

**PRE-FINAL (95%)
SOIL COVER SYSTEM DESIGN
LINDEN ROAD SITE
FLINT TOWNSHIP, MICHIGAN
VOLUME 1**

Prepared for

GENERAL MOTORS CORPORATION
Environmental and Energy Staff
Remediation Group

Prepared by

ROY F. WESTON, INC.
Three Hawthorn Parkway
Vernon Hills, Illinois 60061

January 1998

Work Order No. 01138-079-002

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- A Stormwater Run-off Pre-Development Conditions
- B Detention Basin Design
- C Storm Sewer System Design
- D Roadway and Foundation Design
- E Soccer Goal Information
- F Operation and Maintenance Plan

ATTACHMENTS

Attachment

- 1 Clearing and Waste Consolidation (Phase 1) Construction Plans
- 2 Soil Cover System (Phase 2) Construction Plans

SECTION 1

INTRODUCTION

Roy F. Weston, Inc. (WESTON®) has prepared the pre-final design report for the Linden Road Site in Flint Township, Michigan. This document corresponds to 95 percent completion of the design process and has been prepared in accordance with the Remedial Action Plan (RAP), the preliminary design submittal, and ongoing discussions with GM. This document has been presented in three volumes. Volume 1 of this document consists of the following sections:

- Section 1: Provides a summary of the site background, previous site activities, and the selected remedial action. A detailed discussion of these items was presented in the preliminary design submittal.
- Section 2: Presents the design activities including the revised stormwater management design, site preparation and, waste consolidation activities, roadway and storm sewer design, and final site grading.

Design calculations and computer modeling results have been included as appendices to Volume 1 of this document. Volume 2 consists of the proposal, technical specifications, and construction plans which will govern clearing and waste consolidation activities to be conducted in Phase 1. Volume 3 includes the proposal, technical specifications, and construction plans for Phase 2 soil cover construction activities.

1.1 SITE LOCATION AND DESCRIPTION

The site is a 40-acre parcel in Flint Township, Genesee County, Michigan, and is located in Section 17 of Township 7 North and Range 6 East. The site is approximately 1.5 miles west of the City of Flint. The site is bounded by Linden Road on the east. The northern boundary of the site is approximately 1/4 mile south of Calkins Road, and the southern boundary is approximately 1/2 mile north of West Court Street. The western boundary of the site is approximately 1/4 mile east of Dye Road.

Based on current knowledge, the site has had three periods of land use during this century as: a source of mined gravel, a landfill, and an unused property. It was first used as a source of mined sand and gravel. The extent of the gravel excavation is uncertain. WESTON's review of an aerial photograph of the site taken in 1941 did not indicate any evidence of large excavations or traces of a filled excavation. For an undetermined number of years preceding 1931, a rubbish incinerator reportedly occupied part of the site. The Chevrolet Division of GM purchased the 40-acre property from several owners in 1931. GM used the site as a general refuse landfill from 1931 until 1969. The refuse reportedly consisted of construction debris, plaster, buffing and grinding wheels, buffing and grinding refuse, metallic chips, and other process wastes. Landfill operations ceased in 1969, and GM constructed a security fence around the site in July 1980. Since landfill activities ceased in 1969, the Linden Road property has been enclosed by a fence and monitored but has not been used for any beneficial purpose. A more detailed account of the site history is presented in the Remedial Action Plan for the Linden Road Site (WESTON, 1996).

1.2 SUMMARY OF PREVIOUS INVESTIGATIONS

WESTON conducted a Phase I Environmental Assessment of the site in February 1990 and an Interim Remedial Measures Evaluation (IRME) and Site Investigation (SI) between November 1990 and September 1991. The Phase I assessment included review of background information and results of past investigations, review of historical aerial photographs, performance of an aerial survey, preparation of a detailed topographic map, and a detailed site inspection. The findings of this assessment were documented in a report titled *Phase I Environmental Assessment of Linden Road Landfill, Flint Township, Michigan* (WESTON, 1990).

The IRME and SI included sampling and analysis of surface waste material, a geophysical survey, soil gas investigation, excavation and sampling of test pits, drilling of auger probes, soil borings, installation and sampling of shallow and deep monitoring wells, installation of piezometers, and sampling and analysis of surface waters.

Findings of the IRME and SI were documented in a report titled *Interim Remedial Measures Evaluation and Site Investigation Report, Linden Road Landfill Site, Flint Township, Michigan* (Volumes I and II) (WESTON, March 1992). The IRME and SI report was prepared prior to the implementation of amendments to Part 201 of PA 451.

Within the IRME and SI Report, WESTON presented an assessment of the potential risks associated with impacted soils on-site. Based on this risk assessment, a remedial alternatives screening was conducted to evaluate the effectiveness and feasibility of implementing a wide range of possible remedial actions. It was determined from this analysis that a soil cover system with limited regrading was the appropriate and effective remedial action for the specific conditions at the Linden Road site.

Based upon the findings and recommendations presented in the IRME and SI Report, a limited waste removal action was conducted at the site in November 1992. In addition, 17 observation wells constructed in 1980 were decommissioned.

WESTON prepared a Remedial Action Plan (RAP) (WESTON, January, 1996) which included a site specific evaluation of potential risks based on various end uses for the site, and a description of the proposed remedial action. In the RAP, GM proposed to remediate the frontage area to meet the MDEQ Generic Commercial Criteria and construct a soil cover on the remaining portions of the landfill. The frontage area would then be rezoned and sold as a commercial development and the balance of the site developed into a recreational facility.

In order to quantify and define the limits of waste requiring removal, WESTON conducted a detailed investigation of the 400-foot frontage area along Linden Road. WESTON conducted soil borings, auger probes, and hand auger drilling on a 100-ft x 100-ft grid pattern. A total of 54 subsurface soil samples were sent to a laboratory for analysis. The analytical results were compared to MDEQ Generic Commercial Subcategories I and II, as well as to the Ambient Air and CSAT Criteria. The results of this investigation was documented in a report entitled "Findings of the Subsurface Soil Sampling Investigation for

Frontage Development" (WESTON, July 1997). The limits of waste in the 400-foot frontage area is shown on the Plans.

WESTON prepared the Preliminary Design Submittal (WESTON 1997) to further describe the implementation of the RAP. The design submittal included site grading and waste consolidation activities, preliminary stormwater and roadway design evaluations, and preparation of site development plans. The preliminary design submittal was utilized by GM during discussions with the American Youth Soccer Organization (AYSO) to determine the requirements for developing the site as a recreational facility. Comments from the AYSO were incorporated into the preliminary design submittal which was subsequently approved by GM.

1.3 PROPOSED REMEDIAL ACTION

The proposed remedial action for the site consists of excavation of waste materials which exceed the designated removal criteria from the 350-foot-deep frontage of the property, relocation of this material into the western portion of the site, and construction of a 2.5-foot soil cover over the waste materials to limit the potential for human contact during subsequent use of the site. The frontage area will be sold as a dedicated commercial-use property following waste removal activities. Once the site is covered with the 2.5-foot cover layer, the site will be further developed as a recreational facility with open grassy areas to support soccer fields.

SECTION 2

DESIGN ACTIVITIES

This section presents the pre-final design activities and procedures which were conducted during preparation of the development plan for the Linden Road Site. The intent of this section is to present the major components of the remedial action to confirm that the pre-final design of the site will meet the intent of the RAP and provide a functional and useful post-development recreational facility. Each subsection provides a description of the engineering component with a summary of the conclusions developed from each evaluation. Detailed design calculations and computer modeling used to develop each conclusion are provided in the appendix. The drawings which present the pre-final design evaluation are provided as an attachment to this report.

2.1 SCHEDULE OF CONSTRUCTION ACTIVITIES

Implementation of the Linden Road Site development project is currently scheduled to be conducted in two phases. Phase 1 is expected to begin mid-January 1998 and will include site preparation activities, clearing and grubbing of existing vegetative materials, excavation and relocation of waste materials from the frontage area, and limited regrading and backfilling of the frontage in preparation for sale of the property. Phase 2 construction will be conducted during the 1998 construction season and will include the balance of site regrading activities and waste relocation along the western boundary of the site, construction of a gravel entrance road and stormwater management system, and construction of the 2.5 foot soil cover system over the site.

2.2 CONTRACTOR MOBILIZATION

The general contractor selected for the Phase 1 activities will begin mobilization activities immediately following issuance of a Notice to Proceed. The initial tasks for the contractor will include preparation of submittals in accordance with the specifications. The submittals will include providing a detailed construction schedule, a schedule of values, a site specific

Health and Safety Plan, a Construction Quality Control Plan, an Erosion and Sediment Control Plan, and a Mobilization Plan. The submittals will be reviewed by WESTON and actual mobilization to the site will not begin until the submittals are approved.

The Mobilization Plan will include a description of how the contractor expects to proceed with the work, including his plan for equipment delivery, temporary facilities, method of controlling construction activities, and traffic management plan for activities which may effect Linden Road. The plan includes a requirement for the contractor to provide GM with a separate field trailer fitted with telephone and fax capability for use by GM and WESTON during oversight of field construction activities.

The Construction Quality Control Plan (CQCP) to be completed by the contractor will document the contractors plan for ensuring the work is completed in accordance with the approved design and construction contract. The plan will describe the sequence of quality control testing and identify those personnel directly responsible for overseeing and implementing the CQCP. Once approved, the contractor will use the CQCP as a guide for conducting prequalification soil testing of proposed borrow sites for use in regrading activities at the site.

2.3 SITE PREPARATION

The initial phase of field work will consist of clearing the site of vegetation and miscellaneous debris. Trees, brush and woody vegetation will be cut, chipped, and removed from the site by the contractor. Large-diameter trees may be cut into manageable sizes and salvaged by the contractor. Tree stumps, roots and other materials which are in contact with site soil will be chipped or otherwise reduced in size and disposed of under the final cover material. This is necessary to ensure that any impacted soil from the facility does not leave the site. Other debris will be relocated to areas designated to receive general fill. Clearing activities will consist of removal of all vegetation on the west side of the site (from a north/south line approximately 350 feet from the Linden Road Right-of-Way), and within the 108-foot-wide right-of-way (ROW) to Linden Road. Vegetation and debris in the

frontage area will be removed only as necessary to complete waste consolidation activities. The limits of planned clearing activities are shown on the plans.

Prior to initial site clearing activities, sediment and erosion control structures will be installed in accordance with a Soil Erosion and Sediment Control (SESC) Permit obtained by the Engineer. The SESC Permit will be issued by the Genesee County Drain Commission. A construction stormwater NPDES Permit will also be obtained by the Engineer prior to mobilization to the site. At a minimum, silt fence will be installed along the perimeter of the site along the existing fenceline. Hay bale barriers will be installed in areas which are prone to excessive runoff from cleared areas. Silt fence and hay bale structures will be constructed of materials and methods as specified in the Michigan Department of Transportation Standard Specifications for Construction (1996) and the Genesee County Drain Commission erosion control standards. The permit will also include inspection and maintenance requirements to be performed by the contractor throughout the contract period to ensure that the structures continue to perform as constructed.

The current access road to the site will be utilized during Phase 1 site preparation activities and waste consolidation activities. The contractor will be directed to establish temporary facilities at the current entrance location, to include mobile offices, decontamination areas, and employee facilities, until completion of clearing and waste consolidation activities.

2.4 WASTE CONSOLIDATION

Waste relocation from the frontage area will be conducted during Phase 1 and relocation of waste along the western edge of the site will occur during Phase 2 construction. WESTON has identified 5 waste areas requiring removal during the first phase of construction. Following clearing of the site, the contractor will conduct a survey of all cleared areas to provide an accurate basemap for determining the volume of soil to be removed. Each waste area delineated on the drawings will be staked in the field by the contractor and approved by the WESTON field engineer. Waste excavation will be completed using standard earthmoving equipment such as excavators and front end loaders.

The contractor will excavate to the predetermined depth and to the limits of each area as shown on the drawings. Excavation depths in the frontage will range from 5 to 12 feet. Waste in Area 1 will be excavated to a line approximately 400 feet from the Linden Road right-of-way. The limits of Area 1 excavation is shown on the plans. Excavated waste from the frontage will be placed in the western portion of the site. Materials will be placed in thin lifts and compacted to limit subsidence during the post-development period. Material placement techniques and quality control requirements are dictated in the specifications. The contractor will utilize the Grading Plan to determine where to place the waste. Waste will be relocated such that the final elevation of the placed materials do not exceed the grades shown on the Grading Plan. In addition, no waste materials will be place within 50 feet of the proposed property line along the frontage to provide a buffer zone around the landfill unit.

Once excavation in the frontage is complete, WESTON will obtain confirmation samples from the sidewalls and bottom of each excavation to determine if all soil above the removal criteria has been relocated. Samples will be analyzed on a 24-hour turn-around-basis. If results show that additional removal is necessary, the WESTON field engineer will direct the contractor on the scope of additional excavations. Once each area is addressed, the contractor will conduct a limited survey of each area to determine the actual volume of waste relocated. This value will be used as the pay item for waste consolidation activities.

Waste consolidation activities during the second phase of construction will be executed using the same earthmoving techniques as the first. The contractor will relocate waste materials to portions of the site requiring additional fill in conjunction with other site grading activities. Excavation will proceed to the bottom of the waste layer, approximately 10 feet and to a minimum of 25 feet from the property line in order to better define the limits of waste along the western property. The contractor will be instructed to safeguard the existing fenceline along the western property boundary during excavation activities. The contractor will also conduct the balance of site waste grading activities in an effort to grade and shape the site as shown in the Final Cover Plan drawing. Additional backfilling with off-site

general fill will also be necessary to complete construction of the separation berm along the frontage area.

Excavations created during waste consolidation activities in the frontage area will be backfilled with off-site clean general fill which will be pre-approved during the soil pre-qualification process. Backfill in the frontage will be limited to approximately 2 to 4 feet including a 4 inch topsoil layer. This material will provide a stable surface above the groundwater table and will promote drainage of the site. Excavations within the 108-foot ROW may be backfilled with off-site granular fill. During Phase 2, the excavation along the western property limit may be backfilled with on-site general fill (or foundry sand) or off-site general fill based on availability of materials at the time of construction.

2.5 STORMWATER MANAGEMENT

The stormwater management system has been designed in accordance with the recommendations of the Genesee County Drain Commission (GCDC) and the Genesee County Road Commission (GCRC). Stormwater management for the site consists of providing surface and subsurface drainage structures to collect, detain, and direct precipitation to the nearby stormwater management system. The objective of the system is to minimize erosion, sedimentation and runoff to adjacent properties. GCDC recommended that WESTON utilize the Oakland County Method to design the stormwater management system. The guidance also allows the engineer to use other more detailed evaluation methods to determine the runoff from the site. WESTON has elected to utilize the method of the Soil Conservation Service Technical Release No. 55 (SCS TR55) referred to in the "Urban Hydrology for Small Watersheds" (June 1986) to determine the size of drainage channels and detention basins required for the project. In addition, WESTON has elected to utilize the computer program Pond Pack (ver. 6.0) and Culvertmaster, by Haestads Methods, Inc., to evaluate the functioning of the detention basin, and the discharge structure requirements.

2.5.1 Detention Basin Design

The site was divided into distinct watershed areas. SCS TR-55 was used to determine the peak flows into the basin and to determine the hydraulic characteristics of each storm event based on the post-developed site conditions. The 100-year storm event was utilized as required by the GCDC. In accordance with the GCDC design requirements, the basin should be designed to manage the runoff from the 100-year storm event and the discharge from the basin should be limited to the discharge which would have occurred from the site during the 2-year design storm during the pre-development conditions. Using the Rational Method, the runoff from the pre-developed site, using a runoff coefficient of 0.25 and a storm intensity of 1.3 inches per hour, was found to be 3.9 cubic feet per second (cfs). Therefore, the allowable discharge rate for the detention pond should be limited to 3.9 cfs. The calculations are presented in Appendix A.

The detention basin, located in the southern portion of the site, services approximately 24 acres of the developed site. The peak flow from this portion of the site was calculated to be 44 cfs. The discharge from the basin is being directed to the existing storm drain manhole located on the Linden Road property along the southern property line. The manhole is located on the Hollingsworth Drain line which is a main storm sewer line owned by the GCDC servicing this portion of the township. Since the manhole is located in the easement, and will eventually be located on frontage property designated for sale, a below-grade connection was determined to be preferable. In order to make the connection to the existing manhole and to maintain acceptable slopes and velocities in the drain piping, a catch basin inlet was selected for the south pond discharge structure to minimize the slope of the discharge piping.

Since the discharge piping from the detention basin would be below grade, WESTON selected a 15-inch diameter pipe to limit the flow velocity and to minimize the potential for debris to clog the drainage piping. The inlet to the catch basin was used to limit the flow to the design discharge rate of 3.9 cfs. The inlet grate selected provides the necessary restriction to flow. Pond Pack was utilized to evaluate the effects of the inlet grate orifice

on the detention requirements for the basin. Neenah Foundry Company, Neenah, Wisconsin, also provides a method for determining the flow capacity of selected inlets under ponded water conditions. Each evaluation produced a consistent result verifying the expected functioning of the inlet. The catch basin will be a concrete structure with a 3 foot sump area to allow debris and sediment to settle out and be collected prior to the flow discharging to the Hollingsworth Drain. Supporting calculations and modeling printouts are presented in Appendix B and C.

2.6 ACCESS ROAD AND PARKING AREAS

The access road for the development will be located in the center of the eastern border of the site. The access road will consist of a 40-foot-wide gravel driveway. A concrete paved parking area will also be provided on the main entrance road within the limits of the facility property line. The main entrance onto Linden Road will be constructed by others during development of the frontage parcels. The developer will be responsible for construction plans and permits required for this work. The balance of the access roads and the parking areas on the site will be gravel surfaced.

The concrete parking area pavement will be designed to handle light-duty commercial vehicles and buses. The pavement will consist of an 8-inch gravel base course and a 6-inch reinforced concrete surface. The concrete design calculations are included in Appendix E.

The gravel parking areas have been designed to provide suitable spacing for minivan and sport utility vehicle access. The main parking areas inside of the gate provide approximately 325 spaces including 13 handicapped spaces. The smaller lot outside the gate will provide 12 spaces, including 2 handicapped spaces. The main lot has been sized to allow for one directional travel which will allow park users and buses to exit the facility through the main entrance.

2.7 SITE FENCING

The permanent site fence has been designed in accordance with MDOT Standard Specifications Section 808, Fencing and Section 907, Fencing Materials. The fence shall be 6-foot high chain link with double-leaf swing gates at the entrance road. Sections of the existing chain link fencing being removed will be inspected prior to construction and the fence posts and fabric suitable for reuse will be salvaged. Existing fencing on the north, west and south sides of the site will be maintained and become part of the completed site restoration. The contractor will be responsible for maintaining the stability and integrity of fencing during the construction activities. Following completion of construction, the north, south, and east portions of the fence that remain will be removed of brush and repainted. The existing fence and gate structure will be maintained and temporary fencing will be installed as needed to maintain site security during the construction activity.

During Phase 1 construction, the existing fence network at the site will be maintained. The contractor will utilize the existing entrance to the site and the temporary facilities will be placed at that entrance. During clearing operations, it will not be necessary to remove any of the existing fencing. If the existing fenceline is damaged due to falling trees or equipment, the contractor is required to replace that portion of fence with a temporary fence in order to maintain security of the Linden Road Site property. At the completion of this phase, the work in the frontage property will essentially be complete except for minor grading and restoration work along the perimeter of the frontage area to be conducted during Phase 2.

The temporary office area during Phase 2 will be located along the main entrance road. The contractor will be prohibited from using the frontage area or the existing entrance for construction activities in an effort to limit disturbance of the restored areas. This will aid in maintaining the visual quality of the parcel during potential sale activities. The contractor will establish a main construction gate at the new entrance location and will maintain security of the site from this location during construction. The permanent fence will be constructed as one of the last tasks of construction. This fence will be placed along the limit

of the 350 foot frontage approximately 1 foot inside the newly established property line. The gate structure will be a double leaf swing gate with an appropriate locking mechanism. A separate personnel gate will be provided near this entrance to allow pedestrian entrance to the site. It is planned that this pedestrian gate will remain open at all times for local residents to utilize the walking path at the site. Vehicular access to the site will be limited to scheduled athletic events to be managed by the local AYSO.

In addition to a perimeter security fence structure, the current plan includes post and cable fencing within the park area along the gravel access roads and parking areas. The post and cable fencing will be constructed as a traffic control device to keep vehicles from driving off of the gravel surface onto the grassed areas. A suitable number of swing gates will be provided to allow access to each area of the site for maintenance or emergency purposes. The locations of cable gates and post and cable fencing are shown on the drawings.

2.8 MONITORING WELLS

Following completion of closure activities, the existing wells at the site will be used as a means of conducting long term monitoring of the effectiveness of the cover system and to monitor overall groundwater quality at the boundary of the Linden Road Site. Wells designated to remain will be extended up to meet the final grades by welding casing extensions where necessary and reinstalling the protective casings. All wells will be completed as flush-mounted wells with protective covers cast into concrete slabs. The drawings include a table describing each existing well, the current ground surface elevation and the proposed final cover elevation. The contractor will be required to raise the wells as necessary to maintain the accessibility and functioning of each well. The well extension activity will be conducted during Phase 2 construction activities.

2.9 SITE GRADING PLAN

The grading plan for the site presents the elevations of the ground surface following completion of waste consolidation activities and general filling of the site. The intent of this

operation is to provide the base grades necessary for efficient stormwater management and to support the development of the playing field surfaces by utilizing the waste excavated from the frontage area and limited regrading of the western side of the site. By maximizing the use of on-site soil and off-site foundry sand for general grading, the volume of off-site general fill soil necessary to construct the cover soil layer can be minimized.

In general, the design intent is to limit the amount of off-site general fill to complete this grading plan and to prevent the off-site disposal of waste materials from the site. Clean off-site general fill material (non-foundry sand material) will be used to backfill the frontage excavation areas. Foundry sand materials from off-site stockpiles will be used to backfill the waste excavation area along the western property line, and the balance of filling required within the site boundaries. In general, foundry sand will only be used as general fill in areas that will remain the property of GM. Any filling considered to be off-site, or any filling in the 108-foot access area will be conducted with clean off-site general fill.

In addition, during grading activities, the contractor will be required to limit waste placement to within 50 feet of the newly established eastern property line and no waste filling will be permitted in the 108-foot ROW. Any filling work in either of these areas will be conducted with clean off-site general fill material to limit the potential for materials that are not fully characterized to be placed in close proximity to the property line and to further limit the potential for contact during the post-development period.

The grading plan elevations can be determined by deducting 2.5 feet from the Final Cover Grading Plan elevations. Minor adjustments in the grades and elevations may be required based on the volume of waste materials finally excavated and the overall volume of materials needed to reach the intended grades. During construction, WESTON will continually monitor the progress of grading activities and will make any engineering modifications necessary to achieve the intended grades.

2.10 FINAL SOIL COVER PLAN

Following completion of general grading activities, the final soil cover system will be constructed. The soil cover system will be 2.5 feet thick and will consist of 2 feet of general fill material and 6 inches of topsoil. Foundry sand remaining following completion of grading activities may be used as general fill in this layer. This foundry sand material will be limited to the bottom 1 foot of the 2 foot general fill layer. Both materials will be obtained from off-site locations or from previously stockpiled materials at the site. Site grading and final cover construction activities will be coordinated by the contractor to limit the unnecessary double handling of material stockpiled at the site.

The cover system will be placed by standard construction equipment and methods. The specifications will require periodic compaction testing to verify the stability of the constructed surfaces. Successful compaction of the general fill and cover soil will increase soil strength and limit any post-construction settlement.

Following construction of the cover soil layers, the site will be vegetated. The vegetative layer will consist of preselected topsoil rich in organic content and nutrients necessary to support vigorous plant growth. The soil will be augmented with additional nutrients or fertilizer to enhance the growing potential of the soil. The soil prequalification testing activities will determine the appropriate quantity of fertilizer necessary to achieve a healthy vegetative surface.

The playing fields will be seeded with a mixture specifically designed for athletic field construction. This mix is a durable plant mix which can maintain a stable root structure while being mowed to a short thickness. It is also resistant to the effects of high foot traffic and can survive during times of limited drought. The areas designated for this mix will include the fields and a zone approximately 50 feet outside the limits of each field. This will also protect against reduction of grass surfaces along the boundary and sidelines of each field from spectator traffic. The balance of the site will be seeded with a lawn and turf

mixture suitable for commercial facilities. This mix is less costly, but retains the qualities of being resistant to damage from constant mowing and limited watering.

2.11 SOCCER FIELD LAYOUT

Linden Road Site will be developed as a recreational facility following completion of the soil cover system construction. The current layout includes 5 junior fields (50 yards by 100 yards), one senior field (70 yards by 120 yards), and one competition field (80 yards by 130 yards). The size and quantity of fields were selected by AYSO based on their expected organization enrollment and growth over the next 10 years. The site will also include a storage building and two concrete pads located at either end of the site for placement of portable toilet facilities during major athletic events. This building will be used to store soccer equipment, maintenance equipment, and can act as a concession stand during recreational tournaments. A large graveled parking area will be provided which spans the site from north to south:

During construction of the soccer fields, a corner marker will be permanently constructed at the corner of each field. This marker will be consistent with a benchmark type monument which will be flush with the ground surface and constructed of concrete with a steel sleeve. The marker will be constructed to a sufficient depth to withstand the freeze thaw effects. The concrete anchor will extend up to within 6 inches of the ground surface so that the concrete support would not be exposed. A steel sleeve will be placed at each corner to allow for placement of corner flags. WESTON has also identified a supplier of soccer equipment including corner markers and goals. The concrete base for the goals will be finished to within 6 inches of the ground surface so that the concrete support will not be exposed. Tubular frame goals can be constructed with mounting pegs which can be used to secure the goals into ground mounted sleeves. The mounting sleeves consist of a steel pipe secured in a concrete base. Once installed, the goals can easily be remounted in the same location each time. Literature from the goal supplier has been included in Appendix E. Additional details will be added to the design drawings to direct the construction of the corner markers and the pipe sleeves during the Phase 2 construction activities.

2.12 PARK SIGNAGE, SUPPORT STRUCTURES AND LANDSCAPING

The median at the site entrance provides a location for a park sign. The median will include a rock garden and other incidental landscaping. Lights will not be provided at the sign location and no street lights will be provided at the entrance. Additional discussions will be required to finalize a design layout for the entrance road median and site sign.

The storage building will be a one-story pre-engineered metal building constructed on a 30 ft by 30 ft concrete slab. The building will be approximately 20 ft by 30 ft with one roll-up door and one personnel door. It may be used for storage of lawn mowers, tractors, or athletic equipment. The building will also be constructed with removable window areas to provide the option of a concession stand or other service. Utilities provided at the shelter will include a phone line and an electric line. The electric line will be sized to power lights and small appliances, but will not be of sufficient size to provide heat to the building.

Preliminary landscaping has been developed for the site. In addition to grass revegetation, trees will be provided along the perimeter of the site and scattered throughout the site to provide visual screening and to limit the potential for balls or other equipment from being kicked or hit over the fenceline into adjoining properties. A gravel walkway path has also been included in the 100 percent design submittal. The path is expected to be 8-feet wide with a gravel surface, and has been designed in accordance with the Americans with Disabilities Act requirements. The landscaping plan and walking path alignment were presented on a rendering of the completed site. The rendering was submitted under separate cover. A detailed landscaping plan to include specifications and design drawings has been included in this report.

2.13 PERMITS

The construction activities at the Linden Road site will require permits from the GCDC, and the Flint Township Department of Buildings. The components of the design which will

be reviewed include the stormwater management system design and discharge system, and the site grading and erosion control plan for the site.

The GCDC will require a soil erosion permit for the project site. Generally, this permit is used to ensure that the site grading plan and construction activities are conducted in a manner that will limit erosion and sedimentation of on-site and off-site drainage systems. The permit will require the Contractor to prepare a plan to implement soil conservation methods, and will dictate the inspection and maintenance responsibilities of the Contractor. The Engineer will be responsible for applying for and receiving this permit prior to construction.

Once the soil erosion permit is obtained, the Notice of Coverage for the National Pollutant Discharge Elimination System (NPDES) permit for the construction phase must be submitted. This permit authorizes the contractor to discharge stormwater associated with construction activities. Submission of this Notice of Coverage to the Michigan Department of Environmental Quality is required for any construction activities disturbing more than 5 acres of land. The Engineer is responsible for obtaining the NPDES construction stormwater discharge permit. A post-construction NPDES permit is not required for this site.

In addition to the soil erosion and construction NPDES permit, the GCDC's Storm Department also requires a stormwater discharge permit for the Linden Road site if stormwater discharges are directed to the Hollingsworth Drain along the southeast corner of the site. Because the stormwater runoff from the site will ultimately reach the existing storm sewer system along Linden Road, the volume and flow of this discharge must be considered and approved by the Drain Commission. As Engineer, WESTON will be responsible for acquiring this permit. The size of the detention basin and required detention time will be directly related to the available capacity in the existing storm drain system. WESTON has also submitted a draft plan to the GCDC for review and comment. Upon receipt of comments WESTON will make any applicable modifications and submit a formal application for approval to GCDC.

A building permit must also be obtained for the Linden Road site before construction is to begin. The building permit is issued by the Flint Township Department of Buildings and is required for all construction and building activities in the township. The Contractor will be responsible for the building permit.

A landfill permit is required by the Flint Township Department of Buildings. This permit covers all earthwork projects where excavation and filling is conducted. The permit requires plan approval by the Flint Township Board. The Engineer is responsible for obtaining the landfill permit.

The Remedial Action Plan for the site was submitted to the MDEQ in January 1996. A draft Operations and Maintenance Plan, a Groundwater Monitoring Plan, a Financial Assurance Plan and land use restrictions are required by MDEQ. No other permits are required from MDEQ to proceed with construction of the Linden Road site remedial action.

SECTION 3

SOIL COVER TECHNICAL SPECIFICATIONS

The development of the Linden Road Site is being designed in accordance with the Remedial Action Plan for the site. Technical specifications were prepared to govern construction activities during implementation of the completed design. Construction activities were divided into two phases of construction and two sets of technical specifications have been prepared. The first phase includes site clearing and waste consolidation scheduled for completion in 1998 and the second phase includes the soil cover construction which will begin in 1998. Specifications governing Phase 1 construction activities are included in Volume 2. Specifications for Phase 2 construction are included in Volume 3. The design plans included as Attachment 1 will be used during both construction activities.

APPENDIX A

STORMWATER RUN-OFF PRE-DEVELOPMENT CONDITIONS

CLIENT/SUBJECT Gm Linden Rd.

W.O. NO. 01138-079-002

TASK DESCRIPTION Allowable Outflow Calculation

TASK NO. 0030-00

PREPARED BY Rachel M. DEPT 1245 DATE 12-15-97

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY	
DEPT _____	DATE _____

Use Rational Method to determine outflow under existing undeveloped site conditions into the existing stormwater system which will then be used to design/size detention pond for proposed site conditions.

$$Q = C I A$$

A From Genesee County Drain Commissioner (GCDC) existing site conditions of agricultural land has runoff coefficient of:

$$C = 0.25$$

A To determine I, Intensity, the intensity-duration-frequency curves provided by GCDC are used.

- the 2-year frequency storm and a 32 minute time of concentration are used. (See attached calculation of t_c).
- As directed by GCDC, a 30 minute initial time is added to the t_c giving a total duration of 62 minutes.

Using the attached curve ^{I-D-F}, $I = 1.3$ inches/hour.

A To determine the area serviced by outlet structures in the predeveloped site conditions, the existing topography must be studied. It shows the site elevations to be highest up the center of the site (E-W line) which approximately divides the site into 2 areas - each ~12 acres. Because the proposed location of our detention pond falls on the South side of the site, the area of the Southern portion of the site will be used for A (because this is the approximate area serviced by existing drainage structures in the proposed location of the pond.) → $A = 12$ acres.

$$Q = C I A = (0.25)(1.3)(12)$$

$Q = 3.9$ cfs → size pond by allowing no more than 3.9 cfs to flow out of the pond (pick outflow = 3.9 cfs)

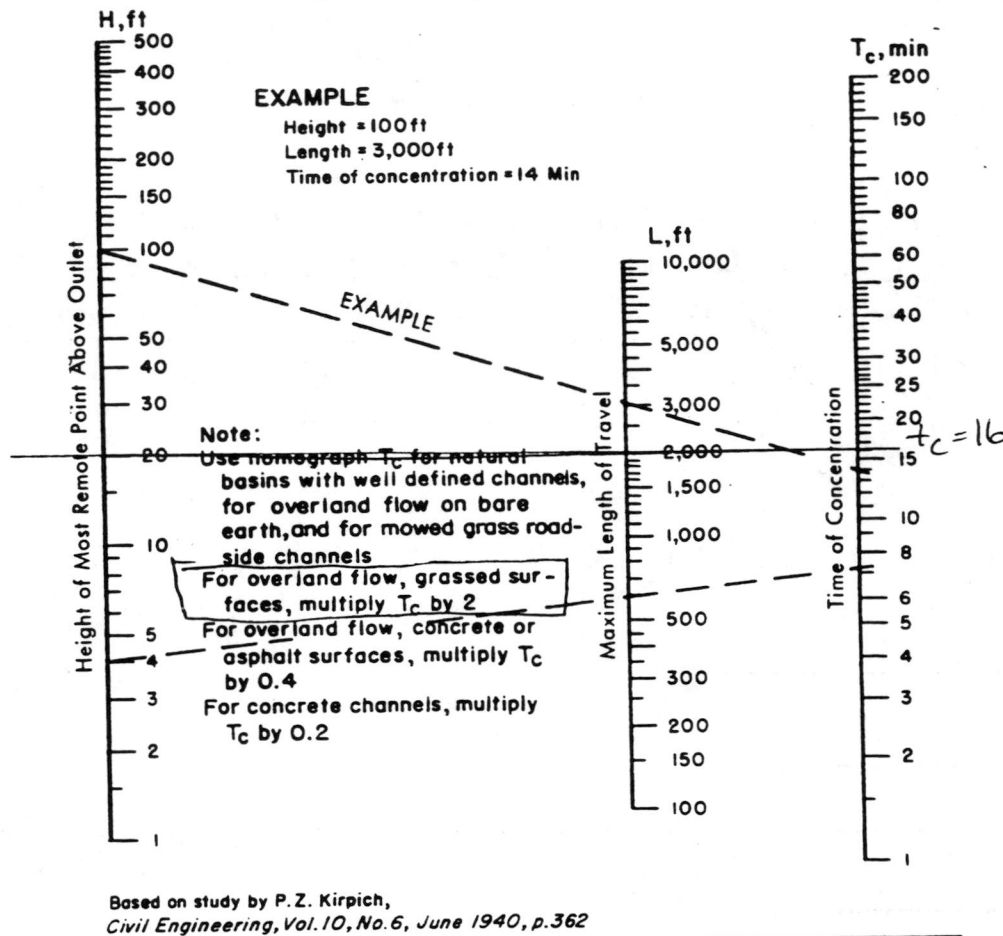


Figure 3.10 Time of concentration of rainfall on small drainage basins.

For the preddevelopment site conditions
 Most Remote Point above Outlet
 $H = 20 \text{ ft.}$

Length of travel
 $L = 2000 \text{ ft.}$

$t_c = 16 \text{ min.}$

For overland flow, multiply
 t_c by 2
 $t_c = 32 \text{ min}$

TIME OF
LARGE W

In large w:
 inspection
 data is unava
 be used for e

Kirpich (1

T

in which T_c

Note: Use Ki
 earth.
 by 2. For
 channels.

