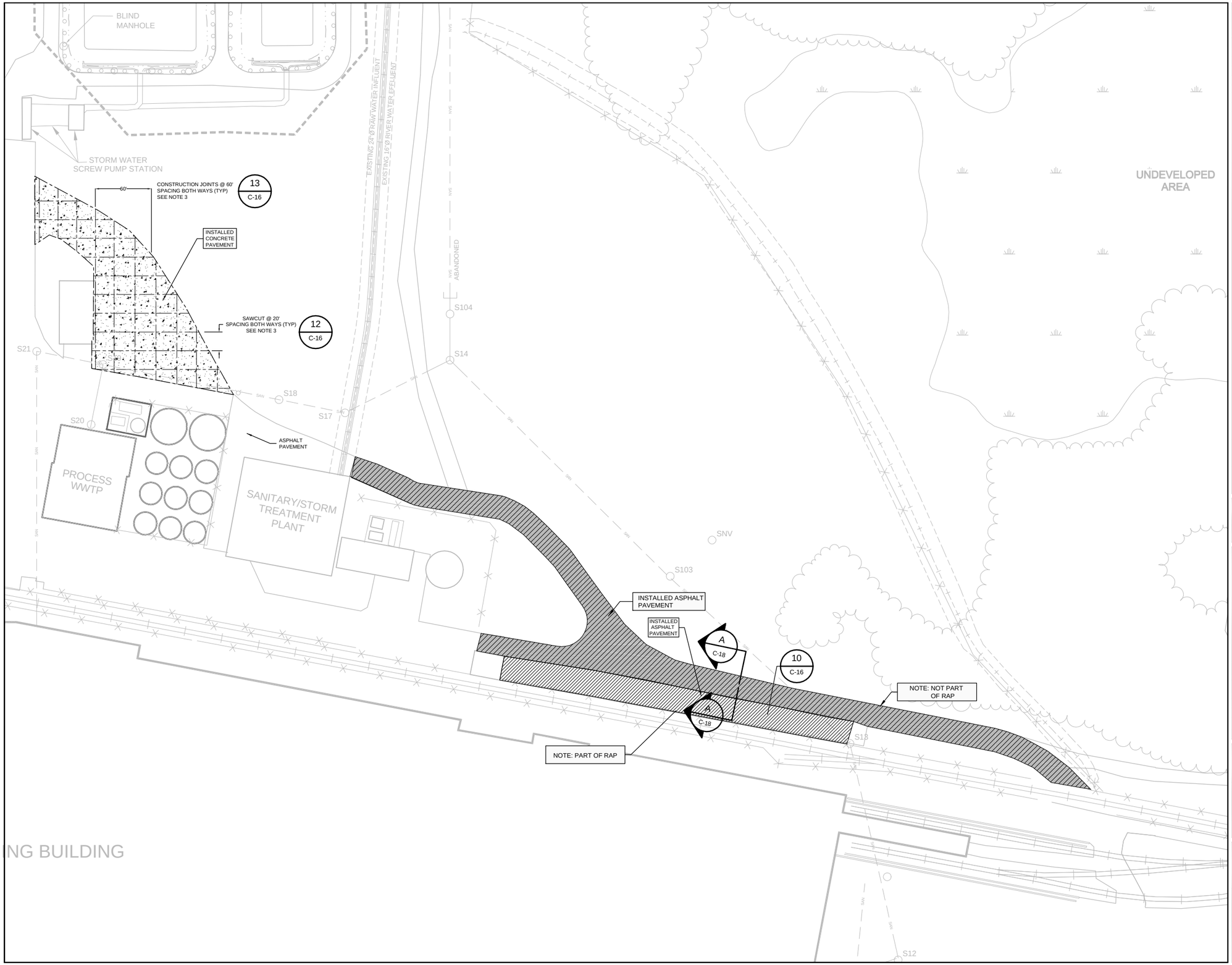
WEST SUPPORT FACILITIES AREA PAVEMENT PLAN

CRA CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
SPICER GROUP, SAGINAW, MICHIGAN, DRAWING D352409, OCTOBER 1999

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=40'	Project N ⁰: 12610-10	Report N ⁰: 016	Drawing N ⁰.: C-14AR

12610-10(016)CI-WA019 APR 16/2002



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

NOTES:

1. PAVEMENT FINAL ELEVATIONS AND GRADES WILL BE DETERMINED IN FIELD.
2. ADJUST EXISTING MANHOLES AND STRUCTURES AS REQUIRED
3. FINAL LOCATION AND SPACING FOR SAWCUT AND CONSTRUCTION JOINTS TO BE DETERMINED IN FIELD

REALM **Remediation and Liability Management Company, Inc.**

GM **POWERTRAIN**

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH27

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

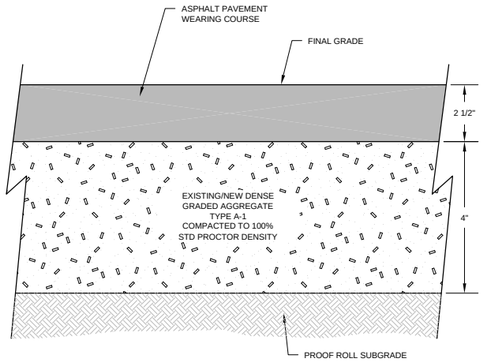
EAST SUPPORT FACILITIES AREA PAVEMENT PLAN

CRA **CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:
SPICER GROUP, SAGINAW, MICHIGAN, DRAWING D352409 AND D352406, OCTOBER 1999

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=50'	Project N №: 12610-10	Report N №: 016	Drawing N №: C-15AR

12610-10(016)CI-WA018 APR 16/2002



DETAIL 10 / C-15

FLEXIBLE PAVEMENT DETAIL

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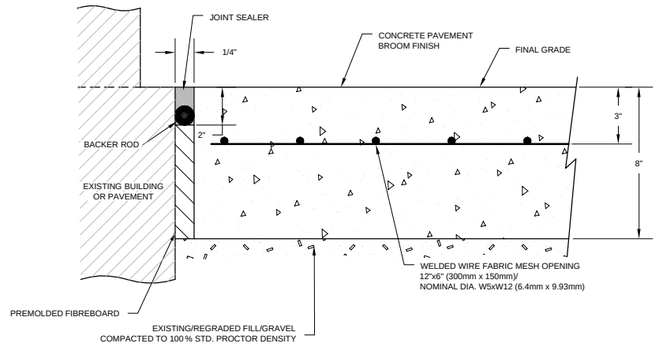

DETAIL 11 / S-03

RIGID PAVEMENT ISOLATION JOINT DETAIL

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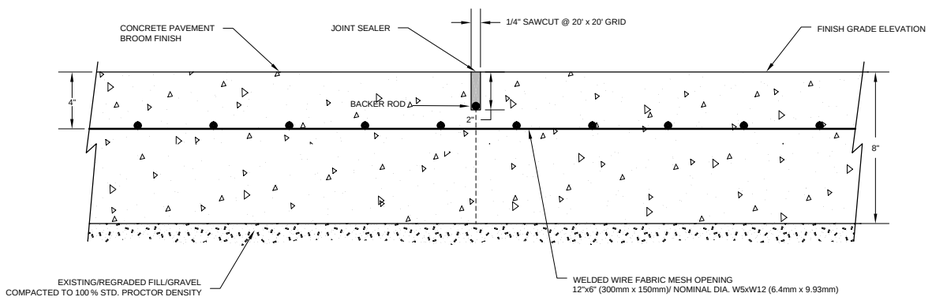
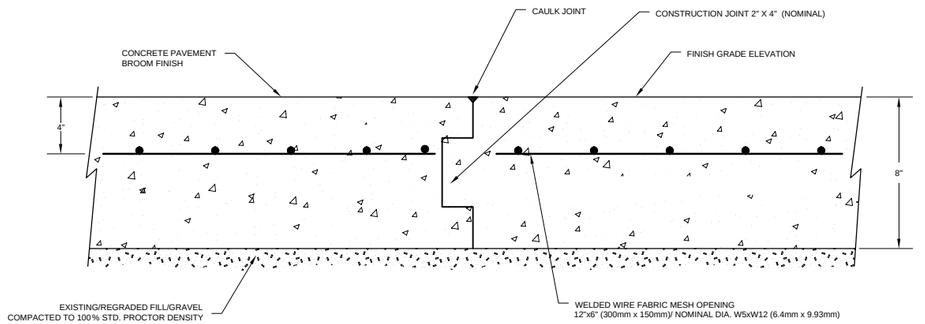


DETAIL 12 / C-15

SAWCUT DETAIL

N.T.S.



DETAIL 13 / C-15

RIGID PAVEMENT CONSTRUCTION JOINT DETAIL

N.T.S.

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	REVISED CONSTRUCTION JOINT DETAILS	APR 15/99	RLA
3	AS RECORDED	MAY 2000	MRT

REALM Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH28

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

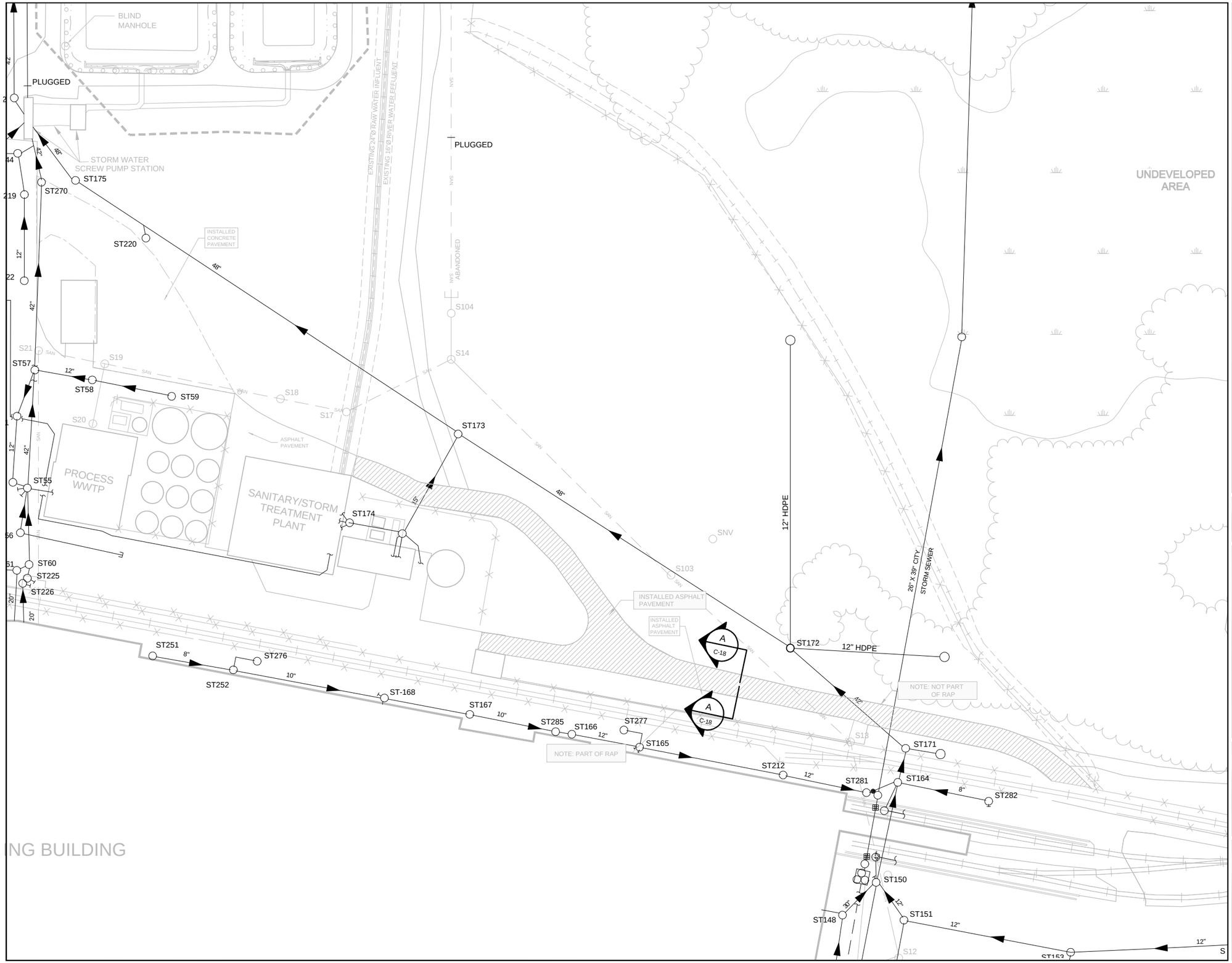
SUPPORT FACILITIES AREA DETAILS

CRA CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: AS SHOWN	Project N º: 12610-10	Report N º: 016	Drawing N º: C-16AR

12610-10(016)CI-WA011 APR 16/2002



№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

NOTES:

1. PAVEMENT FINAL ELEVATIONS AND GRADES WILL BE DETERMINED IN FIELD.
2. ADJUST EXISTING MANHOLES AND STRUCTURES AS REQUIRED
3. FINAL LOCATION AND SPACING FOR SAWCUT AND CONSTRUCTION JOINTS TO BE DETERMINED IN FIELD