40,00

30,00

20,00

10,00

8,00

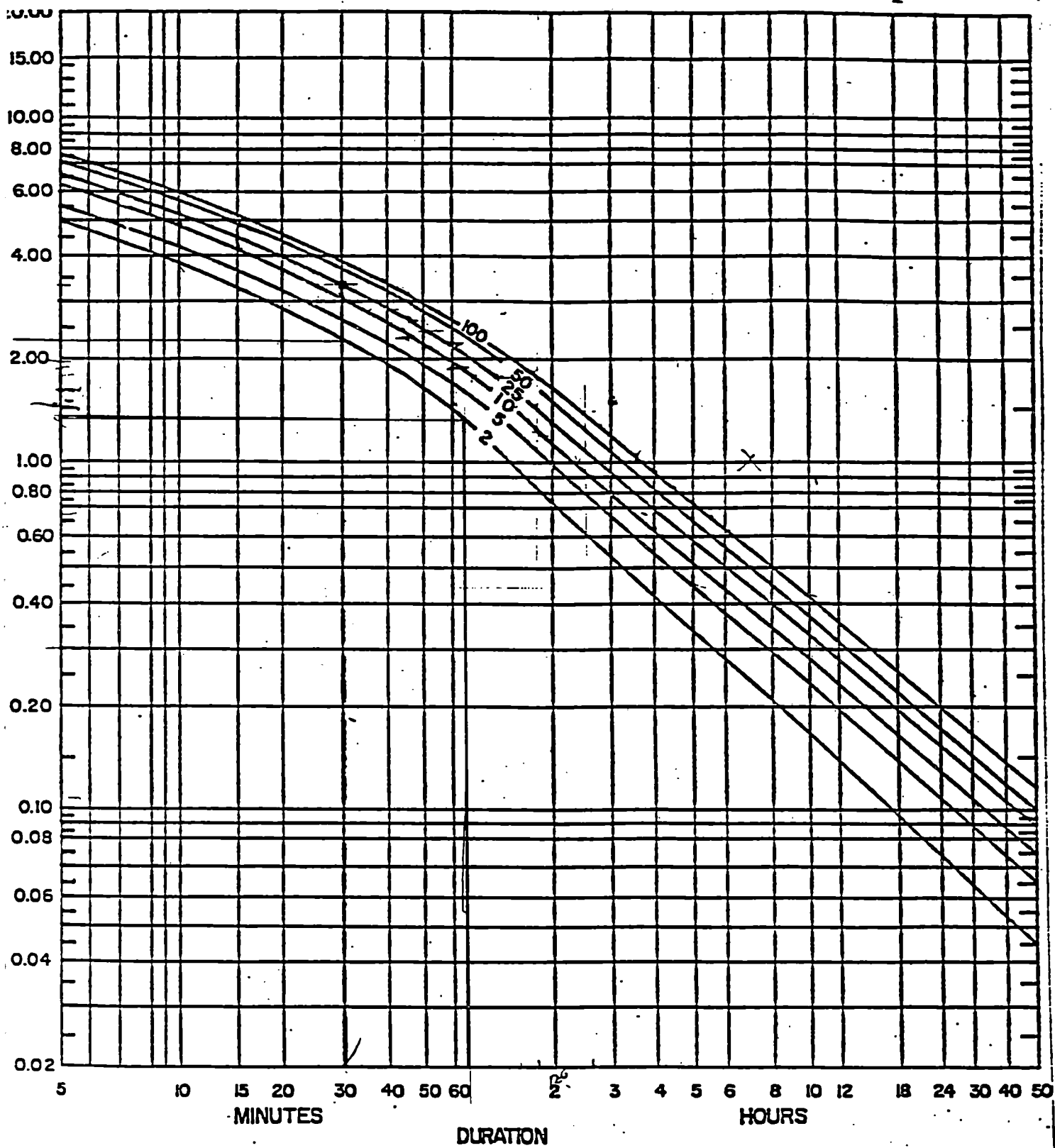
4,00

2,00

1,00

60

Figure 3.1



RAINFALL INTENSITY — DURATION — FREQUENCY CURVES
FOR FLINT, MICHIGAN

GENESEE COUNTY DRAIN COMMISSIONER
DIVISION OF WATER AND WASTE SERVICES

APPENDIX B

DETENTION BASIN DESIGN

CLIENT/SUBJECT GM - LINDEN ROADW.O. NO. 01138-019-002TASK DESCRIPTION DETENTION BASIN DESIGN.TASK NO. 0030-00PREPARED BY Rachel M. DEPT 1245 DATE 12-15-91.

APPROVED BY

MATH CHECK BY DEPT DATE METHOD REV. BY DEPT DATE DEPT DATE

PURPOSE: To look at the 100-year hydrograph for the site, to design the outlet structure in the detention pond based on the allowable outflow to the existing storm sewer (Directed by Genessee County Drain Commissioner and Genessee County Road Commissioner), and to size the pond according to the 100-year inflow and the allowable outflow.

REFERENCE: 1) Soil Conservation Service, TR-55 "URBAN HYDROLOGY FOR SMALL WATERSHEDS", June 1986 Edition.

2) Haestad Methods "PONDPAK", Urban Stormwater Management Software, Version 3.1.

ASSUMPTIONS:

- 1) The site was divided into 9 watersheds.
- 2) The Tabular Method was used in calculating peak flows.
- 3) Sheet flow was assumed for the first 300 ft of overland flow, and shallow flow was assumed to occur until the flow entered a channel (defined as a depression 2 ft in depth).
- 4) Rainfall amounts were taken from Appendix B, TR-55, Synthetic Rainfall Distribution and Rainfall Data Sources
100 year - 24 hour storm $\rightarrow$ 4.7 inches.
- 5) Based on the Soil Survey of Genessee County, Michigan, hydrologic soil group C was assumed. A weighted curve number of 74 was used for the grassy areas and a curve number of 89 was used for the gravel road/parking areas.

CLIENT/SUBJECT Gm - LINDEN ROAD.

W.O. NO. 01138-079-002

TASK DESCRIPTION DETENTION BASIN DESIGN.

TASK NO. 0030-00

PREPARED BY Rachel M DEPT 1245 DATE 12-15-97

APPROVED BY

MATH CHECK BY DEPT DATE

METHOD REV. BY DEPT DATE

DEPT DATE

PROCEDURE:

- 1) Determine the area of each subarea, or watershed, using PAYDIRT computer program (See attached table - Attachment A)
- 2) Determine length of flow, slope, and type of flow for each subarea (See attached table - Attachment B)
- 3) Input above parameters into TR-55 computer program to obtain peak flows and hydrograph data. (see attached program printout sheets - Attachment C)
- 4) Input hydrograph data into PONDPAK COMPUTER PROGRAM.
- 5) Choose an outlet structure to discharge pond water to existing storm sewer.
 - The Detention Pond will be located on the South end of the site and will discharge into a catch basin and culvert connecting to the Hollingsworth Drain. Genesee County Drain Commission dictated an allowable 2-year outflow based on existing site conditions. Maximum permissible outflow limited to 2-year storm (see Appendix A) Outlet structure design - see Attachment D
- 6) Size the pond and route the hydrograph of the 100-year storm through the pond and outlet structure with PONDPAK. Adjust pond size until hydrograph routing is optimized (Optimization occurs when hydrograph volume at peak flow equals volume capacity of the pond). (See Attachment E)

CLIENT/SUBJECT GM-Linden Rd. W.O. NO. 01138-079-002

TASK DESCRIPTION Detention Basin Design TASK NO. 0030-00

PREPARED BY Rachul M. DEPT 1245 DATE 12-15-97

MATH CHECK BY DEPT DATE

METHOD REV. BY DEPT DATE

APPROVED BY	
DEPT <u> </u> DATE <u> </u>	

RESULTS:

The results of the pond sizing are as follows.

depth of pond = 4 feet (water elevation 753 → 757)

high water dimensions = 385 ft. x 85 ft.

pond volume = 2.325 ac-ft = 3,750 cy.

CLIENT/SUBJECT GM Linden Rd.
TASK DESCRIPTION Design of Stormwater System/Runoff.

TASK NO. 0030-00

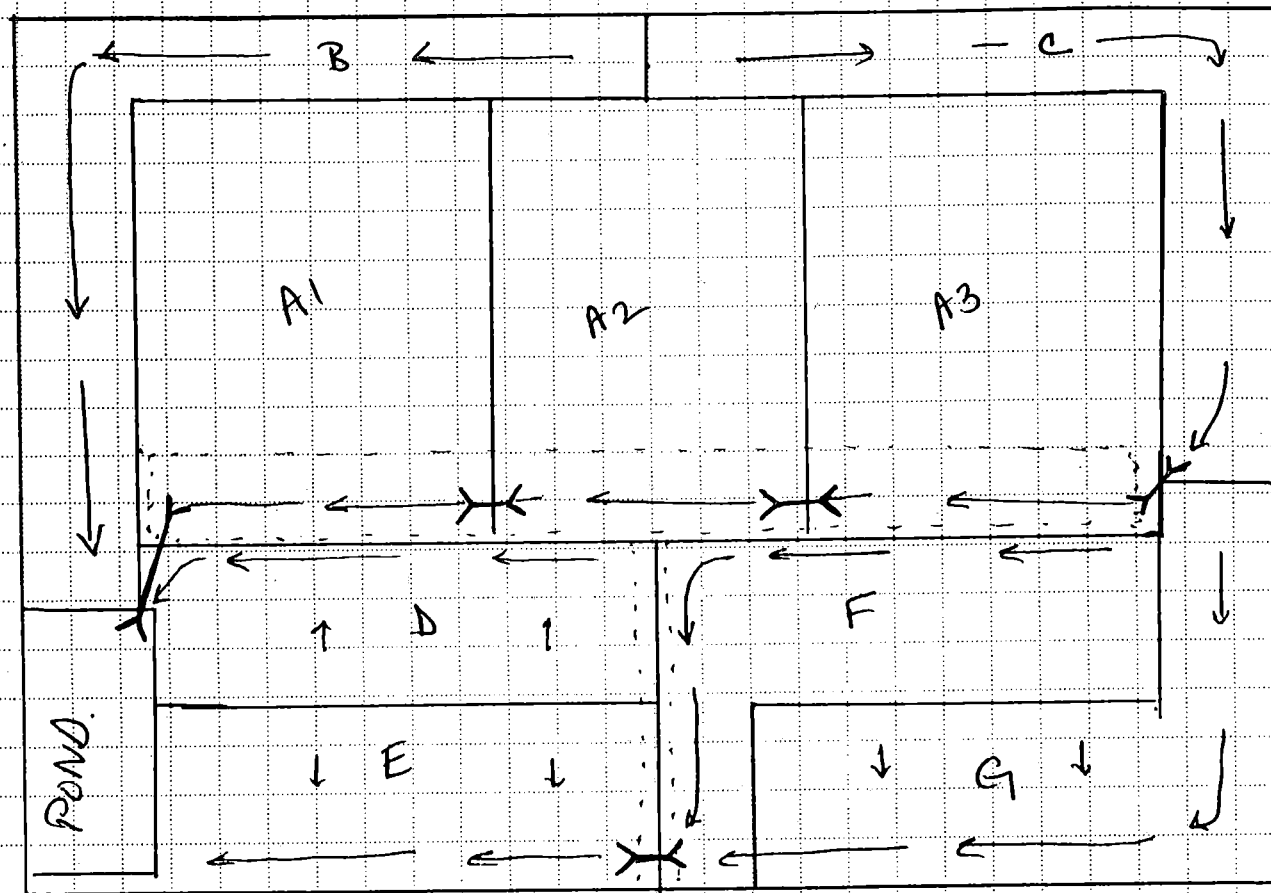
PREPARED BY Rachel M DEPT 1245 DATE 12-15-97

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____
DEPT _____ DATE _____

Attachment A



gravel parking lot ~ 950x120 divided among watersheds A1, A2 & A3.

gravel roadway divided among watersheds D, E & F (minimal change due to curve number to small amt. of gravel surface in each)

CLIENT/SUBJECT Gm-Linden Rd

W.O. NO. 01138-079-002

TASK DESCRIPTION Stormwater Design.

TASK NO. 0030-00

PREPARED BY Rachel M. DEPT 1245 DATE 12-15-97

APPROVED BY

MATH CHECK BY _____ **DEPT** _____ **DATE** _____

METHOD REV. BY _____ DEPT _____ DATE _____

DEPT _____ DATE _____

9 Watersheds

Attachment A

Watershed Areas.

	<u>SQ. FT</u>	<u>ACRES</u>
A1	160,841 (38,067 gravel)	3.69 .87/3.69 gravel
A2	127,460 (38,066 gravel)	2.93 .87/2.93 gravel
A3	151,309 (38,067 gravel)	3.47 .87/3.47 gravel
B	124,588	2.86
C	91,258	2.09
D	93,379	2.14 (0.04/2.14 road)
E	94,046	2.16 (0.11/2.16 road)
F	98,686	2.27 (0.15/2.27 road)
G	100,469	2.31

1042 D66 SQFT

23.92 acres.

Gravel parking area = 114,200 sqft $\rightarrow$ divide 3 ways into A1, A2, A3

Roadway $\rightarrow 90 \times 70 = 6300 = 0.14$ acres $\rightarrow 0.07 E$
 $\rightarrow 0.07 F$

$$24 \times 290 = 6960 = 0.16 \text{ acres} \rightarrow 0.08 \text{ F}$$

0.04 E
0.04 D

CLIENT/SUBJECT Gm-Lindend.

TASK DESCRIPTION Stormwater Design.

PREPARED BY Rachel M. DEPT 1245 DATE 12-15-92

MATH CHECK BY _____ DEPT _____ DATE _____

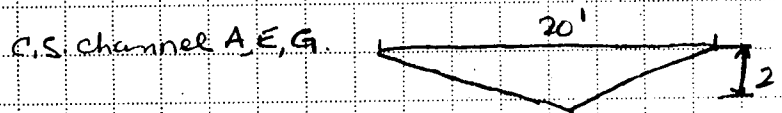
METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____

DEPT _____ DATE _____

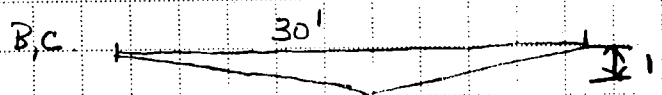
Attachment B

WATERSHED	SHEET FLOW length slope %	SHALLOW FLOW length slope %	CHANNEL FLOW length slope %	TRAVEL TRUNK SUBAREA length slope %
A1	100 0.5	340/100 0.5/8	280 0.6	280 0.6 (A2, A3, C)
A2	100 0.5	340/100 0.5/8	230 0.6	230 0.6 (A3, C)
A3	100 0.5	340/100 0.5/8	350 0.6	350 0.6 (C)
B	100/120 0.5/4	— —	590 1.9	— —
C	100/100 0.5/6	— —	420 0.7	— —
D	160 0.5	460/100 0.5/6	— —	— —
E	150/20 0.5/5	— —	500 0.8	500 0.8 (F, G)
F	150 0.5	780 0.5	— —	— —
G	100 0.5	— —	800 0.6	— —



$$A = \frac{1}{2}(20)(2) = 20 \text{ SF}$$

$$WP = 20 + 2(10.2) = 40.4 \text{ Ft}$$



$$A = \frac{1}{2}(30)(1) = 15 \text{ SF}$$

$$WP = 30 + 2(15.03) = 60.06 \text{ Ft}$$

Version 2.00

Date: 11-24-97

Date: _____

Subarea : A1

Version 2.00

Date: 11-24-97

Date: _____

Subarea : A1

Version 2.00

Date: 11-24-97

Date:

Subarea : A2

Gravel (w/ right-of-way)	-	-	.87(89)	-
--------------------------	---	---	---------	---

Total Area (by Hydrologic Soil Group) 2.93

SUBAREA: A2 TOTAL DRAINAGE AREA: 2.93 Acres WEIGHTED CURVE NUMBER: 78

RUNOFF CURVE NUMBER COMPUTATION Version 2.00
Project : LINDEN ROAD User: RAM Date: 11-24-97
County : Genessee State: MI Checked: Date:
Subtitle:
Subarea : A3

COVER DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns, parks etc.)				
Good condition; grass cover > 75%	-	-	2.6(74)	-
Streets and roads				
Gravel (w/ right-of-way)	-	-	.87(89)	-

Total Area (by Hydrologic Soil Group) 3.47

SUBAREA: A3 TOTAL DRAINAGE AREA: 3.47 Acres WEIGHTED CURVE NUMBER: 78

RUNOFF CURVE NUMBER COMPUTATION Version 2.00
Project : LINDEN ROAD User: RAM Date: 11-24-97
County : Genessee State: MI Checked: Date:
Subtitle:
Subarea : B

COVER DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D
	Acres (CN)			
FULLY DEVELOPED URBAN AREAS (Veg Estab.)				
Open space (Lawns, parks etc.)				
Good condition; grass cover > 75%	-	-	2.86(74)	-

Total Area (by Hydrologic Soil Group) 2.86

SUBAREA: B TOTAL DRAINAGE AREA: 2.86 Acres WEIGHTED CURVE NUMBER: 74

RUNOFF CURVE NUMBER COMPUTATION Version 2.00
Project : LINDEN ROAD User: RAM Date: 11-24-97
County : Genessee State: MI Checked: ____ Date: ____
Subtitle:
Subarea : C

COVER DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D
	Acres (CN)			

FULLY DEVELOPED URBAN AREAS (Veg Estab.)

Open space (Lawns,parks etc.)

Good condition; grass cover > 75%	-	-	2.09(74)	-
-----------------------------------	---	---	----------	---

Total Area (by Hydrologic Soil Group) 2.09

SUBAREA: C TOTAL DRAINAGE AREA: 2.09 Acres WEIGHTED CURVE NUMBER: 74

RUNOFF CURVE NUMBER COMPUTATION Version 2.00
Project : LINDEN ROAD User: RAM Date: 11-24-97
County : Genessee State: MI Checked: ____ Date: ____
Subtitle:
Subarea : D

COVER DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D
	Acres (CN)			

FULLY DEVELOPED URBAN AREAS (Veg Estab.)

Open space (Lawns,parks etc.)

Good condition; grass cover > 75%	-	-	2.10(74)	-
-----------------------------------	---	---	----------	---

Streets and roads

Gravel (w/ right-of-way)	-	-	.04(89)	-
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Total Area (by Hydrologic Soil Group) 2.14

SUBAREA: D TOTAL DRAINAGE AREA: 2.14 Acres WEIGHTED CURVE NUMBER: 74

RUNOFF CURVE NUMBER COMPUTATION Version 2.00
Project : LINDEN ROAD User: RAM Date: 11-24-97
County : Genessee State: MI Checked: ____ Date: ____
Subtitle:
Subarea : E

COVER DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D
	Acres (CN)			

FULLY DEVELOPED URBAN AREAS (Veg Estab.)

Open space (Lawns,parks etc.)

Good condition; grass cover > 75% - - 2.05(74) -

Streets and roads

Gravel (w/ right-of-way) - - .11(89) -

Total Area (by Hydrologic Soil Group) 2.16

SUBAREA: E TOTAL DRAINAGE AREA: 2.16 Acres WEIGHTED CURVE NUMBER: 75

RUNOFF CURVE NUMBER COMPUTATION Version 2.00
Project : LINDEN ROAD User: RAM Date: 11-24-97
County : Genessee State: MI Checked: ____ Date: ____
Subtitle:
Subarea : F

COVER DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D
	Acres (CN)			

FULLY DEVELOPED URBAN AREAS (Veg Estab.)

Open space (Lawns,parks etc.)

Good condition; grass cover > 75% - - 2.12(74) -

Streets and roads

Gravel (w/ right-of-way) - - .15(89) -

Total Area (by Hydrologic Soil Group) 2.27

SUBAREA: F TOTAL DRAINAGE AREA: 2.27 Acres WEIGHTED CURVE NUMBER: 75

RUNOFF CURVE NUMBER COMPUTATION Version 2.00

Project : LINDEN ROAD User: RAM Date: 11-24-97
County : Genessee State: MI Checked: Date:
Subtitle:
Subarea : G

COVER DESCRIPTION	Hydrologic Soil Group			
	A	B	C	D

Acres (CN)

FULLY DEVELOPED URBAN AREAS (Veg Estab.)

Open space (Lawns, parks etc.)

Good condition; grass cover > 75% - - 2.31(74) -

Total Area (by Hydrologic Soil Group) 2.31

SUBAREA: G TOTAL DRAINAGE AREA: 2.31 Acres WEIGHTED CURVE NUMBER: 74

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.00

Project : LINDEN ROAD User: RAM Date: 11-24-97
County : Genessee State: MI Checked: Date:
Subtitle:

Subarea #1 - A1

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft/sec)	Velocity (hr)	Time
-----------	-------------	-------------	---------------	--------------	---	--------------	-------------	---------------	------

Sheet	2.4	100	.005	E			0.328		
Shallow Concent'd		340	.005	U			0.083		
Shallow Concent'd		100	.08	P			0.005		
Open Channel		280	.006		.03320	40.4	0.036		

Time of Concentration = 0.45*

Open Channel		280	.006		.03320	40.4	0.036		
--------------	--	-----	------	--	--------	------	-------	--	--

Travel Time = 0.04*

Subarea #2 - A2

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft/sec)	Velocity (hr)	Time
-----------	-------------	-------------	---------------	--------------	---	--------------	-------------	---------------	------

Sheet	2.4	100	.005	E			0.328		
-------	-----	-----	------	---	--	--	-------	--	--

Shallow Concent'd	340	.005	U		0.083
Shallow Concent'd	100	.08	P		0.005
Open Channel	230	.006		.03320 40.4	0.029

Time of Concentration = 0.45*

Open Channel	230	.006		.03320 40.4	0.029
--------------	-----	------	--	-------------	-------

Travel Time = 0.03*

Subarea #3 - A3

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft/sec)	Velocity (hr)	Time
-----------	-------------	-------------	---------------	--------------	---	--------------	-------------	---------------	------

Sheet	2.4	100	.005	E			0.328		
Shallow Concent'd	340	.005	U				0.083		
Shallow Concent'd	100	.08	P				0.005		
Open Channel	350	.006		.03320	40.4		0.044		

Time of Concentration = 0.46*

Open Channel	350	.006		.03320	40.4		0.044		
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Travel Time = 0.04*

* - Generated for use by TABULAR method

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.00

Project : LINDEN ROAD User: RAM Date: 11-24-97
 County : Genessee State: MI Checked: Date:
 Subtitle:

Subarea #4 - B

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft/sec)	Velocity (hr)	Time
-----------	-------------	-------------	---------------	--------------	---	--------------	-------------	---------------	------

Sheet	2.4	100	.005	E			0.328		
Sheet	120	.04	E				0.165		
Open Channel	590	.019		.03315	60.1		0.066		

Time of Concentration = 0.56*

Subarea #5 - C

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft/sec)	Velocity (hr)	Time
-----------	-------------	-------------	---------------	--------------	---	--------------	-------------	---------------	------

Sheet	2.4	100	.005	E			0.328		
Sheet	100	.06	E				0.122		
Open Channel	420	.007		.03315	60.1		0.078		

Time of Concentration = 0.53*

----- Subarea #6 - D -----

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft/sec)	Velocity (hr)	Time
Sheet	2.4	160	.005	E				0.478	
Shallow Concent'd		460	.005	U				0.112	
Shallow Concent'd		100	.06	U				0.007	
Time of Concentration = 0.60*									

----- Subarea #7 - E -----

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft/sec)	Velocity (hr)	Time
Sheet	2.4	150	.005	E				0.454	
Sheet		20	.05	E				0.036	
Open Channel		500	.008		.03320	40.4		0.055	
Time of Concentration = 0.55*									

Open Channel		500	.008		.03320	40.4		0.055	
Travel Time = 0.05*									

----- Subarea #8 - F -----

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft/sec)	Velocity (hr)	Time
Sheet	2.4	150	.005	E				0.454	
Shallow Concent'd		780	.005	U				0.190	
Time of Concentration = 0.64*									

* - Generated for use by TABULAR method

TIME OF CONCENTRATION AND TRAVEL TIME Version 2.00

Project : LINDEN ROAD User: RAM Date: 11-24-97

County : Genessee State: MI Checked: _____ Date: _____

Subtitle:

----- Subarea #9 - G -----

Flow Type	2 year rain	Length (ft)	Slope (ft/ft)	Surface code	n	Area (sq/ft)	Wp (ft/sec)	Velocity (hr)	Time
Sheet	2.4	100	.005	E				0.328	
Open Channel		800	.006		.03320	40.4		0.102	
Time of Concentration = 0.43*									

--- Sheet Flow Surface Codes ---

A Smooth Surface F Grass, Dense --- Shallow Concentrated ---

B Fallow (No Res.) G Grass, Bermuda -- Surface Codes --
 C Cultivated < 20 % Res. H Woods, Light P Paved
 D Cultivated > 20 % Res. I Woods, Dense U Unpaved
 E Grass-Range, Short J Range, Natural
 * - Generated for use by TABULAR method

TABULAR HYDROGRAPH METHOD Version 2.00
 Project : LINDEN ROAD User: RAM Date: 11-24-97
 County : Genessee State: MI Checked: ____ Date: ____
 Subtitle:

Total watershed area: 0.037 sq mi Rainfall type: II Frequency: 100 years

	Subareas				
	A1	A2	A3	B	C
Area(sq mi)	0.01*	0.00*	0.01*	0.00*	0.00*
Rainfall(in)	4.7	4.7	4.7	4.7	4.7
Curve number	78*	78*	78*	74*	74*
Runoff(in)	2.46	2.46	2.46	2.13	2.13
Tc (hrs)	0.45*	0.45*	0.46*	0.56*	0.53*
(Used)	0.40	0.40	0.50	0.50	0.50
TimeToOutlet	0.00	0.00	0.00	0.00	0.00
Ia/P	0.12	0.12	0.12	0.15	0.15

Time Total	Subarea Contribution to Total Flow (cfs)				
(hr) Flow	A1	A2	A3	B	C
11.0	0	0	0	0	0
11.3	0	0	0	0	0
11.6	0	0	0	0	0
11.9	3	1	1	0	0
12.0	9	2	1	1	1
12.1	15	4	3	2	1
12.2	28	6	5	4	2
12.3	39	8P	7P	6	4
12.4	44P	8	6	7P	5P
12.5	39	6	5	7	5
12.6	30	4	3	5	4
12.7	23	3	2	4	3
12.8	19	2	2	3	2
13.0	12	2	1	2	1
13.2	9	1	1	1	1
13.4	9	1	1	1	1
13.6	5	1	1	1	0
13.8	5	1	1	1	0
14.0	4	1	1	0	0
14.3	2	1	0	0	0
14.6	1	1	0	0	0
15.0	0	0	0	0	0
15.5	0	0	0	0	0
16.0	0	0	0	0	0
16.5	0	0	0	0	0

17.0	0	0	0	0	0	0
17.5	0	0	0	0	0	0
18.0	0	0	0	0	0	0
19.0	0	0	0	0	0	0
20.0	0	0	0	0	0	0
22.0	0	0	0	0	0	0
26.0	0	0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

TABULAR HYDROGRAPH METHOD Version 2.00

Project : LINDEN ROAD User: RAM Date: 11-24-97

County : Genessee State: MI Checked: _____ Date: _____

Subtitle:

Continuation of subarea information

	Subareas			
	D	E	F	G
Area(sq mi)	0.00*	0.00*	0.00*	0.00*
Rainfall(in)	4.7	4.7	4.7	4.7
Curve number	74*	75*	75*	74*
Runoff(in)	2.13	2.21	2.21	2.13
Tc (hrs)	0.60*	0.55*	0.64*	0.43*
(Used)	0.50	0.50	0.75	0.40
TimeToOutlet	0.00	0.00	0.00	0.00
Ia/P	0.15	0.14	0.14	0.15

Time (hr)	Subarea Contribution to Total Flow (cfs)			
	D	E	F	G
11.0	0	0	0	0
11.3	0	0	0	0
11.6	0	0	0	0
11.9	0	0	0	0
12.0	1	1	0	1
12.1	1	1	0	2
12.2	2	2	1	3
12.3	3	3	1	4P
12.4	4P	4P	2	4
12.5	3	4	3P	3
12.6	3	3	3	2
12.7	2	2	3	2
12.8	2	2	3	1
13.0	1	1	2	1
13.2	1	1	1	1
13.4	1	1	1	1
13.6	0	0	1	0
13.8	0	0	1	0
14.0	0	0	1	0
14.3	0	0	0	0
14.6	0	0	0	0
15.0	0	0	0	0

15.5	0	0	0	0
16.0	0	0	0	0
16.5	0	0	0	0
17.0	0	0	0	0
17.5	0	0	0	0
18.0	0	0	0	0
19.0	0	0	0	0
20.0	0	0	0	0
22.0	0	0	0	0
26.0	0	0	0	0

P - Peak Flow * - value(s) provided from TR-55 system routines

CLIENT/SUBJECT GM-Linden Rd.

W.O. NO. 01138-079-002

TASK DESCRIPTION Detention Basin Outlet Structure TASK NO. 0030-00

PREPARED BY Rachem DEPT 1245 DATE 12-15-91

APPROVED BY

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

DEPT _____ DATE _____

Outlet Design for Stormwater Basin

The basin outlet shall be designed as a catch basin with the inlet grate limiting the flow into the catch basin to 3.9 cfs, based on the allowable 2-year storm discharge as calculated from the rational method.

Using Neenah nomograph, the required opening area, assuming a 4 foot pond depth is 0.4 square feet. This would limit the discharge into the catch basin to approximately 3.9 cfs.

Using Neenah Orifice Equation, calculated flow rate is:

$$Q = CA \sqrt{2gh}$$

$$C = 0.6 \text{ (from Neenah Manual)}$$

$$Q = (0.6)(0.4) \sqrt{2(32.2)(4)} = 3.85 \text{ cfs}$$

The selected cover would be Neenah R-6352-A. Other manufacturers grates with equal opening size would be considered an equal.

ORIFICE FLOW

(Determines how much water flows through the grate)

CAPACITY OF NEENAH GRATES FOR PONDING CONDITIONS

For flow through a grate under ponding conditions, orifice type flow occurs. If the net open area is used as the orifice area, the discharge can be computed using the orifice equation $Q = CA \sqrt{2gh}$ where C has a value of 0.60, A = area in square feet, g = the constant value 32.2, and h = depth in feet of water over the grate.

The orifice equation is most accurate when large depths of ponding are encountered. At shallower depths, the equation loses its accuracy. The determining factor is the grate's free open area. The orifice equation remains accurate for grates of smaller area when depths are in the .4 to .3 foot range. Grates of larger free open area are not able to sustain ponding conditions at shallow depths, and therefore flow reverts to weir or one directional flow.

Since this equation contains three variables, two must be known to make a determination of the third. To facilitate rapid solution of the equation a nomograph (see page 45) is used. Please note the nomograph is limited to depths of .3 foot.

To use the nomograph, a line is drawn through the two known values on their respective axis. The third value will be obtained at the intersection of this line with the third axis. For example, if the area of a grate required to pass 6.7 cubic feet/second under a .5 feet head is desired, a line is projected from the .5 unit point on the right axis through the 6.7 unit point on the center axis. This line intersects the left axis at approximately 2.0 units indicating that a grate with a net open area of 2.0 square feet is required. Selection of this grate can be made by referring to the size table for the various Neenah grates.

It should be left to the designer to make any necessary reductions in the discharge due to trash accumulation or clogging.

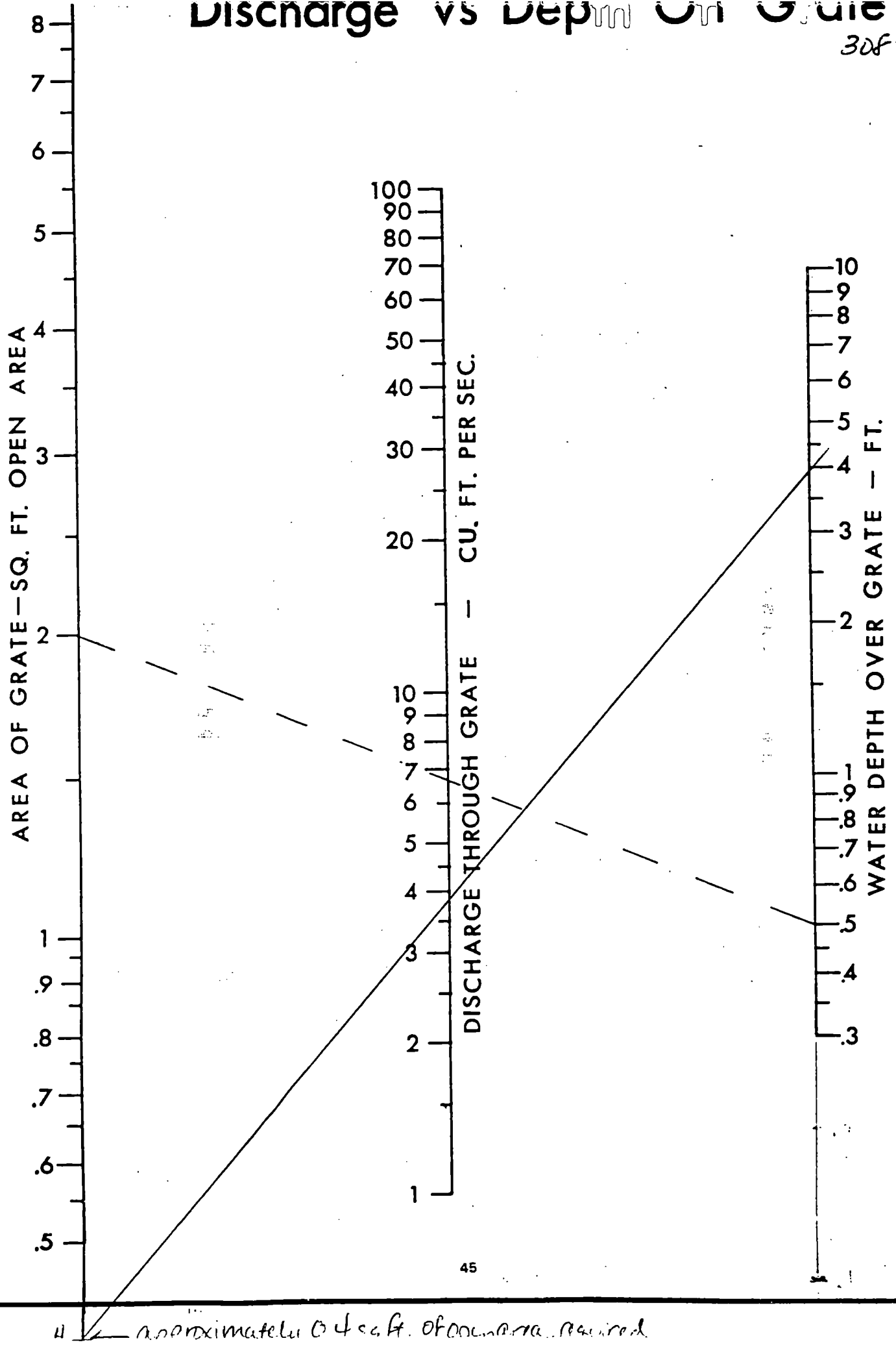
For an example of the relationship between the weir and orifice equations and the expected flow through a grate under varying conditions see page 53.

Note on BEEHIVE grates:

To determine orifice flow capacities for beehive grates, the ponding depth is zero at the top of the grate. This is conservative, but it is usually better to underestimate than overestimate the grate capacity.