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH27

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

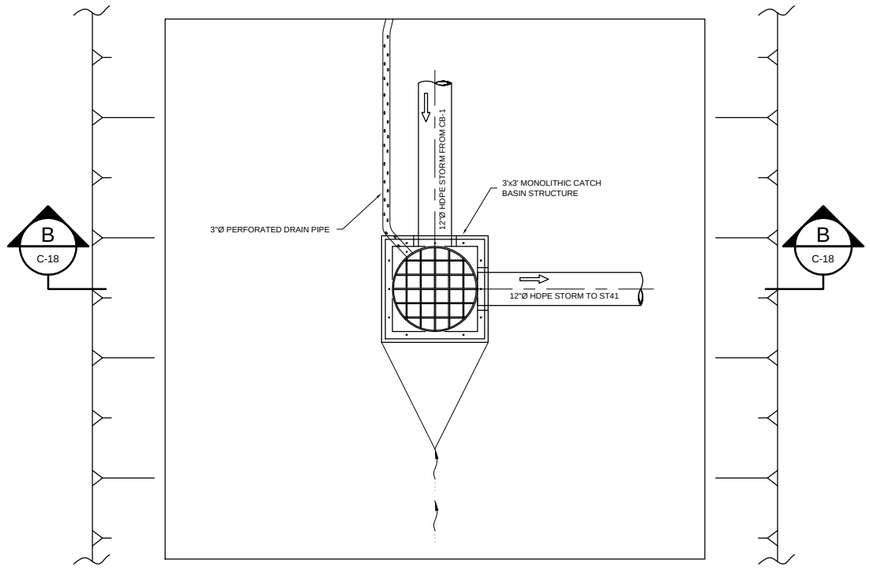
AS RECORDED

EAST AREA
DRAINAGE

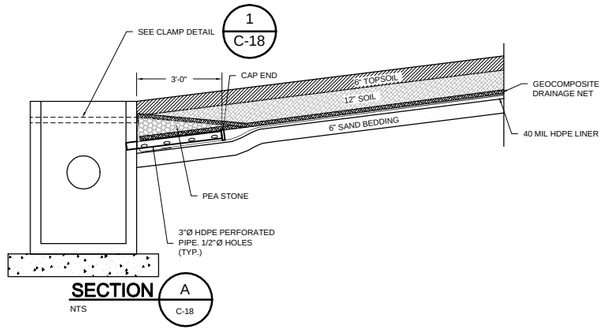
CONESTOGA-ROVERS & ASSOCIATES

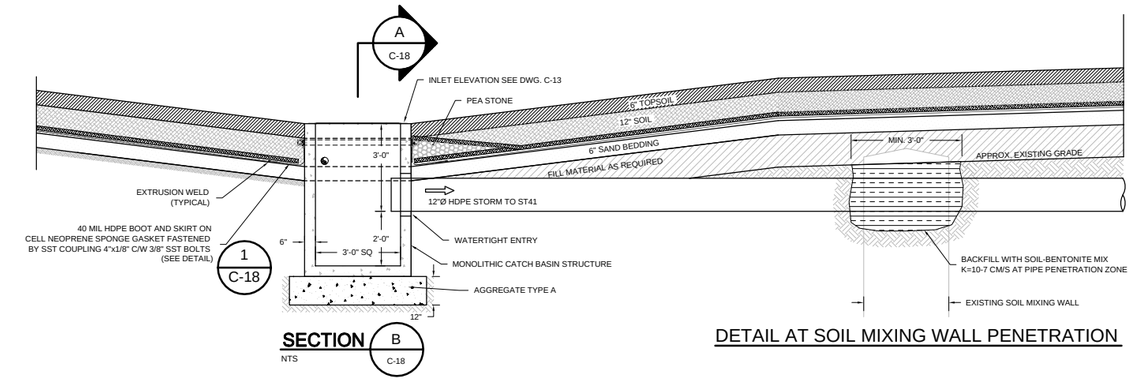
Source Reference:			
SPICER GROUP			
Project Manager: MRT	Reviewed By: RLA	Date: JUNE 2000	
Scale: 1"=50'	Project N º: 12610-10	Report N º: 016	Drawing N º.: C-17AR

12610-10(016)CI-WA020 APR 16/2002

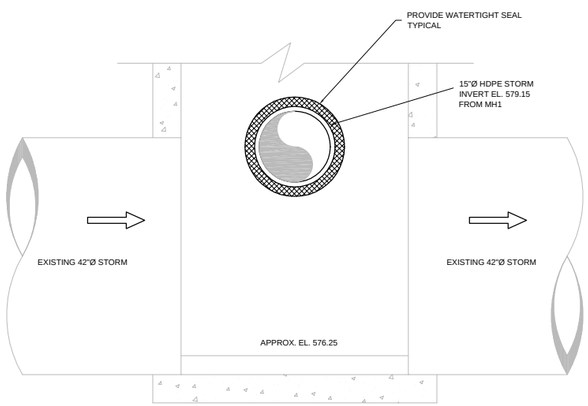


PLAN OF TYPICAL CATCH BASIN DETAIL (CB-2)

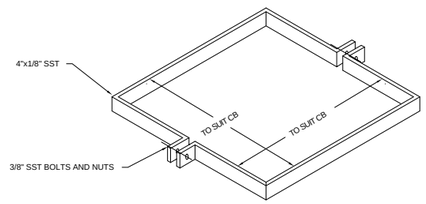




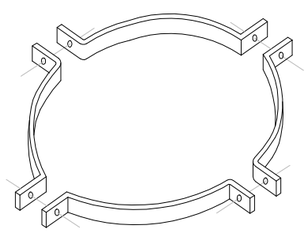
DETAIL AT SOIL MIXING WALL PENETRATION



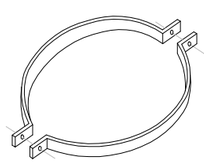
ELEVATION OF EXISTING MANHOLE ST41



TWO PIECE SQUARE COUPLING DETAIL



FOUR PIECE ROUND COUPLING DETAIL



TWO PIECE ROUND COUPLING DETAIL

DETAIL 1 C-18
NTS

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	SEPTEMBER 2000	MRT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH30

AS RECORDED SEPTEMBER 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

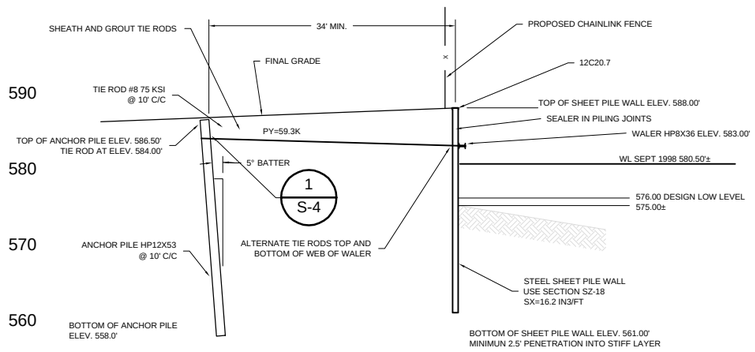
MANHOLE AND CATCHBASIN DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	AW	JUNE 2000	
Scale: 3/4"=1'-0"	Project N №: 12610-10	Report N №: 016	Drawing N №: C-18AR