Discharge vs Depth Over Grate

3084



approximately 0.4 sq. ft. of opening required

Type.... Time-Elev
Name.... POND RT 20
File.... .\sample\GM2.PPK

Water elev: 753-757
Size: 385ft x 80ft
Outlet: 0.4 sqft. orifice
Volume: 2.325 acft = 3751 CY

Page 1.01

TIME vs. ELEVATION (ft)

Time hrs	Output Time increment = .1000 hrs				
	Time on left represents time for first value in each row.				
11.0000	753.00	753.00	753.00	753.00	753.00
11.5000	753.00	753.00	753.00	753.00	753.03
12.0000	753.12	753.32	753.66	754.17	754.76
12.5000	755.31	755.73	756.04	756.26	756.43
13.0000	756.56	756.65	756.72	756.78	756.85
13.5000	756.90	756.92	756.94	756.95	756.96
14.0000	756.97	756.96	756.95	756.94	756.91
14.5000	756.89	756.85	756.82	756.78	756.74
15.0000	756.70	756.65	756.61	756.57	756.52
15.5000	756.48	756.43	756.39	756.35	756.30
16.0000	756.26	756.21	756.17	756.13	756.08
16.5000	756.04	756.00	755.96	755.91	755.87
17.0000	755.83	755.79	755.74	755.70	755.66
17.5000	755.62	755.58	755.53	755.49	755.45
18.0000	755.41	755.37	755.33	755.29	755.25
18.5000	755.21	755.17	755.13	755.09	755.05
19.0000	755.01	754.97	754.93	754.90	754.86
19.5000	754.82	754.78	754.74	754.71	754.67
20.0000	754.63	754.60	754.56	754.53	754.49
20.5000	754.45	754.42	754.39	754.35	754.32
21.0000	754.28	754.25	754.22	754.18	754.15
21.5000	754.12	754.09	754.06	754.02	753.99
22.0000	753.96	753.93	753.90	753.88	753.85
22.5000	753.82	753.79	753.76	753.73	753.71
23.0000	753.68	753.66	753.63	753.61	753.58
23.5000	753.56	753.53	753.51	753.49	753.46
24.0000	753.44	753.42	753.40	753.38	753.36
24.5000	753.34	753.32	753.30	753.28	753.27
25.0000	753.25	753.23	753.22	753.20	753.19
25.5000	753.17	753.16	753.15	753.14	753.12
26.0000	753.11	753.10	753.09	753.08	753.07
26.5000	753.07	753.06	753.05	753.05	753.04
27.0000	753.04	753.03	753.03	753.03	753.02
27.5000	753.02	753.02	753.02	753.02	753.01
28.0000	753.01	753.01	753.01	753.01	753.01
28.5000	753.01	753.01	753.01	753.01	753.00
29.0000	753.00	753.00	753.00	753.00	753.00
29.5000	753.00	753.00	753.00	753.00	753.00
30.0000	753.00	753.00	753.00	753.00	753.00
30.5000	753.00	753.00	753.00	753.00	753.00
31.0000	753.00	753.00			

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050

Compute Time: 13:44:11

Date: 11-24-1997

Type.... Time vs. Volume
Name.... POND RT 20

Page 2.01

File.... .\sample\GM2.PPK

TIME vs. VOLUME (ac-ft)

Time hrs	Output Time increment = .1000 hrs				
	Time on left represents time for first value in each row.				
11.0000	.000	.000	.000	.000	.000
11.5000	.000	.000	.000	.000	.012
12.0000	.058	.150	.317	.578	.902
12.5000	1.223	1.482	1.674	1.820	1.933
13.0000	2.017	2.080	2.130	2.174	2.217
13.5000	2.252	2.270	2.280	2.289	2.297
14.0000	2.300	2.299	2.292	2.280	2.264
14.5000	2.244	2.223	2.199	2.173	2.145
15.0000	2.116	2.085	2.055	2.025	1.995
15.5000	1.965	1.935	1.906	1.877	1.848
16.0000	1.819	1.790	1.762	1.734	1.706
16.5000	1.678	1.650	1.623	1.595	1.568
17.0000	1.541	1.515	1.488	1.462	1.436
17.5000	1.410	1.385	1.359	1.334	1.309
18.0000	1.284	1.259	1.235	1.211	1.187
18.5000	1.163	1.140	1.116	1.093	1.070
19.0000	1.048	1.025	1.003	.981	.959
19.5000	.938	.916	.895	.874	.854
20.0000	.833	.813	.793	.773	.754
20.5000	.734	.715	.696	.678	.659
21.0000	.641	.623	.606	.588	.571
21.5000	.554	.537	.521	.505	.489
22.0000	.473	.457	.442	.427	.412
22.5000	.398	.384	.370	.356	.342
23.0000	.329	.316	.303	.291	.279
23.5000	.267	.255	.244	.232	.221
24.0000	.211	.200	.190	.180	.170
24.5000	.161	.152	.143	.134	.126
25.0000	.118	.110	.103	.095	.088
25.5000	.082	.075	.069	.063	.058
26.0000	.052	.047	.042	.038	.034
26.5000	.030	.027	.025	.022	.020
27.0000	.018	.016	.014	.013	.012
27.5000	.010	.009	.008	.007	.007
28.0000	.006	.005	.005	.004	.004
28.5000	.004	.003	.003	.003	.002
29.0000	.002	.002	.002	.001	.001
29.5000	.001	.001	.001	.001	.001
30.0000	.001	.001	.001	.001	.000
30.5000	.000	.000	.000	.000	.000
31.0000	.000	.000			

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050 Compute Time: 13:44:11

Date: 11-24-1997

Type.... Vol: Elev-Area
Name.... P 20

Page 3.01

File.... .\sample\GM2.PPK

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
753.00	-----	.4640	.0000	.000	.000
757.00	-----	.7070	1.7438	2.325	2.325

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1, Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050 Compute Time: 13:44:11

Date: 11-24-1997

Type.... Outlet Input Data
Name.... OUTLET 20

File.... .\sample\GM2.PPK

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 753.00 ft
Increment = .10 ft
Max. Elev.= 757.00 ft

OUTLET CONNECTIVITY

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.	Outfall	E1, ft	E2, ft
Orifice-Area		---	---	---
TW SETUP, DS Channel		---> TW	753.000	757.000

Type.... Outlet Input Data
Name.... OUTLET 20

Page 4.02

File.... .\sample\GM2.PPK

OUTLET STRUCTURE INPUT DATA

Structure ID	=	
Structure Type	=	Orifice-Area

# of Openings	=	1
Invert Elev.	=	753.00 ft
Area	=	.4000 sq.ft
Top of Orifice	=	.00 ft
Datum Elev.	=	753.00 ft
Orifice Coeff.	=	.600

Structure ID	=	TW
Structure Type	=	TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...

Maximum Iterations=	30
Min. TW tolerance =	.01 ft
Max. TW tolerance =	.01 ft
Min. HW tolerance =	.01 ft
Max. HW tolerance =	.01 ft
Min. Q tolerance =	.10 cfs
Max. Q tolerance =	.10 cfs

Type.... Individual Outlet Curves
Name.... OUTLET 20

Page 4.03

File.... .\sample\GM2.PPK

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Orifice-Area)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev, Device Q		Tail Water		Notes
WS Elev. ft	Q cfs	TW Elev ft	Converge +/-ft	Computation Messages
753.00	.00	Free Outfall	H =.00	
753.10	.61	Free Outfall	H =.10	
753.20	.86	Free Outfall	H =.20	
753.30	1.05	Free Outfall	H =.30	
753.40	1.22	Free Outfall	H =.40	
753.50	1.36	Free Outfall	H =.50	
753.60	1.49	Free Outfall	H =.60	
753.70	1.61	Free Outfall	H =.70	
753.80	1.72	Free Outfall	H =.80	
753.90	1.83	Free Outfall	H =.90	
754.00	1.93	Free Outfall	H =1.00	
754.10	2.02	Free Outfall	H =1.10	
754.20	2.11	Free Outfall	H =1.20	
754.30	2.20	Free Outfall	H =1.30	
754.40	2.28	Free Outfall	H =1.40	
754.50	2.36	Free Outfall	H =1.50	
754.60	2.44	Free Outfall	H =1.60	
754.70	2.51	Free Outfall	H =1.70	
754.80	2.58	Free Outfall	H =1.80	
754.90	2.65	Free Outfall	H =1.90	
755.00	2.72	Free Outfall	H =2.00	
755.10	2.79	Free Outfall	H =2.10	
755.20	2.86	Free Outfall	H =2.20	
755.30	2.92	Free Outfall	H =2.30	
755.40	2.98	Free Outfall	H =2.40	
755.50	3.04	Free Outfall	H =2.50	
755.60	3.10	Free Outfall	H =2.60	
755.70	3.16	Free Outfall	H =2.70	
755.80	3.22	Free Outfall	H =2.80	
755.90	3.28	Free Outfall	H =2.90	
756.00	3.33	Free Outfall	H =3.00	
756.10	3.39	Free Outfall	H =3.10	
756.20	3.44	Free Outfall	H =3.20	
756.30	3.50	Free Outfall	H =3.30	

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050 Compute Time: 13:44:11

Date: 11-24-1997

Type.... Individual Outlet Curves
Name.... OUTLET 20

Page 4.04

File.... .\sample\GM2.PPK

RATING TABLE FOR ONE OUTLET TYPE

Structure ID = (Orifice-Area)

Upstream ID = (Pond Water Surface)

DNstream ID = TW (Pond Outfall)

WS Elev,Device Q		Tail Water		Notes
WS Elev.	Q	TW Elev Converge		Computation Messages
ft	cfs	ft	+/-ft	
756.40	3.55	Free Outfall	H =3.40	
756.50	3.60	Free Outfall	H =3.50	
756.60	3.65	Free Outfall	H =3.60	
756.70	3.70	Free Outfall	H =3.70	
756.80	3.75	Free Outfall	H =3.80	
756.90	3.80	Free Outfall	H =3.90	
757.00	3.85	Free Outfall	H =4.00	

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050 Compute Time: 13:44:11

Date: 11-24-1997

Type.... Composite Rating Curve
Name.... OUTLET 20

Page 4.05

File.... .\sample\GM2.PPK

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
753.00	.00	Free	Outfall	
753.10	.61	Free	Outfall	
753.20	.86	Free	Outfall	
753.30	1.05	Free	Outfall	
753.40	1.22	Free	Outfall	
753.50	1.36	Free	Outfall	
753.60	1.49	Free	Outfall	
753.70	1.61	Free	Outfall	
753.80	1.72	Free	Outfall	
753.90	1.83	Free	Outfall	
754.00	1.93	Free	Outfall	
754.10	2.02	Free	Outfall	
754.20	2.11	Free	Outfall	
754.30	2.20	Free	Outfall	
754.40	2.28	Free	Outfall	
754.50	2.36	Free	Outfall	
754.60	2.44	Free	Outfall	
754.70	2.51	Free	Outfall	
754.80	2.58	Free	Outfall	
754.90	2.65	Free	Outfall	
755.00	2.72	Free	Outfall	
755.10	2.79	Free	Outfall	
755.20	2.86	Free	Outfall	
755.30	2.92	Free	Outfall	
755.40	2.98	Free	Outfall	
755.50	3.04	Free	Outfall	
755.60	3.10	Free	Outfall	
755.70	3.16	Free	Outfall	
755.80	3.22	Free	Outfall	
755.90	3.28	Free	Outfall	
756.00	3.33	Free	Outfall	
756.10	3.39	Free	Outfall	
756.20	3.44	Free	Outfall	
756.30	3.50	Free	Outfall	
756.40	3.55	Free	Outfall	
756.50	3.60	Free	Outfall	
756.60	3.65	Free	Outfall	
756.70	3.70	Free	Outfall	
756.80	3.75	Free	Outfall	
756.90	3.80	Free	Outfall	

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050 Compute Time: 13:44:11

Date: 11-24-1997

Type.... Composite Rating Curve
Name.... OUTLET 20

Page 4.06

File.... .\sample\GM2.PPK

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
757.00	3.85	Free Outfall		

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050 Compute Time: 13:44:11 Date: 11-24-1997

Type.... Pond E-V-Q Table
Name.... POND RT 20

Page 5.01

File.... .\sample\GM2.PPK

LEVEL POOL ROUTING DATA

HYG Dir = .\sample\
Inflow HYG file = GM1PND.HYG - HYG 10
Outflow HYG file = NONE STORED - POND RT 20

Pond Node Data = P 20
Pond Volume Data = P 20
Pond Outlet Data = Outlet 20

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 753.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .1000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infiltr. cfs	Q Total cfs	2S/t + O cfs
753.00	.00	.000	.4640	.00	.00	.00
753.10	.61	.047	.4695	.00	.61	11.90
753.20	.86	.094	.4749	.00	.86	23.58
753.30	1.05	.142	.4805	.00	1.05	35.34
753.40	1.22	.190	.4860	.00	1.22	47.20
753.50	1.36	.239	.4916	.00	1.36	59.17
753.60	1.49	.288	.4972	.00	1.49	71.26
753.70	1.61	.338	.5028	.00	1.61	83.48
753.80	1.72	.389	.5085	.00	1.72	95.83
753.90	1.83	.440	.5142	.00	1.83	108.31
754.00	1.93	.492	.5200	.00	1.93	120.92
754.10	2.02	.544	.5257	.00	2.02	133.67
754.20	2.11	.597	.5315	.00	2.11	146.55
754.30	2.20	.650	.5374	.00	2.20	159.57
754.40	2.28	.704	.5433	.00	2.28	172.73
754.50	2.36	.759	.5492	.00	2.36	186.03
754.60	2.44	.814	.5551	.00	2.44	199.46
754.70	2.51	.870	.5610	.00	2.51	213.05
754.80	2.58	.926	.5670	.00	2.58	226.77
754.90	2.65	.983	.5731	.00	2.65	240.64
755.00	2.72	1.041	.5791	.00	2.72	254.65
755.10	2.79	1.099	.5852	.00	2.79	268.80
755.20	2.86	1.158	.5913	.00	2.86	283.10

S/N: HOMOL0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050 Compute Time: 13:44:11

Date: 11-24-1997

Type.... Pond E-V-Q Table
Name.... POND RT 20

Page 5.02

File.... .\sample\GM2.PPK

LEVEL POOL ROUTING DATA

HYG Dir = .\sample\
Inflow HYG file = GM1PND.HYG - HYG 10
Outflow HYG file = NONE STORED - POND RT 20

Pond Node Data = P 20
Pond Volume Data = P 20
Pond Outlet Data = Outlet 20

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 753.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .1000 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + cfs
755.30	2.92	1.217	.5975	.00	2.92	297.5
755.40	2.98	1.278	.6037	.00	2.98	312.1
755.50	3.04	1.338	.6099	.00	3.04	326.89
755.60	3.10	1.400	.6161	.00	3.10	341.7
755.70	3.16	1.461	.6224	.00	3.16	356.8
755.80	3.22	1.524	.6287	.00	3.22	372.03
755.90	3.28	1.587	.6351	.00	3.28	387.3
756.00	3.33	1.651	.6415	.00	3.33	402.8
756.10	3.39	1.715	.6479	.00	3.39	418.54
756.20	3.44	1.781	.6543	.00	3.44	434.35
756.30	3.50	1.846	.6608	.00	3.50	450.3
756.40	3.55	1.913	.6673	.00	3.55	466.4
756.50	3.60	1.980	.6738	.00	3.60	482.72
756.60	3.65	2.048	.6804	.00	3.65	499.1
756.70	3.70	2.116	.6870	.00	3.70	515.7
756.80	3.75	2.185	.6936	.00	3.75	532.51
756.90	3.80	2.255	.7003	.00	3.80	549.3
757.00	3.85	2.325	.7070	.00	3.85	566.2

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050 Compute Time: 13:44:11

Date: 11-24-1997

Name.... POND RT 20

File.... .\sample\GM2.PPK

LEVEL POOL ROUTING SUMMARY

HYG Dir = .\sample\
Inflow HYG file = GM1PND.HYG - HYG 10
Outflow HYG file = NONE STORED - POND RT 20

Pond Node Data = P 20
Pond Volume Data = P 20
Pond Outlet Data = Outlet 20

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 753.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout = .00 cfs
Time Increment = .1000 hrs

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

=====

Peak Inflow	=	44.00 cfs	at	12.4000 hrs
Peak Outflow	=	3.83 cfs	at	13.9000 hrs

Peak Elevation	=	756.97 ft
Peak Storage	=	2.300 ac-ft

=====

MASS BALANCE (ac-ft)

+ Initial Vol	=	.000
+ HYG Vol IN	=	2.959
- Infiltration	=	.000
- HYG Vol OUT	=	2.958
- Retained Vol	=	.000

Unrouted Vol = -.000 ac-ft (.001% of Inflow Volume)

Type.... Pond Routed HYG (total out)
Name.... POND RT 20

Page 5.04

File.... .\sample\GM2.PPK

POND ROUTED TOTAL OUTFLOW HYG...

HYG file =

HYG ID = POND RT 20

HYG Tag =

Peak Discharge = 3.83 cfs

Time to Peak = 13.9000 hrs

HYG Volume = 2.958 ac-ft

HYDROGRAPH ORDINATES (cfs)

Output Time increment = .1000 hrs

Time on left represents time for first value in each row.

Time hrs					
11.0000	.00	.00	.00	.00	.00
11.5000	.00	.00	.00	.00	.15
12.0000	.67	1.08	1.56	2.08	2.55
12.5000	2.93	3.18	3.35	3.48	3.57
13.0000	3.63	3.68	3.71	3.74	3.78
13.5000	3.80	3.81	3.82	3.83	3.83
14.0000	3.83	3.83	3.83	3.82	3.81
14.5000	3.79	3.78	3.76	3.74	3.72
15.0000	3.70	3.68	3.66	3.64	3.61
15.5000	3.59	3.57	3.54	3.52	3.50
16.0000	3.48	3.45	3.43	3.40	3.38
16.5000	3.36	3.33	3.31	3.29	3.26
17.0000	3.24	3.21	3.19	3.16	3.14
17.5000	3.11	3.09	3.06	3.04	3.01
18.0000	2.99	2.96	2.94	2.91	2.89
18.5000	2.86	2.84	2.81	2.78	2.76
19.0000	2.73	2.70	2.68	2.65	2.62
19.5000	2.60	2.57	2.54	2.52	2.49
20.0000	2.46	2.43	2.41	2.38	2.35
20.5000	2.32	2.29	2.27	2.24	2.21
21.0000	2.18	2.15	2.12	2.09	2.07
21.5000	2.04	2.01	1.98	1.95	1.92
22.0000	1.89	1.86	1.83	1.80	1.77
22.5000	1.74	1.71	1.68	1.65	1.62
23.0000	1.59	1.56	1.53	1.50	1.47
23.5000	1.43	1.40	1.37	1.34	1.31
24.0000	1.28	1.25	1.22	1.18	1.15
24.5000	1.12	1.09	1.06	1.03	.99
25.0000	.96	.93	.90	.87	.83
25.5000	.80	.76	.73	.70	.67
26.0000	.64	.61	.55	.49	.44
26.5000	.40	.36	.32	.29	.26
27.0000	.23	.21	.19	.17	.15

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050

Compute Time: 13:44:11

Date: 11-24-1997

Type.... Pond Routed HYG (total out)

Page 5.05

Name.... POND RT 20

File.... .\sample\GM2.PPK

HYDROGRAPH ORDINATES (cfs)					
Output Time increment = .1000 hrs					
Time hrs	Time on left represents time for first value in each row.				
27.5000	.14	.12	.11	.10	.09
28.0000	.08	.07	.06	.06	.05
28.5000	.05	.04	.04	.03	.03
29.0000	.03	.02	.02	.02	.02
29.5000	.02	.01	.01	.01	.01
30.0000	.01	.01	.01	.01	.01
30.5000	.01	.00	.00	.00	.00
31.0000	.00	.00			

S/N: HOM0L0120356 Roy F. Weston, Inc.

Pond Pack Ver: 5-05-97 :050

Compute Time: 13:44:11

Date: 11-24-1997

Index of Starting Page Numbers for ID Names

----- O -----

OUTLET 20... 4.01, 4.03, 4.05

----- P -----

P 20... 3.01

POND RT 20... 1.01, 2.01, 5.01,
5.03, 5.04

APPENDIX C

STORM SEWER SYSTEM DESIGN

CLIENT/SUBJECT G.M. Linden Road

W.O. NO. _____

TASK DESCRIPTION Storm Sewer Design

TASK NO. _____

PREPARED BY Rachael M DEPT 1245 DATE 12-17-97

APPROVED BY _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

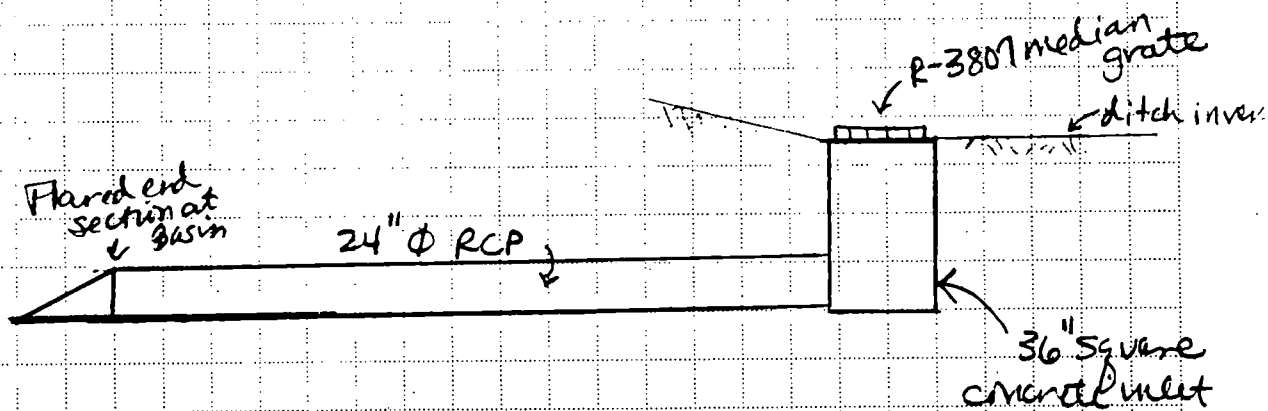
DEPT _____ DATE _____

- ▲ Size Storm Sewer and Inlet Grate from parking area to the Detention Area - Culvert 5.

From TR-55, peak flow into the inlet is 26 cfs. This inlet is designed as a median drain including frame and grate positioned on a 36" square concrete box inlet catch basin.

Using 26 cfs, required opening size/area is 3.8 sq. ft. Select median grate R-3807, Neenah Foundries, such that inlet grate does not restrict flow into catch basin. See attached tables for model selection.

Using Culvertmaster, storm sewer pipe required to pass peak flow of 26 cfs is a 24 inch diameter concrete pipe. Computer printouts are attached. Construction of inlet is as shown below.



Culvert Design Report Trial-1

Parking Lot TO
Detention Pond
Culvert 5

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	761.00 ft	Storm Event	Design
Computed Headwater Elevation	759.24 ft	Discharge	26.00 cfs
Headwater Depth/ Height	2.12	Tailwater Elevation	N/A ft
Inlet Control HW Elev	759.06 ft	Control Type	Outlet Control
Outlet Control HW Elev	759.24 ft		
Grades			
Upstream Invert	755.00 ft	Downstream Invert	753.00 ft
Length	210.00 ft	Constructed Slope	0.009524 ft/ft
Hydraulic Profile			
Profile	Composite M2 Pressure	Depth, Downstream	1.79 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	1.79 ft
Velocity Downstream	8.78 ft/s	Critical Slope	0.011708 ft/ft
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev	759.24 ft	Upstream Velocity Head	1.06 ft
Ke	0.50	Entrance Loss	0.53 ft
Inlet Control Properties			
Inlet Control HW Elev	759.06 ft	Flow Control	Submerged
Inlet Type	End-Section Conforming to fill slope	Area Full	3.1 ft ²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

R-3807 Median Drain Frame and 2 pc. Grate Assembly

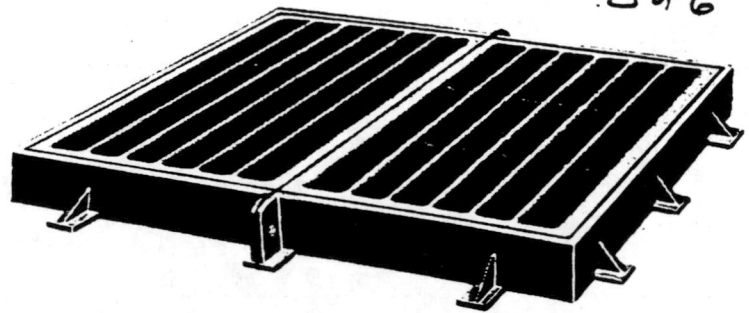
Heavy Duty

Total Weight 735 Pounds

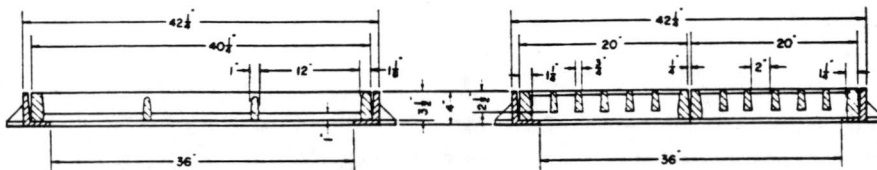
For flush type inlet box in locations where median narrows. Recommended installation, with load bearing bars parallel to roadway. Frames and grates furnished standard in Gray Iron. Grates available in Ductile Iron for extra heavy use when specified.

Specify:

1. Grates in Ductile or Gray Iron, as required.



Illustrating R-3807



R-3808-1 Single Unit Median Drain Frame and Grate Assembly

Heavy Duty

Total Weight 335 Pounds

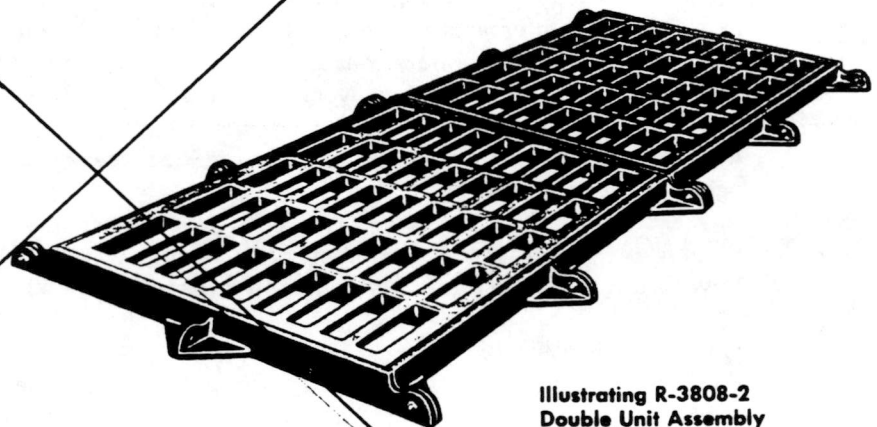


R-3808-2 Double Unit Assembly

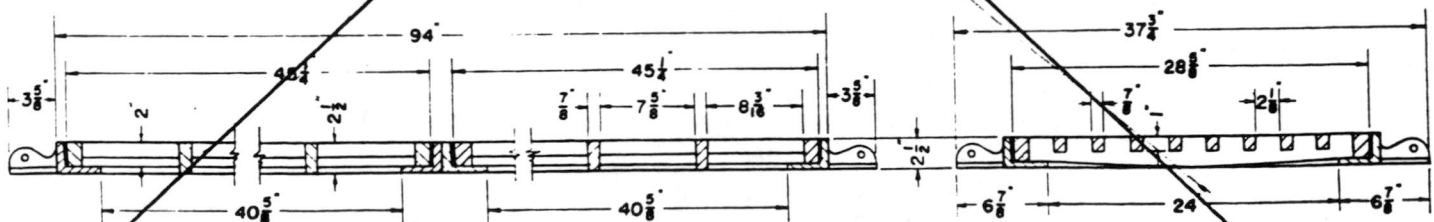
Heavy Duty

Total Weight 670 Pounds

Center ditch inlet for grade slopes of 8:1 to 4:1. Frames Gray Iron, Class 35; grates Ductile Iron.



Illustrating R-3808-2
Double Unit Assembly



ORIFICE FLOW

(Determines how much water flows through the grate)

CAPACITY OF NEENAH GRATES FOR PONDING CONDITIONS

For flow through a grate under ponding conditions, orifice type flow occurs. If the net open area is used as the orifice area, the discharge can be computed using the orifice equation $Q = CA \sqrt{2gh}$ where C has a value of 0.60, A = area in square feet, g = the constant value 32.2, and h = depth in feet of water over the grate.

The orifice equation is most accurate when large depths of ponding are encountered. At shallower depths, the equation loses its accuracy. The determining factor is the grate's free open area. The orifice equation remains accurate for grates of smaller area when depths are in the .4 to .3 foot range. Grates of larger free open area are not able to sustain ponding conditions at shallow depths, and therefore flow reverts to weir or one directional flow.

Since this equation contains three variables, two must be known to make a determination of the third. To facilitate rapid solution of the equation a nomograph (see page 45) is used. Please note the nomograph is limited to depths of .3 foot.

To use the nomograph, a line is drawn through the two known values on their respective axis. The third value will be obtained at the intersection of this line with the third axis. For example, if the area of a grate required to pass 6.7 cubic feet/second under a .5 feet head is desired, a line is projected from the .5 unit point on the right axis through the 6.7 unit point on the center axis. This line intersects the left axis at approximately 2.0 units indicating that a grate with a net open area of 2.0 square feet is required. Selection of this grate can be made by referring to the size table for the various Neenah grates.

It should be left to the designer to make any necessary reductions in the discharge due to trash accumulation or clogging.

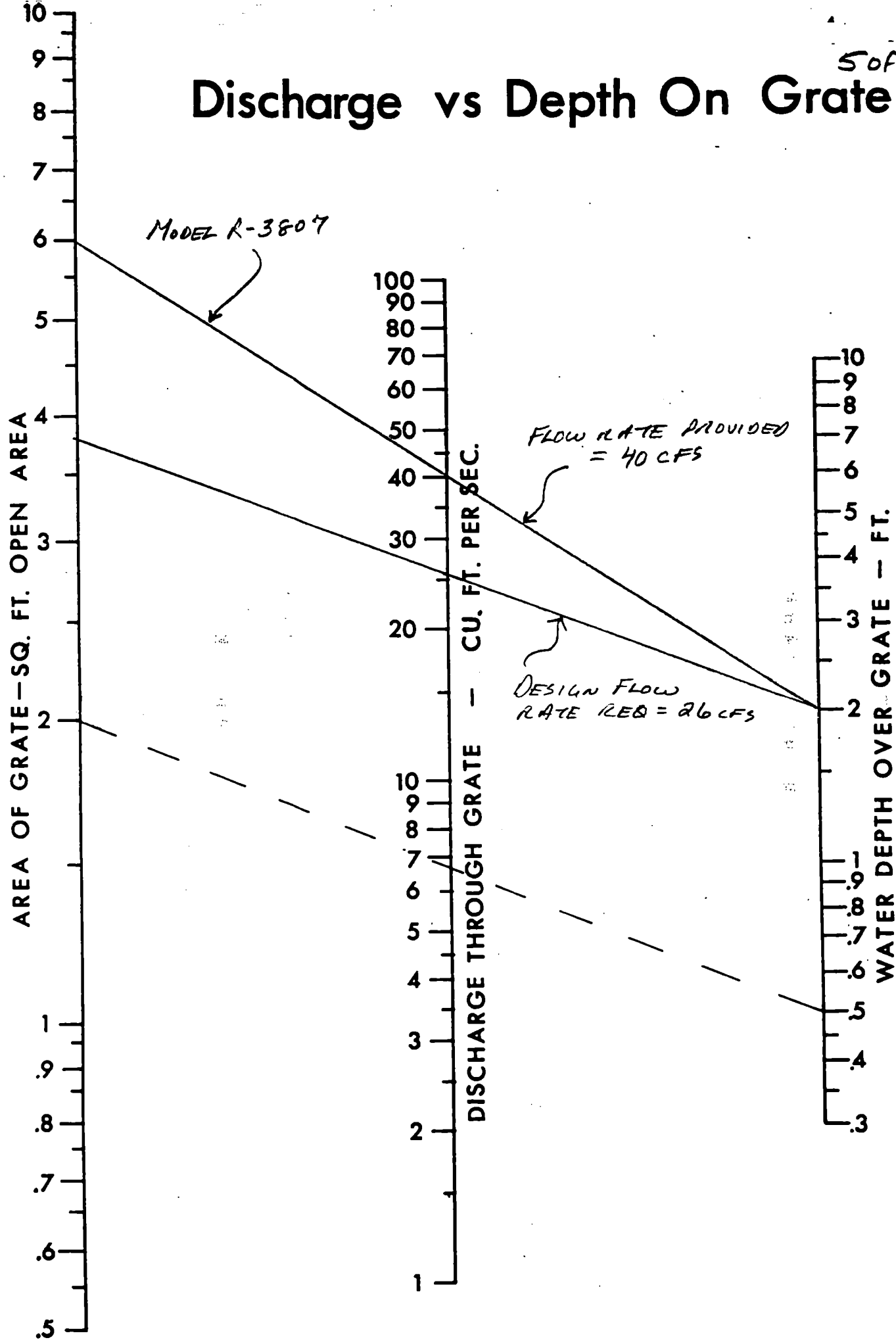
For an example of the relationship between the weir and orifice equations and the expected flow through a grate under varying conditions see page 53.

Note on BEEHIVE grates:

To determine orifice flow capacities for beehive grates, the ponding depth is zero at the top of the grate. This is conservative, but it is usually better to underestimate than overestimate the grate capacity.

5 of 6

Discharge vs Depth On Grate



FREE OPEN AREAS AND WEIR PERIMETERS OF NEENAH GRATES (Continued)

CATALOG NO.	TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET	CATALOG NO.	TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET	CATALOG NO.	TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-3348	K	1.9	8.0	R-3477	C	3.3	12.3	R-3918	DR/DL	1.4	8.9
R-3348-A	K	1.8	7.7	R-3480	C	3.3	12.7	R-3920	B or D	1.5	8.0
R-3350	K	2.2	9.3	R-3480-A	A	1.6	8.5	R-3921-A	B	1.0	5.8
R-3351	K	2.7	9.3	R-3501-A	M	0.9	3.4	R-3921-D	D	0.7	4.8
R-3356-A	K	1.5	7.6	R-3501-B	M	0.9	3.4	R-3922	V	0.8	5.9
R-3357-A	K	2.0	8.7	R-3501-D2A	M	1.0	3.4	R-3922-A	V	0.8	5.0
R-3359	K	1.1	7.3	R-3501-E2	M	1.4	4.2	R-3924	B	2.3	8.4
R-3360-A	K	1.6	7.8	R-3501-H2	M	3.3	6.2	R-3928	B	0.5	1.9
R-3361	K	3.4	12.7	R-3501-H3	M	3.0	6.2	R-3929	B	0.2	3.3
R-3362	C	2.3	10.3	R-3501-HL	M	3.3	5.8	R-3930	B or D	0.3	3.0
R-3362-1	C	2.3	7.0	R-3501-H4	M	3.0	5.8	R-3931	B or D	0.3	3.0
R-3363-1	C	4.6	10.3	R-3501-L1A	M	1.2	4.4	R-3933	B or D	0.6	4.9
R-3381	K	1.0	6.8	R-3501-M	M	2.3	5.6	R-3935	A or C	0.6	5.3
R-3382	K	2.3	10.4	R-3501-N	M	1.6	4.3	R-3936-A	C	1.0	6.5
R-3383-A	K	2.7	9.3	R-3501-O	M	1.4	3.3	R-3940	A	1.0	6.1
R-3383-B	K	4.0	12.0	R-3501-P	M	1.5	4.3	R-3942	V	0.8	5.1
R-3390	K	2.2	9.1	R-3501-R	M	2.6	5.5	R-3943	V	1.2	6.9
R-3392	K	1.8	7.7	R-3501-TL	M	1.4	4.6	R-3948	D	1.4	5.1
R-3393-A	K	2.0	8.7	R-3501-TR	M	1.4	4.6	R-3952	D	1.1	6.3
R-3396	K	3.2	11.4	R-3502-A	M	1.4	4.1	R-3954	B	1.8	8.1
R-3397	A	1.1	7.2	R-3502-B	M	1.4	4.2	R-3961	D	0.7	5.2
R-3397-1	V	1.5	7.2	R-3502-D2	M	1.9	4.2	R-3976	B	0.2	3.3
R-3401	D	1.9	7.6	R-3503	M	1.3	4.1	R-3977	B	0.1	2.6
R-3401-B	B	3.8	11.2	R-3503-B	M	2.0	4.1				
R-3401-C	B	5.7	14.7	R-3504-F	M	2.8	5.1	R-4001-A	C	0.3	2.5
R-3402	A or C	0.4	4.0	R-3506-A2	M	1.4	2.9	R-4001-B	C	0.3	2.5
R-3402-E	A or C	2.1	8.0	R-3506-B	M	1.2	2.9	R-4003-A	A	0.9	6.1
R-3403	A or C	1.1	6.5	R-3506-B1	M	1.3	3.5	R-4003-B	A	0.9	6.1
R-3403-A1	A	1.5	8.3	R-3506-B2	M	1.3	3.5	R-4003-C	A	0.9	6.1
R-3403-F	A	3.2	10.6	R-3507-C	M	1.6	3.7	R-4004-A	C	1.3	6.8
R-3404	A or C	1.4	7.2	R-3507-D	M	1.6	3.7	R-4004-B	B	1.5	7.4
R-3405	A or C	1.5	7.9	R-3508-A2	M	1.7	3.8	R-4004-C	B	1.5	7.4
R-3405-A	A or C	1.3	8.0	R-3508-B	M	1.8	3.8	R-4004-G	D	1.9	7.3
R-3405-B	A or C	1.5	8.0	R-3508-B1	M	1.9	3.8	R-4005-A2	B or D	0.4	4.3
R-3406	C	1.8	9.8	R-3508-C	M	1.4	3.8	R-4006	B or D	0.3	3.1
R-3406-A	C	1.8	9.8	R-3509	M	0.9	2.8	R-4007	B or D	0.4	4.3
R-3406-2	C	1.8	15.9	R-3510	M	2.9	4.1	R-4008-B	B or D	0.4	4.3
R-3406-2A	C	1.8	15.9	R-3511	M	2.0	2.9	R-4011-B1	B or D	0.4	4.3
R-3408-L	L	1.2	7.3	R-3513	M	1.4	4.7	R-4014-B	C	2.8	9.7
R-3408-AL	L	2.4	9.7	R-3516	M	4.5	6.2	R-4014-C	C	2.4	8.4
R-3408-BL	L	2.4	12.5	R-3516-1	M	2.2	4.3	R-4014-E	C	3.0	10.1
R-3409	C	1.5	7.6	R-3517	M	1.8	3.7	R-4014-T	D	1.3	7.4
R-3413	C	1.5	9.0	R-3525-L	L	1.0	6.7	R-4014-T1	D	0.8	5.0
R-3415	A	4.1	13.5	R-3526-1	K	1.8	6.7	R-4015-A	B	0.2	3.3
R-3416	A	1.4	9.8	R-3526-L	L	1.6	7.7	R-4015-A1	B	0.2	3.3
R-3420	A	1.2	10.0	R-3527-M	V	1.6	11.3	R-4015-B	C	0.4	3.3
R-3423	B	1.6	9.9	R-3527-V	V	0.8	5.6	R-4015-C	B	0.2	3.3
R-3425-A	K	2.1	9.4	R-3528-V	V	0.8	7.5	R-4015-D	B	0.2	3.3
R-3425-B	K	2.1	9.4	R-3529-V	V	1.6	11.3	R-4016-A	B	0.6	4.8
R-3429-A	A or C	1.0	6.0	R-3531-A	A or C	6.0	13.0	R-4016-B	C	0.5	4.8
R-3430	A or C	0.9	6.6	R-3531-B	A or C	6.0	13.0	R-4016-E	A	0.6	4.8
R-3433	A or C	1.5	8.0	R-3531-C	A or C	3.0	9.1	R-4016-E1	A	0.6	4.8
R-3438-A	A or C	7.0	16.6	R-3531-D	A or C	3.0	9.1	R-4016-F	C	0.6	4.8
R-3443	A	0.7	6.0	R-3531-E	A or C	4.7	12.7	R-4016-G	B	0.8	4.8
R-3443-B	A	0.7	6.0	R-3570	A	2.4	7.4	R-4016-H1	A	0.6	5.3
R-3448-B	C	1.1	6.8	R-3570-A	A	2.4	7.4	R-4016-K	D	1.1	6.3
R-3448-C	C	0.9	6.8	R-3571	A	2.4	7.4	R-4017	B	0.4	4.1
R-3448-D	S	1.2	6.8	R-3571-A	A	2.4	7.4	R-4017-1	B	0.4	4.1
R-3449	C	0.9	6.8	R-3572	DR/DL	5.1	12.4	R-4018	B	0.2	3.8
R-3451	C	1.5	7.3	R-3573	DR/DL	4.4	12.4	R-4027-B	C	1.1	4.1
R-3451-B	C	1.7	7.8	R-3574	DR/DL	5.6	12.4	R-4030-4	G	0.1	1.4
R-3454	A	4.1	13.2	R-3574-L	L	2.3	12.4	R-4030-6	G	0.1	2.1
R-3454-B	D	2.5	9.9	R-3575	B	2.6	9.5	R-4030-8	G	0.2	2.7
R-3455-A	A	2.6	9.8	R-3576	DR/DL	2.4	9.3	R-4030-10	G	0.3	3.3
R-3455-C	A	2.6	10.0	R-3577	D	1.8	9.2	R-4030-12	G	0.4	3.7
R-3457-C	B	6.0	14.0	R-3578	L	2.3	10.9	R-4030-15	G	0.8	4.8
R-3460-A	A	0.8	6.0	R-3579	L	1.4	7.8	R-4030-18	B	1.1	5.8
R-3460-D	C	0.8	6.0	R-3580	L	1.4	7.9	R-4030-21	B	1.3	6.7
R-3461	C	1.5	8.0	R-3580-1	L	2.8	12.9	R-4030-24	B	2.1	7.6
R-3462-B	DR/DL	1.8	7.6	R-3581	V	2.2	9.3	R-4030-27	G	2.8	3.0
R-3463-B	DR/DL	3.5	12.6	R-3588	D	1.8	7.9	R-4030-30	G	3.5	3.3
R-3465	A	0.8	6.0	R-3588-L	L	1.5	7.9	R-4040-6	E	0.1	2.1
R-3466-A	A	0.8	6.0	R-3589	D	1.8	7.9	R-4040-8	E	0.2	2.7
R-3469	A	2.7	9.2	R-3589-L	L	1.5	7.9	R-4040-10	E	0.3	3.3
R-3469-E2	B or D	2.3	9.2	R-3591	A	1.5	8.0	R-4040-12	E	0.4	3.7
R-3471	C	0.6	5.8	R-3593	C	2.5	12.3	R-4040-15	E	0.7	4.8
R-3472	A or C	1.3	7.3	R-3594	S	1.8	8.0	R-4040-18	E	1.2	5.8
R-3473	C	0.9	6.3	R-3599-A	L	0.1*	6.0	R-4040-21	G	1.4	6.7
R-3475	A	2.7	9.8	R-3807	K	6.0	13.4	R-4040-24	G	1.6	7.6
R-3475-1	A	2.7	9.8	R-3808-1	C	5.2	12.3	R-4040-27	G	2.3	3.0
R-3475-3	A	4.1	13.7	R-3808-2	C	10.3	19.9	R-4040-30	G	2.9	3.3
R-3475-E	A	2.7	9.8	R-3900	A or C	6.6	16.0	R-4215-A	BEEHIVE	2.0	9.0
R-3475-F	C	5.4	13.8	R-3900-A	A or C	4.4	11.8	R-4215-C	BEEHIVE	3.3	11.3
R-3475-G	C	8.1	17.8	R-3902-A	C	2.4	7.9	R-4216-B	BEEHIVE	2.2	4.1
R-3475-H	C	10.8	21.8					R-4216-D	BEEHIVE	3.0	3.8

*Per Lineal Foot

Type K indicates "Special" grate style and is not among standard types as illustrated.

Type M indicates roll type or mountable curb.

For BEEHIVE grates, see note on page 44.

CLIENT/SUBJECT GM-Linden Road W.O. NO. _____

TASK DESCRIPTION Parking lot Crossover Culverts TASK NO. _____

PREPARED BY Rachel M DEPT 1245 DATE 12-17-97 APPROVED BY _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____ DEPT _____ DATE _____

- Determine size of culverts under parking lot crossings and entrance road crossing.

Maximum peak flow at culvert 1, across the entrance road, is 7 cfs. The selected culvert is an 18 inch concrete culvert with flared end sections - see sheet 2

Maximum peak flow at culvert 2, from the NW corner into the north end of the parking lot is 4 cfs. The selected culvert is a 15 inch concrete culvert with flared end sections - see sheet 3

Maximum peak flow at culvert 3, the Northern parking lot culvert is 11 cfs. The selected culvert is a 21 inch concrete culvert with flared end sections. Sheet 4 shows the computer modeling for culvert 3.

Maximum peak flow at culvert 4, the Southern parking lot culvert is 18 cfs. The selected culvert is a 24-inch concrete culvert with flared end sections. See sheet 5 for modeling.

Culvert Design Report Trial-1

Entrance Road
Culvert 1

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	764.00 ft	Storm Event	Design
Computed Headwater Elevation	763.70 ft	Discharge	7.00 cfs
Headwater Depth/ Height	1.13	Tailwater Elevation	762.53 ft
Inlet Control HW Elev	763.63 ft	Control Type	Outlet Control
Outlet Control HW Elev	763.70 ft		
Grades			
Upstream Invert	762.00 ft	Downstream Invert	761.25 ft
Length	125.00 ft	Constructed Slope	0.006000 ft/ft
Hydraulic Profile			
Profile	M1	Depth, Downstream	1.28 ft
Slope Type	Mild	Normal Depth	1.07 ft
Flow Regime	Subcritical	Critical Depth	1.02 ft
Velocity Downstream	4.36 ft/s	Critical Slope	0.006766 ft/ft
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev	763.70 ft	Upstream Velocity Head	0.42 ft
Ke	0.50	Entrance Loss	0.21 ft
Inlet Control Properties			
Inlet Control HW Elev	763.63 ft	Flow Control	Unsubmerged
Inlet Type	End-Section Conforming to fill slope	Area Full	1.8 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

NW to parking lot
culvert 2

504-5

Culvert Design Report **Trial-1**

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	768.00 ft	Storm Event	Design
Computed Headwater Elevation	767.32 ft	Discharge	4.00 cfs
Headwater Depth/ Height	1.05	Tailwater Elevation	766.35 ft
Inlet Control HW Elev	767.26 ft	Control Type	Outlet Control
Outlet Control HW Elev	767.32 ft		
Grades			
Upstream Invert	766.00 ft	Downstream Invert	765.50 ft
Length	105.00 ft	Constructed Slope	0.004762 ft/ft
Hydraulic Profile			
Profile	M2	Depth, Downstream	0.85 ft
Slope Type	Mild	Normal Depth	0.92 ft
Flow Regime	Subcritical	Critical Depth	0.81 ft
Velocity Downstream	4.48 ft/s	Critical Slope	0.006774 ft/ft
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.25 ft
Section Size	15 inch	Rise	1.25 ft
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev	767.32 ft	Upstream Velocity Head	0.26 ft
Ke	0.50	Entrance Loss	0.13 ft
Inlet Control Properties			
Inlet Control HW Elev	767.26 ft	Flow Control	Unsubmerged
Inlet Type	End-Section Conforming to fill slope	Area Full	1.2 ft ²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

North Farming Lot
Culvert 3

Culvert Design Report

Trial-1

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	766.60 ft	Storm Event	Design
Computed Headwater Elevation	766.16 ft	Discharge	11.00 cfs
Headwater Depth/ Height	1.18	Tailwater Elevation	765.12 ft
Inlet Control HW Elev	766.11 ft	Control Type	Outlet Control
Outlet Control HW Elev	766.16 ft		
Grades			
Upstream Invert	764.10 ft	Downstream Invert	763.90 ft
Length	40.00 ft	Constructed Slope	0.005000 ft/ft
Hydraulic Profile			
Profile	M2	Depth, Downstream	1.24 ft
Slope Type	Mild	Normal Depth	1.41 ft
Flow Regime	Subcritical	Critical Depth	1.24 ft
Velocity Downstream	6.06 ft/s	Critical Slope	0.006713 ft/ft
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.75 ft
Section Size	21 inch	Rise	1.75 ft
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev	766.16 ft	Upstream Velocity Head	0.46 ft
Ke	0.50	Entrance Loss	0.23 ft
Inlet Control Properties			
Inlet Control HW Elev	766.11 ft	Flow Control	Unsubmerged
Inlet Type	End-Section Conforming to fill slope	Area Full	2.4 ft ²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Design Report Trial-1

Culvert 4

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	765.30 ft	Storm Event	Design
Computed Headwater Elevation	765.19 ft	Discharge	18.00 cfs
Headwater Depth/ Height	1.34	Tailwater Elevation	763.87 ft
Inlet Control HW Elev	765.14 ft	Control Type	Outlet Control
Outlet Control HW Elev	765.19 ft		
Grades			
Upstream Invert	762.50 ft	Downstream Invert	762.40 ft
Length	40.00 ft	Constructed Slope	0.002500 ft/ft
Hydraulic Profile			
Profile	M2	Depth, Downstream	1.53 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	1.53 ft
Velocity Downstream	6.99 ft/s	Critical Slope	0.007295 ft/ft
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev	765.19 ft	Upstream Velocity Head	0.53 ft
Ke	0.50	Entrance Loss	0.27 ft
Inlet Control Properties			
Inlet Control HW Elev	765.14 ft	Flow Control	Submerged
Inlet Type	End-Section Conforming to fill slope	Area Full	3.1 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

TABLE 1
CATCH BASIN AND CULVERT DATA
STORMWATER MANAGEMENT SYSTEM
LINDEN ROAD SITE
FLINT TOWNSHIP MICHIGAN

<u>Catch Basin/Manhole</u>	<u>Rim Elevation</u>	<u>Invert Elevation/Description</u>
CB 1	750.60	743.54 (EX. 24" NE & SW) 746.00 (15" NW)
CB 1A	753.00	749.00 (15" SE)
CB 1B	761.00	755.00 (24" SE)
Culvert 1	NA	762.00 (18" N) 761.25 (18" S)
Culvert 2	NA	766.00 (15" NE) 765.50 (15" SW)
Culvert 3	NA	764.10 (21" N) 763.90 (21" S)
Culvert 4	NA	762.50 (24" N) 762.40 (24" S)
Culvert 5	NA	755.00 (24" NE) 753.00 (24" SW)

APPENDIX D

CONCRETE ROADWAY AND FOUNDATION DESIGN

SHEET 1 of

CLIENT/SUBJECT GM - Cap for Landfill (Vardon Hills Off.) W.O. NO. 01138-079-002

TASK DESCRIPTION Entrance Road TASK NO. 0025-00

PREPARED BY JWG DEPT 1283 DATE 8-19-97

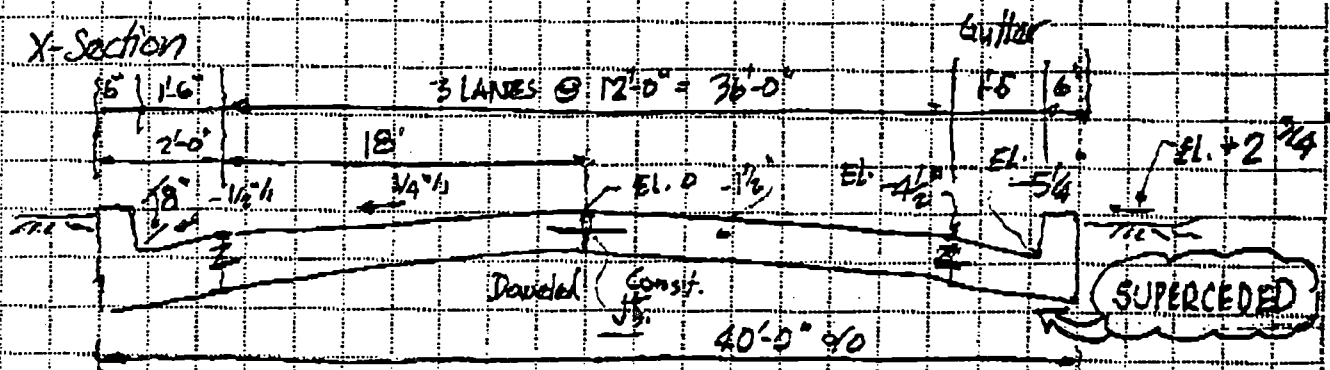
MATH CHECK BY DEPT DATE

METHOD REV. BY DEPT DATE

APPROVED BY

DEPT DATE

- Road - 3 Lanes plus curb & gutter, 350' ± long. - concrete
- Loading - no trucks, but perhaps a bus - design for H-15 truck ld.
- Roadway is founded on natural soil or fill - not waste material.
- Location, Detroit, Mich.



Using TM-822-5 CDE METHODS.

H-15 Truck Ld. Assume good subgrade characteristics

Axle Ld. = 24' Assume Category II - Traffic composed primarily of passenger cars, panel and pick-up trucks, but may contain as much as 10% two-axle trucks - low usage

Wheel Ld. = 12' Assume Modulus of Soil reaction = 200 pci

Say Design Index = 2

Plain Concrete Pavement:

Fig. M2-1 @ D.I. = 2, $F_c = 600$ psi; $k = 200$

From Fig. Req'd thick = 5.2" use 6" conc slab

Transv. Jts. @ 25' (1.25(20) = 25': Expon. Jts. every 3rd joint (@ 75' spac.)

#4 @ 12" long: $A_s = .20$ in ² /ft	$R = \frac{.20}{6(12)} = .0028$ or .28%	} use depth = 25"
#4 @ 16" transv: $A_s = .15$ in ² /ft	$R_t = \frac{.15}{6(12)} = .0021$ or .21%	
#5 @ 12" long: $A_s = .31$ in ² /ft	$R = \frac{.31}{6(12)} = .0043$ or .43%	}
#5 @ 18" transv: $A_s = .21$ in ² /ft	$R_t = \frac{.21}{6(12)} = .0029$ or .29%	

Thicken slab @ expans. joints 1.25(6") = 7.5" use 8" thick @ Jt taper 2" over 5'

dowels - #5 @ 2'-6" o.c.

SHEET 2 of

CLIENT/SUBJECT GM - Cap for Landfill W.O. NO. 01138-079-00

TASK DESCRIPTION Entrance Rd. TASK NO. 0025-00

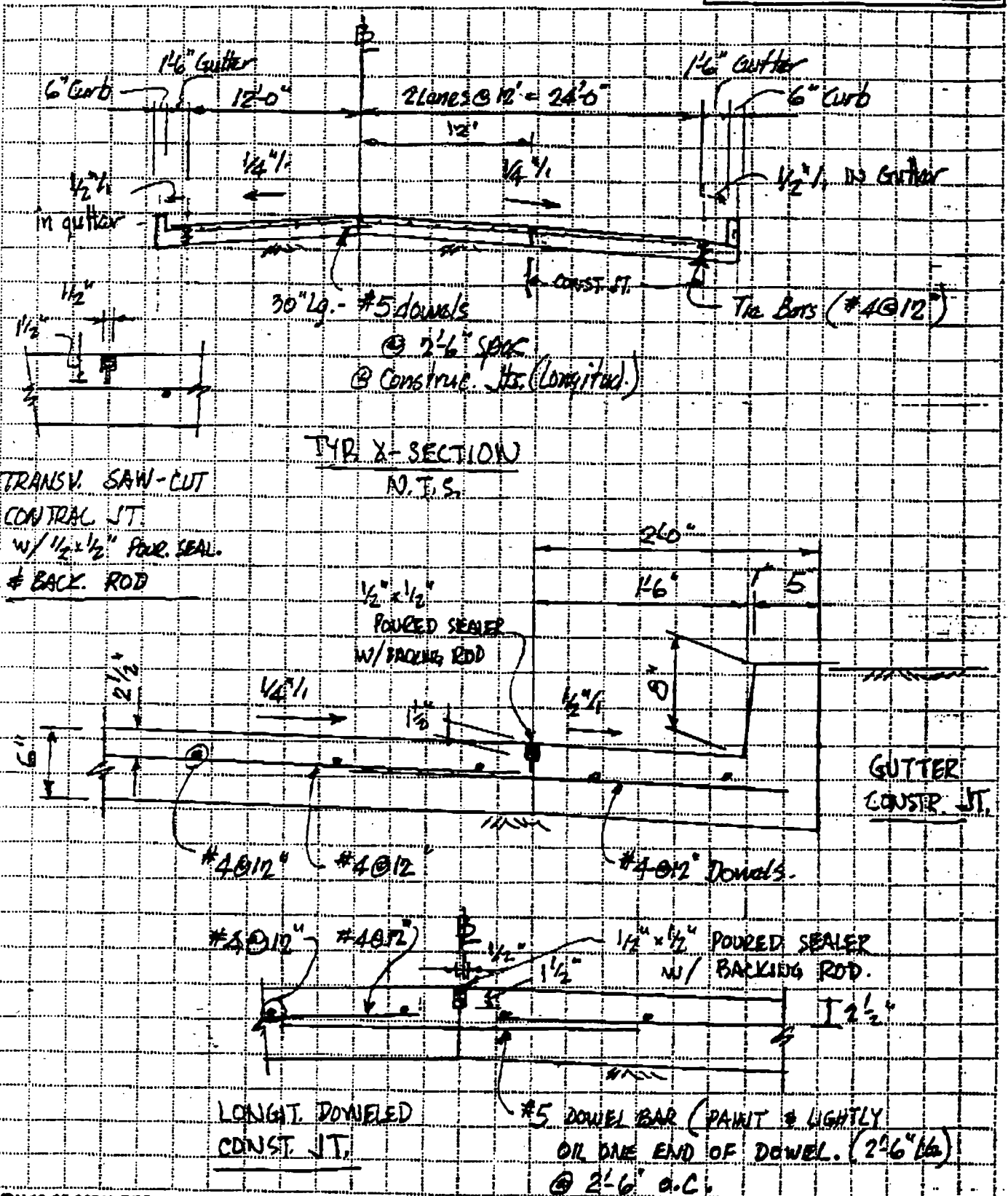
PREPARED BY JWG DEPT 1283 DATE 8-20-97

MATH CHECK BY DEPT DATE

METHOD REV. BY DEPT DATE

APPROVED BY

DEPT DATE



CLIENT/SUBJECT GM - Cap for Land Fill

W.O. NO.

TASK DESCRIPTION Entrance Rd.

TASK NO.

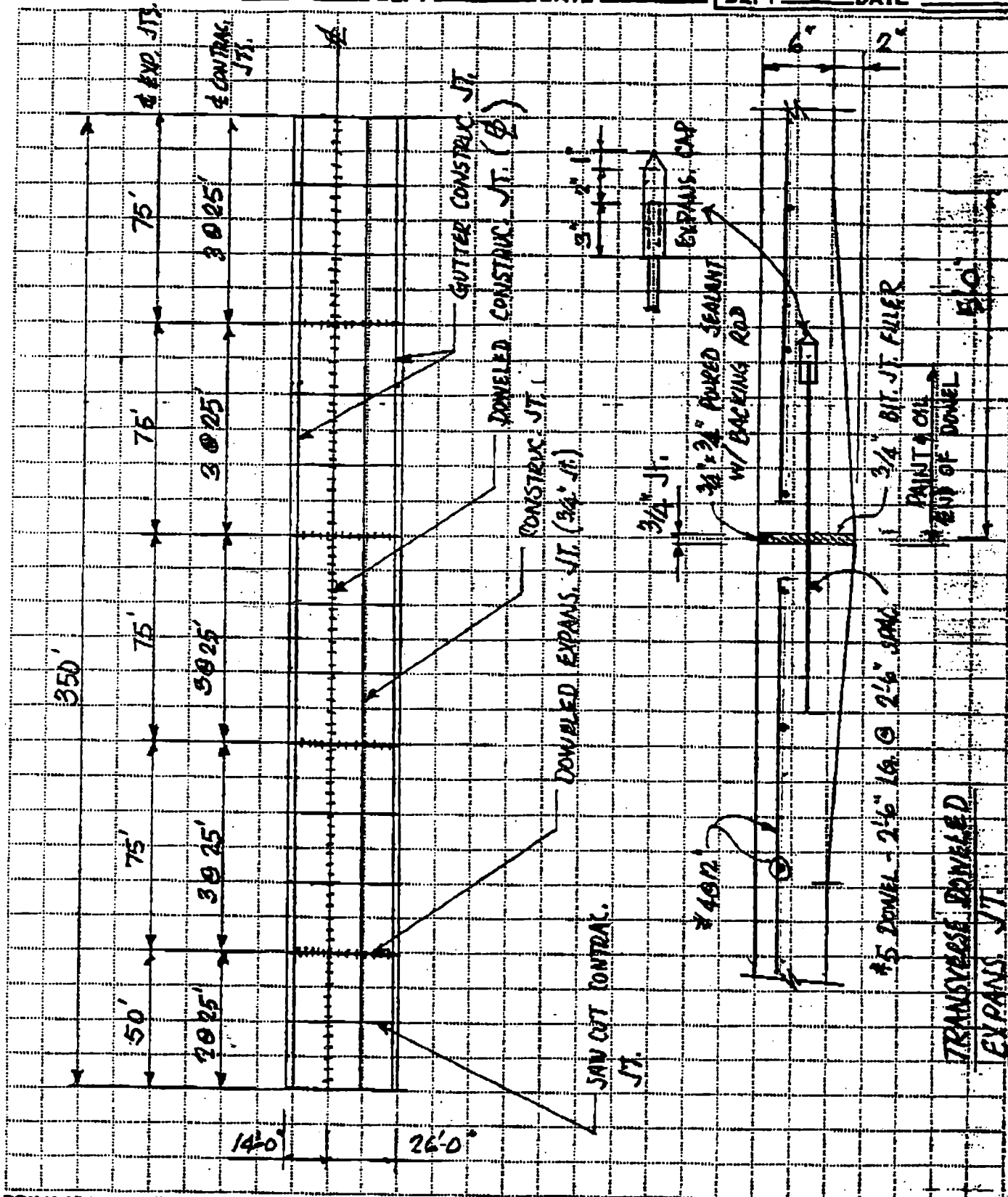
PREPARED BY JWG DEPT 1283 DATE 8-21-97

APPROVED BY

MATH CHECK BY _____ **DEPT** _____ **DATE** _____

METHOD REV. BY _____ DEPT _____ DATE _____

DEPT _____ DATE _____



GM - Cap for Landfill

W.O. NO.

TASK DESCRIPTION

Pad for Equip. or Bldg.

TASK NO.

PREPARED BY

MUG

DEPT

1283

DATE _____

8-2-97

APPROVED BY

MATH CHECK BY

DEPT

DATE

METHOD REV. BY

DEPT

DATE

DEPT

DATE _____

Pad size = 20' x 30' - use 8" slab - good for aggr/p. or bldg.

Assume a future bldg. will be sited on this pad.

Bld Roof DL = .025 $\frac{4}{9}$ (20Y30) = 15'

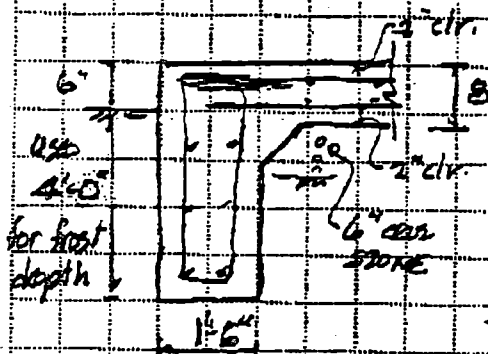
" " $L = .035$ $(20 \times 30) = 21$

Assume: BIL WH = 51 cbs = .050 (10' H. (30' X 2) = 30'

664

Design $\omega = \frac{66}{100} = 110 \text{ k/ft}^2$

Top Steel!

$$+M = 0.74 (110)(18) = 264 \text{ kN}$$
$$\rightarrow M_B = 0.13 (.40)(28) = 1.12 \text{ k}$$
$$Bolt\ Stress = -M = .077(.110)(98)^2 = 2.74 \text{ } \mu\text{in}$$
$$-M_B = 0.04(110/28)^2 = 1.21' \text{ k}$$
$$d = 8 + 2.5 + 5.5''$$
$$d_p = 8 - 2 - 1.5 = 4.5''$$


Bottom Steel: $A_s = \frac{2.74}{16(85)} = 1.28 \text{ in}^2$ #5 @ 12" short way

$$-A_B = \frac{1.21}{1.76(45)} = .15 \text{ in.} \quad \#4 @ 12" \text{ long}$$

Top Steel: $A_s = \frac{2.64}{1.76(5.5)} = .27 \text{ in}^2$ #5 @ 12" short way

by observation

#4012 Long way

$$\text{Slab Min. } A_s = .0018(12 \times 8 \times 5) = .09 \text{ in.}^2 \text{ use } \#4 @ 12" \text{ Min.}$$

Frast wall Reinf

$$A_s \cdot .0025(18)(12)(.5) = .27 \text{ in}^2$$

5012 E.F. HORT.

$$A_{3\%} = .0015 (18 \times 12 \times .5) = .16 \text{ m\%}$$

#4912 E.F. VERE

CLIENT/SUBJECT GM - Cap for Landfill W.O. NO. _____

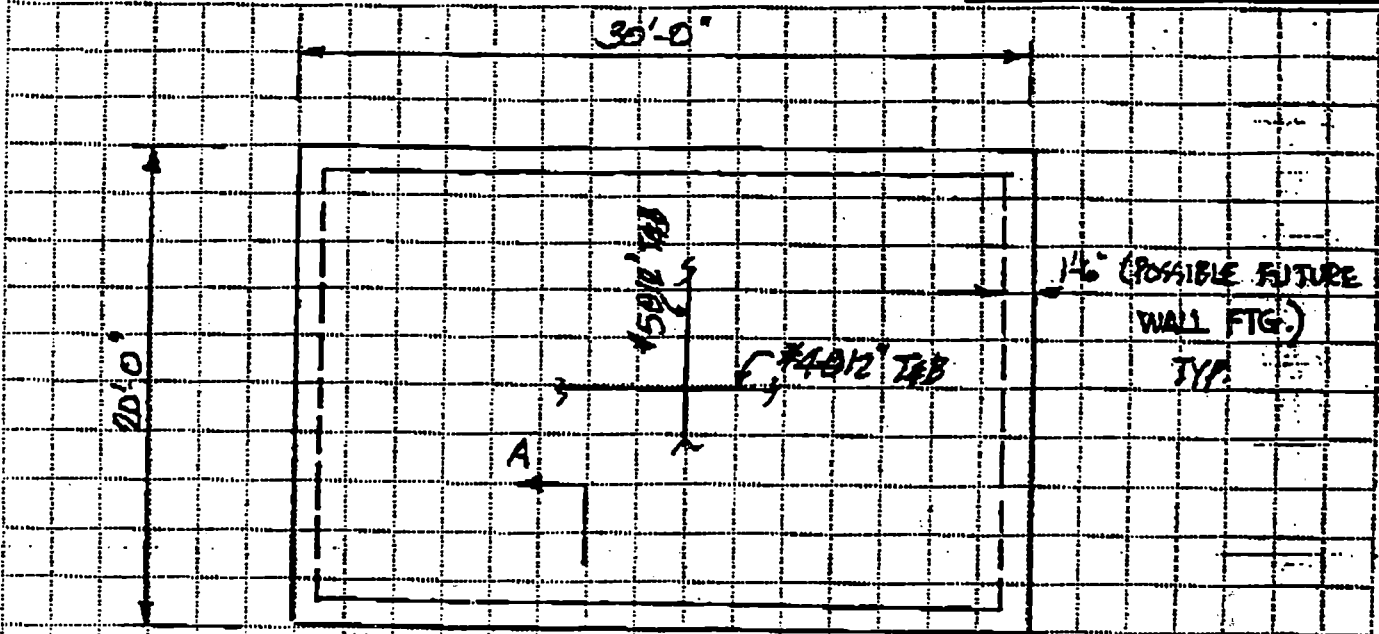
TASK DESCRIPTION Pad for Equip. or Bldg. TASK NO. _____

PREPARED BY MVG DEPT 1283 DATE 8-22-97

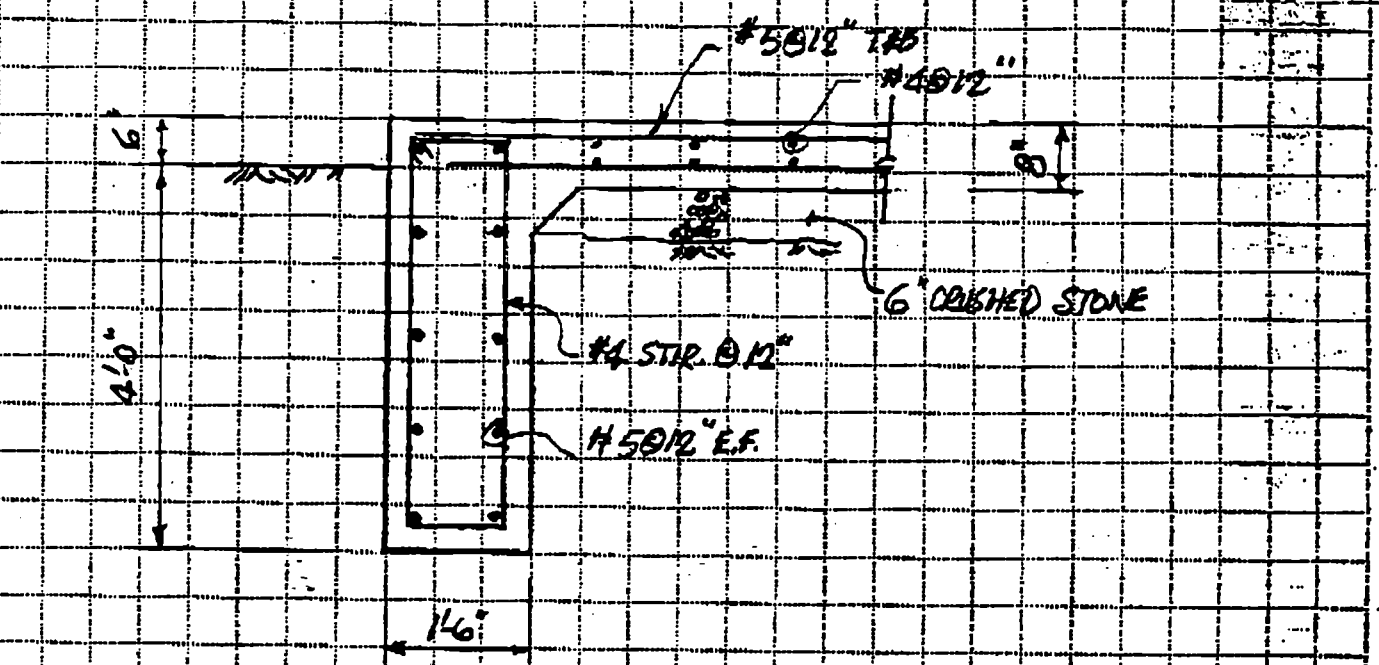
MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____
DEPT _____ DATE _____

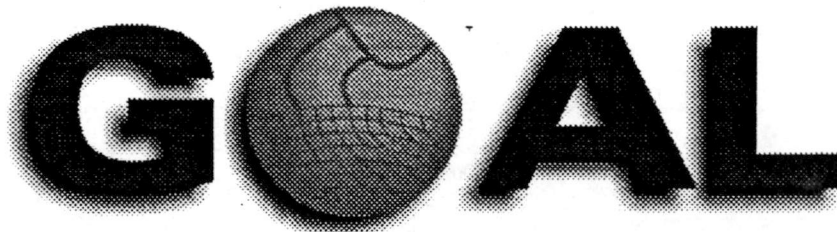


PAD PLAN
18' x 10'



APPENDIX E

SOCCER GOAL INFORMATION



1.800.334.GOAL (4625) fax: 1.860.767.9121

WELCOME TO G

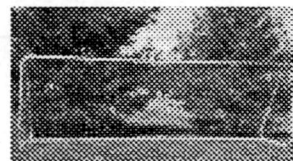
SOCCER

SOCCER LEAGUE GOALS

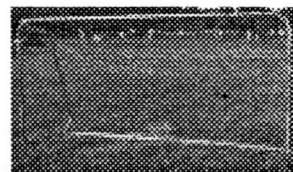
Superior design and quality make these goals the best buy in the industry!

The Soccer League Goals are designed for league play, tournaments, practices and recreational use. Superior design makes this goal strong and convenient at an affordable price. Goal includes; frame with full ground bar, push buttons to attach goal, (8) J-stake anchors and safety warning labels.

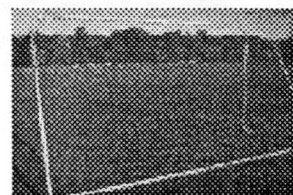
- Constructed of 1 5/8" heavy guage galvanized (unpainted) steel tubing.
- One piece side construction for added strength & durability.
- Four piece construction (full ground bar) with push buttons for easy assembly & storage
- Lightweight and durable...Great Value!!
- Custom sizes available... call for quote
- Ships via truck



SLG824



SLG612

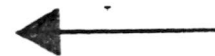


SLG rear view

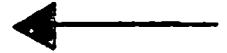
Nets Sold Separately
Suggested Retail Price

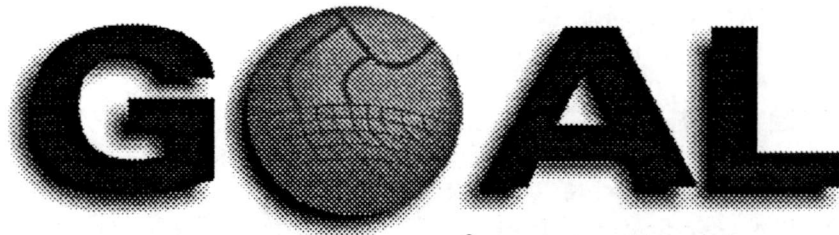
<u>MODEL</u>	<u>SIZE</u>	<u>WEIGHT</u>	<u>QUANTITY</u>
SLG412	4'H x 12'W	82 lbs.	Pair
SLG510	5'H x 10'W	79 lbs.	Pair
SLG612	6'H x 12'W	94 lbs.	Pair
SLG618	6.5'H x 18'W	124 lbs.	Pair
SLG712	7'H x 12'W	98 lbs.	Pair
SLG721	7'H x 21'W	130 lbs.	Pair
SLG824	8'H x 24'W	155 lbs.	Pair

Rounded Goals



ITEM#	DESCRIPTION	LIST PRICE
	World Cup Goals and Official Indoor/Outdoor	
SWC824	World Cup Goal- 4" Rd. Alum. 8' x 24'	\$1695 pr
SIG824SQPP	Official Indoor/Outdoor Goal- 4" SQ. Alum. 8' x 24'	\$1850 pr
SIG721SQPP	Official Indoor/Outdoor Goal- 4" SQ. Alum. 7' x 21'	\$1780 pr
SIG618SQPP	Official Indoor/Outdoor Goal- 4" SQ. Alum. 6.5' x 18'	\$1450 pr
SIG712SQPP	Official Indoor/Outdoor Goal- 4" SQ. Alum. 7' x 12'	\$1390 pr
SIG612SQPP	Official Indoor/Outdoor Goal- 4" SQ. Alum. 6.5' x 12'	\$1375 pr
	NEW Aluminum Telescoping Goals	
SOGT824	4" Sq. Alum. Telescoping Soc. Goal- 8' x 24' / 7' x 21' / 6.5' x 18'	\$1850 pr
SOGT712	4" Sq. Alum. Telescoping Soc. Goal- 7' x 12' / 6.5' x 12' / 5' x 10'	\$1350 pr
	Telescoping Goals	
STSG824	Telescoping Soc. Goal- 8' x 24' / 7' x 21' / 6.5' x 18'	\$890 pr
STSG712	Telescoping Soc. Goal- 7' x 12' / 6.5' x 12' / 5' x 10' / 4.5' x 9'	\$600 pr
STSG712HD	Telescoping Soc. Goal- 7' x 12' / 6.5' x 12' / 5' x 10', 1 5/8" OD	\$690 pr
STSG68	Telescoping Soc. Goal- 6' x 8' / 4' x 6'	\$390 pr
STSBG712	STSG712 Bag Nylon Carrying Bag	\$96 ea
STSG68	STSG68 Bag Nylon Carrying Bag	\$90 ea
	League Goals	
SLG824	Port. Soc. League Goal- 8' x 24'	\$820 pr
SLG721	Port. Soc. League Goal- 7' x 21'	\$720 pr
SLG618	Port. Soc. League Goal- 6.5' x 18'	\$690 pr
SLG712	Port. Soc. League Goal- 7' x 12'	\$520 pr
SLG612	Port. Soc. League Goal- 6' x 12'	\$480 pr
SLG510	Port. Soc. League Goal- 5' x 10'	\$450 pr
SLG412	Port. Soc. League Goal- 4' x 12'	\$410 pr





1.800.334.GOAL (4625) fax: 1.860.767.9121

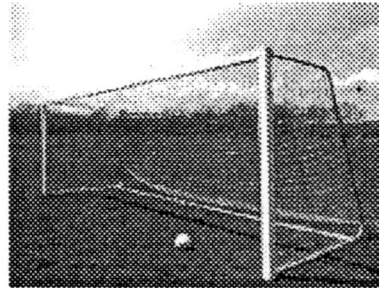
WELCOME

S O C C E R
OFFICIAL GOALS / SQUARE

Superior design and quality make these goals the best buy in the industry!