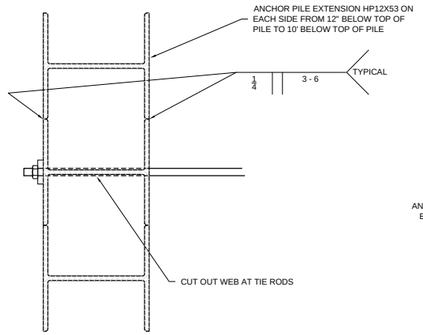
12610-10(016)CI-WA022 APR 16/2002



DETAIL D-3 / S-01

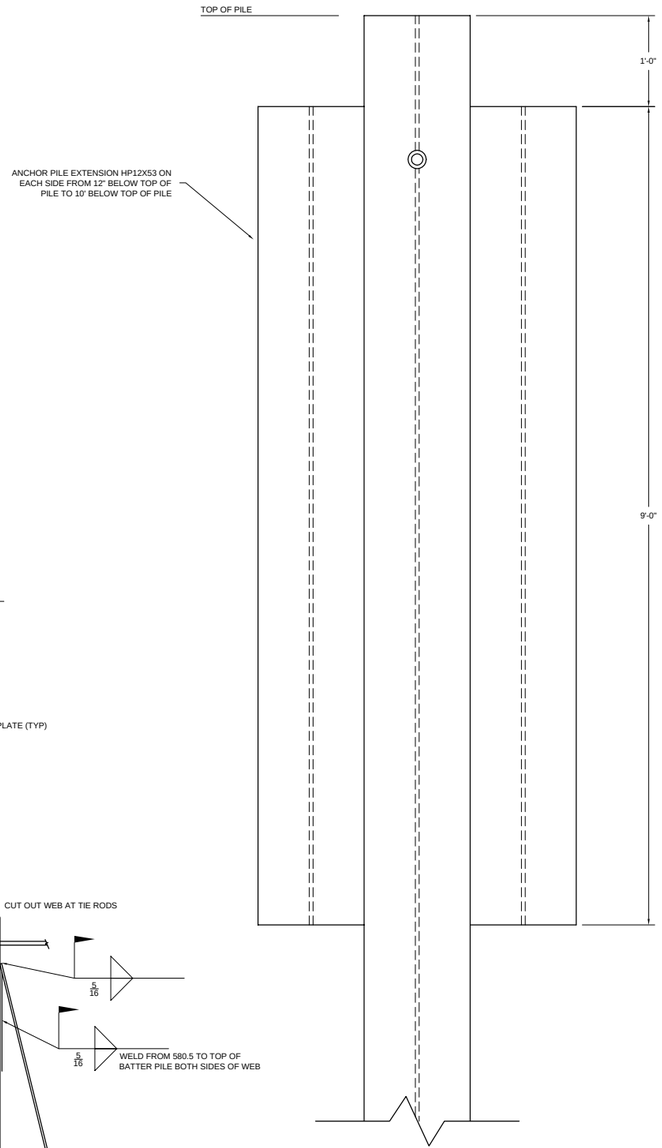
NTS

TYPICAL SECTION NOT ADJACENT DSM WALL



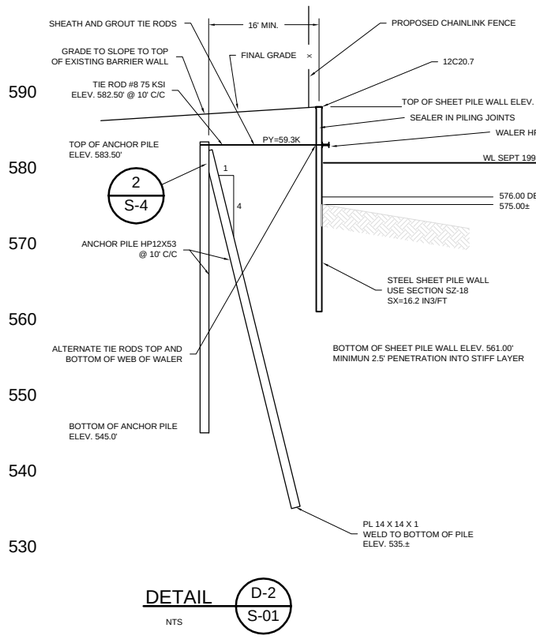
DETAIL 1 / S-4 PLAN

NTS



DETAIL 1 / S-4 ELEVATION

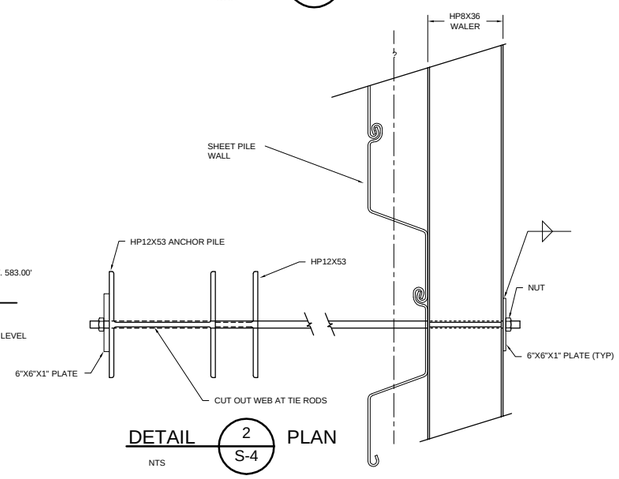
NTS



DETAIL D-2 / S-01

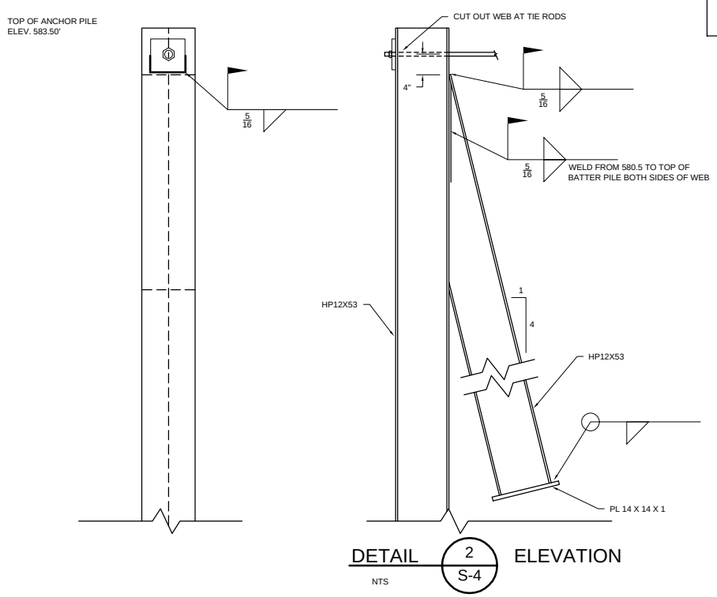
NTS

TYPICAL SECTION ADJACENT TO DSM WALL



DETAIL 2 / S-4 PLAN

NTS



DETAIL 2 / S-4 ELEVATION

NTS

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH34

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

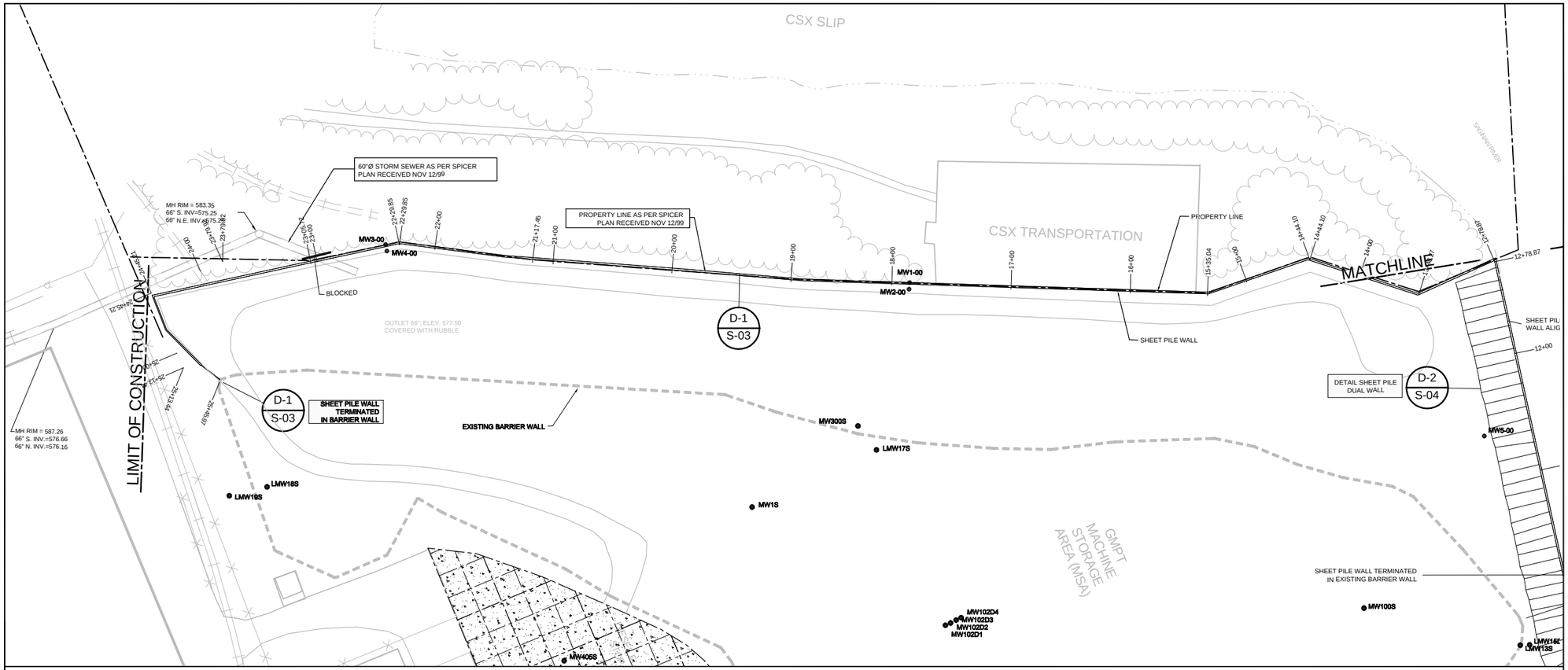
SHEET PILING DETAILS
SHEET 2 OF 2

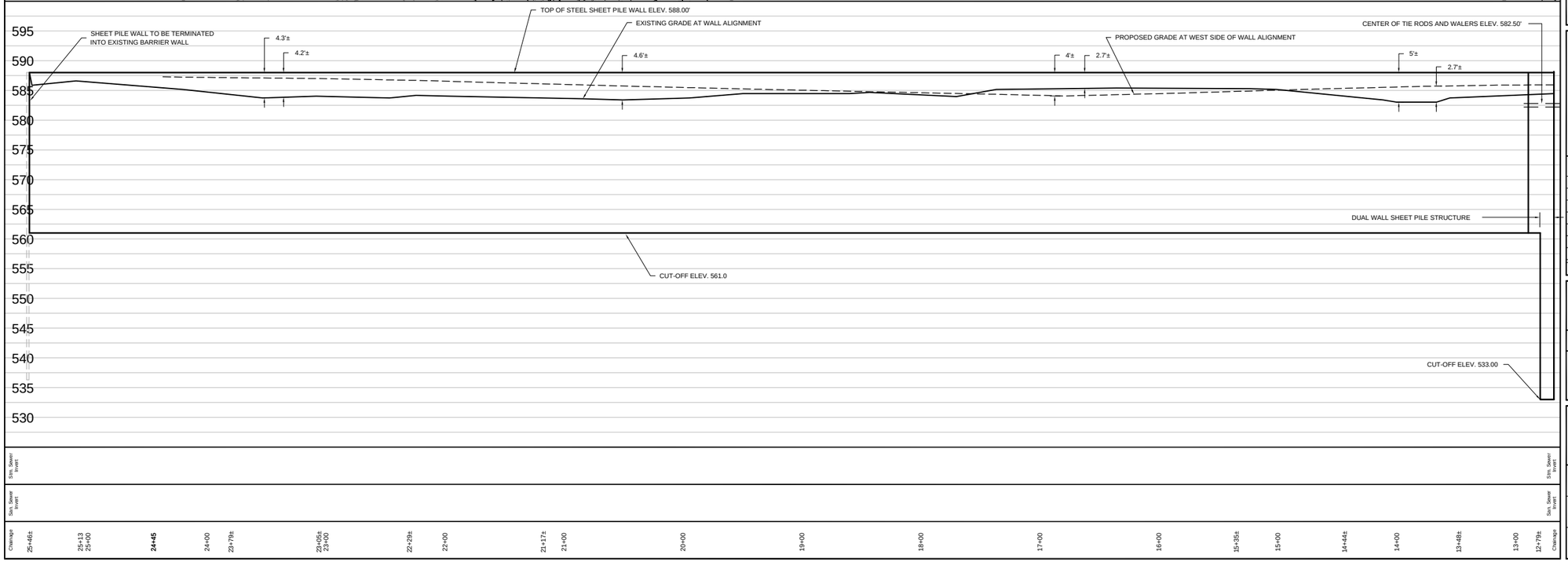
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: AS SHOWN	Project N º: 12610-10	Report N º: 016	Drawing N º: S-04AR

12610-10(016)ST-WA004 APR 16/2002





№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-H-96
SHEET No.: SH32

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

CROTTY STREET CHANNEL SITE
BAY CITY, MICHIGAN

AS RECORDED

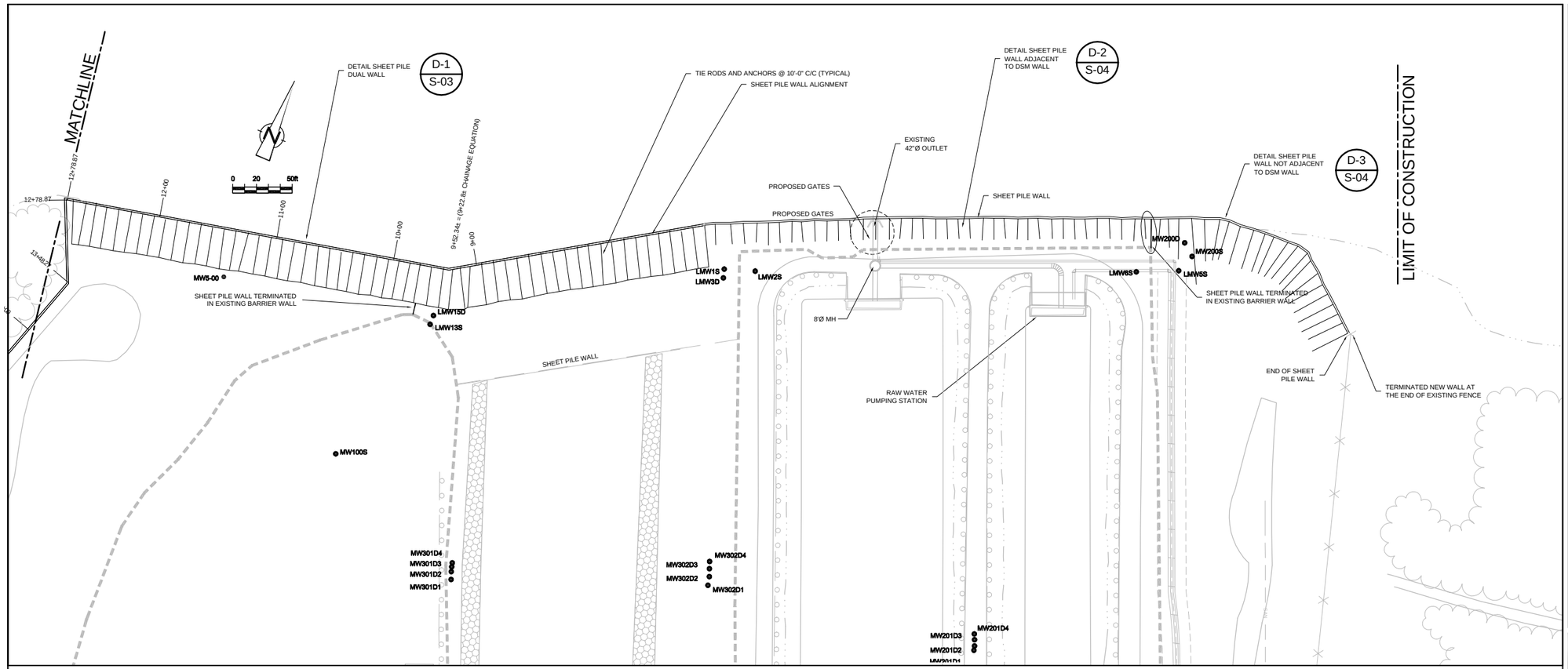
SHEET PILING
PLAN AND PROFILE 10+50 - 25+46

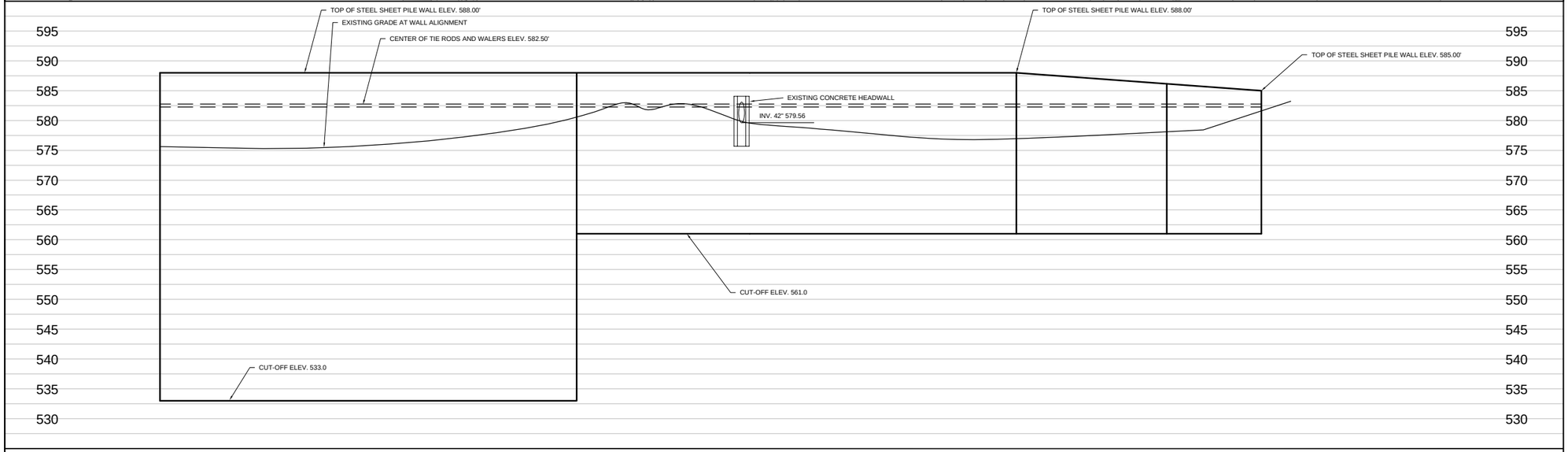
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
SPICER GROUP, SAGINAW, MICHIGAN, DRAWING E23201, FEBRUARY 2000

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=50' 1"=10'	Project N №: 12610-10	Report N №: 016	Drawing N №: S-02AR

12610-10(016)ST-WA003 APR 16/2002





№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96

SHEET No. SH31

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

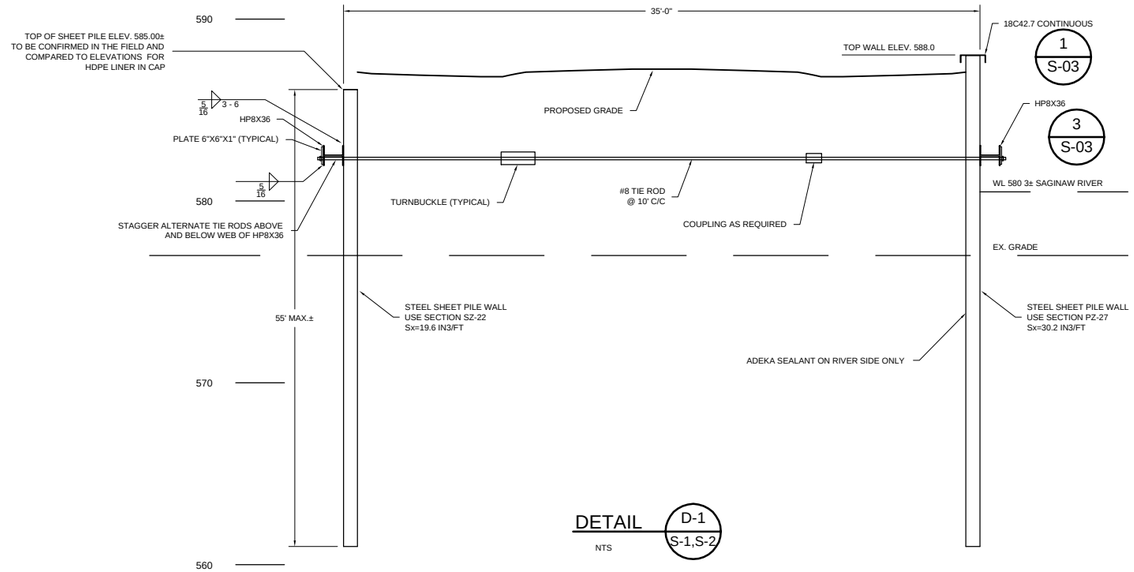
SHEET PILING
PLAN AND PROFILE 1+00 - 12+78.87

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
SPICER GROUP, SAGINAW, MICHIGAN, DRAWING D352408, JULY 1999

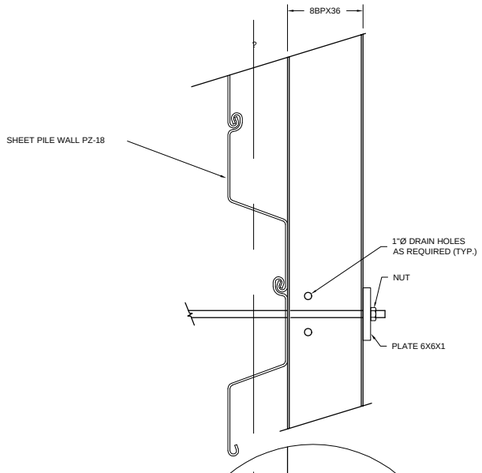
Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=50' 1"=10'	Project N №: 12610-10	Report N №: 016	Drawing N №: S-01AR

12610-10(016)ST-WA002 APR 16/2002

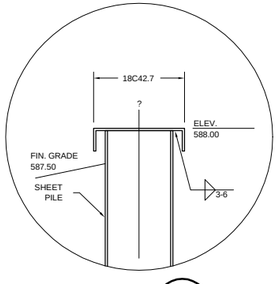


DETAIL D-1 / S-1,S-2
NTS

SECTION THROUGH DUAL WALL



DETAIL 3 / S-03
NTS



DETAIL 1 / S-03
NTS

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	MRT

REALM Remediation and Liability Management Company, Inc.

GM POWERTRAIN
GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-H-96
SHEET No. SH33

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

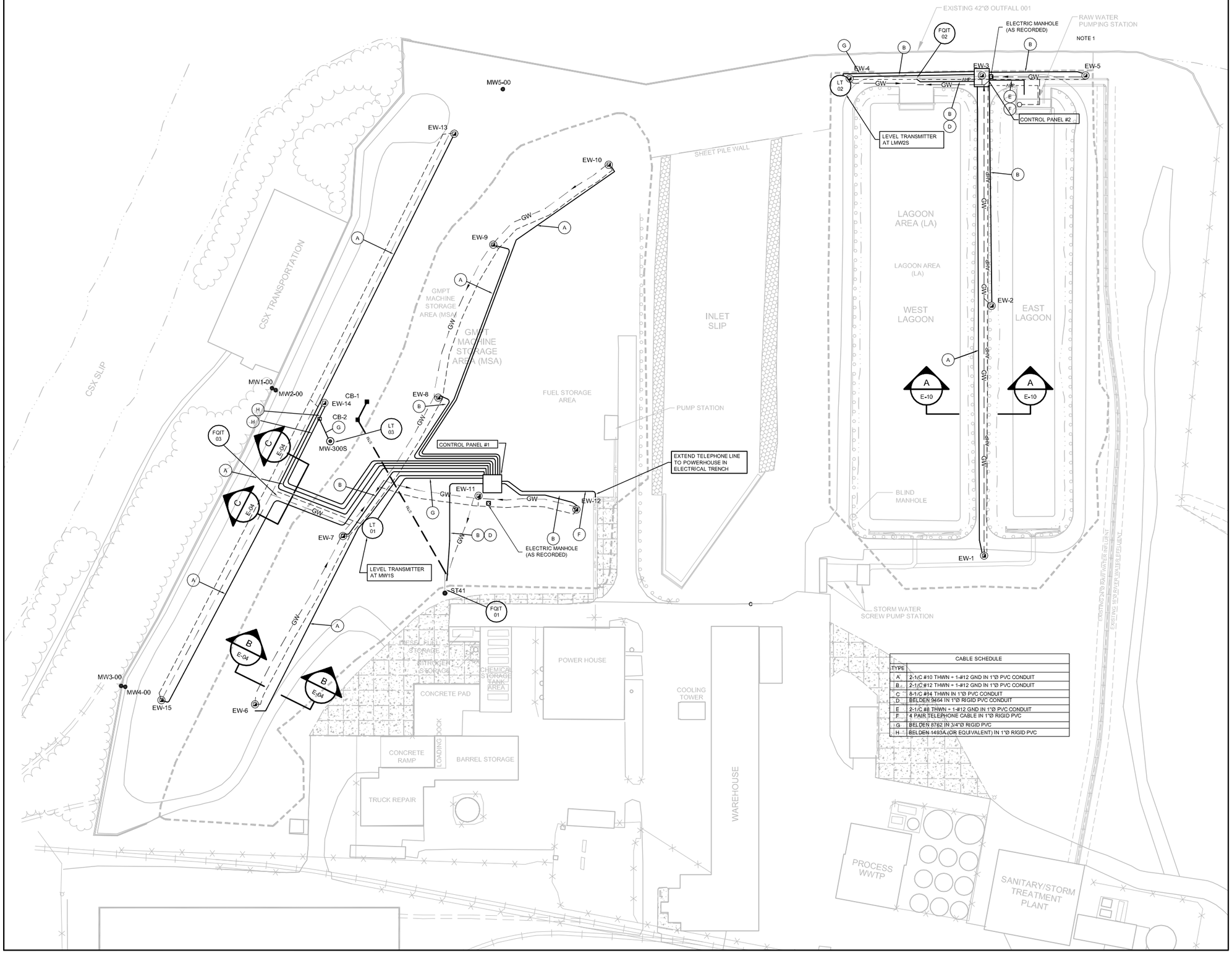
SHEET PILING DETAILS
SHEET 1 OF 2

CRA CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: AS SHOWN	Project N º: 12610-10	Report N º: 016	Drawing N º: S-03AR

12610-10(016)ST-WA001 APR 16/2002



CABLE SCHEDULE	
TYPE	
A	2-1/C #10 THWN + 1-#12 GND IN 1"Ø PVC CONDUIT
B	2-1/C #12 THWN + 1-#12 GND IN 1"Ø PVC CONDUIT
C	8-1/C #14 THWN IN 1"Ø PVC CONDUIT
D	BELDEN 9R64 IN 1"Ø RIGID PVC CONDUIT
E	2-1/C #8 THWN + 1-#12 GND IN 1"Ø PVC CONDUIT
F	4 PAIR TELEPHONE CABLE IN 1"Ø RIGID PVC
G	BELDEN 8762 IN 3/4"Ø RIGID PVC
H	BELDEN 1493A (OR EQUIVALENT) IN 1"Ø RIGID PVC

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	ADDITIONAL FOR NEW EXTRACTION WELLS	NOV 15/99	BFM
3	REVISED AS REQUIRED	DEC 06/99	BFM
4	AS RECORDED	MAY 2000	BFM

NOTES:

1. CONNECT TO EXISTING 480V, 3Ø DISTRIBUTION PANEL IN RAW WATER FEED STATION. CONNECT TELEPHONE LINE TO EXISTING PHONE SYSTEM AT RAW WATER FEED SYSTEM.
2. POWER OF EW-13, 14, 15 TO BE FROM DISTRIBUTION PANEL(CP1) MOUNTED IN CONTROL BUILDING AT EW-11.
3. FLOWMETER FQIT-03 TO BE INSTALLED IN CHAMBER AT EW-14. LEVEL TRANSMITTER LT-03 TO BE INSTALLED AT MW300S.
4. POWER SUPPLY TO FQIT-03 TO BE FROM EW-14. BELDEN 1493A CABLE (4 PAIRS, IS & OS) OR EQUIVALENT TO BE USED FOR SIGNALS OF FQIT-03 AND LT-03. REFER TO DWG. E-05, 07.

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-E-81
SHEET No.: SH35

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY MICHIGAN

AS RECORDED

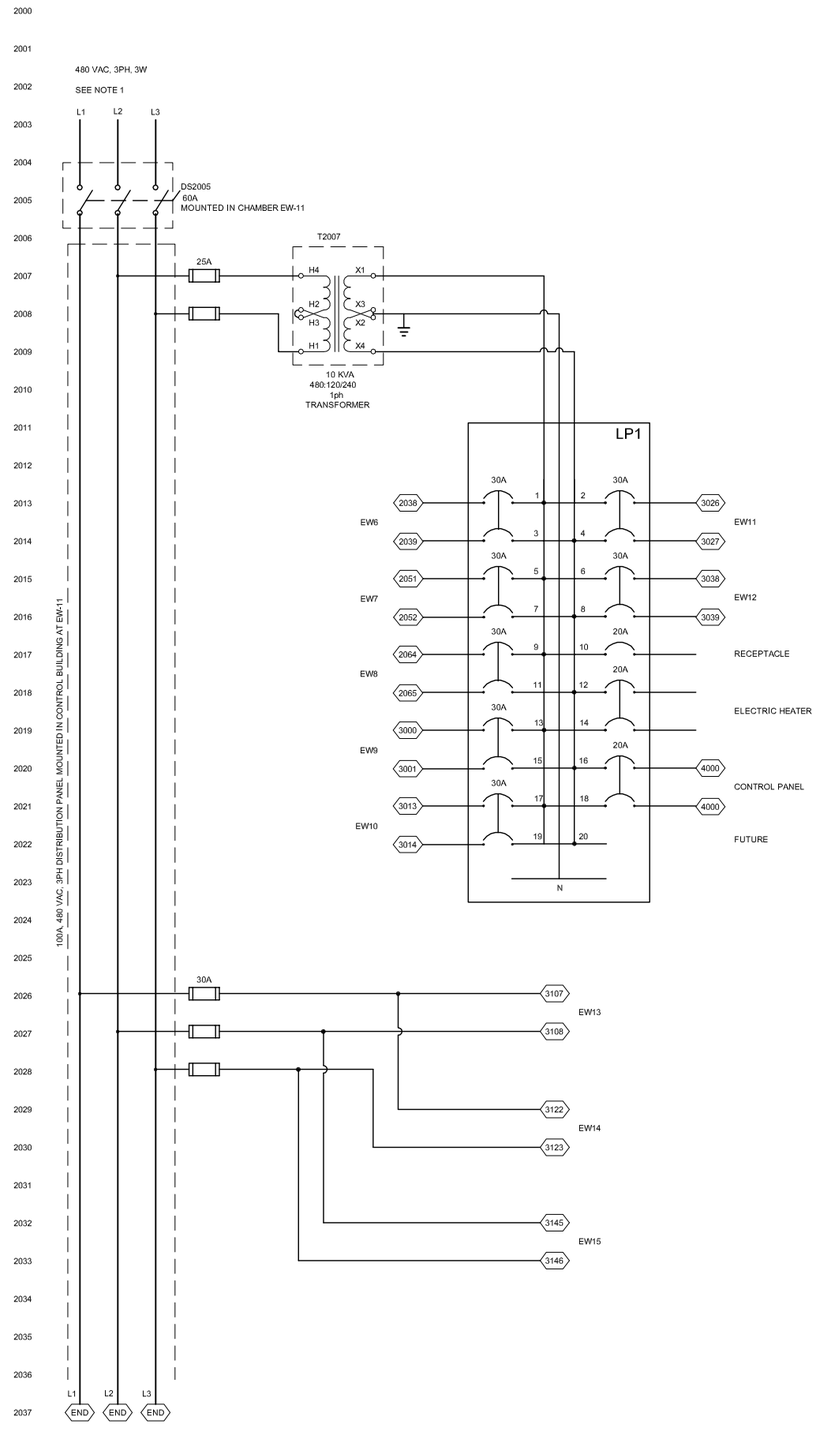
ELECTRICAL
SITE PLAN

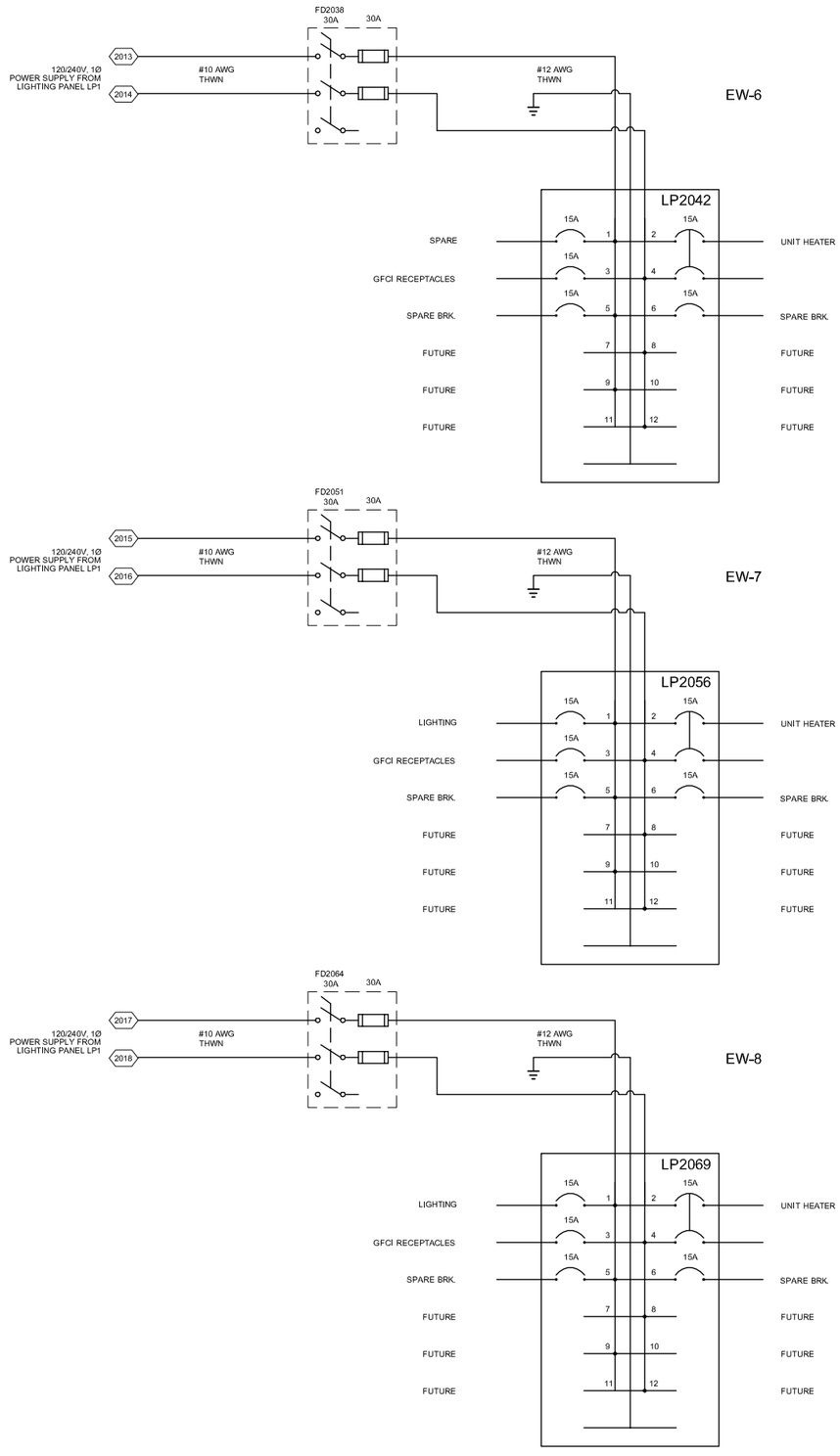
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: 1"=60'	Project N №: 12610-10	Report N №: 016	Drawing N №: E-01AR

12610-10(016)EL-ME001 FEB 26/2003





NOTES:

1. POWER FEED FROM EXISTING PUMPING STATION CONTROL PANEL

No.	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	JL

Remediation and Liability Management Company, Inc.