OFFICIAL SQUARE GOALS (SOG)**Suggested Retail Price**

Smoother and safer profile makes this the goal of choice. Construction of 4" square aluminum with new rounded radius corners. Meets NCAA, NHSA and FIFA specifications. Portable models are six-piece construction for easy assembly. Goals include 1 5/8" OD galvanized steel backstays, full one-piece groundbar for added strength and safety, eight 14" heavy duty steel ground stakes, and net attachments.



SOG 7

**WHEEL ADAPTER FOR PORTABLE GOALS**

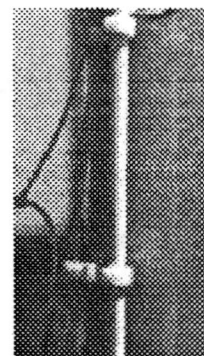
This wheel adapter kit converts one pair of portable SOG's or SLG's into roll-a-way goal with the use of 4 large wheels (10"). Allows for easy movement on artificial turf and on natural grass.



SOW

ITEM: SOW**WEIGHT:** 32 lbs.**SHIPS:** UPS**SET OF:** 4**NET RAIL OPTION**

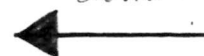
Requires ten 8' sections per pair of goals. Order by section. For use on SOG models only. Net clips included.

ITEM: NR8**WEIGHT:** 13lbs.**SHIPS:** UPS**SET OF:** 10

NR8

<u>MATERIAL</u>	<u>MODEL</u>	<u>STYLE</u>	<u>SIZE</u>	<u>WEIGHT</u>	<u>QUANTITY</u>
4" Square Aluminum	SOG7	Portable	8'H x 24'W x 3'D x	300 lbs.	Pair
	SOG721SQPP	Portable	8'B	270 lbs.	Pair
	SOG618SQPP	Portable	7'H x 21'W x 3'D x	250 lbs.	Pair
	SOG712SQPP	Portable	7'B	220 lbs.	Pair
	SOG612SQPP	Portable	6.5'H x 18'W x 3'D	210 lbs.	Pair
			x 6.5'B 7'H x 12'W x 2'D X 7'B 6.5'H x 12'W x 2'D X 6'B		

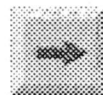
SQUARE SIDE
GOALS



Suggested Retail Price

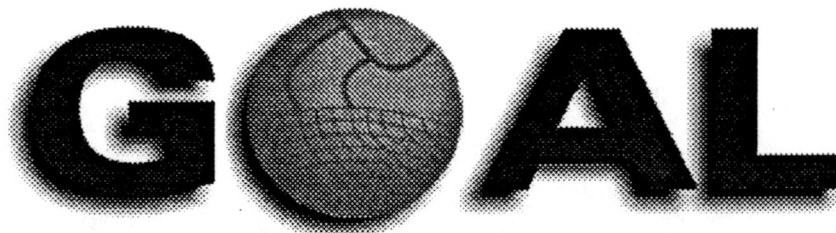


More Official Soccer Goals...



Return to Soccer Index

Copyright 1997 Goal Sporting Goods, Inc.
Report any site problems to Webmaster@PLHNET.com

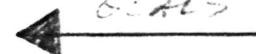


1.800.334.GOAL (4625) fax: 1.860.767.9121

Click Here To Order On-Line

<u>ITEM#</u>	<u>DESCRIPTION</u>	<u>LIST PRICE</u>
Official Round Soccer Goals		
SOG1	Port. Soc. Goal-4" Rd. Alum. 8' x 24'	\$1695 pr
SOG721RPP	Port. Soc. Goal-4" Rd. Alum. 7' x 21'	\$1495 pr
SOG618RPP	Port. Soc. Goal-4" Rd. Alum. 6.5' x 18'	\$1370 pr
SOG712RPP	Port. Soc. Goal-4" Rd. Alum. 7' x 12'	\$1200 pr
SOG612RPP	Port. Soc. Goal-4" Rd. Alum. 6.5' x 12'	\$1175 pr
Official Square Soccer Goals		
SOG7	Port. Soc. Goal-4" Sq. Alum. 8' x 24'	\$1795 pr
SOG721SQPP	Port. Soc. Goal-4" Sq. Alum. 7' x 21'	\$1525 pr
SOG618SQPP	Port. Soc. Goal-4" Sq. Alum. 6.5' x 18'	\$1390 pr
SOG712SQPP	Port. Soc. Goal-4" Sq. Alum. 7' x 12'	\$1230 pr
SOG612SQPP	Port. Soc. Goal-4" Sq. Alum. 6.5' x 12'	\$1200 pr
SOW	Wheel Adapter Kit for Portable Goals, set of 4	\$160 set
NR8	Net Rail Option	\$18 sect
Official Unpainted		
SOG1U	Port. Unpainted Soc. Goal-4" Rd. Alum. 8' x 24'	\$1395 pr
SOG721RU	Port. Unpainted Soc. Goal-4" Rd. Alum. 7' x 21'	\$1310 pr
SOG618RU	Port. Unpainted Soc. Goal-4" Rd. Alum. 6.5' x 18'	\$1250 pr
SOG712RU	Port. Unpainted Soc. Goal-4" Rd. Alum. 7' x 12'	\$1125 pr
SOG612RU	Port. Unpainted Soc. Goal-4" Rd. Alum. 6.5' x 12'	\$1075 pr
S2G824	Recreational Goal- 4" x 2" Alum- 8' x 24'	\$1250 pr
S2G721	Recreational Goal- 4" x 2" Alum- 7' x 21'	\$1175 pr
S2G618	Recreational Goal- 4" x 2" Alum- 6.5' x 18'	\$1050 pr
S2G712	Recreational Goal- 4" x 2" Alum- 7' x 12'	\$1025 pr
S2G612	Recreational Goal- 4" x 2" Alum- 6.5' x 12'	\$1015 pr
S2G510	Recreational Goal- 4" x 2" Alum- 5' x 10'	\$880 pr
S2GP	Paint Option for any SEG Goal	\$240 pr

SQUARE SOCCER GOALS



GOAL

1.800.334.GOAL (4625) fax: 1.860.767.9121

WELCOME TO G

S O C C E R

NETS

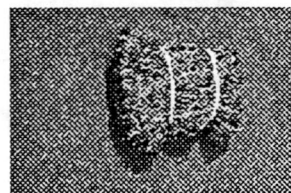
*Our soccer nets offer excellent quality,
tremendous variety and selection in size and color.*

SOCCER NETS

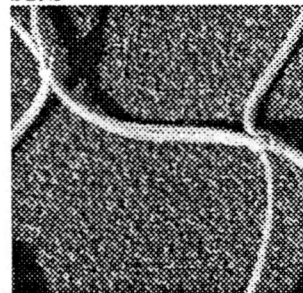
Excellent quality, tremendous variety and selection in size and color. New this year, official size nets (3mm) in 5 colors, 6mm in orange only. We manufacture many of our own nets. Call for custom sizes and perimeter netting.



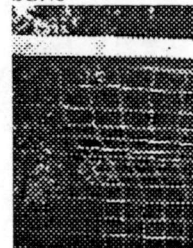
SGN4



SGN3



SGN6



SGN4BCBW

Suggested Retail Price

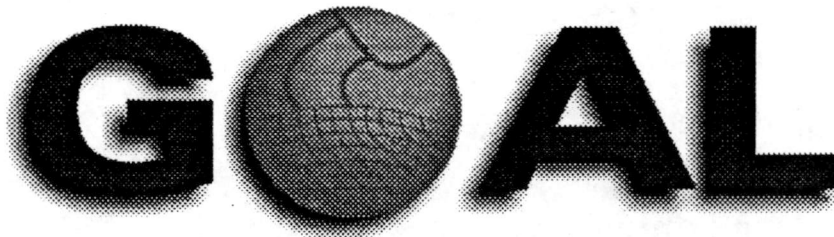
<u>ITEM</u>	<u>SIZE</u>	<u>NETTING</u>	<u>COLOR</u>	<u>WEIGHT</u>
SGN6	8'H x 24'W x 4'D x	6mm	Orange	30 lbs.
SGN4	10'B	4mm	Orange, White	23 lbs.
SGN4-C	8'H x 24'W x 4'D x	4mm	Red, Blue, Yellow	23 lbs.
SGN3	10'B	3mm	Orange	19 lbs.



SGN3-C	8'H x 24'W x 4'D x	3mm	Red, Blue, Yellow,	19 lbs.
SGN2.5	10'B	2.5mm	White	14 lbs.
SGN2.5-C	8'H x 24'W x 4'D x	2.5mm	Orange	14 lbs.
SGN2	10'B	2mm	Red, Blue, Yellow,	12 lbs.
SGN824	8'H x 24'W x 4'D x	3mm	White	13 lbs.
SGN721	10'B	2.5mm	Orange	11 lbs.
SGN721-0	8'H x 24'W x 4'D x	2.5mm	Orange, White	10 lbs.
SGN618	10'B	3mm	Orange	11 lbs.
SGN618-0	8'H x 24'W x 4'D x	3mm	Orange, White	11 lbs.
SGN712	10'B	2.5mm	Orange, White	10 lbs.
SGN712-0	8'H x 24'W x 4'D x	2.5mm	Orange, White	9 lbs.
SGN712-27	10'B	2.5mm	Orange	11 lbs.
SGN612	8'H x 24'W x 0'D x	3mm	Orange, White	10 lbs.
SGN612-0	8'B	2.5mm	Orange	8 lbs.
SGN6806SM	7'H x 21'W x 3'D x	2.5mm	Orange, White	8 lbs.
SGN510	7'B	2.5mm	Orange, White	8 lbs.
SGN412	7'H x 21'W x 0'D x	3mm	White	8lbs.
SGN49	7'B	2.5mm	White	8 lbs.
STGN824	6.5'H x 18.5'W x 2'D	3mm	White	13 lbs.
STGN718	x 6'B	3mm	White	10 lbs.
STGN510	6.5'H x 18'W x 0'D x	3mm	Orange, White	8 lbs.
SKRN	6'B	4.5mm	Orange, White	10 lb s.
SKRN2	7'H x 12'W x 4'D x	2.5mm	Orange, White	5 lbs.
SKRN2HD	4'B	4.5mm	White	8 lbs.
*SBG618N	7'H x 12'W x 0'D x	2mm	White	6 lbs.
*SBG612N	6'B	2mm	White	5 lbs.
*SBG68N	7'H x 12'W x 2'D x	2mm	Orange, White	4 lbs.
*SBG46N	7'B	2mm	Orange, White	3 lbs.
*SBG23N	6.5'H x 12'W x 2'D x	2mm	Orange, White	1 lbs.
*SFG68N	6'B	3mm	White	4 lbs.
*SFG46N	6.5'H x 12'W x 0'D x	3mm	Orange	3 lbs.
*SFG34N	6'B	3mm	Orange, Green, Yellow,	2 lbs.
#SGN4BCBW	6'H x 8'W x 0'D x 6'B	4mm	White	23 lbs.
#SGNWC4	5'H x 10'W x 2'D x	4mm	Orange, Green, Yellow,	26 lbs.
SGN3-38	5'B	3mm	White	18 lbs.
	4'H x 12'W x 2'D x		Orange, Green, Yellow,	
	4'B		White	
	4.5'H x 9'W x 0'D x		Blue and White	
	5'B		White	
	8'H x 24'W		Orange	
	7.5'H x 18'W			
	5'H x 10'W			
	6'H x 6'W			
	4'H x 4'W			
	4'H x 4'W			
	6'H x 18'W x 20" x			
	44"			
	6'H x 12'W x 20" x			
	44"			
	6'H x 8'W x 1'D x 44"			
	4'H x 6'W x 1'D x 39"			
	2'H x 3'W x 8"D x			
	22"			
	6'H x 8'W x 0 x 24"			
	4'H x 6'W x 0 x 24"			
	3'H x 4'W x 0 18"			
	8'H x 24'W x 4'D x			
	10'B			
	8'H x 24'W x 6.5'D			

<u>ITEM#</u>	<u>DESCRIPTION</u>	<u>LIST PRICE</u>
Nets		
SGN6	Soccer Net- 8' x 24' x 4' x 10'- 6mm Orange	\$260 pr
SGN4	Soccer Net- 8' x 24' x 4' x 10'- 4mm Orange/White	\$190 pr
SGN4-C	Soccer Net- 8' x 24' x 4' x 10'- 4mm Red/Blue/Yellow	\$199 pr
SGN4BCBW	Soccer Net- 8' x 24' x 4' x 10'- 4mm Bi-color- Blue and White	\$280 pr
SGWC4	World Cup Net- 8' x 24' x 6.5'x 6.5'- 4mm White	\$340 pr
SGN3	Soccer Net- 8' x 24' x 4' x 10'- 3mm Orange	\$125 pr
SGN3-C	Soccer Net- 8' x 24' x 4'- 3mm Red/Blue/Yellow/White	\$130 pr
SGN3-38	Soccer Net- 8' x 24' x 3' x 8'- 3mm Orange	\$120 pr
SGN2.5	Soccer Net- 8' x 24'- 2.5mm Orange	\$108 pr
SGN2.5-C	Soccer Net- 8' x 24'- 2.5mm Red/Blue/Yellow/White	\$112 pr
SGN2	Soccer Net- 8' x 24'- 2 mm Orange	\$82 pr
SGN824	Soccer Net- 8' x 24'- 3mm- No top Depth- White	\$110 pr
SGN721-3	Soccer Net- 7' x 21'- 3mm White	\$114 pr
SGN721	Soccer Net- 7' x 21'- 2.5mm Orange	\$100 pr
SGN721-O	Soccer Net, 7'H x 21'W- No top Depth- Orange/White	\$110 pr
SGN618	Soccer Net- 6.5' x 18.5'- 3mm White	\$110 pr
SGN618-O	Soccer Net- 6.5' x 18'- No top Depth- White	\$104 pr
SGN712	Soccer Net- 6.5' x 18.5'- 3mm White	\$70 pr
SGN712-O	Soccer Net- 6.5' x 18'- No top Depth	\$70 pr
SGN712-27	Soccer Net, 7'H x 12'W- Orange	\$120 pr
SGN612	Soccer Net- 6.5' x 12'- 3mm Orange/White	\$120 pr
SGN612-0	Soccer Net- 6.5' x 12'- No top Depth- 2.5mm Orange	\$84 pr
SGN6806SM	Soccer Net- 6'H x 8'Wx 0' x 6'- Small Mesh 2.5mm White	\$88 pr
SGN412	Soccer Net- 4' x 12'- 2.5mm White	\$96 pr
SGN510	Soccer Net- 5' x 10'- 2.5mm White	\$100 pr
SGN49	Soccer Net, 4.5 x 9- 2.5mm White	\$90 pr
STGN824	Soccer Training Net- 8' x 24'- 3mm White	\$99 ea.
STGN718	Soccer Training Net- 7.5' x 18.- 3mm White REDUCED	\$64 ea.
STGN510	Soccer Training Net- 5' x 10'- 3mm White	\$32 ea.
STGRN718	Soccer Training Rebounder- 7.5' x 18'- 2.5mm White	\$96 ea.

STGRN510	Soccer Training Rebounder- 5' x 10'- 2.5mm White	\$66 ea.
SKRN	Soccer Rebounder- 6' x 6'- 4.5mm	\$73 ea.
SKRN2	Soccer Rebounder- 4' x 4'- 2.5mm	\$55 ea.
SKRN2HD	Soccer Rebounder- 4' x 4'- 4.5mm	\$65 ea.
SBG618N	Replacement Net for SBG618 White REDUCED	\$49 ea.
SBG612N	Replacement Net for SBG612 Org./White REDUCED	\$44 ea.
SBG68N	Replacement Net for SBG68 White REDUCED	\$36 ea.
SBG510N	Replacement Net for SBG510 Orange	\$30 ea.
SBG66N	Replacement Net for SBG66 White	\$33 ea.
SBG48N	Replacement Net for SBG48 White	\$32 ea.
SBG46N	Replacement Net for SBG46 White REDUCED	\$30ea
SBG23N	Replacement Net for SBG23 Orange	\$20 ea.
SFG68N	6'H x 8'W x 1'D x 44" B-2mm Org./Grn./Yel./White REDUCED	\$48 ea.
SFG46N	4'H x 6'W x 10"D x 39" B-2mm Org./Grn./Yel./White REDUCED	\$42 ea.
SFG34N	3'H x 4'W x 18" B-2mm Org./Grn./Yel./White REDUCED	\$38 ea.
SGNBAG	Soccer Net Bag	\$30 ea.



1.800.334.GOAL (4625) fax: 1.860.767.9121

WELCOME TO GOAL SPC

S O C C E R

CORNER MARKERS

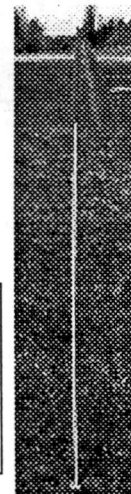
SOCCER CORNER MARKER

Our best quality field marker. Measures 60"H x 1/2" OD. Flexible acetate plastic post, will not break or shatter. Attaches to strong spring base with a fully galvanized steel spike that can be inserted quickly and easily. High visibility red nylon flags make this the marker of choice.

Flag is 13" x 13"

Suggested Price List

<u>ITEM</u>	<u>WEIGHT</u>	<u>SHIPS</u>	<u>SET OF</u>
SCM1	5 lbs.	UPS	4
SCM1B	5 lbs.	UPS	Bulk



SCM1

INDOOR MARKER

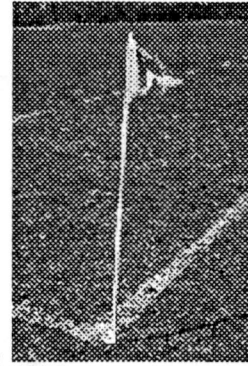
60"H acetate base attaches to stable, heavy, flat steel (padded) base. Red flag is 13" x 13". Not recommended for outdoor use on grass.

Suggested Retail Price

<u>ITEM</u>	<u>WEIGHT</u>	<u>SHIPS</u>	<u>SET OF</u>
SCM3	10 lbs.	UPS	4

COLLEGIATE CORNER MARKER

Official collegiate corner flag markers, 60"H x 1" OD plastic uprights. Steel base and spike that can be inserted quickly and easily. Same high visibility flag, 13" x 13", as shown on SCM1. **Suggested Retail Prices**



SCFF

SOCCER CORNER FLAGS

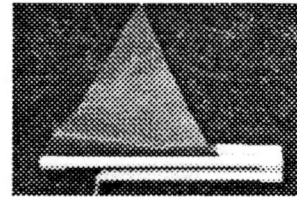
Flexible 60"L x 1" OD post. Durable plastic base with spring. Pennant shape flag is 9" x 18".

Suggested Retail Price

<u>ITEM</u>	<u>WEIGHT</u>	<u>SHIPS</u>	<u>SET OF</u>
CCM	8 lbs.	UPS O/S	4
SCFP	4 lbs.	UPS	4

PORT A FLAG (PAT. PENDING)

A unique folding corner flag system. Internal shock cord allows post to breakdown and store in seconds. This new portable folding corner flag set is ideal for game and practice drills. The SCFF is constructed of 1" OD post - strong, flexible and safe. Set of 4 neon flags, posts and spikes fold neatly (20") into reuseable carry box. **Suggested Retail Price**

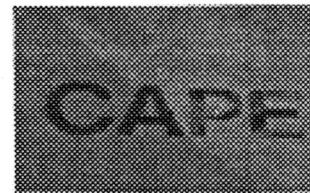


SCFF FOLDED

<u>ITEM</u>	<u>WEIGHT</u>	<u>SHIPS</u>	<u>SET OF</u>
SCFF	6 lbs.	UPS	4

CORNER FLAG IMPRINTING

Goal introduces a new way to promote your team, league or school with imprinted corner flags. Give us your camera-ready name or logo and we can screen it on our 13" x 13" high visibility red flags. Use as a fund-raiser by screening on an advertiser and use for theft prevention. Others will comment on your professional looking flags. Be a trend setter! Be the first league or team to have the new imprinted corner flags. Call today for information. Available on Items SCM1, SCM3 and CCM. Maximum of 12 characters.



IMPRINT

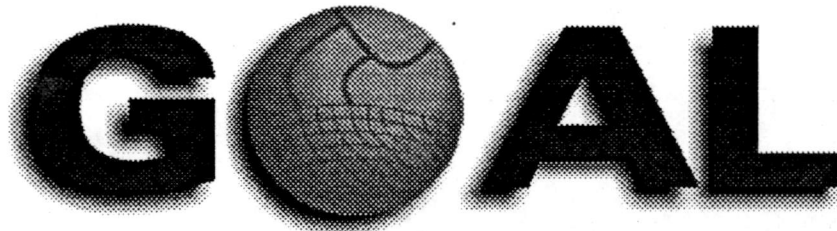
Imprinting in black. **Item: SCFI**

Suggested Retail Price



More Official Soccer Goals...





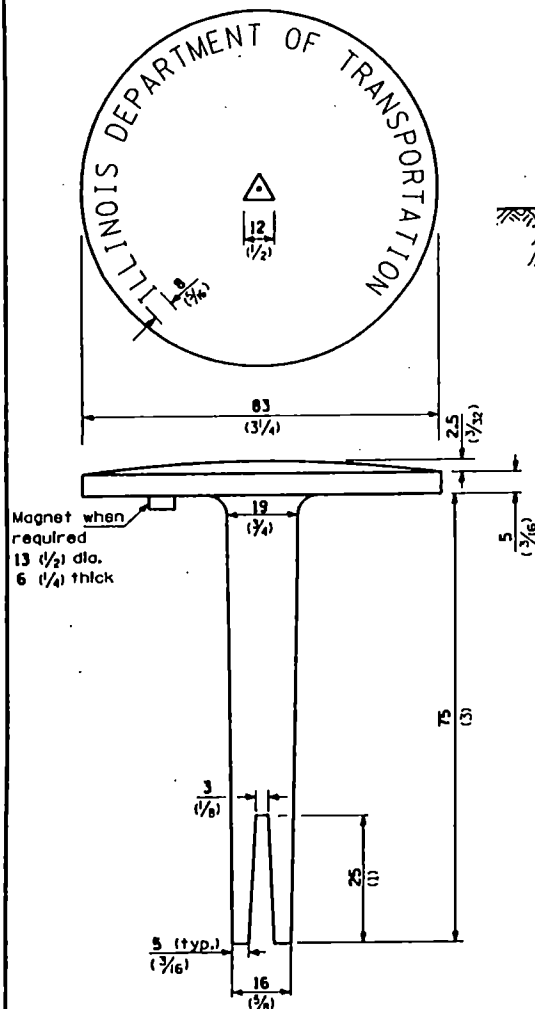
1.800.334.GOAL (4625) fax: 1.860.767.9121

Click Here To Order On-Line

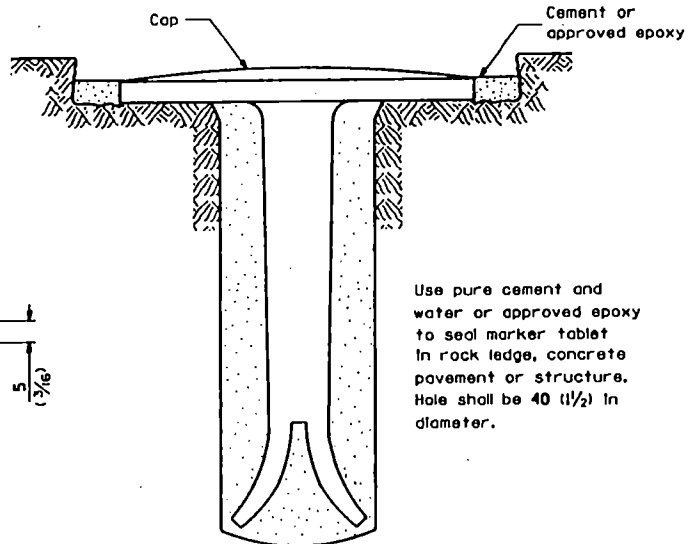
ITEM#	DESCRIPTION	LIST PRICE
Trainers & Rebounders		
STG510	Soccer Training Goal- EA- 5' x 10'	\$190 ea.
STG718	Soccer Training Goal- EA- 7.5' x 18' REDUCED	\$330 ea.
STG824	Soccer Training Goal- EA- 8' x 24' REDUCED	\$395 ea.
STGIB	Indoor Base for STG, Set of 2	\$150 set
STGB824	Heavy-duty Bag for STG824	\$80 ea.
STGB718	Heavy-duty Bag for STG718	\$77 ea.
STGB510	Heavy-duty Bag for STG510	\$75 ea.
STGR510	Soccer Training Rebounder- 5' x 10'	\$230 ea.
STGR718	Soccer Training Rebounder- 7.5' x 18'	\$395 ea.
STGA510	Trainer to Rebounder Adapter 5' x 10'	\$80 ea.
STGA718	Trainer to Rebounder Adapter 7.5' x 18'	\$120 ea.
Rebounders		
SKR1	Soccer Kick Rebounder w/Net- 6' x 6'	\$220 ea.
SKR2	Mini Rebounder w/Net- 4' x 4'	\$160 ea.
SKR2HD	Heavy-duty Mini Rebounder w/Net- 4' x 4'	\$180 ea.
STN1	Target Net- 8' x 24', 3mm	\$15 ea.
GW1	Goal Wall, each	\$99 ea.
Corner Flags		
SCM1	Corner Flag Marker- Spring Base, Set of 4 REDUCED	\$68 set
SCM1B	Corner Flag Marker- Spring Base, Bulk, 6 Sets of 4 REDUCED	\$396 bulk
SCM3	Corner Flag Marker- Indoor, Set of 4	\$66 set
CCM	Collegiate Corner Marker, 1" OD w/ Steel Spike	\$80 set
CCMB	Collegiate Corner Marker, Bulk, 6 Sets of 4	\$468 set
SCFP	Soccer Corner Flag Plastic	\$50 set
SCFF	Soccer Corner Flag Folding	\$49 set
SCFI	Soccer Corner Flag Imprinting (Screen Charge)	\$75 ea.
	(Per Flag)	\$150 ea.
CFB	Corner Flag Bag	\$24 ea.



Examples of Standard Concrete Marking Dimensions



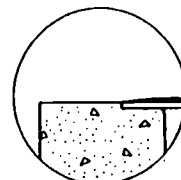
ALUMINUM TABLET



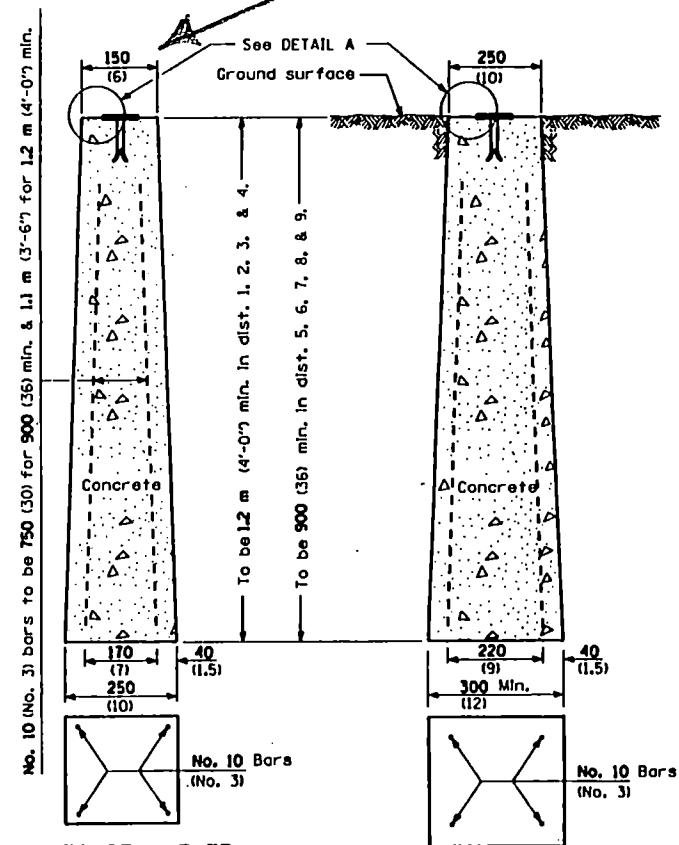
Use pure cement and water or approved epoxy to seal marker tablet in rock ledge, concrete pavement or structure. Hole shall be 40 (1 1/2) in diameter.

Tablet constructed in rock ledge or concrete.

TYPE I



DETAIL A



PRECAST MARKER

TYPE II

CAST-IN-PLACE MARKER

All dimensions are in millimeters (inches) unless otherwise shown.

Illinois Department of Transportation	
PASSED	1994
ENGINEER OF POLICY AND PROCEDURES	
APPROVED	1994
ILLINOIS DEPARTMENT OF TRANSPORTATION	

DATE	REVISIONS	PERMANENT SURVEY MARKERS	D-3.00
6-15-94	Totally revised. Added Metric.		
		STANDARD 2135-1	

APPENDIX F

OPERATION AND MAINTENANCE PLAN

**DRAFT OPERATION AND MAINTENANCE PLAN
LINDEN ROAD SITE
FLINT TOWNSHIP, MICHIGAN**

Prepared For:

**GENERAL MOTORS CORPORATION
Environmental and Energy Staff
Remediation Group**

Prepared By:

**ROY F. WESTON, INC.
Suite 400, 3 Hawthorn Parkway
Vernon Hills, IL 60061-1450**

November 1997

Work Order No. 01138-079-002

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DRAFT

SECTION 1

INTRODUCTION

1.1 OBJECTIVE AND SCOPE

The objective of this Operation and Maintenance (O&M) Plan is to describe the inspection and maintenance activities required to maintain the effectiveness of the Linden Road site soil cover system and its associated management systems for the duration of the post-closure operation period. The O&M Plan is intended to be used in conjunction with the Soil Cover Construction Plans and Specifications, which describes the construction activities related to this remedial action. O&M activities will be conducted by General Motors Corporation (GMC) or a designated representative under the direct supervision of GM. The records compiled through implementation of this O&M Plan will provide the Michigan Department of Environmental Quality (MDEQ) with sufficient documentation verifying the remedial action is functioning as designed and constructed, and will be an indicator as to the effectiveness of the remedial action.

This O&M Plan has been prepared in accordance with the Remedial Action Plan (RAP) and the remedial action design. The remedial action construction specifications provide material types for use in conducting maintenance and restoration activities and are incorporated into this document by reference. Following completion of construction and preparation of record documents, this plan will be finalized to reflect the actual materials and suppliers used, to include inspection/maintenance requirements.

1.2 SITE LOCATION AND DESCRIPTION

The site is a 40-acre parcel in Flint Township, Genesee County, Michigan, and is located in Section 17 of Township 7 North and Range 6 East. The site is approximately 1.5 miles west of the City of Flint. The site is bounded by Linden Road on the east. The northern boundary of the site is approximately 1/4 mile south of Calkins Road, and the southern

boundary is approximately 1/2 mile north of West Court Street. The western boundary of the site is approximately 1/4 mile east of Dye Road.

Based on current knowledge, the site has had three periods of land use during this century as: a source of mined gravel, a landfill, and an unused property. It was first used as a source of mined sand and gravel. The extent of the gravel excavation is uncertain. WESTON's review of an aerial photograph of the site taken in 1941 did not indicate any evidence of large excavations or traces of a filled excavation. For an undetermined number of years preceding 1931, a rubbish incinerator reportedly occupied part of the site. The Chevrolet Division of General Motors (GM) purchased the 40-acre property from several owners in 1931. GM used the site as a general refuse landfill from 1931 until 1969. The refuse reportedly consisted of construction debris, plaster, buffing and grinding wheels, buffing and grinding refuse, metallic chips, and other process wastes. Landfill operations ceased in 1969, and GM constructed a security fence around the site in July 1980. Since landfill activities ceased in 1969, the Linden Road property has been enclosed by a fence and monitored but has not been used for any beneficial purpose. A more detailed account of the site history is presented in the Remedial Action Plan for the Linden Road Site (WESTON, 1996).

1.3 REMEDIAL ACTION

The remedial action for the site consists of excavation of waste materials which exceed the designated removal criteria from the 400-foot-deep frontage (measured from the centerline of Linden Road) of the property located along Linden Road, relocation of this material into the western portion of the site, and construction of a 2.5-foot soil cover system over the waste materials in the western portion of the site to limit the potential for human contact during subsequent use of the facility. The frontage area will be sold as a dedicated commercial-use property following waste removal activities. Once the western portion of the site is covered with the 2.5-foot cover layer, this area will be further developed as a recreational facility with open grassy areas to support soccer fields.

1.4 ELEMENTS OF THE O&M PLAN

This O&M Plan has been prepared as a tool for use by GM or its designated representative to ensure the safe and effective implementation of the remedial action. The plan generally consists of the following elements:

- Description of main remedial components to include the final cover system and the stormwater management systems.
- Description of remedial action objectives and restoration specifications.
- Frequency of inspection and monitoring tasks.
- Identification of potential problems and corrective actions to be implemented by GM.
- Description of safety precautions and recommendations.
- Description of record-keeping and documentation requirements.

1.5 ROLES AND RESPONSIBILITIES

Successful implementation of this O&M Plan will depend on a clear understanding of the roles and responsibilities of each member of the O&M team. The team is made of members responsible for implementing, operating, and overseeing the completion of the remedial action. The following list identifies the key personnel from each organization responsible for implementation of this remedial action:

- General Motors Project Manager
Name: _____
Title: _____
Org: _____
Phone: _____
Address: _____

- MDEQ Project Manager

Name: _____

Title: _____

Org: _____

Phone: _____

Address: _____

Key personnel may change from time to time during the operation of this system. It is imperative that the site inspection personnel maintain an updated contact list in the event an emergency or other situation occurs that requires prompt action by one or more of the respective parties. The contact list should be reviewed and updated a minimum of once each quarter.

1.6 HEALTH AND SAFETY

Inspection and maintenance activities shall be conducted in accordance with a site-specific health and safety plan (HASP) to be prepared by the O&M contractor. The HASP shall be prepared in accordance with all State and federal regulations, including Occupational Health and Safety Administration (OSHA) construction safety standards and 29 Code of Federal Regulations (CFR) 1910 and 1926. The HASP shall include a task-by-task risk analysis using the available site data and incorporating each potential task to be conducted during site inspection and maintenance activities.

SECTION 2

OPERATION AND MAINTENANCE ACTIVITIES

2.1 SOIL COVER SYSTEM O&M

The 2.5-foot final soil cover for the site consists of a 2-foot protective soil cover layer, and a 0.5-foot topsoil layer. The cover system has been designed in accordance with the Remedial Action Plan (RAP) prepared for the site. The objective of this inspection activity is to maintain the quality of the cover system to ensure the performance objectives dictated in the RAP are being met. The specific soil types and installation/restoration requirements are detailed in the construction specifications. Repair or reconstruction work will be completed in accordance with the construction specifications.

The final cover is intended to reduce the potential for human contact with the waste materials contained on the site. The final cover plan was prepared to allow the surface to shed water to the perimeter stormwater management system, minimize the need for additional off-site fill, and to minimize the potential for erosion damage. The 0.5-foot topsoil layer is provided as a highly organic layer that can support vigorous plant growth, which in turn will minimize erosion damage from precipitation events, and maximize evaporation and transpiration. During the inspection process, GM or its designated representative shall document the quality of the cover system and areas where the performance objectives are not being maintained.

2.1.1 Soil Cover System O&M Inspection Requirements

During the inspection process, GM will evaluate the quality of the vegetative cover across the site. A satisfactory area of vegetation shall be defined as an area of 10,000 square feet that has:

- No bare spots larger than 3 square feet.
- Not more than 10 percent of area with bare spots larger than 1 square foot.

Areas that show signs of erosion or sparse vegetation will be repaired. The surface will be graded and/or filled to match the surrounding grade with topsoil material, as specified in the construction specifications. The area will be reseeded and mulched in accordance with the specifications. The area will be sufficiently watered as needed to restore vegetation to an acceptable level. In areas prone to excessive pedestrian traffic, wood chips or gravel may be used to create walking paths in lieu of vegetative restoration.