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-E-81
SHEET No.: SH36

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

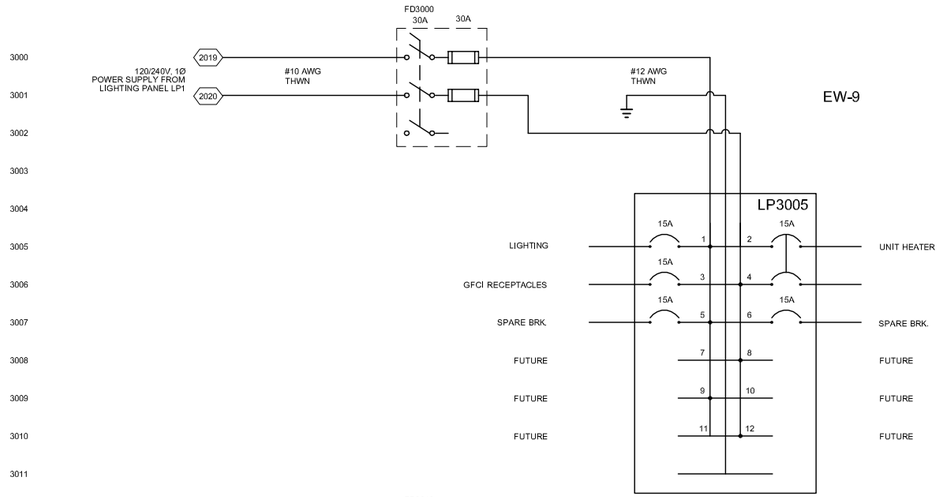
EQUIPMENT STORAGE AREA
POWER DISTRIBUTION SH. 1 OF 3

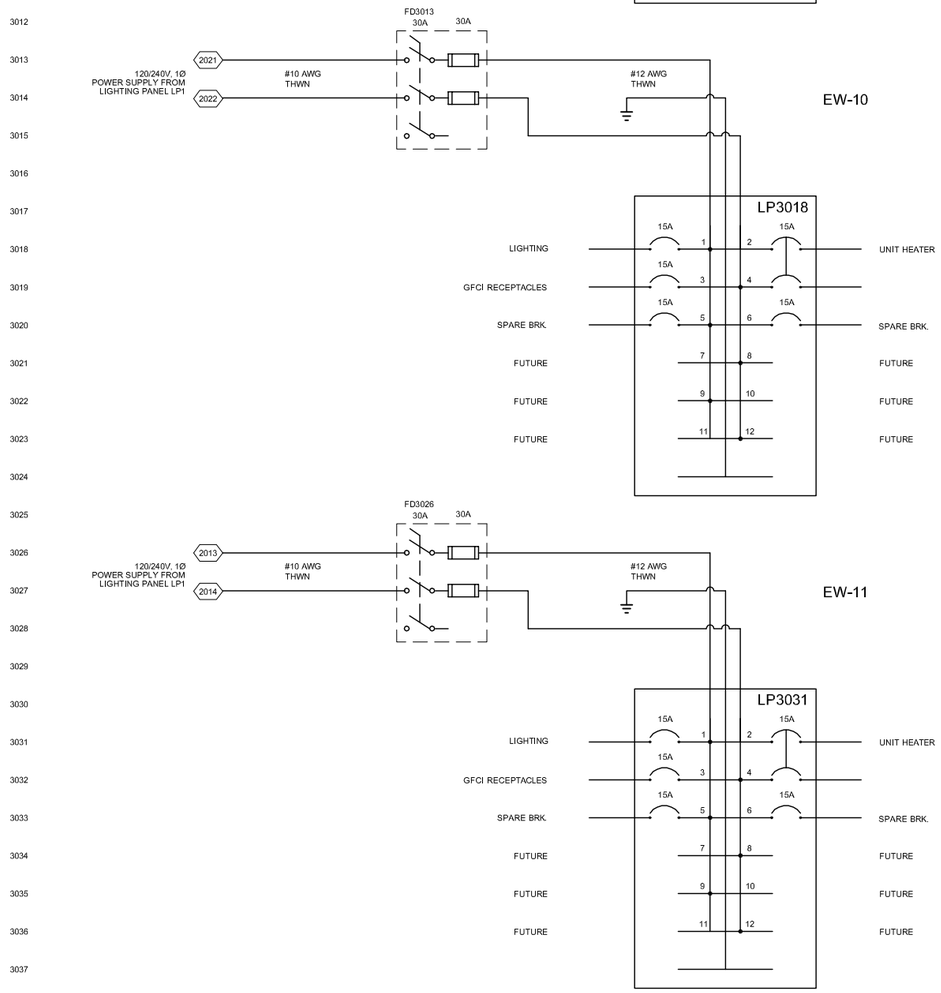
CONESTOGA-ROVERS & ASSOCIATES

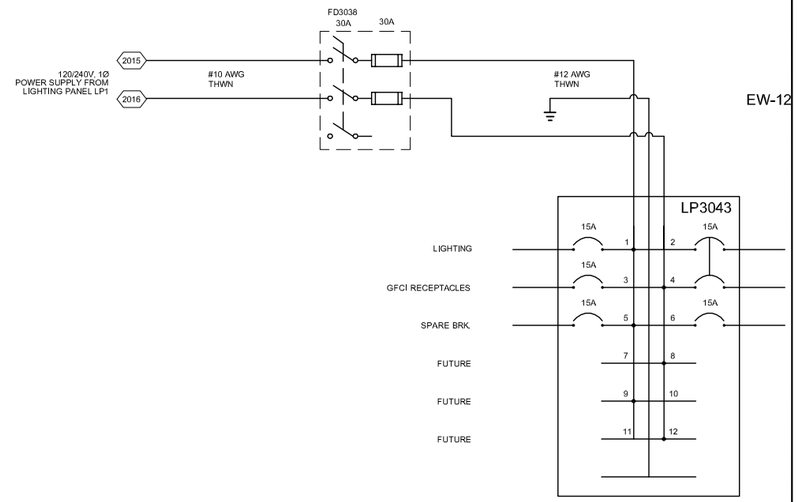
Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project No.: 12610-10	Report No.: 016	Drawing No.: E-02AR

12610-10(016)EL-ME002 FEB 26/2003







MAJOR EQUIPMENT LIST

FOR EW-6,7,8,9,10,11,12

SYM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
DP1	1	C-H	YS2024/LT2024S	100A, 18CCT 480V 3ø 3W PANELBOARD
DS 2005	1	SQUARE-D	HU361	30A NON-FUSED DISCONNECT
FD2038,FD2051 FD2064,FD3000,FD3013, FD3026,FD3038	7	SQUARE-D	H362	60A DISCONNECT
LP2042,LP2056,LP2069	1	SQUARE-D	--	100A, 20cct, 120/240V, 3W
LP2042,LP2056,LP2069 LP3005,LP3018,LP3031, LP3043	7	SQUARE-D	NQOD12L100CV/ MH20/MHC20/S	100A, 12cct, 120/240V, 3W PANELBOARD, NEMA1
T2007	1	SQUARE-D	--	480:120/240 10 KVA LIGHTING TRANSFORMER

SEE DWG.12610-20(004)EL-ME003AME FOR MAJOR EQUIPMENT LIST OF EW-13, 14, 15

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	REVISED AS REQUIRED	NOV 15/99	BFM
3	AS RECORDED	MAY 2000	BFM

REALM **Remediation and Liability Management Company, Inc.**

GM **POWERTRAIN**

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-E-81

SHEET No. SH37

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

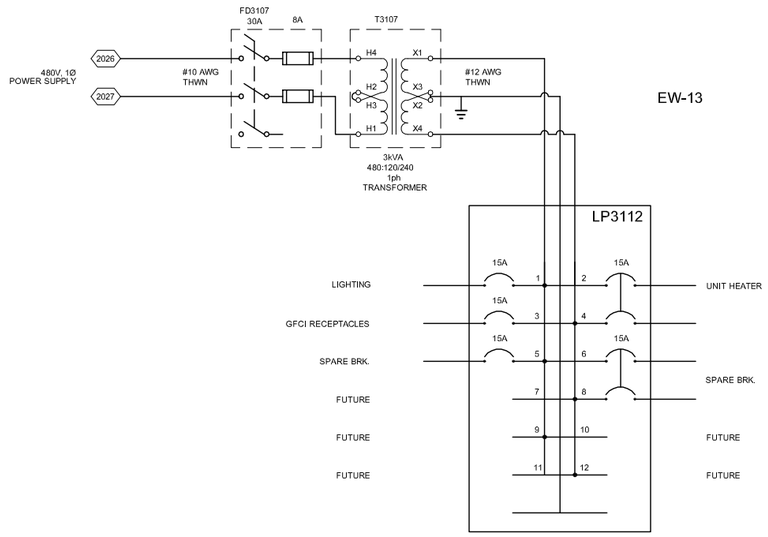
EQUIPMENT STORAGE AREA
POWER DISTRIBUTION SHEET 2 OF 3

CRA **CONESTOGA-ROVERS & ASSOCIATES**

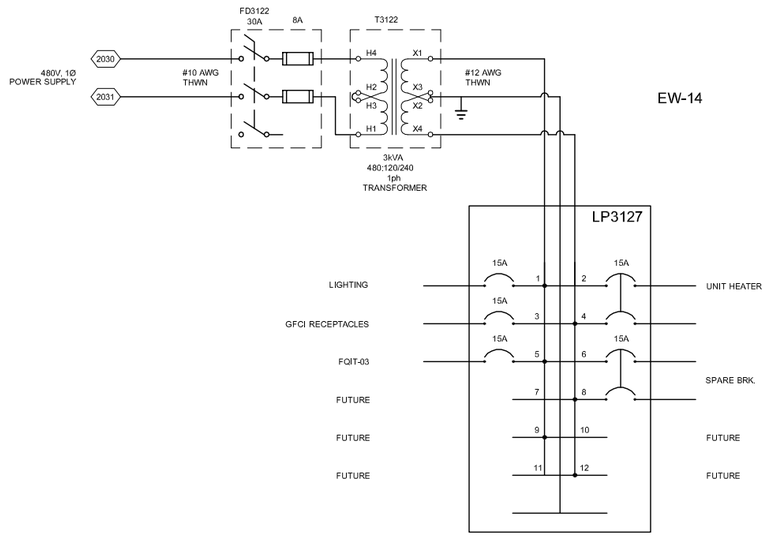
Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project No.: 12610-10	Report No.: 016	Drawing No.: E-03AR

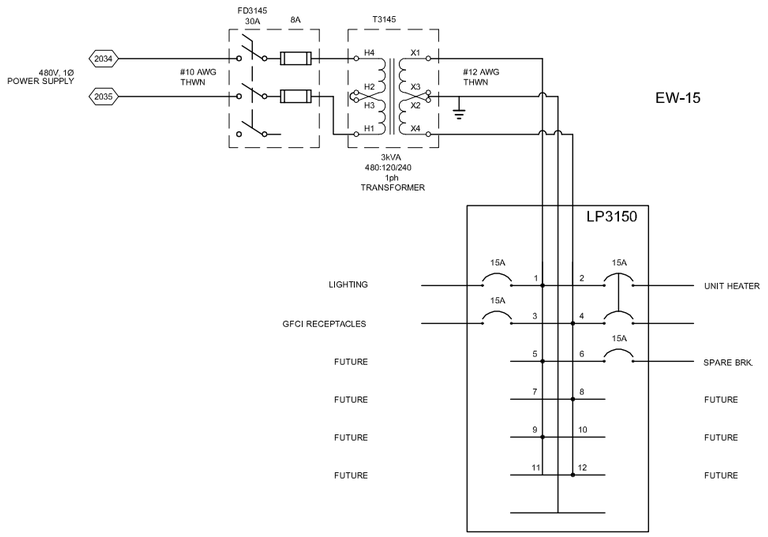
12610-10(016)EL-ME003 APR 16/2002



EW-13



EW-14



EW-15

MAJOR EQUIPMENT LIST

FOR EW-13, 14, 15

SYM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
FD3107,FD3122,FD3145	3	SQUARE-D	H361DS	30A DISC. WITH NEMA 4X ENCLOSURE
T3107,T3122,T3145	3	SQUARE-D	3S1F	480:120/240, 3kVA OUTDOOR LIGHTING TRANSFORMER
LP3112,LP3127,LP3150	3	SQUARE-D	NQOD12L100CV/ MH20WP	100A, 12cct, 120/240V, 3W PANELBOARD, NEMA3R

EW-13, 14, 15 POWER DISTRIBUTION DIAGRAM

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	FOR NEW EXTRACTION WELLS	NOV 15/99	BFM
3	REVISED FOR NEW EXTRACTION WELLS	NOV 30/99	BFM
4	AS RECORDED	MAY 2000	BFM