The cover system will be inspected for areas of significant erosion or cracking in the cover system. Significant erosion or cracking is defined as a crack or gully 6 inches deep or loss of vegetation and multiple gullies/cracks 3 inches deep. Each layer of the final cover will be repaired in accordance with the initial construction specifications. If significant erosion is discovered, the area will be overexcavated and material will be placed and recompact to restore the damaged section. The cover soil and the topsoil shall be replaced immediately following completion of the soil cover system to minimize damage.

GM or its designated representative will inspect the final cover for signs of settlement or subsidence. Areas showing signs of potential ponding or continued settlement will be backfilled with protective cover soil and topsoil and will be seeded/mulched in accordance with the construction specifications. The final cover vegetated areas will be mowed at a minimum twice per year.

Damaged areas of the final cover will be documented to include method and scope of the repairs conducted. The locations and suppliers of materials will be included in the documentation.

2.2 STORMWATERMANAGEMENTSYSTEM O&M

The stormwater management system is intended to control runoff generated from precipitation events over the operating life of the site. The system consists of drainage channels directing runoff via culverts or other structures into the detention basin on the

south side of the site with final discharge to the Genessee County Drain Commission Stormwater System.

2.2.1 Erosion Control Protection Plan

During the first year after construction and prior to full establishment of vegetation, erosion potential for both the soil cover system and drainage channels will be the greatest. The plan for erosion protection includes cover erosion control and repairs, and channel control and repair. Immediately following construction of the channels and detention areas, the remedial contractor will be responsible for constructing straw bale erosion barriers at locations shown on the plans. These barriers will be positioned along the drainage path to slow the flow of runoff and to limit scouring forces. The length of the vegetated channels will be lined with mulch or straw matting to aid in slowing runoff velocities. The central drainage channel through the gravel parking area and each culvert entrance and exit point will be constructed using rip rap. Rip rap will prevent point source erosion due to channel restrictions and increased velocities, and it will limit maintenance.

Temporary sedimentation areas will be constructed at the outlets of each drainage channel as the channel enters the detention area. These areas will include multiple rows of straw bale barriers and silt fence constructed in a semicircle shape. This shape will allow any residual suspended solids to fall out of suspension prior to discharge to the stormwater system.

The balance of the site which does not drain into a channel, will drain by sheet flow off the surface into the detention area. The specifications require the surface to be mulched following final seeding. The silt fence will also be installed to allow suspended materials to settle out in front of the fencing prior to entering the detention areas.

2.2.2 Stormwater Control O&M Inspection Requirements

GM or its designated representative shall inspect each component of the stormwater control system during the inspection period. The drainage channels will be inspected for excessive erosion damage or lack of suitable vegetation. Erosion gullies will be backfilled, seeded, and mulched. During the first year following construction, additional straw bale barriers may be required to protect the repaired area until vegetation is reestablished. The presence of cattails or other pond-type vegetation is an indication that appropriate drainage through that portion of channel is not occurring. Regrading and backfilling may be required to correct the slope or erosion along the channel lengths. Materials used for backfilling and restoration will be in accordance with the construction specifications for that element of work. GM will evaluate areas of continual erosion damage and will determine the need for permanent riprap structures in these areas. Catch basins and culverts will be inspected for debris and sediment build up. Sediment in catch basin sumps will be removed to restore the sump volume to full capacity. Sticks and debris will be removed from culverts as necessary to restore flow capacity. Each culvert will be inspected for damage or erosion at the end sections. Riprap will be replaced as necessary, and any debris will be removed to maintain a free-flowing condition.

Straw bale barriers along each channel length will be inspected during the first year following completion of construction for serviceability and efficiency. Straw bale barriers will be maintained for a minimum of one year or until a full vegetative layer is established. Any bales that are no longer intact or secured to the subgrade will be replaced. GM will document the volume of sediment buildup in front of each bale and will remove sediment when the volume exceeds one third of the bale's height. The site inspector will observe the water flow direction and will verify the flow is not passing around the ends of the straw bale structure. If runoff is passing around barrier, straw bales will be replaced or repositioned, or additional bales will be added to contain runoff and force the flow to pass through the bales.

Silt fence structures will be inspected during the first year following completion of construction for serviceability and efficiency. Silt fence structures will be maintained for a minimum of one year or until a full vegetative layer is established. The site inspector will inspect the silt fence post and will reinstall posts that are no longer secure or vertical. The fence fabric will be inspected for rips or sagging. Damaged fabric will be repaired or replaced with new fabric in accordance with the specifications. The fence fabric will be securely positioned in an anchor trench that runs the complete length of the fence structure. GM will document the depth of the sediment and will remove the sediment when the depth exceeds one third of the total fence height.

2.3 GENERAL SITE MAINTENANCE

2.3.1 Security Fence O&M Inspection Requirements

Chain-link fencing is provided around the perimeter of the site to further limit potential public contact with waste materials under the final cover. In addition, the fencing provides protection of the soil cover system as a whole. Post and cable fencing has been provided along all gravel access roads and parking areas. This fencing will keep vehicle traffic on established roadway surfaces limiting the potential for damage to the vegetative cover. Excessive vehicle or recreational use without the appropriate maintenance can contribute to erosion or limited vegetation.

GM or its designated representative shall inspect the fence for serviceability and for signs of tampering. The chain-link fence fabric shall be securely attached to each post and end rail. The end posts shall be solidly installed in concrete pads with the necessary support posts and top rails detailed in the specifications. Any damaged or missing material shall be replaced with new material meeting the requirements of the specification. Any signage located along the fence limit or attached to the fence fabric will be inspected. Any damaged or unreadable signs will be replaced.

2.3.2 Access Road and Parking Area O&M Inspection Requirements

A gravel access road and parking area has been constructed in the central portion of the site. During the post closure period, this road will serve as the primary access to the recreational site. During construction, the road will provide a means to control tracking of mud and debris from the site out onto Linden Road.

GM or its designated representative will inspect and maintain the access road to allow access to the site to conduct inspection and maintenance operations as well as to provide safe travel for park visitors. The road shall be graded to drain, while allowing runoff from the upper areas of the cover system to pass over without ponding along the roadway edges. If excessive ponding or rutting of the road occurs, additional gravel may be required to bring the area up to grade. Geotextile fabric shall be replaced if subgrade soil is observed pumping up through the gravel surface course. Gravel materials shall be placed and compacted as necessary to provide a stable and wear-resistant surface. All materials shall be in accordance with the construction specifications.

2.4 GROUNDWATER MONITORING

GM will conduct post-construction groundwater monitoring to assess the effectiveness of the soil cover system and to confirm results of previous groundwater sampling at the site. The groundwater monitoring program has the following objectives:

- Establish a baseline for site groundwater quality immediately after the placement of the soil cover system.
- Monitor the quality of groundwater in the shallow water-bearing zone annually for five years after completion of the Phase 2 construction activities.

The necessity for continuing the groundwater monitoring program will be evaluated at the end of five years. During this five-year period, specific adjustment to the program may be necessitated by the following issues:

- Analyte list—do analytes need to be added or deleted?
- Sampling frequency—is annual sampling adequate or excessive?
- Monitoring well network—is the monitoring well network adequate? Does any well need to be replaced? Should additional wells be installed? Can some of the monitoring well be deleted from the sampling program?
- Sampling program—do the analytical data indicate the changes in groundwater quality? Should the monitoring program continue?

Any modifications to the monitoring program will be implemented after consultations with the MDEQ.

Each monitoring well will be inspected on an annual basis concurrent with sampling activities. GM will repair or replace wells that are damaged or are no longer suitable for long-term sampling in accordance with the O&M Plan. If groundwater contaminant levels increase, GM will evaluate the need for additional monitoring locations to better define the scope and magnitude of the increase or change.

2.4.1 Baseline Groundwater Monitoring

The baseline groundwater monitoring will be conducted immediately after the placement of the soil cover system. A network of 9 shallow groundwater monitoring wells exists at the site. All the monitoring wells will be used for the baseline groundwater monitoring. For the baseline monitoring, the groundwater samples will be analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics.

2.4.2 Routine Groundwater Monitoring

The routine groundwater monitoring will be conducted annually for five years after Phase 2 construction, and then the need for further groundwater monitoring will be evaluated. The objective of the routine groundwater monitoring is to monitor any changes to the overall groundwater quality over time.

GM or its representative will forward to MDEQ a copy of the groundwater monitoring results within one month of receiving complete analytical results from the laboratory following every sampling event. Any significant change to groundwater quality will be noted in these submittals.

GM proposes to perform the groundwater monitoring during the fourth quarter of each year consistent with such monitoring performed at other GM sites in the area. The monitoring report will be submitted to the MDEQ by the first week of March during the following year for every monitoring event.

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SECTION 3

DOCUMENTATION

This section describes the record-keeping that will be used to document the O&M activities performed during the post-construction period. This documentation will be the ongoing record of effectiveness of the work completed. All documentation completed as part of this project will be presented as part of a post-closure certification report to be prepared at the completion of the O&M period. The following subsections describe the specific records that will be maintained.

3.1 PERIODIC INSPECTION REPORT

GM or an appointed representative will prepare a report that will serve as a chronological record of periodic maintenance and inspection activities. At a minimum, the report will contain:

- Date, project name, location, and other identification (as necessary).
- Weather conditions.
- Construction activities and incidents that occurred during working and nonworking hours.
- Descriptions of inspections and observations conducted by GM or its designated representative.
- Description and quantity of materials received, including vendor certification documents (if applicable).
- Description of restoration work completed and/or deficiencies identified with corrective actions taken.

In addition to the written narrative of construction, repair, and inspection activities, observation check sheets will be provided as an appendix to the inspection report.

Figure 3-1 shows the Periodic Inspection Report Form to be used by GM in documenting inspection and maintenance activities.

3.2 PROJECT PHOTOGRAPHS

The site inspector will take photographs of all work placed to augment periodic inspection reports and to assist in documenting work deficiencies before and after corrective actions are taken. All photographs taken by the site inspector must be recorded on a photograph documentation log that will include, at a minimum, the following information:

- A unique identifying number for cross referencing and document control.
- Date, time, location, and current weather conditions at the time the photograph was taken.
- Purpose of intent of the photograph.
- Signature of the photographer.

3.3 RECORD DRAWINGS

GM will maintain a complete set of design drawings, including formal modifications and field changes. The inspector will record any deviations from the plans and specifications and will document the reason for the deviation. The drawings should document any changes made to the completed work, to include actual lines and grades, survey data showing locations of restored work, locations of testing, and elevations of each particular component repaired. At the completion of the O&M period, the information will be used to update the record drawings for use in the post-closure certification report.

3.4 STORAGE AND DISPOSITION OF RECORDS

During post-closure activities, GM will be responsible for maintaining a complete set of plans, specifications, design drawings, analytical data, and inspection reports. These

Figure 3-1

**Operation and Maintenance Periodic Inspection Report
Linden Road Site
Flint Township, Michigan**

Inspector _____
 Company _____
 Project _____
 Location _____
 Date/Time _____
 Project No. _____

Weather	Clear	P. Cloudy	Cloudy	Fog
Temperature	High	____ F°	---	---
Wind	Calm	Medium	High	---
Precipitation (circle)	Rain	Light	Moderate	Heavy
	Snow	Light	Moderate	Heavy

Type of Inspection Routine ☐ Special ☐

Persons/Equipment Present: _____

General Description of Site Conditions: _____

Specific Inspection Items	Potential Problem Areas	Status*	Notes
Perimeter Security Fencing	Missing barbed wire, torn fabric.		
Entrance Gate and Locking Mechanism	Lock broken/missing, mechanism inoperative.		
Monitoring Wells and Wellhead Covers	Signs of tampering, casing damaged, lock missing.		
Final Cover Vegetation	Bare spots, stressed vegetation, deep rooted vegetation.		
Final Cover Slope (explain below)	Gullies, cracking, subsidence, ponding.		
Evidence of Burrowing Animals	Damage to final cover, evidence of waste.		
Stormwater Drainage Channels	Gullies, erosion, debris, culvert blocked.		
Access Road	Ponding, rutting, erosion.		

* (1) Acceptable—No Maintenance Required. (2) Not Acceptable—Identify Required Maintenance.

Summary of Deficiencies and/or Corrective Actions: _____

Signature of Inspector _____

Date _____

documents will be used to record all changes or modifications to the project as of completion of construction. GM shall transfer all changes to the record documents following each maintenance activity at the site. GM will retain the periodic inspection reports, including all analytical data and evaluations. The documents will be maintained at GM's Flint, Michigan office, in accordance with approved document control methods.

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SECTION 4

O&M INSPECTION SCHEDULE

The Linden Road site shall be maintained in a safe and operational condition at all times during the operational life of the remedial action. Damage to any portion of the control system shall be immediately repaired to maintain protection and to allow for proper functioning of the system. At a minimum, the soil cover system shall be inspected in accordance with the schedule in Table 4-1.

The contractor shall document all inspection and maintenance activities, including an evaluation of additional measures required to effectively control reoccurring issues with respect to the soil cover system, the stormwater management system, and other support structures.

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Table 4-1

**Operation and Maintenance Schedule
Linden Road Site
Flint Township, Michigan**

	Operation and Maintenance Activity				
Year	Soil Cover Inspection/ Maintenance (Frequency)	Access Control Inspection/ Maintenance (Frequency)	Drainage System Maintenance (Frequency)	Groundwater Monitoring (Frequency)	Reporting (Frequency)
1	Quarterly	Quarterly	Quarterly	Annual ¹	Annual
2	Semi-annual	Semi-annual	Semi-annual	Annual	Annual
3	Semi-annual	Semi-annual	Semi-annual	Annual	Annual
4	Semi-annual	Semi-annual	Semi-annual	Annual	Annual
5	Annual	Annual	Annual	Annual	Annual
6, 8, 10... ¹	Bi-annual	Bi-annual	Bi-annual	N/A	Bi-annual

¹ Baseline groundwater monitoring will be conducted immediately following cap construction.

**PHASE 1 CONSTRUCTION
TECHNICAL SPECIFICATIONS
LINDEN ROAD SITE
FLINT TOWNSHIP, MICHIGAN**

VOLUME 2

Prepared for

GENERAL MOTORS, CORPORATION
Environmental and Energy Staff
Remediation Group

Prepared by

ROY F. WESTON, INC.
Three Hawthorn Parkway
Vernon Hills, Illinois 60061

November 1997

Work Order No. 01138-079-002



**WORLDWIDE PURCHASING
Machinery & Equipment**

November 10, 1997

Gentlemen/Ladies:

Enclosed is one set of bid documents for the **Linden Road Landfill Remediation Phase I, Flint Township, Michigan.**

We would appreciate receiving a **PROPOSAL** per the attached documents. A Proposal Form and Specifications are included and must be utilized to validate your proposal. Failure to utilize the supplied forms will invalidate your proposal.

You are to submit two **BID PROPOSALS** inclusive of all materials requested. (Please submit only the two requested copies utilizing the proposal form provided- one to Purchasing, one to Engineering.) The two documents are to be delivered no later than:

Friday, December 12, 1997

Please address bids to:

PURCHASING

**Cedell Timms
Worldwide Purchasing/Indirect
902 E. Hamilton Avenue
Mail Code: 485-101-102
Flint, MI 48550-8502**

ENGINEERING

**Robert Metcalf
GM - WFFG Remediation Team
NAO Flint Operations
CLCD North
Mail code: 485-185-020
902 E. Hamilton Avenue
Flint, MI 48550-8502
(810) 236-7391**

For your convenience, Purchasing bids can be deposited in the **Purchasing Lock Box**, located in the lobby at 6750 Chicago Road.

Proposals are considered confidential. Your proposal should be prepared and submitted, utilizing the form herein, sealed in an envelope and **clearly identified by Proposal Title**. If you do not wish to submit a proposal for this project, please return the entire bid package to the Purchasing department.

We welcome suggestions regarding changes in specifications and/or modifications in design or production methods which will aid in reducing costs without impairing quality, or which will improve the quality, safety, and/or performance of the product on which you are quoting. However, your base bid price must be submitted on the basis of the bid documents. All voluntary alternates are to be presented as a separate price from the base bid. Failure to provide a proposal per the RFQ will invalidate your proposal. Note also that this is a General Motors Request for Quote, subject to G.M. terms and conditions. If you cannot abide by the G.M. terms and conditions, please, contact the writer immediately. If you would like to propose an alternate to the G.M. terms and conditions, it must be done as a voluntary alternate and should include a deduction.

TENDERS

Bids rendered in the form of an electronic transmission will be accepted provided an original is provided via delivery or mail within 24 hours. Changes to bids will be accepted if received in a sealed envelope marked as above at the location specified **before the bid due time and due date.**

UTILIZATION OF MINORITY CONTRACTORS

It is the policy of GM Corporation that minority business enterprises shall have the opportunity to participate in the performance of GM Corporation contracts. By award of a contract for the Work of the captioned Project, the seller shall agree to *ten percent (10%) minority content*. The following are considered minorities for the purpose of the GM Minority Supplier Program.:

Afro-Americans; American Indians; Hispanics whose origin is from any Latin American country in South America, Central America or the Caribbean. This includes Brazilians and Puerto Ricans; Orientals whose origin is from China, Japan or Korea; Indonesians, Philippines; Those whose origin is from India and Pakistan; Micronesians, Polynesians, Samoans and native Hawaiians. (Native Hawaiians are those who are descendants of persons who lived on the island of Hawaii prior to its discovery by the English); Aleuts, Eskimos.

Under the general guidelines of this policy, a minority company is one which is minority group owned and controlled, or where provisions are established for eventual minority group ownership control. Also, managerial and supervisory positions must be principally filled by minority group personnel.

In the Bid, the Bidder shall identify their minority suppliers who would be utilized by stating the supplier bid amount, description of Work, supplier's name and address and the principal person to contact. The Bidder shall also include a copy of the written representation he received from the minority business enterprise concerning minority ownership.

You may contact the National Minority Supplier Development Council @ (212) 944-2430 to obtain supplier information.

Bid Walk

The project bid walk is scheduled for December 1, 1997 at 1 p.m.. For answers to any technical questions regarding this RFQ contact Robert Metcalf 810-236-0300.

Sincerely,

Cedell Timms
Sr. Buyer
Worldwide Purchasing/Indirect

GENERAL MOTORS CORPORATION
REQUEST FOR QUOTATION
CONTRACTORS BID PROPOSAL FOR ALL TRADE WORK

We, the undersigned, have prepared and submitted this bid as directed for the **Linden Road Landfill Remediation Phase I** in Flint Township, Michigan. The Seller shall provide services in strict accordance with the Drawings, Specifications, and Attachments. All costs, including taxes, labor, materials, etc. to perform the work are included in the Total Base Bid amount of \$ _____. The Base Bid breakdown is as follows:

Description	Quantity	Units	Unit Price	Total
1. General Conditions	1	LS		\$
2. Mobilization and Demobilization	1	LS		\$
3. Erosion and Sediment Control	1	LS		\$
4. Clearing and Grubbing	32	AC		\$
5. Waste Excavation, Relocation and Placement	37,540	CY		\$
6. Off-Site General Fill Backfill	13,930	CY		\$
7. Off-Site Granular/Aggregate Backfill	2,770	CY		\$
8. Topsoil	1,720	CY		\$
9. Finish Grading and Temporary Seeding/Mulching	15,480	SY		\$
Total Base Bid:				\$

Quantities listed above will be based on in-place cubic yardage calculated from field surveys. All bid items are further defined in the specifications, and specifically in Section 01025, "Measurement and Payment."

Contractor shall acknowledge all addendums issued for bid to be considered responsive. The TOTAL Base Bid reflects all changes for Addendum/Pre-Contract Bulletins numbered:

Contractor must bid according to bid documents. Exceptions or qualification statements must be included in this bid form. This bid form must be completed in its entirety at time of submission unless otherwise noted. Failure to provide the requested information at the time bid is submitted will be sufficient cause for the rejection of any bid or any part of any bid as stated in the General Conditions, Page 2, Item 4, "Tenders."

The following are the General Motors attachments to this proposal:

1. General Motors Corporation Construction General Conditions, GM 1638 (12/95).
2. Owner's Technical Specifications.
3. Owner's Design Plans.

The prices in this bid will stay in effect for at least 90 days after the proposals are received.

Company Name: _____ DUNS# _____

Address: _____

Telephone Number: _____ FAX Number: _____

Prepared By: _____ Title: _____

Submitted By: _____

Signature

Title: _____

Date: _____

SUBCONTRACTORS

The contractor shall state here the names of the Subcontractors which form the basis of his bid. If any of the Subcontractors indicated are not required for this project, the Contractor shall state "not required."

Work Item	Subcontractor's Name
Clearing and Grubbing	_____
Waste Consolidation Activities	_____
Excavation, Backfilling, Compaction	_____
Culverts and Detention Basin Outlets	_____
Topsoil Backfilling, Compacting, and Grading	_____
Seeding and Maintenance	_____
Site Survey Services	_____
Soil Erosion and Sedimentation Control	_____
Geotechnical/Materials Testing Laboratory	_____
_____	_____
_____	_____
_____	_____
_____	_____

UTILIZATION OF MINORITY CONTRACTORS

The total base bid includes the utilization of minority business enterprises as identified below:

Description of Work or Materials	Contractor or Supplier's Name, Address, and Contract Person	Material Bid Value
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
Total Value of Minority Involvement:		\$ _____

CHANGES IN THE WORK:

The Contractor shall include and bill as a separate item Sales and/or Use Tax except for items marked, in the Bulletin/Field Order, as follows:

PP - Personal Property

QP - Qualified Personal Pollution Control Facilities

For any marked items in the Bulletin/Field Order, the Contractor shall furnish the selling price, which shall include the price of materials including fabrication labor, installation labor and all other charges. For marked items, GM assumes the responsibility for the amount of any applicable sales and/or use tax.

UNIT PRICING

The Contractor shall submit with this proposal an Hourly Rate/Unit Price Schedule to be utilized by GM for Buyer approved changes.



General Motors Corporation
CONSTRUCTION GENERAL CONDITIONS
GM 1638 (12/95)

SUPERSEDES GM 1638 (9/81)
GM 1638-S (11/92) and GM 1638 (5/94)

CC5

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	GM 1650 NOTICE OF COMMENCEMENT (RECORDED COPY)
	GM 1651 NOTICE OF FURNISHING
	GM 1652 NOTARIZED SWORN STATEMENT
	GM 1653 PARTIAL UNCONDITIONAL WAIVER OF LIEN
	GM 1654 FINAL UNCONDITIONAL WAIVER OF LIEN

**General Motors Corporation
CONSTRUCTION GENERAL CONDITIONS**

1. GENERAL

- 1.1. The General Conditions shall apply to all work located in any of the States of the United States of America unless otherwise stated, and shall govern and supersede any preprinted terms and conditions appearing on the face or reverse side of any Purchase Order issued by the Owner in connection with this work. Work shall consist of the provision of all supervision, labor, material, equipment and services required to complete the project.

The General Conditions are hereby declared to be a part of the attached Specifications.

- 1.2. The Owner reserves the right to award other contracts for other work on the premises, even if of similar nature, character or trade.

- 1.3. The Drawings and Specification are intended to be complementary and all inclusive for the complete project as related to each trade or subdivision of the work. All items of work described by either the Drawings or Specifications shall be construed as if called for by both. The described work shall be complete in every detail, although every item may not be particularly mentioned or shown.

The Specification is divided into trades and divisions to facilitate the work; however, the Contractor shall be responsible for furnishing all labor, materials, equipment and services necessary to provide the complete project. Details, sections and work shown on the Drawings in part only shall continue throughout unless distinctly marked otherwise.

- 1.4. Should any error or inconsistency appear in the Drawings or Specification, the Contractor shall not proceed with the work in uncertainty but shall consult with the Owner regarding revisions to the Drawings and/or Specification. If found to be justified, Bulletins will be issued by the Owner to cover such changes.

- 1.5. No photographs, project related advertisements or any other related project publicity regarding any portion of the premises will be permitted without the express written consent of the Owner.

2. EXAMINATION OF PREMISES

- 2.1. Each Contractor shall examine the construction site and area and compare its findings with the Drawings and Specification, and shall inform and satisfy itself as to all matters necessary for its carrying out the work; including but not limited to, general working conditions, labor requirements, accessibility, condition of the premises, obstructions, drainage conditions, actual levels, excavating, filling, etc.. The Contractor shall investigate all other conditions as to character of the site and character of existing structures at or adjacent to the site, and the character and extent of the Owner's and other Contractors' operations in the area, and in connection with the project, and shall take all these matters into account in submitting its bid. No allowance or extra payment will be subsequently made because of any such items or conditions occasioned by the Contractor's failure to make such comparison and examination on account of interferences from the Owner's and other Contractors activities, or by reason of any error or oversight on the Contractor's part.

3. DEFINITIONS

- 3.1. **Owner** -- General Motors Corporation as represented by the Division indicated on the title page of this Specification.
- 3.2. **Architect-Engineer** -- The Owner's local engineering department or home office of the independent contractor engaged by the Owner to perform architectural and/or engineering services.
- 3.3. **Field Representative** -- The Architect-Engineer's employee designated to represent the Architect-Engineer at the project site or the Owner designated representative when the Architect-Engineer does not have a field representative.

The function of the Architect-Engineer's and/or Owner's designated Field Representative is to assure the Owner that the project shall be completed in full compliance with the requirements of the Drawings and Specification. This Representative is instructed to give the Contractor all assistance in interpreting the Drawings and Specification. This assistance shall not relieve the Contractor from any responsibility for the work. Any faulty work must be corrected by the Contractor. Although this Representative may have permitted faulty work or work done not in accordance with the Drawings and Specification, the Owner shall not be prevented from insisting upon the Contractor fully completing the work as specified.

- 3.4. **General Contractor** -- The Contractor designated by the Owner as General Contractor.
- 3.5. **Contractor** -- Any party having a direct Contract with the Owner.
- 3.6. **Subcontractor** -- Any party (including its sub-tier contractors) who agrees to assume a portion of a contract from a Contractor and agrees to construct a portion of the work for which the Contractor has been engaged to construct under its contract with the Owner.
- 3.7. **Assigned Contractor** -- A Contractor who becomes a Subcontractor by virtue of its contract being assigned by the Owner to another Contractor.
- 3.8. **Superintendent** -- A representative who must have authority to act for the General Contractor, Contractor or Subcontractor respectively.
- 3.9. **Materialman** -- Any party furnishing materials required under this contract for the improvement of property. If the materialman incorporates the materials into construction itself, the Materialman shall be designated under this Contract as a Subcontractor.

- 3.10. Bid Documents – These documents shall only include Drawings, Specifications (including General Conditions and Special Conditions) and Bulletins issued and dated on or before the date of contract with the Owner's approval.

4. TENDERS

- 4.1. The Contractor must base its bid on the Drawings and Specification.
- 4.2. The Contractor's bid shall be a firm price and shall not be adjusted for any increases or decreases in material prices, wage rates, freight rates or other items of cost in connection with the performance of the work.
- 4.3. The Owner reserves the right to accept or reject any or all bids or portions thereof.

5. OWNER'S OPERATIONS

- 5.1. THE OWNER MAY DURING THE PERIOD OF THIS CONTRACT ELECT TO COMMENCE OR CONTINUE ITS OPERATIONS ON THE PREMISES. TO THIS END THE CONTRACTOR SHALL COOPERATE WITH THE OWNER AS TO PERFORMANCE OF THE WORK. TO AVOID INTERFERENCE WITH THE OWNER'S OPERATIONS THE CONTRACTOR SHALL PERFORM ALL WORK AT HOURS AND IN SUCH MANNER AND AT SUCH TIMES AS TO SUIT THE OWNER'S CONVENIENCE, AND ALL COSTS IN CONNECTION THEREWITH SHALL BE INCLUDED IN THE CONTRACTOR'S BASE BID.

6. LAWS, ORDINANCES AND REGULATIONS

- 6.1. The law of the place of the work shall govern the work of the Contract. All Contractors shall be responsible for all work and shall comply to the requirements of all applicable Federal, State and Local Laws, Ordinances and Regulations including but not limited to safety and environmental requirements.
- 6.2. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with performing its work under this contract. When a General Contractor is designated by the Owner, the General Contractor shall coordinate the safety activities of the General Contractor and Contractors so the Owner's project is subject to unified safety precautions being directed by the General Contractor and carried out by the General Contractor and Contractors.

7. TAXES AND CONTRIBUTIONS

- 7.1. The Contractor shall include in its tender and shall make payment of all Federal, State and Local sales, use or any other taxes now in force, or which may be enacted during the progress and completion of the work.
- 7.2. The Contractor shall also be responsible for the payment of any payroll taxes or contributions for unemployment insurance, old age pensions or annuities which are measured by the wages, salaries or other remunerations paid to the employees of the Contractor and its subcontractors.
- 7.3. Where permissible by law the Owner may elect to exercise certain tax exemptions, in which event, those exemptions will be designated in the bid documents.

In the event the State agency rules that any of the exempted items do not qualify as tax exempt, then the Owner will make whatever tax adjustment is necessary with the Contractor for proper payment of the tax to the State.

The Owner reserves the right to reclassify, for tax purposes, materials and equipment. The Contractor agrees to furnish data necessary for the proper payment or exemption of the tax.

8. PERMITS AND INSPECTION FEES

- 8.1. The Owner will furnish at its expense a general building permit.
- 8.2. Contractors and Subcontractors shall obtain and pay necessary fees required for all other permits and/or inspections required by their work and, at the completion of the work, shall furnish certificates of approval from all governing inspection authorities.

9. OWNER'S SELECTION OF MATERIALS AND EQUIPMENT

- 9.1. In all cases where the choice of more than one make or style of article or material is specified, the final selection of the make or style rests with the Owner. Where the Contractor will require an adjustment in its bid because of such selection by the Owner, the Contractor is required to state in its bid the make or style of the article or materials specified upon which its bid is based, and the amount to be added or deducted from its bid if the other makes or styles named in the Specification are selected. In the absence of such statement in the bid form, the Owner may select any make or style without incurring a change in price.
- 9.2. The use of polychlorinated biphenyl's or higher polyphenyls (PCB's) in any product is prohibited (i.e., as a dielectric fill in power factor correction capacitors, surge protection capacitors, capacitors in lighting fixtures, transformer coolants and etc.).

10. ALTERNATE AND SEPARATE PRICES

- 10.1. Alternate and separate prices may be requested for the distinct purpose of determining the price of alternate materials, equipment or design, or for the purpose of adding to or deleting work from the scope of the project. These prices are to be all inclusive for substitutions, additions or deletions from work as specified.
- 10.2. Where the Specification calls for any stipulated item or "approved substitute" or words to that effect, the Contractor must base its bid on the make or style specified. If the Contractor elects to propose a substitute make or style which it believes to be equal,

Contractor shall so state in its bid, giving the price to be added to or deducted from its base bid, and full details of the proposed substitution.

- 10.3. Final selection shall be determined by the Owner.

11. REGULATION AND USE OF OWNER'S FACILITIES

- 11.1. The Contractor and all Subcontractors and their employees shall be subject and shall conform to the Owner's rules and regulations governing conduct of persons while on the Owner's premises.
- 11.2. Prior to submitting a bid, the Contractor shall consult with the Owner concerning use of Owner's facilities in connection with the work described in this Specification.
- 11.3. Identification badges will be required for all Contractor's and Subcontractors' employees to limit the use of the Owner's premises. Contractor shall cooperate with the Owner in setting up this identification system.
- 11.4. The Contractor shall not display advertising on the premises without approval of the Owner.
- 11.5. Smoking will be allowed only in designated smoking areas.
- 11.6. Any damage to Owner's facilities, including but not limited to, pavements, curbs, sidewalks, landscaping, structures, fences, etc., which are not designated to be removed and which may be damaged in the performance of the work under this Contract, must be properly restored, replaced or repaired without cost to the Owner except to the extent covered under the Owner's Property Insurance.
- 11.7. The Owner's security fencing shall not be altered, removed or relocated without first obtaining written permission from the Owner.
- 11.8. No drilling or burning into structural steel is allowed unless the Contractor has first obtained the written permission of the Owner.
- 11.9. Before beginning work on the Owner's premises, the Contractor shall consult the Owner's fire supervisor regarding established plant rules and regulations for fire protection including cutting and welding procedures. Conformance to these local rules shall be mandatory.

12. USE AND PROTECTION OF EXISTING UTILITIES

- 12.1. Prior to submitting a bid, the Contractor shall consult with the Owner concerning the use of existing utilities in connection with the work described in this Specification. Permission for use of the Owner's utilities must be obtained in writing and included with Contractor's bid proposal.
- 12.2. When the Contractor is permitted to use existing utilities, Contractor shall provide and pay for all wiring, piping, etc., required for its use and shall make all connections to Owner's service and disconnect and remove same at the Contractor's expense upon completion of the work.
- 12.3. The Contractor shall be fully responsible for the protection from damage of all known utilities and underground lines. Any such utilities and underground lines which are not designated to be removed and which may be damaged in the performance of the work under this Contract must be properly restored, replaced and repaired without cost to the Owner except to the extent covered under the Owner's Property Insurance.
- A. Prior to starting work, the Contractor shall consult with the Owner regarding of known utilities and underground lines.
- B. Should the Contractor encounter utilities and underground lines not previously identified, Contractor shall consult with the Owner before proceeding with the work.
- C. In case of public utilities, the Contractor shall consult with the governing authorities concerning protection and use prior to the start of work. Public utilities damaged in the performance of the work shall be repaired, altered or replaced as directed by the governing authorities at the Contractor's sole cost and expense.

13. TEMPORARY FACILITIES AND UTILITIES

- 13.1. The Contractor shall provide at its expense any temporary facilities and utilities required for completion of the work described in this Specification unless otherwise specified in the Special Conditions. The temporary facilities and utilities shall include but not be limited to:
- A. Providing temporary construction roads, ramps and approaches as soon as possible after award of a contract and maintaining them in a serviceable and dust free condition for use by all persons performing work in connection with this construction project.
- B. Providing main ladders and runways for the performance of the work. Subcontractors shall provide additional ladders and runways as required for the performance of their own work.
- C. Providing field offices and other temporary structures the Contractor may require. Subcontractors must provide their own offices, construction and storage sheds. The design and location of these temporary structures shall be as approved by the Owner. When directed by the Owner, the Contractor shall remove the temporary structures and shall be responsible for Subcontractors removing their temporary structures from the premises.

- D. Providing a field office for the Architect-Engineer's Field Representative which shall be a mobile office type trailer with not less than 300 square feet or other structure approved by the Owner. This office shall be provided with exterior doors with locks, suitable windows with screens, furnishings including a table approximately 4 ft. by 8 ft., drawings racks, desk, chairs, file cabinets and other necessary furnishings.

The Contractor shall be responsible for maintenance of this office including cleaning and the provision of heat, light and air conditioning. The Contractor shall provide an adequate supply of bottled drinking water.

- E. Providing fire protection for the field offices and other temporary structures. The Contractor shall provide and place in each field office and temporary structure not less than three fire extinguishers as follows:

- (1) One (1) dry chemical type having a net chemical content of not less than fifteen (15) pounds for use on Class B fires (oil, gasoline, paint and grease) and for Class C fires (electrical).
- (2) Two (2) water pressurized (2 1/2 gallon) for Class A fires (wood, textile, paper and rubbish).

All extinguishers shall be checked once a week and maintained in first class operating condition.

- F. Telephones:

- (1) Provide for the exclusive use of the Architect-Engineer, a telephone in the office of the Architect-Engineer's field representative. The Contractor shall pay for the telephone service and all calls except long distance which shall be paid for by the persons making such calls. The telephone shall remain in service until the completion of the entire work.
- (2) The Contractor shall provide all telephone service as may be required for its own and its Subcontractors' use.

- G. Providing near each phone at the job site, a legibly printed sign listing emergency telephone numbers including local doctor, local public fire and police departments, Contractor's first aid stations on the job, ambulance services and the Owner's local plant protection and fire department.

- H. Providing suitable toilet facilities and maintaining in a proper disinfected condition.

- I. Providing all water required in connection with the work to be performed under this Specification.

- J. Providing all compressed air required in connection with the work to be performed under this Specification.

- K. Providing temporary light and power as follows:

- (1) The Owner shall furnish electrical power to the job site at a location designated by the Owner and shall pay for all electrical power required in connection with the work under this contract except portable generators as may be required.

The characteristics of the temporary electrical system shall be as set forth in the bid documents or Special Conditions.

- (2) The Contractor shall connect at the designated points and provide and install all required transformers, meters, disconnect switches, temporary feeders and power and lighting outlets for distribution of electrical power. All feeder lines shall be protected from damage and installed to minimize interference with work areas.
- (3) The power and lighting system shall be 120 volt consisting of not less than twin weatherproof sockets (one for a 150 watt lamp and one for 150 watt power extension or additional lamp), spaced on not more than fifty foot centers each way throughout the construction area unless otherwise specified. Larger lamps shall be used for high bays as required. Also provide additional twin sockets and lamps for other areas such as rooms, stairwells and corridors. Lamps shall be installed and maintained by the Contractor.

The system shall be installed so as not to interfere with the work of the various trades and shall provide adequate distribution of light.