REALM **Remediation and Liability Management Company, Inc.**

GM **POWERTRAIN**

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-E-81

SHEET No. SH38

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

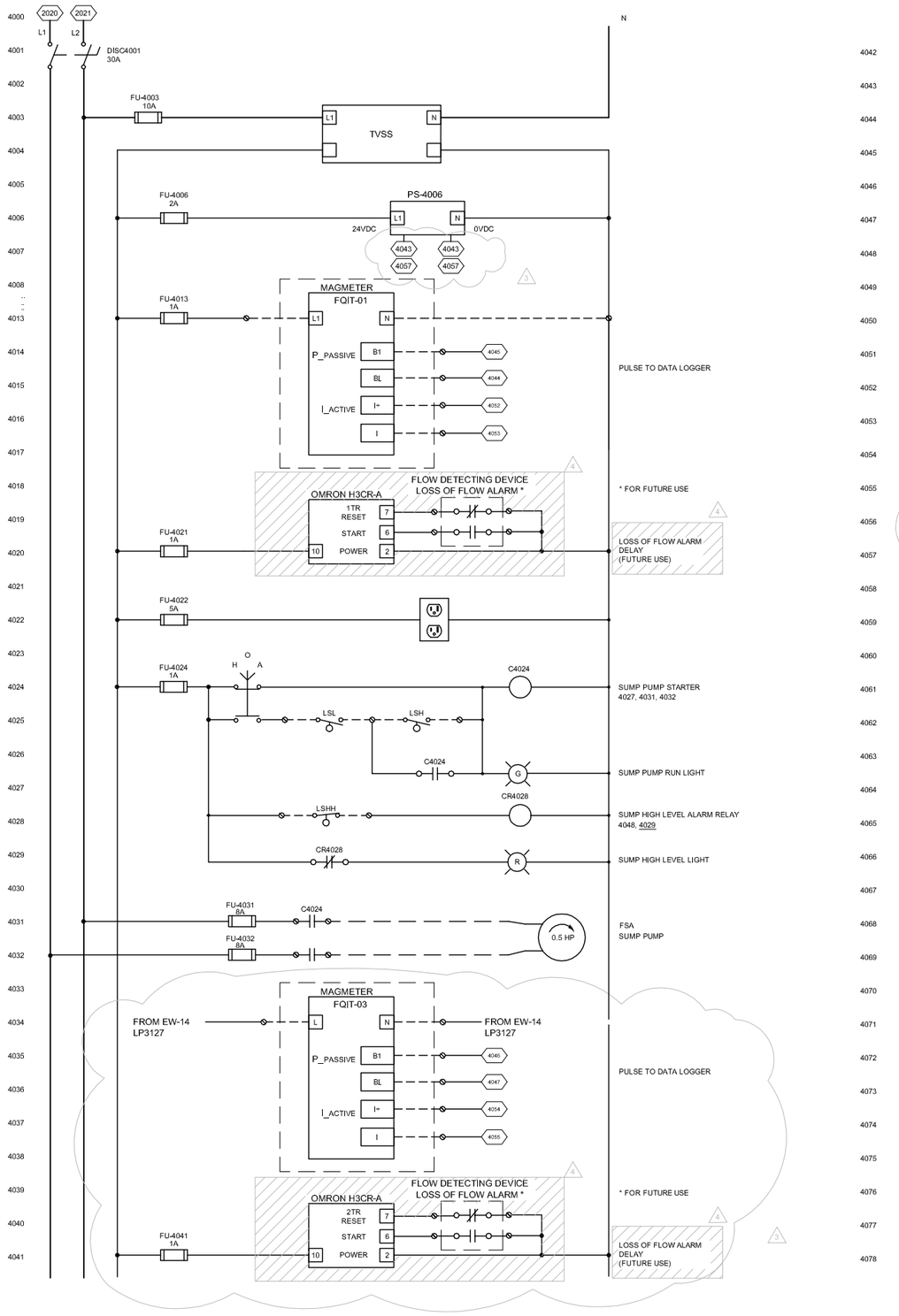
EQUIPMENT STORAGE AREA
POWER DISTRIBUTION SHEET 3 OF 3

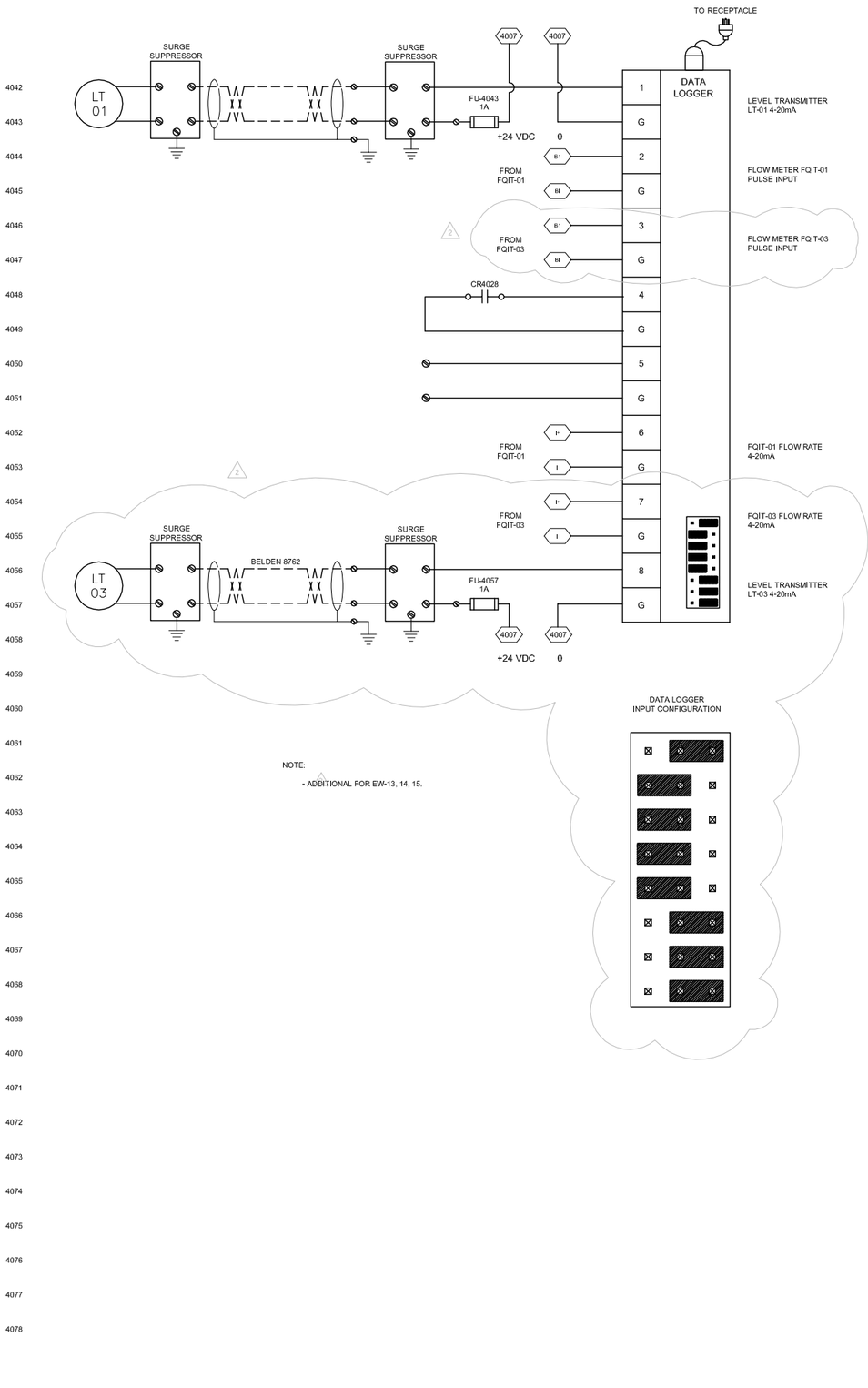
CRA **CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project N №: 12610-10	Report N №: 016	Drawing N №: E-04AR

12610-10(016)EL-ME004 FEB 26/2003





NOTE:

- ADDITIONAL FOR EW-13, 14, 15.

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	ADDITIONAL FOR NEW EXTRACTION WELLS	NOV 15/99	BFM
3	REVISED AS REQUIRED	DEC 06/99	BFM
4	AS RECORDED	MAY 2000	BFM

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-E-81
SHEET No.: SH39

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

CONTROL SCHEMATIC
CP1

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project N №: 12610-10	Report N №: 016	Drawing N №: E-05AR

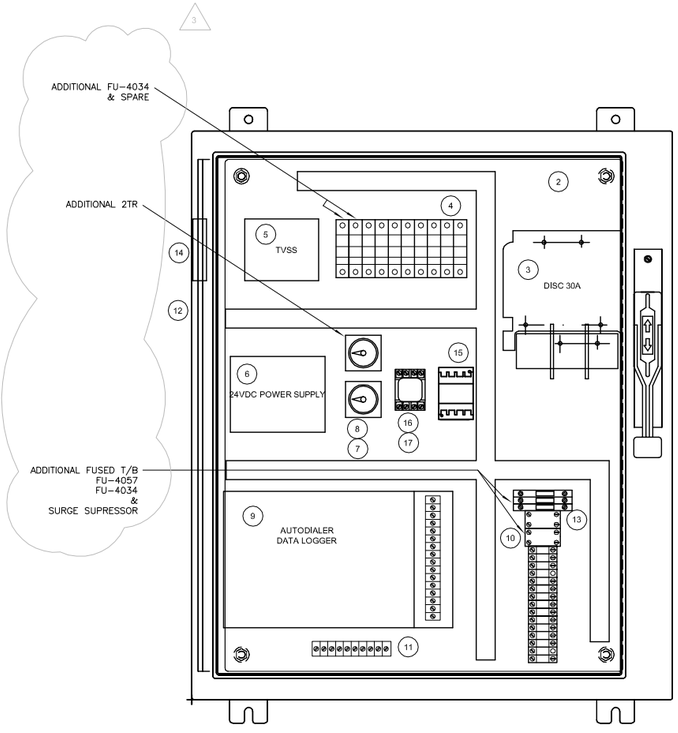
12610-10(016)EL-ME005 FEB 26/2003

BILL OF MATERIAL — FOR EW-6, 7, 8, 9, 10, 11, 12

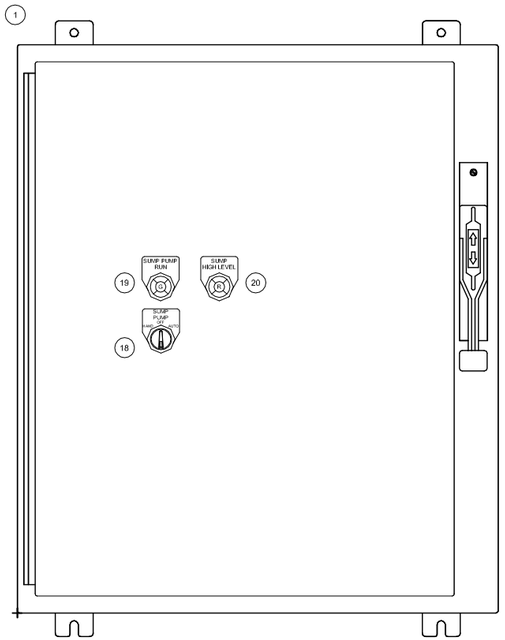
SYM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
1	1	HOFFMAN	A-30HS2508LP	30x25x8 NEMA 4 ENCLOSURE
2	1	HOFFMAN	A-30P24	BACK PANEL
3	1	ALLEN-BRADLEY	1494V-DS30 1494V-RA1/1494V-W1	30A NON-FUSED DISCONNECT W/OPERATING HANDLE
4	8	ALLEN-BRADLEY	1492-FB1	1 POLE FUSE BLOCKS
5	1	INOV. TECH. Inc.	HS-120-10A	TVSS-10A
6	1	SOLA	SLS-24-012	24VDC POWER SUPPLY
7	1	OMRON	H3CR-A-AC100-240	TIMER DELAY RELAY
8	1	OMRON	P2CF-11	RELAY BASE
9	1	PHONETICS	SENSOPHONE2000	AUTODIALER/DATA LOGGER
10	1	SQUARE D	MTL375	SURGE SUPRESSOR
11	1			GROUND BUSS
12	1	HUBBELL	SPECIF. GRADE	RECEPTACLE
13	1	ALLEN-BRADLEY	1492-H6	FUSED TERMINAL BLOCK
14	1	HUBBELL		TELEPHONE JACK
15	1	ALLEN-BRADLEY	100-A18ND3	IEC CONTACTOR 18A
16	1	ALLEN-BRADLEY	700HA32A1	DPDT 120V RELAY
17	1	ALLEN-BRADLEY	700HN125	RELAY BASE
18	1	ALLEN-BRADLEY	800T-J2A	3 POSITION SELECTOR SWITCH
19	1	ALLEN-BRADLEY	800T-P16G	PILOT LIGHT GREEN
20	1	ALLEN-BRADLEY	800T-P16R	PILOT LIGHT RED

BILL OF MATERIAL — FOR EW-13, 14, 15

SYM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
4	1	ALLEN-BRADLEY	1492-FB1	1 POLE FUSE BLOCK
7	1	OMRON	H3CR-A-AC100-240	TIMER DELAY RELAY
8	1	OMRON	P2CF-11	RELAY BASE
10	2	SQUARE D	MTL375	SURGE SUPRESSOR
13	2	ALLEN-BRADLEY	1492-H6	FUSED TERMINAL BLOCK



BACK PANEL LAYOUT



DOOR LAYOUT

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	ADDITIONAL FOR NEW EXTRACTION WELLS	NOV 15/99	BFM
3	REVISED AS REQUIRED	DEC 06/99	BFM
4	AS RECORDED	MAY 2000	BFM

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-E-81
SHEET No.: SH40

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

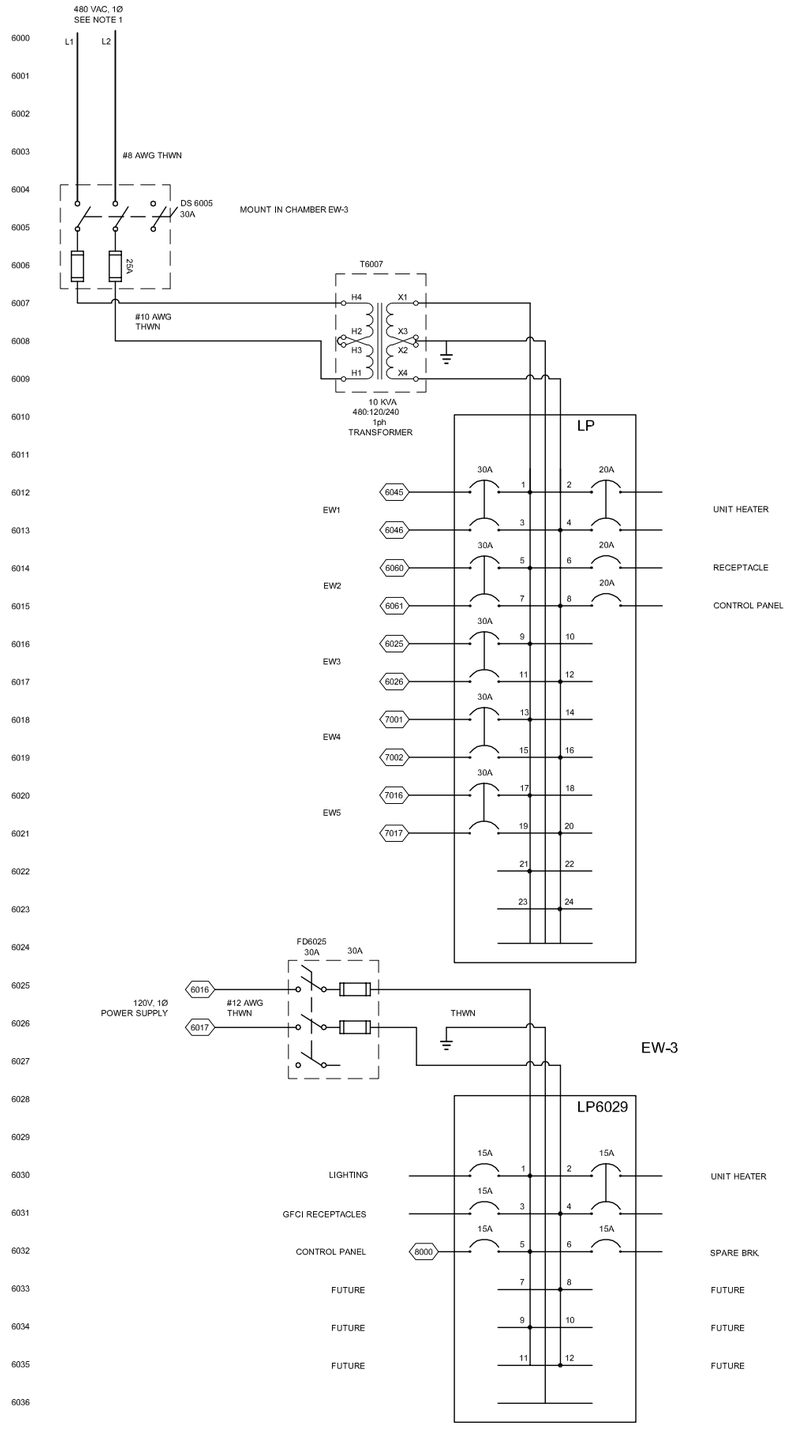
EQUIPMENT STORAGE AREA
CONTROL PANEL LAYOUT (CP1)

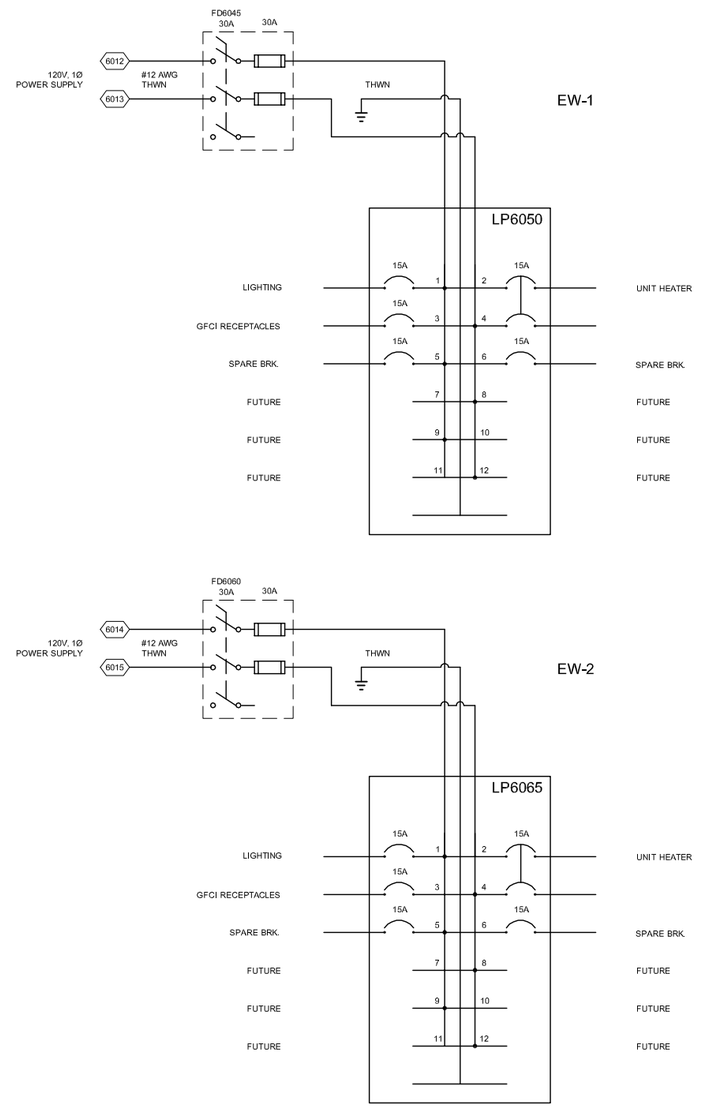
CRA CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project N º: 12610-10	Report N º: 016	Drawing N º: E-06AR

12610-10(016)EL-ME006 FEB 26/2003





№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	JL

NOTES:

1. CONNECT TO EXISITNG DISTRIBUTION PANEL BOARD IN RAW WATER FEED STATION.

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-E-81

SHEET No. SH41

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

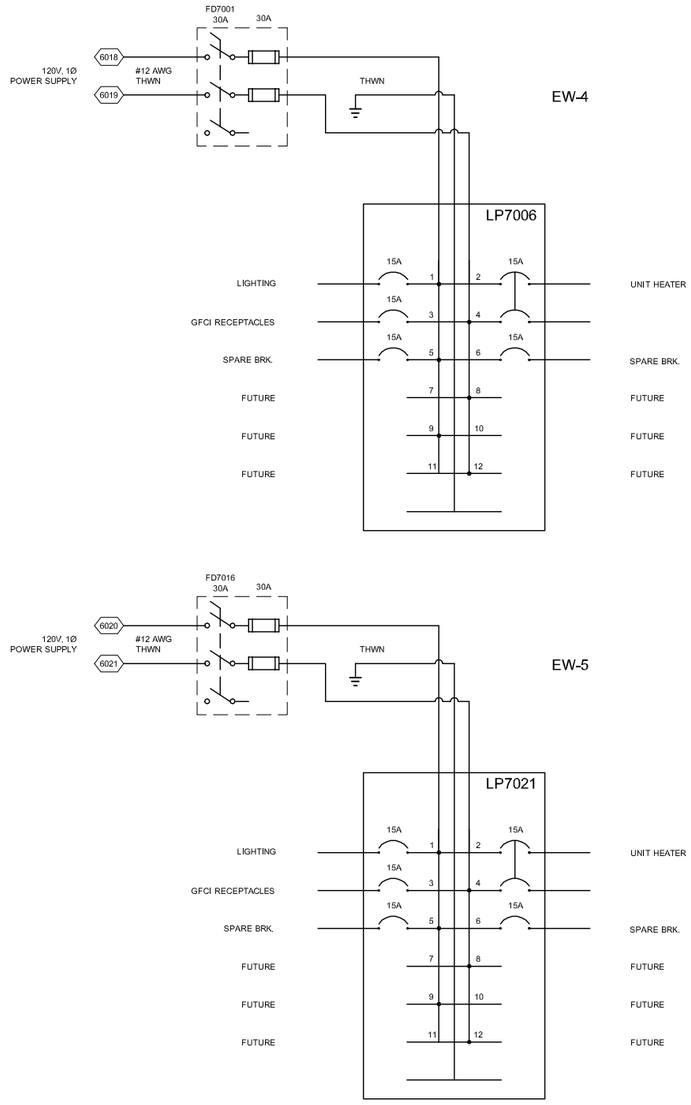
LAGOON AREA
POWER DISTRIBUTION, SH. 1 OF 2

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project N º: 12610-10	Report N º: 016	Drawing N º: E-07AR

12610-10(016)EL-ME007 FEB 26/2003



MAJOR EQUIPMENT LIST

SYM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
DS 6005	1	SQUARE-D	H361	30A FUSED DISCONNECT
FD6025,FD6045,FD6060 FD7001,FD7016	5	SQUARE-D	H361	30A FUSED DISCONNECT
T6007	1	SQUARE-D	–	480:120/240, 10 VA LIGHTING TRANSFORMER
LP6029,LP6050,LP6065 LP7006,LP7021	5	SQUARE-D	NQOD12L100CV/ MH20/MHC20/S	100A, 12cct, 120/240V, 3W PANELBOARD, NEMA1

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	JL

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-E-81
SHEET No.: SH42

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

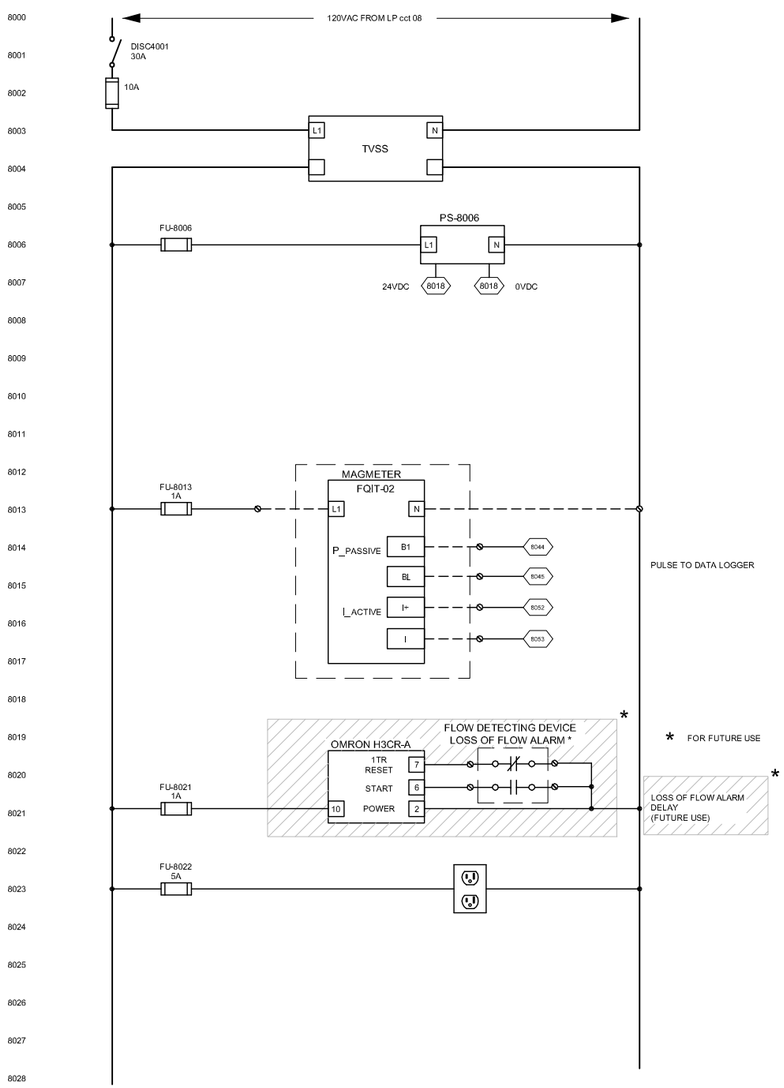
LAGOON AREA
POWER DISTRIBUTION, SH. 2 OF 2

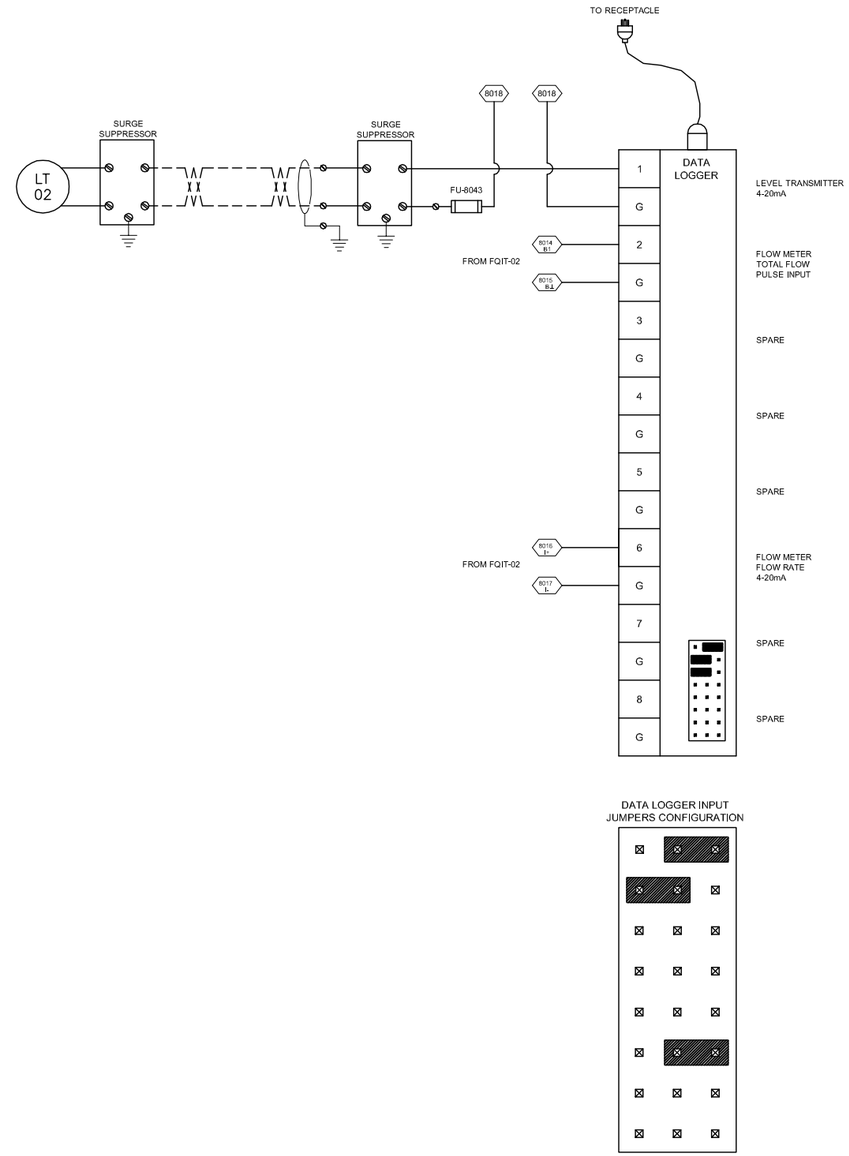
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project No.: 12610-10	Report No.: 016	Drawing No.: E-08AR