- (4) All other Contractors and Subcontractors requiring temporary power and lighting, in excess of or in locations other than provided in the distribution system, shall consult with the Contractor. They shall furnish, install and maintain at their own expense at locations agreed upon with the Contractor, such service feeders, transformers and other electrical installations required. All temporary installations shall be made in a manner which will not present a hazard to, or obstruct the work of, any trade.

- L. Providing temporary weather protection and heat as follows:

- (1) The Contractor shall be responsible for providing weather protection and temporary heat to protect all equipment and all parts of the structure from damage by inclement weather such as wind, water and freezing temperatures. This protection shall include temporary walls, partitions and protective coverings including complete enclosure of the structure or structures if necessary.

- (2) The Contractor shall be responsible for providing temporary space heat as required to protect the occupancy of existing and new structures and to permit the work of the various trades to continue. The Contractor shall provide temporary walls, partitions, roof and wall opening coverings as required to retain the heat within the work areas.

The temporary space heating requirements are as follows:

- (a) Maintain ambient temperatures as required for the proper execution of the work but not less than 10 degrees Celsius (50 deg. F.).
 - (b) All temporary space heaters shall be approved and listed by Underwriters Laboratories, Inc., and shall be package type with fuel supply tanks fastened to the burners complete with safety devices. No more than one (1) day's fuel supply for these heaters shall be stored in the local area of the heaters.
 - (c) The Contractor shall pay all costs of furnishing, installing, operating and removing temporary heating equipment including fuel and necessary attendants. Every precaution shall be taken to prevent fires and accumulation of gases within the building.
- (3) When the building has been totally enclosed and the permanent heating system, including the filtering system, is sufficiently complete to permit its safe use in accordance with all codes, the Contractor may elect to use the permanent heating system in lieu of or in conjunction with the temporary space heating equipment. The Owner will pay for all fuel used in the operation of the permanent heating system.

In the event the Contractor elects to use the permanent heating system it shall:

- (a) Provide and pay for all necessary temporary connections and removals.
- (b) Provide and/or pay for all operating attendants.
- (c) Provide periodic inspections, maintenance and repairs to insure safe and proper operation of the entire system.
- (d) Prior to the final acceptance of the entire system by the Owner, replace all used filters with new ones of the type or types specified. Contractor shall make and pay for all arrangements necessary for completely cleaning the entire system, including ductwork, and make all replacements and repairs as required to restore the system to a condition that will satisfy the guarantee requirements of the Contract.

- 13.2. The Contractor shall be responsible at Contractor's expense for the removal of any temporary facilities and utilities installed in connection with this project by the Contractor.

14. SPECIFICATIONS AND DRAWINGS

- 14.1. After award of the Contract, the Owner shall provide Drawings and Specifications to the Contractor. The quantity to be provided will be determined prior to award of Contract but in no case shall the quantity exceed twenty (20) sets. Additional sets of Specifications and Drawings may be obtained at the cost of reproduction. No transparencies will be provided.
- 14.2. The Owner shall also provide the Contractor with two (2) complete sets of the Contract Drawings and Specifications. The Contractor shall sign and file with the Owner one complete set for the purpose of identifying the scope of work upon which the Contract is based at time of award.
- 14.3. Drawings and Specifications furnished the Contractor shall only be used on work under this Contract.

15. REFERENCE SPECIFICATIONS

- 15.1. Specifications of National Organizations, Trade Associations, Federal and State Agencies and others referenced in the Specification shall mean the latest published revision except as specifically noted.

16. ASSIGNMENT AND SUBLETTING OF CONTRACT

- 16.1. Contractor shall not assign or sublet the whole or any part of the work without the written consent of the Owner; provided however, the Contractor shall remain fully responsible.
- 16.2. The Owner reserves the right to assign any or all Contracts to a General Contractor. Assigned Contracts and Contractors will then become Subcontracts and Subcontractors. The General Contractor and each Assigned Contractor will bear the same responsibility, one to the other, as if the Assigned Contract had originally been awarded by the General Contractor to the Assigned Contractor. The terms and conditions of each Assigned Contract shall not be altered by virtue of assignment.

The extent of assignments contemplated by the Owner on this project is stated in the bid documents or Special Conditions of this Specification. All costs and expenses related to the assignments must be included in the Contractor's base bid.

17. TECHNICAL INFORMATION DISCLOSED TO OWNER

- 17.1. Contractor agrees not to assert any claim with respect to any technical information which Contractor shall have disclosed or may hereafter disclose to Owner in connection with the goods or services covered by this Contract.

18. ROYALTIES AND LICENSE FEES

- 18.1. The Contractor shall, without additional cost to the Owner, pay all royalties and license fees necessary for the full and free use and enjoyment by the Owner of any inventions, articles, machines, devices, processes or methods which may be applied or incorporated as part of the work either in the construction or use after completion.

19. INTELLECTUAL PROPERTY

19.1. Contractor agrees:

- A. to defend, hold harmless and indemnify Owner, its successors and customers against all claims, demands, losses, suits, damages, liability and expenses (including reasonable attorney fees) arising out of any suit or claim or action for actual or alleged direct or contributory infringement of, or inducement to infringe any United States or foreign patent, trademark, copyright or mask work right by reason of the manufacture, use or sale of the goods or services ordered, including infringement arising out of compliance with specifications furnished by Owner, or for actual or alleged misuse or misappropriation of a trade secret resulting directly or indirectly from Contractor's actions;
- B. to waive any claim against Owner under the Uniform Commercial Code or otherwise, including any hold harmless or similar claim, in any way related to a claim asserted against Contractor or Owner for patent, trademark, copyright or mask work right infringement or the like, including claims arising out of compliance with specifications furnished by Owner; and
- C. to grant to Owner a worldwide, nonexclusive, royalty-free, irrevocable license to repair and have repaired, to reconstruct and have reconstructed the goods ordered hereunder. Contractor assigns to Owner all right, title and interest in and to all trademarks and copyrights in any material created for Owner under this Contract.
- D. Contractor shall furnish Owner technical information, including drawings, specification, and manuals together with the right to use such information without restrictions of any kind in conjunction with the maintenance and repair of the goods covered by this Contract.

- 19.2. The Owner shall give the Contractor notice of such claims and suits with reasonable promptness after receipt of any written claim or complaint and shall give the Contractor information and assistance within its control, all at the Contractor's expense, in defending such suits.

- 19.3. In case a suit is brought against the Contractor or any of its Subcontractors, of which the Contractor receives notice, or a written charge of infringement such as contemplated herein is received by the Contractor or any of its Subcontractors, the Contractor shall give the Owner written notice with reasonable promptness.

20. CONTRACTOR'S LIABILITY AND INDEMNIFICATION OF OWNER

- 20.1. Except as otherwise provided in Item 23 entitled "Property and Casualty Insurance", the Contractor assumes all risks of damages or injuries, including death, to any property or persons used or employed on or in connection with the work, and all risks of damages or injuries, including death, to any property or persons wherever located, resulting from any action, omission or operation under the Contract or in connection with the work.
- 20.2. The Contractor shall indemnify, hold harmless and defend the Owner, its employees, agents, servants and representatives from and against any and all losses, damages, expenses, claims, suits and demands of whatever nature, resulting from damages or injuries, including death, to any property or persons, caused by or arising out of any action, omission or operation under the Contract or in connection with the work attributable to the Contractor, any Subcontractor, any Materialmen, any of their respective employees, agents, servants and representatives, or any other person, including the Owner, its employees, agents, servants and representatives; provided, however, that the Contractor shall not be required to indemnify the Owner, its employees, agents, servants and representatives hereunder for any damages or injuries including death, to any property or persons, caused solely and exclusively by the negligence of the Owner, its employees, agents, servants and representatives.
- 20.3. In the event of any accident or occurrence resulting in damages or injuries, including death, to any property or persons, the Contractor shall immediately notify the Owner of the accident or occurrence and shall submit a written report within three (3) calendar days.

21. CONTRACTOR INDEMNITY BONDS

- 21.1. The Owner may require the Contractor to furnish bonds which indemnify the Owner for obligations of the Contractor in connection with the Contract.
- 21.2. Any bonds furnished by the Contractor shall be executed by a bonding company in an amount and form acceptable to the Owner and executed by a duly authorized attorney-in-fact of a licensed corporate surety company or companies.
- 21.3. The Owner will reimburse the Contractor only for performance and payment bonds in the amount of the Contract when such bonds are required by the Owner. The Contractor agrees to secure for the surety any acknowledgment or notice the surety or sureties may request of changes in the Contract amount until the Owner has accepted the work of the Contractor. The Contractor may furnish the surety or sureties copies of the Contractor's monthly invoices as approved by the Owner.
- 21.4. The Owner will not reimburse the Contractor for the cost of bonds which the Contractor may require Subcontractors to post, including Assigned subcontractors.

- 21.5. Other bonds indemnifying the Owner will be considered only upon the written request of the Contractor and the Owner may refuse to accept such bonds. The acceptance by the Owner of any indemnity bond shall not relieve the Contractor from any terms and conditions of the Contract.

22. LIABILITY AND WORKER'S COMPENSATION INSURANCE REQUIREMENTS

Contractor shall as a minimum maintain insurance coverage referenced in Chart A, as may be applicable to Contractor's activities, including all conditions specified on page 2 of Chart A.

In addition, Contractor agrees to require that all of its Subcontractors as a minimum maintain insurance coverage referenced in Chart A, and to secure and maintain in its records all certificates of insurance from all Subcontractors.

Contractor further agrees that if requested by Owner, all certificates of insurance required for this contract will be furnished to Owner within three (3) days of request.

23. PROPERTY AND CASUALTY INSURANCE (BUILDERS RISK)

- 23.1. The Owner will procure and maintain property insurance to cover the material and other property delivered to the site of the project which are to become a part of the permanent construction or are to be consumed on the Owner's premises in the process of completing the project.

- 23.2. The property insurance policy of the Owner shall include as insureds the General Contractor, Contractor, Subcontractors at any tiers, Materialmen, Architects and Engineers in an amount equal to the actual cash value for all risks of direct physical loss. Flood and earthquake losses are limited to \$125.0 Million each occurrence.

The insurance company waives all rights of subrogation against the General Contractor, Contractor, Subcontractors at any tier, Architects and Engineers, or Materialmen. The Owner shall assume responsibility for applicable deductible amounts for an insured loss.

A. The above coverage does not insure against loss caused by:

- (1) Wear and tear, deterioration, rust or corrosion, mold, wet or dry rot.
- (2) Smog, smoke, vapor, liquid or dust discharged from agricultural or industrial operation.
- (3) Mechanical breakdown, including rupture or bursting caused by centrifugal force.
- (4) Settling, cracking, shrinkage, bulging or expansion of pavements, foundations, walls, floors, roofs or ceilings unless loss by a peril not excluded.
- (5) Dampness or dryness of atmosphere, resulting from extremes or changes of temperature.
- (6) Interference by employees or others with customary operations.
- (7) Theft or attempted theft of any property which at the time of loss is in the open outside of buildings located on the Owner's premises or, when designated by the Owner before a loss occurs, the Contractor's security service is not constantly in attendance.
- (8) Unexplained or mysterious disappearance of any property or shortage disclosed on taking inventory; or caused by any willful or dishonest act or omission of the insured or any associate, employee or agent of any insured.
- (9) Errors in design, poor workmanship or use of faulty materials.
- (10) The cost of or resulting from the cost of making good any faulty workmanship, material, construction or design to buildings or structures, but this exclusion shall not apply to loss caused by an insured peril arising as a consequence of faulty workmanship, material, construction or design.
- (11) Electrical or magnetic injury, disturbance or erasure of electronic recordings.
- (12) Nuclear reaction or nuclear radiation or radioactive contamination, all whether controlled, or be in whole or in part caused by, contributed to, or aggravated by any of the perils insured against.
- (13) Pollution accident of any sort.

B. This policy does not insure against loss to:

- (1) Steam boilers (including equipment attached to and forming a part thereof), steam turbines, steam engines, steam pipes interconnecting any of the foregoing or gas turbines caused by any condition or occurrence within such pressure vessels, loss caused by or resulting from explosion, rupture, bursting, cracking, burning or bulging of boilers, pressure vessels, or piping or apparatus attached thereto.
- (2) Electrical appliances, devices, fixtures, wiring, or other electrical equipment caused by electrical currents.
- (3) Lawns, plants, shrubs, trees, standing timber.
- (4) Personal property in the open caused by exposure to elements of the weather.

- (5) Contractors' and Subcontractors' machinery, tools and equipment used in the erection of property covered unless the total capital value of such property is directly and specifically charged to the job.
 - (6) Personal property undergoing alterations, repairs, testing, installation or servicing, including materials and supplies, therefore, if directly attributable to the operations or work being performed thereon, unless loss is caused by an insured peril.
- 23.3. The foregoing provisions shall not relieve the General Contractor, Contractors, Subcontractors at any tiers, Architects or Engineers from their respective liability and responsibility for loss or damage to real or personal property of the Owner or others, which loss or damage is not specifically stated to be included in the insurance coverage to be obtained by the Owner for this project as set forth and limited in this Item 23, which loss or damage is caused by the acts, omissions or operations of the General Contractor, Contractors, Subcontractors, Architects or Engineers, their employees, agents, servants or representatives.
- 23.4. In addition to other required insurance, the General Contractor, Contractors, Subcontractors at any tiers, Materialmen, Architects and Engineers will assume the responsibility to maintain insurance for their respective tools, equipment, tarpaulins, field offices or construction buildings, employees' tools and clothing, materials and other property which will not become a part of the permanent construction or be consumed on the Owner's premises in the process of completing the project.
- 23.5. In the event of loss, the Contractor shall submit a complete written damage report to the Owner. Reports shall be submitted within seventy-two (72) hours after a loss occurs and shall include an estimate of repair or replacement cost. Except in an emergency endangering life or property, the Contractor shall proceed with repairs or replacement only in pursuance of an Emergency Field Order from the Owner. The Contractor shall proceed with the work and, upon completion, submit a proposal in accordance with the provisions for Changes in the Work, Method No. 3 - Cost Plus Percentage Fee, of these Contract General Conditions.

24. PROTECTION OF PERSONS AND PROPERTY

- 24.1. In addition to requirements for protection of the Contractor's employees, the Contractor shall also take all precautionary measures to protect other persons from injury and to protect property, including newly installed materials and equipment, from damage. The Contractor shall remove protective devices when no longer required and repair damage to new and/or existing construction in accordance with Item 32, "Material Installation, Quality and Workmanship." Precautionary measures shall include but not be limited to:
- A. Firmly constructed barricades, fences or guards; decking, planking for excavations and openings in floors, walls, roofs, stairs, elevator shafts, etc.; and protection (including overhead) for walks, driveways and other areas subject to pedestrian and/or vehicular traffic on public, private and Owner's property; and
 - B. Warning devices such as guard lights; danger signs, horns, bells and flags at temporary structures, pits, trenches and other obstructions.
- 24.2. Contractor shall take all necessary precautions to protect occupancy and use of premises from dirt, dust, weather, etc., in such manner that the Owner's operations may be carried on without interference, interruption or inconvenience. Concrete and masonry shall be wetted while cutting, breaking and handling. Hard surfaced roadways used in connection with this project shall be maintained clean and free of dirt and debris at all times.
- 24.3. Storage of combustible materials or equipment shall be in accordance with Item 25, "Fire Protective Measures."
- 24.4. The Contractor shall take all necessary precautions to protect the roofs from damage during the completion of the work required by this Contract. Temporary walkways shall be installed to protect the roof from damage by pedestrian traffic and similar light loading. Protection from heavier loads must bear directly on building structural members. The Contractor will remove temporary protection when no longer required.

25. FIRE PROTECTIVE MEASURES

- 25.1. The Contractor's Superintendent and the Owner jointly shall inspect the entire project at least once each week and take the necessary action to eliminate fire hazards and assure good housekeeping practices. The extent of participation by the Owner shall not relieve the Contractor of its responsibility for complying with or correcting the hazardous conditions unless caused by the Owner.
- 25.2. The Contractor will at least comply with the following requirements:
- A. Field offices and other temporary buildings, tool cribs, trailers, etc., shall be located outside and not less than fifty (50) feet from new construction and existing structures, with space between kept open.
 - B. Provide access to the construction site and around the perimeter of the facility. Such access shall be maintained in a serviceable condition suitable at all times for use by heavy fire fighting equipment.
 - C. Trucks and motor vehicles shall not be parked within the perimeter of any building, completed or under construction, unless directly engaged in construction, in which case the vehicle operator must be in attendance.

- D. Provide and maintain in an operating condition during the period of construction not less than two (2) fire extinguishers in good working order for each building having a total floor area of 6,000 square feet or less. One (1) additional extinguisher shall be provided for each additional 3,000 square feet of floor area. Extinguishers shall be of an approved type, not less than 2-1/2 gallons water pressurized or fifteen (15) pounds dry chemical, and shall be conveniently located throughout the building for proper protection of the hazards to be encountered. Extinguishers subject to freezing shall be protected by the addition of anti-freeze.
- E. If the work is in conjunction with the Owner's existing buildings or in cases where the Owner's fire extinguishers are available, the Contractor must include in its proposal the Owner's written permission for use of the Owner's fire extinguishers.
- F. Flammable liquids shall not be stored within the perimeter of buildings completed or under construction.
- G. Only temporary space heating equipment systems listed by Underwriter Laboratories, Inc., and Owner approved will be allowed. Location of unit will be approved by the Owner. **OPEN FIRES WILL NOT BE PERMITTED.**

It shall be the responsibility of the Contractor to maintain heaters in proper working order and to provide properly trained personnel in attendance at all times while heaters are in operation.
- H. Torch-cutting and welding operations for any type of work will be performed in strict accordance with the Owner's written fire and safety regulations which may require the Contractor to secure a permit for each shift operation.

Permission must be obtained for each specific operation and for a particular time, and in no case will any permit be given which extends beyond one shift.

In all such cases involving cutting and welding, the Owner's Representative shall be present whose specific responsibility shall be the prevention and fighting of fire.
- I. Tarpaulins used in connection with torch-cutting and welding operations must be fire resistant.
- J. Combustible materials or equipment in combustible containers shall be stored in an orderly manner. Not more than one (1) day's supply of combustible materials or containers may be stockpiled on one location within the building. Supplemental fire fighting equipment shall be located in the vicinity of such containers and materials.
- K. Roofing materials shall not be stored within the building. Tar kettles and similar melting equipment will be located not less than twenty-five (25) feet from the building or stockpiled combustible materials. Not less than two (2) fifteen (15) pound dry chemical fire extinguishers must be provided and readily accessible at each tar kettle for protection.
- L. All combustible waste materials shall be removed from all buildings at the close of every work day. All other rubbish and debris shall be removed from the premises at least once every week.
- M. Permanent fire protection water supply, fire extinguishing equipment and systems required by this Specification will be installed at the earliest possible date. Installed sections of the fire protection water supply shall be made available for emergency use, even though final testing has not been accomplished. Where some portions of the fire protection system may be subject to freezing, preventive measures must be taken by the Contractor.
- N. Temporary fire fighting or fire prevention equipment which becomes faulty or defective shall be replaced immediately.
- O. Temporary fire fighting or fire prevention equipment shall be removed upon completion of the project.

26. USE OF EXPLOSIVES AND BLASTING AGENTS

- 26.1. No explosives or blasting agents may be brought onto or used on the Owner's premises without written permission from the Owner's Personnel Director.
- 26.2. If the Contractor proposes to request permission, the Contractor must comply with the following:
 - A. Accompany its bid proposal with a written description of the area of use and purpose.
 - B. Provide the Owner with satisfactory evidence of ability to comply with insurance as described in Item 22, "LIABILITY AND WORKER'S COMPENSATION INSURANCE REQUIREMENTS."
- 26.3. Any Contractor having obtained Owner's written permission must comply with the following:
 - A. Furnish certificate of insurance evidencing compliance with Item 22, "LIABILITY AND WORKER'S COMPENSATION INSURANCE REQUIREMENTS."
 - B. Select an individual qualified as a blaster to directly supervise the transporting, storing, handling and use of explosives or blasting agents and to perform in a safe manner the type of blasting required. Furnish to the Owner's Personnel Director for review and approval satisfactory evidence of each blaster's qualifications by reason of training, mandatory licenses and knowledge of experience in the use of each type of blasting method to be employed.
 - C. Give the Owner's Field Representative a copy of the Owner's Personnel Director's permission and copies of regulatory permits required by any Federal, State, and Local authorities.

- D. Conduct safety meetings at the job site to instruct job site personnel in the plan of each blasting operation and assign trained employees to carry out the plans.
 - E. Each blasting operation plan shall include, but not be limited to, access routes, methods and locations of storage, handling and use of explosives or blasting agents, protective mats to be employed, warning devices and signals, barricades and flags, signal codes to be employed in connection with blasting operations, inspections after blasting and handling of misfires.
- 26.4. Not more than eight (8) hours supply of explosive material may be brought onto Owner's premises per working shift. All unused explosive materials must be removed from the Owner's premises immediately upon the end of the work shift.
- 26.5. Each day the Contractor must account to the Owner's security guards for all explosives and blasting agents transported in or out of the Owner's premises. The Owner's security guards shall maintain an inventory and use record of all explosives and blasting agents brought onto the premises.
- 26.6. If, after award of Contract, the Contractor proposes to use explosives or blasting agents in the performance of the work the provisions and procedures set forth above must be compiled with.

27. POWDER ACTUATED HAND TOOLS

- 27.1. Powder actuated hand tools may be used provided the Contractor complies with the following:
- A. Written permission must be obtained from the Owner prior to bringing the tools to the site.
 - B. Only Contractor's employees trained in the operation of the particular tool to be used shall be permitted to use it.
 - C. All powder actuated hand tools being used at the job site must comply with all applicable safety requirements and shall be maintained in a safe and proper working condition.

28. HELICOPTERS

- 28.1. Any use of helicopters by the Contractor as part of the work to deliver, set, install, or remove material or equipment shall not be permitted without written permission from the Owner's Personnel Director.
- 28.2. If the Contractor proposes to request permission, the Contractor must comply with the following:
- A. Accompany its bid proposal with a written description of the scope of helicopter work and plan of operation.
 - B. Acknowledge that no helicopter operations shall be conducted over areas of the plant occupied by persons.
 - C. Provide the Owner with satisfactory evidence of ability to comply with insurance as described in Item 22, "LIABILITY AND WORKER'S COMPENSATION INSURANCE REQUIREMENTS."
- 28.3. Any Contractor having obtained Owner's written permission must comply with the following prior to operating a helicopter at the Owner's premises:
- A. Furnish certificate of insurance evidencing compliance with Item 22, "LIABILITY AND WORKER'S COMPENSATION INSURANCE REQUIREMENTS."
 - B. Select a licensed helicopter firm experienced in the type of work to be performed. Furnish to the Owner's Personnel Director for review and approval, satisfactory evidence of each pilot's and work crew's qualifications, including typical work experience.
 - C. Give the Owner's Field Representative a copy of the permission issued by the Personnel Director and copies of all regulatory permits required by Federal, State and Local agencies.
 - D. Conduct safety meetings at the job site to instruct the job site personnel in the scope of work intended to be performed by helicopter and measures to be exercised for safety of personnel and property. Notice of any safety meeting shall be given to the Owner not less than 24 hours prior to the scheduled meeting.
 - E. Notify the Owner of all intended helicopter activity at least 24 hours prior to lifting operations.
 - F. Conduct a briefing for the Contractor's and Owner's personnel immediately prior to each day's helicopter operations. These briefings shall include, but not be limited to, personal protective equipment, loose gear and objects, housekeeping, approach distance and flight path.
- 28.4. The Owner reserves the right to approve the proposed flight path and designate the path over the Owner's premises.
- 28.5. If, after award of Contract, the Contractor proposes to use helicopters in the performance of the work the provisions and procedures set forth above must be complied with.

29. SURVEYS AND PROJECT LAYOUT

- 29.1. The Owner will establish lot lines and locate the benchmark unless otherwise specified.
- 29.2. All other lines and elevations necessary for the location and construction of the specified work shall be established and maintained by a competent surveyor who shall be employed and paid for by the Contractor.

- 29.3. The Contractor shall compare carefully all lines and elevations given on Drawings with existing lines and elevations and shall review discrepancies with the Owner as required by Item 1.4 of these General Conditions.

30. APPROVALS, SUBCONTRACTORS, MATERIALMEN AND MATERIALS

- 30.1. Immediately after award of Contract, Contractor shall submit to the Owner written requests for approval of all Subcontractors, Materialmen and materials proposed for use. Approval requests shall indicate the involved trade section of the Specification and shall include all technical data and brochures required for such approval.

- 30.2. The Contractor shall secure and submit to the Owner for approval four samples of materials to be used in the work as required in the trade sections of the Specification or as required by the Owner.

The Contractor's submissions of samples to the Owner for approval shall be accompanied by positive identifying information, including: (1) place the material is to be used and reference to the section of the Specification calling for this material; (2) manufacturer's name, also trade name, catalog number, quality designation, etc.. Materials delivered to the site shall be fully equal to the approved samples.

- 30.3. The Owner will reply to the Contractor in writing stating whether or not the Owner after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner to reply promptly shall constitute notice of no reasonable objection.

If the Owner has reasonable objection to any such proposed person or entity, the Contractor shall submit a substitute to whom the Owner has no reasonable objection, and the Contract sum shall be increased or decreased by the difference in cost occasioned by such substitution and an appropriate Contract Change Order shall be issued; however, no increase in the contract sum shall be allowed for any such substitution unless the Contractor has acted promptly and responsively in submitting names as required.

- 30.4. When a General Contractor has been designated by the Owner, all Subcontractors' materials and samples etc., shall be submitted to the General Contractor for the General Contractor's review and coordination prior to delivery to the Owner.

31. CONTRACTOR'S SHOP DRAWINGS

- 31.1. As soon as possible after award of Contract, the Contractor shall secure from all its Subcontractors and Materialmen uniform size shop drawings and all manufacturers' drawings and specifications required by the various trade sections of Specification.

Each Contractor, Subcontractor, or Materialman shall consecutively number its drawings throughout the duration of the project. The Contractor shall coordinate all shop drawings with other trades prior to delivery to the Owner. Each drawing shall be marked to identify the project including job number, trade section of the Specification and page number, name of checker and date of transmittal.

All shop drawings shall be submitted in ample time to prevent delays of material deliveries. Drawings shall be submitted in the order in which the materials are needed without necessarily waiting for completion of all drawings before submitting part of them for approval.

- 31.2. Prior to submitting shop drawings, the Contractor shall thoroughly check and verify that the design and engineering of work shown on the shop drawings conforms to the intent of the Drawings and Specification, including measurements, sizes of members, materials, details and requirements for capacity, strength, vibration and function.

Shop drawings found to be inaccurate or otherwise in error shall be corrected by the Contractor, Subcontractor or Materialman responsible for the work.

- 31.3. After the Contractor has checked and verified the shop drawings, it shall submit one transparency or, if not practical, six copies of each drawing to the Owner for review.

- 31.4. After review of the shop drawings, the Owner shall return to the Contractor one transparency or one copy of each drawing with one of the following notations:

Approved – Drawings thus marked indicate final action by the Owner.

Approved as
Noted – Drawings thus marked indicated approval subject to corrections noted, and must be corrected and resubmitted for record purposes.

Not Approved – Drawings thus marked must be corrected and resubmitted.

- 31.5. Any materials ordered or fabricated prior to receiving approved shop drawings bearing Owner's notation, "Approved" or "Approved as Noted", shall be at the Contractor's risk.

- 31.6. No changes shall be made on the approved shop drawings without the written consent of the Owner. The Owner's approval of shop drawings and manufacturer's drawings and specifications is for general arrangement only unless otherwise noted, and does not relieve the Contractor from full responsibility for the proper and correct execution of its work. Where errors and omissions are discovered later, they must be made good by the Contractor irrespective of any prior approvals of the Owner.

32. MATERIAL INSTALLATION, QUALITY AND WORKMANSHIP

- 32.1. The quality or fitness of materials and workmanship shall be first class in every respect. Acceptability of materials and workmanship shall rest strictly with the Owner. What is usual or customary on other projects shall not be used as a basis of consideration or decision in this Contract.
- 32.2. The Contractor shall make all necessary adjustments to its materials as required for an acceptable installation, including adjustments to fit its work to receive or be received by the work of others.
- 32.3. When changes in the work are requested, the Owner will furnish the Contractor with Bulletins and Drawings describing the changes. The number of copies furnished will depend on the complexity of the changes, but shall in no case exceed a total of ten (10) sets.
- The Contractor may request additional sets at the cost of reproduction.
- 32.4. All Drawings and Specifications furnished the Contractor shall not be used on other work and shall remain the property of the Owner.
- 32.5. All materials or workmanship of unsound, unfit or damaged character shall be removed, reconstructed, refinished and/or replaced immediately by the installing contractor to the satisfaction of the Owner. Each Contractor is held responsible for damages caused by its work or workmen including subcontractors and representatives of material and equipment suppliers. The Contractor at fault shall bear the expense of corrective work and the cost of delays resulting therefrom. No extension of Contract completion dates shall be allowed. It is not incumbent upon the Owner to give early notice of the rejection of faulty work, unfit or damaged materials.

33. REMOVALS, CUTTING AND PATCHING OR REPAIR WORK

- 33.1. All work shown on the Drawings or specified as work to be removed or altered, or as may be necessary to remove or alter, in order to permit the proper installation of the new work, shall be done by the Contractor or Subcontractor whose trade is involved.
- 33.2. All repair work shall be performed by the Contractor or Subcontractor whose trade is involved, but the cost shall be paid by the Contractor or Subcontractor responsible for causing the repair work.
- 33.3. The written approval of the Owner must be obtained prior to drilling of holes in structural steel, or cutting of openings of any size in walls, ceilings, roofs, floors, etc., in connection with any repair work.
- A. The drilling or cutting of any structural steel members such as beams and columns will not be permitted unless approved in writing by the Owner. All connections must be made with approved beam clamps, or drilled and bolted in accordance with the Owner's requirements. All bolts used in steel construction must be long enough to permit the use of one full nut and one lock washer, or one lock nut. Multiple flat washers will not be permitted. All bolt holes must be either drilled or punched. Flame cutting of bolt holes will not be permitted.
- B. No connections shall be made to concrete beams, columns and piers which do not already have inserts without the written approval of the Owner.

34. OWNERS INSPECTION

- 34.1. The Owner's inspection is for the purpose of making sure that the work called for in the Contract is being properly executed. While the Owner shall give the Contractor all desired assistance requested in interpreting the Drawings and Specification and furnishing additional information as needed, such assistance does not relieve the Contractor of any responsibility for the proper execution of the work.
- 34.2. ON-SITE INSPECTIONS – The Contractor shall provide, at all times, proper facilities for access by the Owner to make inspections. Should the Contractor without consent of the Owner cover up work not yet inspected, the Contractor, if requested by the Owner, shall at its own expense uncover such work for examination. When the Owner requests the Contractor to uncover questionable work for examination, the related cost shall be paid by the Owner if the work is found to be satisfactory. However, if the work is found to be unsatisfactory, the Contractor shall pay the cost of the examination and replacement of the unsatisfactory work.
- 34.3. OFF-SITE INSPECTIONS – The Owner reserves the right to inspect any of the work being performed away from the project site. To insure this right, the Contractor shall give the Owner timely notice of where and when such work is being performed.

35. TESTS

- 35.1. The Contractor shall furnish all labor, materials and equipment required to make all performance and other tests of its work, as required by the governing codes, regulations and the Specifications. Such tests shall be performed at no additional cost to the Owner. All tests shall be performed in the presence of the Owner unless attendance at the test has been waived by the Owner in writing. All work required to be tested which is to be buried underground or otherwise concealed shall be tested before being covered, and the test conditions shall be maintained for a sufficient length of time to permit adequate inspection. Contractor shall furnish the Owner with test results and data upon completion of the testing.

36. SALVAGE AND REMOVAL OF EXISTING WORK AND EQUIPMENT

- 36.1. Unless otherwise specified, the Contractor shall remove existing work and equipment as may be necessary to permit the proper installation of the new work. All cutting, repairing or patching in connection with these removals shall be performed without additional cost to the Owner.
- 36.2. Unless otherwise specified, all equipment and materials removed from existing buildings shall remain the property of the Owner. The Contractor shall protect these materials and equipment from damage and loss until the Contractor has:
 - A. Reinstalled materials and equipment as part of the specified work, or
 - B. Received an appropriate written receipt (see Appendix C) from the Owner after delivering the materials and equipment to a storage area designated by the Owner. This receipt shall properly identify the materials, equipment and storage area.
- 36.3. When salvage material or equipment is specified to become the property of the Contractor, the Contractor shall state in its bid, as a credit or charge, the amount included for the salvaged material or equipment.
- 36.4. No material or equipment may be taken from the premises without first securing a properly executed property removal pass from the Owner. Boxes, cartons, or similar items, are subject to inspection by the Owner.

37. COOPERATION

- 37.1. The Contractor agrees that anything necessary on the part of its trade to eliminate interferences and to make possible the work of other trades is to be done as part of the Contract, including the use of the Owner's facilities and utilities, and shall be done in such a manner and at such times as to avoid interference with the Owner's operations.
 - A. The Contractor shall afford the Owner and other Contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work.
 - B. In the event of an emergency or for the Owner to conduct its operations, each Contractor and its Subcontractors when requested by the Owner shall cease work at any particular location and transfer their men to other locations, and execute such portions of work as required to enable others to carry on their work without delay.
- 37.2. The Contractor shall render all necessary assistance to the Owner and, if required, shall take and furnish to the Owner any levels, measurements, etc., on the work or grounds as the case may be.

38. MOVING OF CONTRACTOR'S MATERIALS AND EQUIPMENT

- 38.1. If it becomes necessary at any time during construction to move materials which are to enter into the construction, or equipment and barricades which have been temporarily placed, the Contractor furnishing these materials, equipment or barricades shall, when directed by the Owner, move them or cause them to be moved without additional charge to the Owner.

39. MATERIALS AND EQUIPMENT FURNISHED BY THE OWNER

- 39.1. All materials and equipment furnished by the Owner for installation by the Contractor shall upon delivery to the job site be unloaded, transferred, stored and fully protected by the Contractor until installed. Any demurrage or similar charge incurred due to failure of the Contractor to promptly unload the materials and equipment shall be the responsibility of the Contractor when the items are delivered in accordance with the Owner's schedule or the Owner and Contractor have cooperated in establishing another delivery date.
- 39.2. The Contractor shall carefully examine all materials and equipment furnished by the Owner. The Contractor shall complete receiving reports (see Appendix D) describing the quantity and condition of the materials or equipment. The Contractor shall be responsible for subsequent damage or loss until installation is completed and accepted by the Owner.
- 39.3. Should the Contractor fail to report any visible signs of damage as required above, then all parties in interest may assume that the damage occurred while the materials and equipment were in the care, custody and control of the Contractor.
- 39.4. Any material furnished by the Owner at an off-site location, on other than a charge basis in connection with the Contract, shall be deemed as held by the Contractor on consignment. All such materials or equipment required under the Contract shall be returned to the Owner, as directed, at the Owner's expense; and, if not accounted for or returned, shall be paid for by the Contractor.

40. INSTALLATION OF OWNER'S EQUIPMENT

- 40.1. The Contractor agrees to allow the Owner to receive, place and install machinery and equipment during the progress of the work and to make use of any portion or portions of the building or facility which can be mutually agreed upon as being available for the Owner's operations. The Contractor further agrees that such placement of machinery and equipment or use of any portion of the building or facility does not evidence completion of the work nor signify the Owner's acceptance of all or any part of the work.

41. CONTRACTOR'S SUPERVISION

- 41.1. The Contractor shall supervise and direct the work using its best skills and attention. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating and controlling all portions of the work under the Contract.

The Contractor shall not be relieved from its obligations to perform the work in accordance with the Contract documents either by the activities or duties of the Owner, Architect or Engineer or by inspections, tests or approvals required or performed by persons other than the Contractor.

Nothing herein contained shall be construed by the Contractor to mean the Contractor is an employee of the Owner and the Contractor expressly agrees that the Contractor is an independent contractor.

- 41.2. Each Contractor shall keep on the work during its entire progress a competent Superintendent satisfactory to the Owner. The Superintendent shall not be changed without the consent of the Owner. Supervision or employees of Contractors determined by the Owner to be unsatisfactory shall be promptly replaced upon written request of the Owner.
- 41.3. The Contractor's Superintendent shall represent the Contractor in the latter's absence and all directions given to the person by the Owner shall be as binding as if given to the Contractor. On request, all such directions will be confirmed in writing by the Owner to the Contractor.

42. CONTRACTOR'S MEETINGS

- 42.1. The General Contractor, or the Contractor when a General Contractor has not been designated by the Owner, shall schedule regular meetings with the representatives of the trades engaged about the premises to issue instructions and assure harmonious progression of the work. Failure of a Contractor's or Subcontractor's supervisor to attend meetings or execute instructions of the General Contractor shall constitute a basis for dismissal from the work. Upon request of the Owner, dismissal will take effect within 12 (twelve) hours and new supervision will be substituted by the Contractor or Subcontractor.
- 42.2. The General Contractor, or the Contractor when a General Contractor has not been designated by the Owner, shall record and promptly distribute detailed and accurate minutes of all regularly scheduled meetings. Distribution of the minutes shall be at the General Contractor's discretion but shall always include the Owner.