12610-10(016)EL-ME008 FEB 26/2003





№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	JL

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No. PE-E-81

SHEET No. SH43

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

CONTROL SCHEMATIC
CP2

CONESTOGA-ROVERS & ASSOCIATES

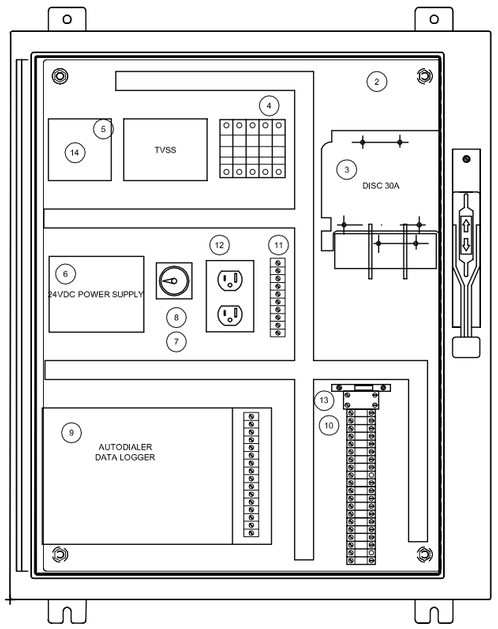
Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project N º: 12610-10	Report N º: 016	Drawing N º: E-09AR

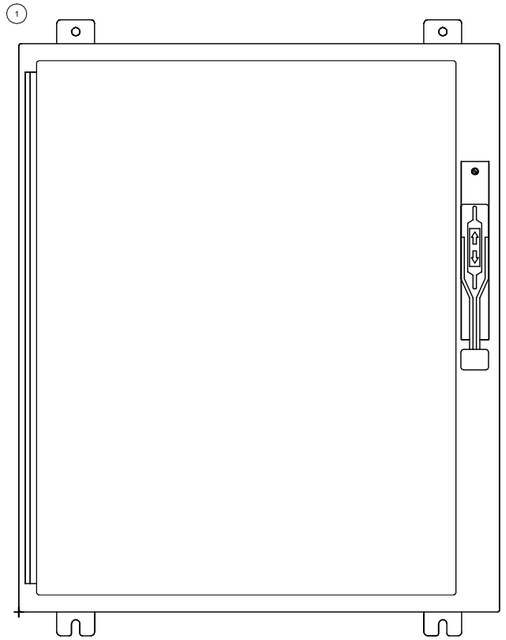
12610-10(016)EL-ME009 FEB 26/2003

BILL OF MATERIAL

SYM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
1	1	HOFFMAN	A-30H52508LP	30x25x8 NEMA 4 ENCLOSURE
2	1	HOFFMAN	A-30P24	BACK PANEL
3	1	ALLEN-BRADLEY	1494V-DS30 494V-RA1/1494V-W1	30A NON-FUSED DISCONNECT W/OPERATING HANDLE
4	6	ALLEN-BRADLEY	1492-FB1	1 POLE FUSE BLOCKS
5	1	INOV. TECH. Inc.	HS-120-10A	TVSS-10A
6	1	SOLA	SLS-24-012	24VDC POWER SUPPLY
7	1	OMRON	H3CR-A-AC100-240	TIMER DELAY RELAY
8	1	OMRON	P2CF-11	RELAY BASE
9	1	PHONETICS	SENSOPHONE2000	AUTODIALER/DATA LOGGER
10	1	SQUARE D	MTL375	SURGE SUPRESSOR
11	1			GROUND BUSS
12	1	HUBBELL	SPECIF. GRADE	RECEPTACLE
13	1	ALLEN-BRADLEY	1492-H6	FUSED TERMINAL BLOCK
14	1	HUBBELL		TELEPHONE JACK



BACK PANEL LAYOUT



DOOR LAYOUT

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	AS RECORDED	MAY 2000	JL

Remediation and Liability Management Company, Inc.

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-E-81
SHEET No.: SH44

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

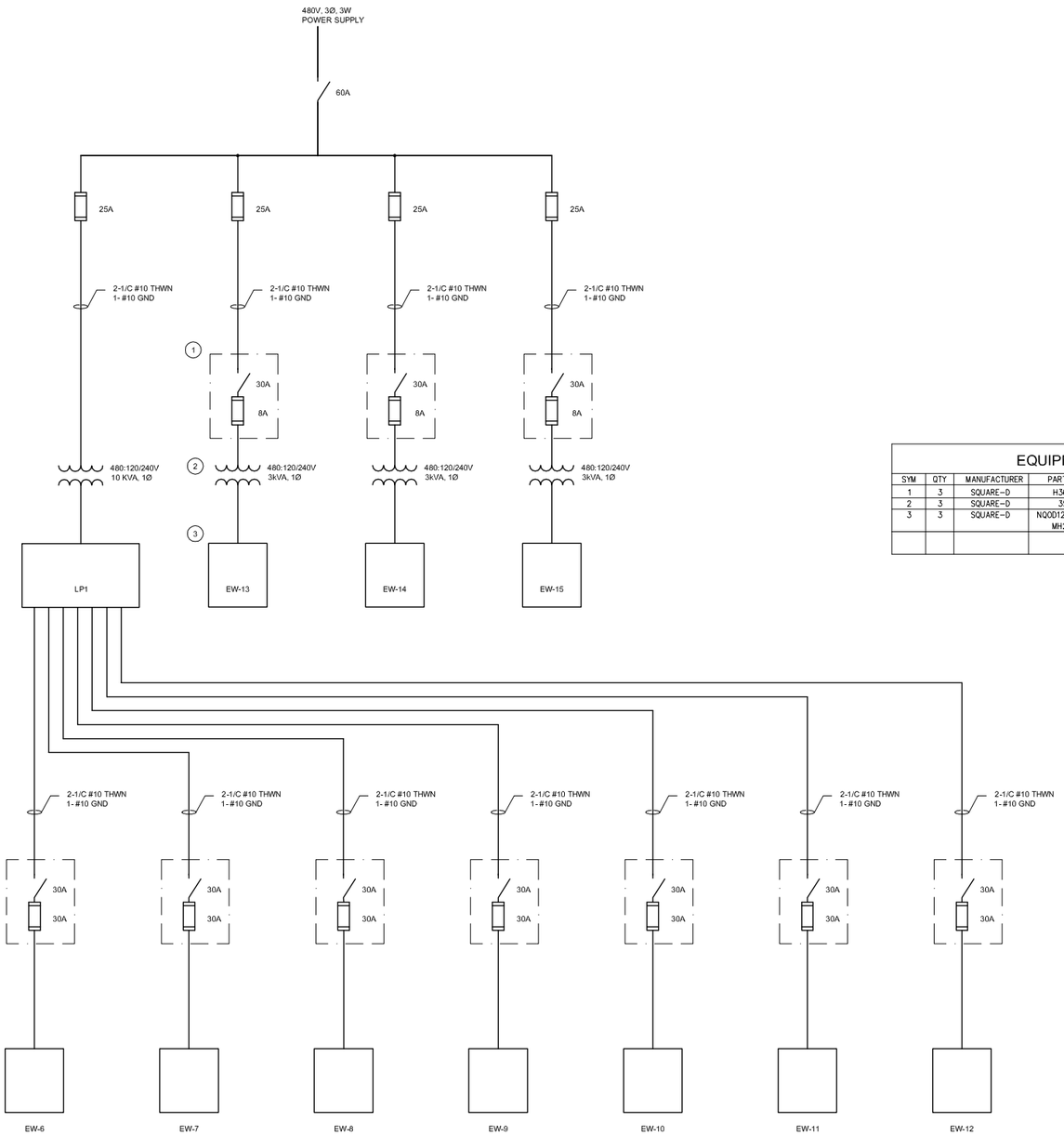
EQUIPMENT STORAGE AREA CONTROL PANEL LAYOUT (CP2)

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project N º: 12610-10	Report N º: 016	Drawing N º: E-10AR

12610-10(016)EL-ME010 FEB 26/2003



EQUIPMENT SCHEDULE

FOR EW-13, 14, 15

SYM	QTY	MANUFACTURER	PART NUMBER	DESCRIPTION
1	3	SQUARE-D	H361DS	30A DISCONNECT WITH NEMA 4X ENCLOSURE
2	3	SQUARE-D	3S1F	480:120/240, 3kVA OUTDOOR LIGHTING TRANSFORMER
3	3	SQUARE-D	NQOD12L100CV/ MH20WP	100A, 12cct, 120/240V, 3W PANELBOARD, NEMA3R

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	ADDITIONAL FOR NEW EXTRACTION WELLS	NOV 17/1999	BFM
3	REVISED FOR NEW EXTRACTION WELLS	NOV 30/1999	BFM
4	AS RECORDED	MAY 2000	BFM

GM POWERTRAIN

GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.
PE-E-81

SHEET No.
SH45

AS RECORDED JUNE 2000

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

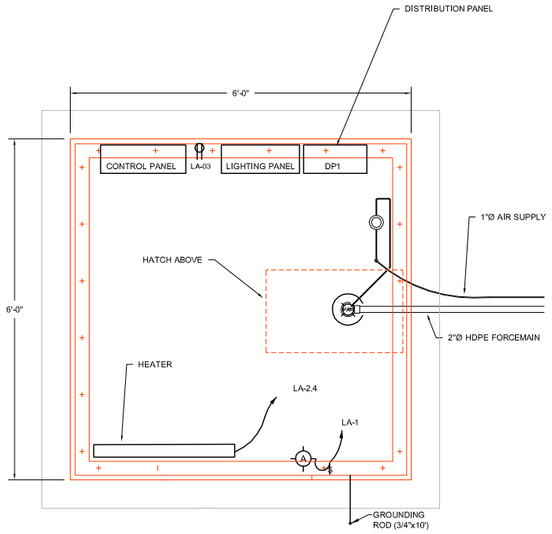
POWER DISTRIBUTION
SINGLE LINE

CRA CONESTOGA-ROVERS & ASSOCIATES

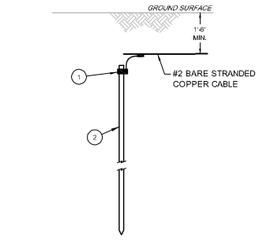
Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NO SCALE	Project No.: 12610-10	Report No.: 016	Drawing No.: E-11AR

12610-10(016)EL-ME011 FEB 26/2003



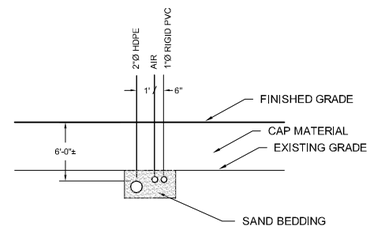
EXTRACTION WELL EW-11 BUILDING LAYOUT



1 CONNECTOR: BURNDY CAT. No. YGLR29C34

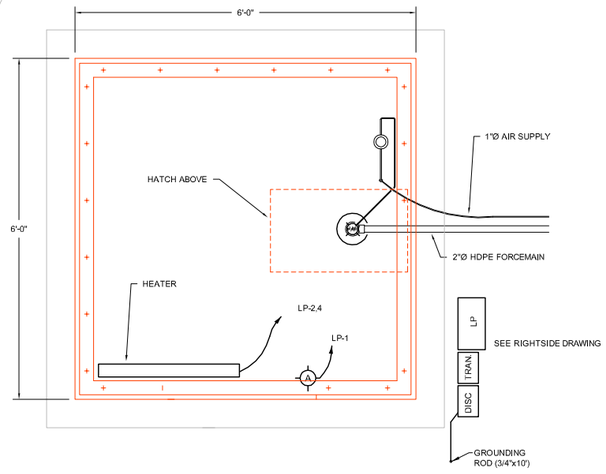
2 GROUND ROD: 3/4" DIA. x 10' LG.

GROUNDING DETAILS

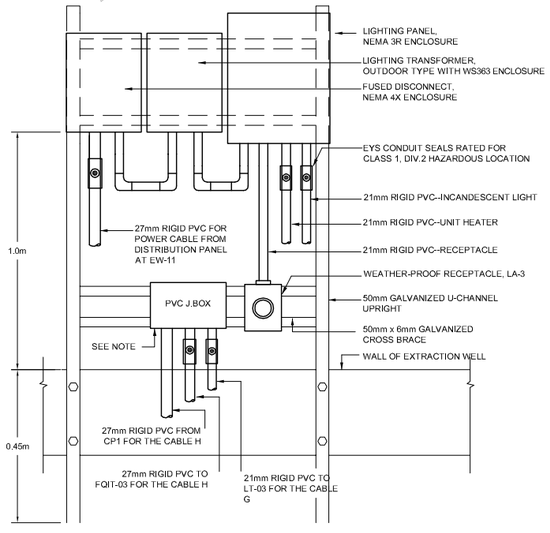


SECTION B
TYPICAL
E-01

LIGHTING SCHEDULE				
SYM	QTY	MANUFACTURER	MODEL NUMBER	DESCRIPTION
A	1	HUBBELL	VG–15	150W INCANDESCENT

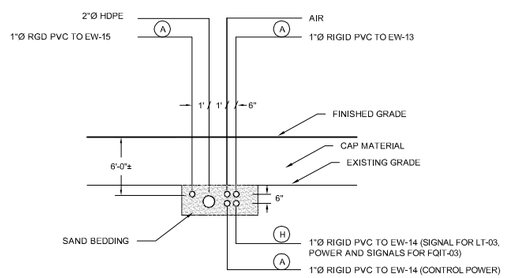


3 TYPICAL BUILDING LAYOUT (EW-13, 14, 15)
N.T.S



4 TYPICAL EQUIPMENT LAYOUT (EW-13, 14, 15)
N.T.S

NOTE: THE PVC JUNCTION BOX IS ONLY FOR EW-14.



SECTION C
TYPICAL
E-01

№	Revision	Date	Initial
1	ISSUED FOR CONSTRUCTION	MAR 01/99	MRT
2	ADDITIONAL FOR NEW EXTRACTION WELLS	NOV 17/99	BFM
3	REVISED FOR NEW EXTRACTION WELLS	NOV 30/99	BFM
4	REVISED AS REQUIRED	DEC 06/99	BFM
5	AS RECORDED	MAY 2000	BFM

Remediation and Liability Management Company, Inc.

GM POWERTRAIN
GENERAL MOTORS POWERTRAIN DIVISION
BAY CITY OPERATION
BAY CITY, MICHIGAN 48708-5460

PLANT ENGINEERING BUILDING No.: PE-E-81
SHEET No.: SH46

AS RECORDED JUNE 2000

SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial

GM POWERTRAIN DIVISION
BAY CITY, MICHIGAN

AS RECORDED

BUILDING ELECTRICAL LAYOUT AND DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager:	Reviewed By:	Date:	
MRT	RLA	JUNE 2000	
Scale: NTS	Project No.: 12610-10	Report No.: 016	Drawing No.: E-12AR

12610-10(016)EL-ME012 FEB 26/2003