43. CLEANING OF PREMISES

- 43.1. The Contractor shall be fully responsible for keeping the buildings and adjoining premises free at all times from accumulations of all waste material, rubbish, debris, broken concrete, etc., caused by the Contractor's employees and its Subcontractors' employees and the work of each.
 - A. The Contractor shall take all precautions to avoid depositing earth, debris or mud on the Owner's existing roads, adjacent public roads, parking areas and etc.. The Contractor shall be responsible for removal of earth, debris or mud, etc., at no additional cost to the Owner.
 - B. No facilities or equipment of the Owner may be used for trash accumulation or the hauling away from the premises without the Owner's prior written approval. Owner's approval shall be secured as provided under Item 11, "Regulation and Use of Owner's Facilities."
- 43.2. All combustible waste materials shall be removed from all buildings at the close of every work day. All other rubbish and debris shall be removed from the premises at least once every week.
- 43.3. When performing construction activities within an operating facility, rubbish, debris and other waste material must be placed in containers at once. All containers shall be covered for removal through any area where the Owner is conducting its operations.
- 43.4. If the Contractor does not clean the premises as required:
 - A. The Owner shall advise the Contractor that in the Owner's opinion the premises are not being maintained in the condition required.
 - B. Should the Contractor fail to initiate substantial progress toward clean-up of the premises within twenty-four (24) hours following receipt of written notice, the Owner may elect to provide the necessary labor, materials or equipment to fulfill the necessary requirements and deduct the cost from any monies then due or thereafter due the Contractor and its Subcontractors. If more than one Contractor's work is involved, a proportionate share of the Owner's cost will be charged to each Contractor and determined as follows:
 - (1) Costs attendant to the removal of all debris, rubbish, packaging, etc., which are identifiable to the activity of a specific Contractor or its Subcontractors shall be charged to that Contractor.
 - (2) Costs attendant to the removal of all other debris, rubbish, etc., shall be pro-rated among all Contractors on the basis of the ratio of the work force of each (including their Subcontractors) to the total work force on the job site.
 - (3) The Owner shall maintain adequate records related to the assessment of charges.
- 43.5. As work is completed in an area, the Contractor shall remove all tools, scaffolding and surplus materials and leave the area broom-clean.
- 43.6. Immediately before turning the building over to the Owner, the Contractor shall have all installed glass washed clean.

44. PAYMENT

Unless otherwise provided in the Contract, the Owner shall make partial payments for the completed work as the construction progresses, subject to a retention. Payment shall be subject to the following terms and conditions, based on the Owner approved payment schedule.

- 44.1. Execution of a written contract by both parties.
- 44.2. Prior to the first application for payment under the Contract, the Contractor shall submit to the Owner a breakdown of the Contract price which will aggregate the total Contract amount and form the basis of the Contractor's applications for payment.
- 44.3. Without changing the Contract price, the Owner reserves the right to require the Contractor:
- A. To increase or decrease amounts within the price breakdown, and
 - B. To conform the price breakdown to the Owner's local accounting practice.
- 44.4. Charges as approved by the Owner for changes in the work must as a prerequisite for payment be formally incorporated into the Contract by a Contract supplement or Contract change order.
- 44.5. All Contractors, Subcontractors and Materialmen doing work on the premises of the Owner, or providing materials or equipment to be used in the performance of the Contract, must agree to comply with all requirements of the Federal Wage and Hour Act regarding hours, rates, etc., and will be held responsible for compliance.
- Should the Owner be joined as a party in any action or proceeding arising out of the violation or an alleged violation of the Federal Wage and Hour Law in the performance of the Contract; the Contractor, Subcontractor or Materialman violating or alleged to have violated such law, or using or introducing goods manufactured or alleged to have been manufactured in violation of the law, shall defend and hold harmless the Owner in any such action or proceeding and pay and defray any damage, expense and cost of any description by reason thereof, including reasonable attorneys fees.
- 44.6. Contractor agrees all funds requested in its applications for payment for the benefit of Subcontractors, Materialmen and Laborers as evidenced by the Contractor's sworn statement shall be paid from the funds received from the Owner for each payment application.
- 44.7. The Owner reserves the right to furnish to any Subcontractor or Materialman evidence of the amounts certified on their respective account for payment to the Contractor.
- 44.8. The Owner may require the Contractor to furnish additional segregation's of the price breakdown for the purpose of allocating the Contract price to individual buildings, structures and/or equipment installations.
- 44.9. The Contractor's estimate of the value of labor and material in place as agreed upon and certified by the Owner's Representative shall constitute the basis for the Contractor's application for payment. Upon application for payment by the Contractor, according to the agreed upon Contract price breakdown, the Owner shall make payment to the Contractor for ninety (90%) percent of the value of the labor and materials in place up to the first day of the month, less the aggregate of all previous payments.
- In the event the Contractor withholds an amount greater than ten (10%) percent retention from a Subcontractor, the Owner shall increase the Contract retention by the same amount.
- 44.10. Materials delivered upon the premises for the construction of the building shall not be removed from the premises without the written consent of the Owner.
- 44.11. Contractor's applications for payment shall be accompanied by the Contractor's sworn statement indicating the status of payments to laborers to the date of the invoice, and setting forth the amounts due each Subcontractor and Materialman as of the date of the Contractor's invoice.
- With the next application for a payment or within fifteen (15) days after the date of each payment to the Contractor, the Contractor shall submit waivers of lien signed by each Subcontractor and Materialman acknowledging payment of the amounts set forth on the sworn statement which accompanied the Contractor's invoice.
- Subsequent applications for payment will not be paid until all necessary waivers of lien, in satisfactory form, have been received covering each previously paid invoice.
- The Contractor's final invoice shall be accompanied by the Contractor's sworn statement, the Contractor's final waiver of lien and final waivers of lien from all Subcontractors and Materialmen who have not previously submitted a final waiver of lien.
- 44.12. Sample copies of the required sworn statement and waiver of lien forms will be provided by the Owner. These suggested forms are intended to cover only the Owner's minimum requirements under the Contract. The Contractor is responsible for supplementing these forms and supplying to the Owner any other information, forms and documents which may be required by applicable laws of the State where the work is being performed.
- If any Subcontractor refuses to furnish a final waiver of lien, the Contractor shall, at the Owner's option, furnish at no additional cost to the Owner, an indemnity bond satisfactory to the Owner in accordance with Item 21 entitled "Contractor Indemnity Bonds", to indemnify the Owner against any and all liens or claims which may at any time be filed or asserted by such Subcontractor.
- 44.13. Payment terms shall be 25th prox. Therefore, invoices dated and received by the Owner from the 1st through the end of the month will be payable on the 25th of the following month, provided all required supporting documents have been received by the Owner.

- 44.14. If at any time there shall be evidence of the existence, whether or not asserted, or any lien or claim arising out of or in connection with the performance or default in performance of the Contract, and if the Owner or representatives of the Owner or any property of either or any property stored or installed on the premises might be or become liable for the discharge or satisfaction of a lien or claim, then the Owner shall have the right to retain out of any monies due or thereafter due, in addition to all other withholdings, an amount sufficient to discharge any lien or satisfy any claim and to reimburse the Owner and/or the Owner's representatives for all costs and expenses including reasonable attorney's fees.
- 44.15. The Owner at its sole discretion shall have the right to apply to liens or claims any monies retained by the Owner if the Contractor does not discharge liens or satisfy claims within ten (10) days after notice, or agree with the Owner to some other procedure to resolve the claims or discharge liens.
- If the monies retained are insufficient to discharge liens or satisfy claims after payments have been made to the Contractor, the Contractor shall reimburse the Owner for all monies paid by the Owner to discharge liens and satisfy claims, including the costs and expenses of attorneys and courts.
- 44.16. The Owner because of subsequently discovered evidence, may withhold or nullify the whole or a part of any payment to the extent necessary to protect the Owner from a loss by reason of:
- A. Defective work not remedied.
 - B. Failure of the Contractor to make proper payments to Subcontractors or Materialmen for material, labor or equipment.
 - C. The Owner's estimate that the Contract cannot be completed for the balance remaining unpaid under the Contract.
 - D. Damage to work furnished or installed by the Owner, another Contractor, Subcontractor or Materialman.
- 44.17. The final payment, including the amounts previously withheld, shall be payable within fifty-five (55) days after completion by the Contractor and acceptance by the Owner of the work under the Contract; provided the Contractor has fully complied with the provisions of this Item 44; submitted all required "As-Built Records", operating instructions and maintenance manuals and "Guarantees" properly endorsed by the Contractor; and all Emergency Field Orders and Bulletins have been incorporated into the Contract.
- 44.18. Any payments by the Owner without requiring strict compliance with the provisions of this Item 44 shall not be construed as a waiver by the Owner of the right to insist upon strict compliance with such provisions as a condition of later payments.
- 44.19. By acceptance of final payment the Contractor waives any and all further claims against the Owner arising out of or in connection with the Contract.

45. PREMIUM OR OVERTIME WORK

- 45.1. The Contractor shall include in its base bid all premium time or overtime required to properly man the job, meet its established schedules, make all necessary tie-ins or cutovers and avoid interferences with the Owner's operations.
- 45.2. In the event the Owner requests the Contractor in writing to work additional premium or overtime, the Contractor shall work such additional hours or shifts required to comply with the Owner's request. The following requirements will govern compensation for such additional premium or overtime:
- A. The Contractor will submit a statement of charges for the Owner's record covering the premium or overtime work in connection with each written authorization of the Owner. This statement shall list the working employees by name, trade classification, hourly rate and premium or overtime hours worked; and shall be supported by daily time sheets signed by the Owner.
 - B. Each statement of charges must be submitted in three copy form. The Owner will only reimburse the Contractor for the premium portion of pay, applicable fringe benefits and taxes, and Federal and State unemployment and insurance contributions. No overhead and/or profit will be allowed.
- The installing Contractor must obtain an approved GM 1783, Hourly Field Labor, for each trade prior to having any premium or overtime approved by the owner.
- C. The Owner reserves the right to audit the Contractor's statements of charges for premium or overtime work and each Contractor agrees to record these statements of charges in a manner to assist the Owner's audit.
- 45.3. All hours to be worked for which premium labor rates are to be paid shall be reported to the Owner at least forty-eight (48) hours in advance of the scheduled performance of the work. Written approval must be given by the Owner to the Contractor before such work is to be performed. This applies to all premium or overtime work whether scheduled by the Contractor, its Subcontractors, or requested by the Owner.
- Casual overtime, such as may be required to complete concrete placement and finishing, is the Contractor's responsibility and may be performed without prior notification to the Owner.
- 45.4. The Contractor must require all its Subcontractors to comply with the terms and conditions set forth in this Item 45.

46. CHANGES IN THE WORK

- 46.1. The Owner shall have the right at any time to require alterations in, additions to and deductions from the work shown on the Drawings or described in the Specification without rendering void the Contract. All changes in the work shall be completed within the time schedule set forth in the Contract.

When changes in the work are requested the Owner will furnish the Contractor with Bulletins and Drawings describing the change. The number of copies furnished will depend on the complexity of the change, but shall in no case exceed a total of ten (10) sets. The Contractor may request additional sets at the cost of reproduction.

All changes shall be described in an Emergency Field Order or Bulletin issued by the Owner. Receipt of Drawings or verbal orders shall not constitute authority to proceed with changes in the work. An Emergency Field Order authorizes the Contractor to proceed immediately with the work described therein with the price to be determined.

A BULLETIN IS A REQUEST FOR QUOTATION. The Contractor shall not proceed with the work described in the bulletin until the work is authorized by:

- A. An Emergency Field Order,
- B. Purchase Order Alteration, or
- C. Contract Change Order

46.2. PERCENTAGE FEES – CONTRACTOR

When authorized changes in the work are not covered by unit prices, the Contractor will be paid for completed work in place on the basis of Estimated Cost Plus Percentage Fees. The percentage fees for changes in the work performed by the Contractor's own forces shall be:

A. OVERHEAD AND PROFIT FOR LABOR AND MATERIALS/EQUIPMENT

The Overhead and Profit fee shall include but not be limited to:

- 1. Consumable materials, i.e. any item that is expendable (such as rags, rope, etc.) or replacement parts (such as abrasive wheels, dies, welding tips, etc.).
- 2. Tools and equipment with original cost of less than \$1,500.
- 3. Home and field office organization and expense, including but not limited to supervision and/or management not continuously employed at the site, and all taxes except sales/use or special taxes.
- 4. All components of Comprehensive General Liability Insurance including bodily injury and property damage liability unless project is covered by Owner controlled insurance program.

NOTE: Builders Risk Insurance is provided by Owner. See Section 23 "Property and Casualty Insurance (Builders Risk)"

This Overhead and Profit fee is paid once to the installing Contractor, being either the prime Contractor (Contract direct with Owner) or Subcontractor.

(a) Application to Labor Cost.

The Labor Overhead and Profit fee is applied to the sum of the base field labor rate and taxable fringes such as vacation pay, holiday pay and union dues. It is not applied to non-taxable fringes and the premium portion of overtime/shift time.

(b) Application to Material Cost.

The Material Overhead and Profit fee is applied to the net actual supplier price (including freight charges and taxes less sales/use tax) of plain/stock material and/or equipment delivered to site for field installation.

- B. **INSURANCE, TAXES AND FRINGE BENEFITS (LABOR ONLY)** – The percentage fee set forth in the Contract as the Contractor's fee for insurance, taxes, and fringe benefits applicable to labor only shall constitute all its charges, both direct and indirect, including but not limited to worker's compensation insurance, payroll taxes, vacation and travel allowances and health and welfare funds.
- C. **SALES/USE TAXES** – The percentage fee set forth in the Contract as the Contractor's fee for Sales/Use Tax shall consist of the actual amount of tax in force and shall be applied separately to the net cost of labor and materials except when such materials and/or labor are exempt from Sales/Use Tax as provided for in the bid documents.
- D. **HANDLING FEES** (work performed by other than the Contractor's own forces) – The percentage fee set forth in the Contract as the Contractor's handling fee shall apply to:
 - 1. Price approved by the Owner for changes in the work performed by Subcontractors,
 - 2. Cost of manufactured items of operating equipment, and

3. Cost of fabricated materials worked to a specific design required by the Drawings and Specification or for which shop drawings are required and the equipment or fabricated materials have been installed by the Contractor.

This fee shall constitute all the Contractor's charges for overhead and profit, including but not limited to; supervision, the services of its general office organization and field office expense. The handling fee shall not be applied to the cost of Owner furnished materials and equipment or to work performed on a unit price basis except for the unit prices established in assigned contracts.

Items declared exempt by the Owner shall be described in the Special Conditions section of the specification or contract documents (usually on or before the price is determined).

- E. OTHER – The percentage fees set forth in the Contract as "Other" percentage fees are fees peculiar to a particular project because of local laws or conditions.

F. PAYROLL TAXES AND WORKER'S COMPENSATION INSURANCE

The Payroll Taxes and Worker's Compensation fee is applied to the sum of base field labor rate and taxable fringes such as vacation and holiday pay and union dues. This fee is not applied to non-taxable fringes. It includes the following payroll taxes and Worker's Compensation Insurance:

1. Social Security (F.I.C.A.),
2. Federal Unemployment (F.U.T.A.),
3. State Unemployment (S.U.T.A.),
4. Special Tax such as Michigan Single Business Tax (MSBT), and
5. Worker's Compensation Insurance.

G. HANDLING FEE ON SUBCONTRACT WORK

The percentage fee payable to a Prime and/or Subcontractor is applied to the total subcontract price excluding unit priced work. The fee is cumulative. This percentage fee shall not be applied to material or equipment prices if the material or equipment is furnished by the Owner or an affiliate/subsidiary company of the prime Contractor or Subcontractor unless this relationship is a condition of the Contract award. For a Contractor to be paid this handling fee, the installing Subcontractor must be an approved Subcontractor as prescribed in Item 30. The handling fee includes the appropriate elements of Overhead and Profit as previously defined in 46.2 (A).

The Contractor requesting the handling fee is required to provide an itemized quote on company letterhead of each Subcontractor or Materialman.

H. OTHER RATES AND FEES

Construction Equipment Use Rate – The rate is paid once to the installing Contractor being the Prime Contractor (Contract direct with Owner) or Subcontractor.

The equipment use rate is applicable to large equipment where original cost is \$1,500 or more. This equipment may be rented or owned and may be any item or assembled group of parts (e.g. scaffolding, prefabricated form panel, etc.). If base contract on-site equipment is used to perform the change, then the agreed percentage of the "Rental Rate Blue Book" monthly equipment rental rates will be used to calculate the price. These monthly rates will be divided by 173 to obtain an hourly rate and increased to include the appropriate hourly operating cost where applicable (less operator). The rate includes any and all charges including sales/use tax.

Field Engineering – The hourly rate is applied to the additional hours required to provide new or to revise contract field layouts and surveys. The rate is applicable to changes not covered by unit prices. The rate includes any and all charges and fees.

Shop Work:

1. Drafting – The hourly rate is applied to the additional hours required to provide new or to revise contract shop drawings. The amount for drafting included in unit prices shall be deducted from the price. The rate includes any and all charges and fees.
2. Shop Labor – The hourly rate is applied to the total hours required to fabricate or assemble plain/stock material/equipment (not covered by unit prices) to the specific requirements of contract Drawings and Specifications. The rate includes any and all charges and fees.

Sales/Use Tax – The percentage fee is applied to the price of the net amount (taxable/non-exempt) for material/equipment including fabrication. The rate is as prescribed by state and local law in the state where the material/equipment is installed at the Owner's site.

46.3. PERCENTAGE FEES – SUBCONTRACTORS.

When authorized changes in the work are not covered by unit prices, Subcontractors will be paid for completed work in place on the basis of Estimated Cost Plus Percentage Fees.

The percentage fees for changes in the work to be performed by Subcontractors shall conform to the respective definitions and applications set forth above as fees for changes in the work performed by the Contractor's own forces. Percentage fees not included in the Contract shall be subject to approval by the Owner.

46.4. METHODS OF EVALUATION.

All quotations submitted by the Contractor for changes in the work shall be based on Unit Prices, Estimated Cost Plus Percentage Fees or a combination thereof, and shall be itemized in detail to facilitate checking by the Owner. The Owner may direct the Contractor to proceed on the basis of the Contractor's Cost Plus Percentage Fees. The Field Order/Bulletin Quotation summary GM Form #1784 must be used by Contractor when submitting a quotation. Each Bulletin or Field Order item number must be priced separately.

A. METHOD NO. 1 – UNIT PRICES

Unit prices, if stated in the Contract, shall govern for changes in the work required by the Drawings and Specification. Unit prices shall include all the Contractor's changes for work completed in place, including overhead and profit. Different unit prices for deducted work will not be accepted.

Unit prices apply to all phases and type of work required under the Contract. Contractor agrees no other charges will be made unless very special circumstances warrant their consideration, in which case the Contractor will submit the price with sufficient detail and adequate supporting documentation to facilitate checking by the Owner.

The Owner reserves the right in case of major changes in the work, defined as single change request for work added or deleted by contract unit prices impacting the original prime contract amount by more than \$100,000 or 5%, whichever is less, to disregard the application of these unit prices to the proposed work and to negotiate the price. The price will be negotiated in accordance with the Methods of Evaluation "Estimated Cost Plus Percentage Fees" or "Cost Plus Percentage Fees" methods of determining Contractor(s) compensation for Changes in the Work.

Unit prices govern for all additions to or deductions from the Contract. The unit prices will govern not only additions or deductions in connection with work covered by the accompanying Drawings and Specification, but also for other work located on the premises which is incidental to or necessary for the use of this building or buildings for which drawings and specifications may be later prepared.

Each unit price provides for any and all charges to furnish and install the described item, except for sales and/or use tax. Sales and/or use tax shall be applied by the Contractor to all items of the change request except items identified as personal property, qualified pollution control facilities, or qualified energy conversion or thermal efficiency improvement facilities.

B. METHOD NO. 2 – ESTIMATED COST PLUS PERCENTAGE FEES

1. The Contractor's quotations for changes in the work to be performed on an Estimated Cost Plus Percentage Fees basis shall be submitted within twenty-one (21) calendar days from the date of request for quotation unless otherwise stated in the request.
2. Each quotation shall be submitted in sufficient detail together with adequate supporting information to facilitate checking by the Owner as follows:
 - (a) Applicable unit price work.
 - (b) Estimated labor and material costs and expenses itemized to include:
 - (1) Labor performed by the Contractor's own forces including its superintendent and engineers continuously employed on the site.
 - (2) Material costs
 - (3) Transportation
 - (4) The use of tools or equipment having an original cost basis of more than \$1,500 per unit
 - (c) Applicable percentage fees set forth in the Contract.
 - (d) Subcontract work (including applicable Subcontract percentage fees).
 - (e) Manufactured items of operating equipment.
 - (f) Fabricated materials worked to a specific design required by the Drawings and Specification or for which shop drawings are required.

3. Where changes involve both additions and deductions, the estimated costs of the work added and deducted shall be balanced against each other and the Contractor's or Subcontractor's percentage fees shall be applied to the net result.
4. Should the Owner authorize the Contractor to proceed with changes in the work pending submission of a price based on Estimated Cost Plus Percentage Fees; the Contractor shall proceed, and shall require each of its Subcontractors to proceed, with the changes in the work on the basis of Cost Plus Percentage Fees until the Owner accepts the Contractor's Estimated Cost Plus Percentage Fees price for the work involved.

C. METHOD NO. 3 - COST PLUS PERCENTAGE FEES

1. The Owner may elect to have changes in the work performed on the basis of the Contractor's Cost Plus Percentage Fees. When so directed in writing by the Owner, the Contractor shall proceed, and shall require its Subcontractors to proceed, with changes in the work on this basis.
 - (a) Applicable percentage fees set forth in the Contract
 - (b) Labor costs shall include employees continuously employed at the site including the Contractor's Superintendent, and engineers based on the Wage Rates for each classification. Labor cost shall not include overhead and profit fee applied to insurance, taxes or non taxable fringe benefits. When required by trade agreement, travel time will be paid on a fixed rate basis.
 - (c) Material costs and expenses less all cash, trade and other discounts, itemized to include:
 - (1) Material costs.
 - (2) Transportation.
 - (3) The use of tools or equipment having an original cost basis of more than \$1,500.00 per unit.
 - (d) Subcontract work (including applicable Subcontractor percentage fees).
 - (e) Overtime work when applicable (if overtime work is involved in the change, payment therefore will be in accordance with Item 45 of these General Conditions).
 - (f) Manufactured items of operating equipment.
 - (g) Fabricated materials worked to a specific design required by the Drawings and Specification or for which shop drawings are required.
 - (h) Sums paid by the Contractor for royalties, permits and inspection fees.
2. Where changes in the work involve both additions and deductions, the cost of the added work shall be balanced against the estimated cost of the deleted work and the Contractor's or Subcontractors' percentage fees shall be applied to the net result.
3. Items of cost shall not include the expense of making good any damage to the work or premises and the removal and replacement of materials or work rejected or condemned by the Owner as failing to conform with the requirements of the Drawings and Specification.
4. The Owner reserves the right to audit as follows:

The Owner may audit and adjust the final Purchase Order price for discrepancies for any compensation amount included in the Contract/Purchase Order which was based on methods other than lump sum or fixed price.

Contractor must segregate its records in such a manner as to facilitate a complete audit and agrees that such audit may be pursued as the basis for settlement of charges against this Contract/Purchase Order.

The Contractor further agrees, for this purpose, to preserve all of the applicable documents for a period of not less than three (3) years after final payment or acceptance.

47. PROCEDURE FOR ALLEGED CHANGE IN COST

- 47.1. Should the Contractor perform any work or should it proceed in any manner which it may subsequently allege has caused it increased cost, damage or loss, purporting in each case to have acted upon verbal instruction or with tacit consent or acceptance or approval other than written from the Owner's Purchasing Department; the Contractor shall be held to have done so at its own peril and the Contractor shall have no claim against the Owner on account of the alleged increased cost, damage or loss.
- 47.2. The Contractor's Superintendent shall represent the Contractor on the site of the work and all directions given to this person shall be as binding as if given to the Contractor.
- 47.3. If the Contractor shall contend that such directions will result in an increase of the cost of the work, damage or loss; the Contractor shall, except in the situation of an emergency, notify the Owner's Purchasing Department in writing within four (4) days of the receipt of such directions. Contractor shall not proceed with the directions or with the work affected thereby until the Contractor has received, in writing, acknowledgment of the claim and instructions from the Owner's Purchasing Department. The Contractor shall comply with the written instructions, and unless the claim is finally disposed of by the acknowledgment and

instructions, compliance shall be without prejudice to the rights of the Contractor and Owner. In the event of an emergency, the Contractor shall proceed with the work necessary and shall keep accurate and complete records of the costs of the work, which records shall be presented to the Owner's Purchasing Department as soon as the emergency ceases to exist.

- 47.4. If the Contractor shall contend during the performance of the work, that the Contractor is entitled to payment from the Owner for increase in the cost of the work, damage or loss because of any action or omission of the Owner or others engaged by the Owner; the Contractor shall not delay its work on account thereof and shall, within seven (7) days after the first observance of the occurrence, notify the Owner's Purchasing Department, in writing, of the amount of its claim and all details in connection with its contention.
- 47.5. Within seven (7) days after receipt by the Owner's Purchasing Department of the Contractor's written notice of claim, the Owner's Purchasing Department shall, in writing, acknowledge receipt of the notice. At the time of this acknowledgment or within a reasonable time thereafter, the Owner's Purchasing Department shall certify or deny the validity of the Contractor's claim. The Contractor shall furnish all information requested by the Owner's Purchasing Department to assist them in making their decision.
- 47.6. It is a condition precedent to the consideration or prosecution of claims by the Contractor that the foregoing provisions be strictly observed in each instance, and if the Contractor fails to comply, the Contractor shall be deemed to have waived the claim. Neither the provisions of this Item 47 nor the acknowledgment of the receipt of any claim by the Owner's Purchasing Department shall constitute admission on the part of the Owner that any claim is valid.

48. PROGRESS SCHEDULE AND TIME OF COMPLETION

- 48.1. The Contractor shall start work as soon as notice to proceed is given by the Owner and carry the work to completion with utmost speed because, as to the Contractor's performance, time is of the essence.
- 48.2. The progress schedule shall be prepared in accordance with the "Critical Path Method" or other scheduling technique as may be approved by the Owner prior to award of a contract.
- 48.3. Within fourteen (14) calendar days of the notice to proceed, the Contractor shall submit to the Owner for approval a detailed incremental progress schedule for the work included in the Contract. This schedule shall reflect the Contract dates and include all construction activities such as detailing, shop fabrication, intervals from purchase to delivery of purchased items, field activity duration's, etc., and shall be sufficiently detailed to enable the Owner, at all times throughout the duration of the work, to compare actual with scheduled progress. This schedule when approved by the Owner shall be the approved schedule.
- 48.4. The Owner reserves the right to issue a written modification of the sequence of work set forth in the approved schedule.
- 48.5. In the event the Contractor fails to provide the incremental progress schedule within the time period stipulated, the Owner may establish and prepare the schedule at the expense of the Contractor. This schedule, when forwarded to the Contractor, shall be the approved schedule.
- 48.6. If the Contractor fails to maintain the approved schedule, or if the progress or performance of the work or the procedure employed in the work is such that, in the opinion of the Owner, the work will not be completed within the time or times stated in the Contract; the Contractor shall at its own expense, work overtime, additional shifts, Saturdays, Sundays and/or holidays, and/or hire additional employees, and revise or implement its construction procedures as may be necessary to restore adherence to the approved schedule.

The Contractor will be responsible for the handling of jurisdictional disputes or work stoppages which may arise during performance of the work. The Contractor shall promptly utilize available remedies to effect resumption of the work.

49. DELAYS AND EXTENSION OF TIME

- 49.1. Should the Contractor contend that it is entitled to an extension of time for completion of any portion of the work, the Contractor shall:
- A. Within forty-eight (48) hours of the occurrence of a delay, notify the Owner setting forth the cause for the delay, a description of the portions of work affected thereby and all pertinent details.
 - B. Within one week after cause for the delay has ceased to exist, submit written application to the Owner for the specific extension of time requested.
- 49.2. The Owner may grant an extension of time equivalent to the time lost as a direct result of a delay provided the completion of the work or the progress of any portion of the work has actually been delayed as a result of:
- A. Flood, cyclone, hurricane, tornado, earthquake or other similar catastrophe.
 - B. Other Acts of God, the public enemy or acts of government.
 - C. Fires, epidemics, quarantine restrictions, strikes, freight embargoes or other casualty for which the Contractor is not responsible.
 - D. Any acts or omissions of the Owner or others engaged by the Owner except as provided in Item 49.3.
- 49.3. No extension of time shall be granted for delays resulting from weather conditions except only for the catastrophic weather conditions mentioned in the preceding paragraph. Nor shall the Contractor be granted an extension of time for delays resulting from interruptions to or suspensions of this work to enable other Contractors to perform their work.

- 49.4. It is a condition precedent to the consideration or prosecution of any claim for an extension of time that the foregoing provisions be strictly adhered to in each instance. If the Contractor fails to comply, it shall be deemed to have waived the right to claim an extension of time.
- 49.5. The only remedy available to the Contractor shall be an extension of time. The Contractor agrees that, whether or not any delay shall be the basis for an extension of time, it shall have no claim against the Owner for:
- A. An increase in the Contract price.
 - B. A payment of allowance of any kind for damage, loss or expense resulting from delays.
 - C. Any damage, loss or expense resulting from interruptions to, or suspensions of, its work to enable other Contractors to perform their work.

50. SUSPENSION OF OPERATIONS

- 50.1. Upon receipt of written notice from the Owner and within the time stated therein, the Contractor shall suspend shipment and delivery of material and stop any part or all of the work and operations hereunder for the periods of time designated by the Owner in the notice. The Contractor shall immediately confer with the Owner relative to:
- A. Probable duration of the suspension or stoppage.
 - B. Delays and extensions of time resulting therefrom.
 - C. The reduction or elimination of the Contractor's field costs.
 - D. Prospective costs and expenses which may result directly from the suspension or stoppage; including but not limited to, the costs to the Contractor of complying with the Owner's directions relative to the preservation of the work in progress and the protection of existing facilities of materials and equipment on or in transit to the site.
- 50.2. Reimbursement to the Contractor shall be limited to its actual net costs and expenses, without any overhead or anticipated profit for incomplete work for items agreed upon between the Owner and Contractor. These costs and expenses shall be subject to audit by the Owner.
- 50.3. The Contractor shall have no further claim against the Owner for damage or loss resulting from suspension of operations.
- 50.4. The Owner may by further written notice, require the Contractor to promptly resume all or any part of the work and operations required by the resumption notice.

51. COMPLETION OF THE WORK

- 51.1. Should the Contractor, in the opinion of the Owner, at any time during the performance of the Contract; neglect or refuse to supply a sufficiency of properly skilled workmen or of materials of proper quality, fail in any respect to prosecute the work with promptness and diligence, fail to perform any terms and conditions of the Contract, become insolvent, file a voluntary petition of bankruptcy or be subject to an involuntary petition of bankruptcy; then the Owner may, after giving forty-eight (48) hours written notice to the Contractor, provide any necessary labor, materials or equipment required to assist the Contractor in the completion of the work and deduct the cost thereof from any monies due or thereafter due the Contractor under the Contract.
- 51.2. In the alternative, for the purpose of completing the work under the Contract, the Owner shall be at liberty to terminate the employment of the Contractor for the work and enter upon the premises and take possession of all materials, tools and equipment; and to employ any other person or persons necessary to finish the work on a fixed sum contract basis, cost plus percentage of cost, cost plus fixed fee basis or a combination thereof. In case of discontinuance of the employment of the Contractor, the Contractor shall not be entitled to receive any further payment under the Contract until the work is finished. If the unpaid balance of the amount to be paid under the Contract shall exceed the costs and expenses incurred by the Owner in finishing the work, the excess shall be paid by the Owner to the Contractor. If the costs and expenses shall exceed the unpaid balance of the Contract, the Contractor shall pay the difference to the Owner.

52. TERMINATION

- 52.1. The Owner reserves the right to terminate this Contract at any time. In such event the Contractor shall be paid to the date of termination for such portions of the work as the Contractor and its Subcontractors have completed and for materials which have been provided, fabricated or delivered, including reasonable expenses arising directly from the termination. No allowance shall be made for anticipated overhead and profit on that portion of the work not completed. This right to terminate shall be in addition to all other rights and remedies granted the Owner under the Contract.

53. ACCEPTANCE OF FACILITIES, SYSTEMS AND EQUIPMENT

- 53.1. Compliance with all requirements of the Drawings and Specification will be required prior to written acceptance of the work by the Owner. Acceptance will be in the form shown in Appendix E and may be submitted by the Contractor when in its opinion all requirements of the Drawings and Specification for its work have been met.
- 53.2. In cases of dispute as to the fulfillment of the requirements of the Drawings and Specification, the Contractor shall make all tests necessary to establish whether the completed work fulfills the requirements of the Drawings and Specification. The Contractor, if so directed in writing by the Owner, must engage an approved testing laboratory to perform such tests. The Contractor shall provide all labor, material and equipment necessary to perform the tests or assist the testing laboratory.

- A. If in the opinion of the Owner the test results indicate compliance with the requirements of the Drawings and Specification, the Owner will reimburse the Contractor for the costs incurred in the performance of the tests.
- B. If in the opinion of the Owner the test results indicate noncompliance with the requirements of the Drawings and Specification, the cost of the testing shall be borne by the Contractor and the Contractor shall immediately remove, replace, reconstruct or otherwise alter the work and secure compliance with the requirements of the Drawings and Specification at no additional cost to the Owner.

53.3. Final acceptance by the Owner shall also be subject to the Contractor furnishing at least the following:

- A. With the Owner's maintenance personnel the Contractor shall direct the checkout of utilities, operations of systems and equipment for readiness and assist Subcontractors and equipment suppliers in their startup and testing procedures in accordance with the Specification and manufacturers requirements.
- B. The Contractor shall be required to provide the Owner with three (3) complete sets of written instructions covering the proper operation and maintenance requirements of all equipment furnished under these Specifications. Contractor shall also furnish reproducible transparencies of all drawings.
- C. Instructions shall be contained in a hard cover type, three or more ringed binder and shall contain uniform sized instruction sheets. Instructions shall essentially consist of the following sections:
 - (1) Description of System
 - (2) Installation and Operating Instructions
 - (3) Maintenance Requirements for All Equipment
 - (4) Controls and Adjustments
 - (5) Parts Lists
 - (6) System Electrical Wiring Diagrams

Instruction sets must be submitted and accepted by the Owner prior to final payment

54. GUARANTEE

- 54.1. The guarantee period shall be for two (2) years unless a different period of time is expressly stated under any trade section of the Specification. No guarantee period shall begin until that portion of the work covered by the guarantee has been accepted in writing by the Owner.
- 54.2. The Contractor shall execute and deliver to the Owner, before final payment will be made, a written guarantee in the form shown in Appendix A, which provides that all labor and materials furnished and work performed by the Contractor are in accordance with the requirements of the Contract including all Contract Supplements thereto. Should any defect develop during the guarantee period due to improper materials, workmanship or arrangement; the defects shall, upon written notice, be made good by the Contractors without expense to the Owner.

The written guarantee by the Contractor is in addition to any guarantees, bonds or other stipulations required from Subcontractors under the various trade sections and shall cover all work under the Contract whether or not any portion or trade has been sublet.

- 54.3. The Contractor shall obtain from Subcontractors written guarantees in the form shown in Appendix B, covering their respective portions of the work for the periods specified, and deliver these to the Owner together with its own guarantee. These Subcontractor guarantees must be enforceable directly by the Owner.

55. AS-BUILT RECORDS

- 55.1. The Contractor shall keep an accurate record of "As-Built" conditions as the work progresses. Upon completion of the work, and prior to final payment by the Owner, the Contractor shall furnish to the Owner marked up drawings showing locations and elevations of all concealed work and recording any variations from working, engineering or shop drawings.

56. NON-DISCRIMINATION CLAUSES

- 56.1. It is the policy of General Motors Corporation to extend employment opportunities to qualified applicants and employees on an equal basis regardless of an individual's age, race, color, sex, religion or national origin. General Motors requests that its subcontractors, vendors and suppliers take appropriate action with respect to implementation of their own equal employment opportunity policies.
- 56.2. The Contractor shall comply and contractually require all Subcontractors to comply with the provisions and requirements set forth in the nondiscriminatory clauses (see Appendix F).

57. HAZARD COMMUNICATION PROGRAM

- 57.1. Under the federal Occupational Safety and Health Act and related laws and regulations, employers must develop a written hazardous communication program for employees, make available data supplied by manufacturers of chemicals used in the

work place, label all materials that qualify as hazardous chemicals and conduct chemical awareness training for employees. The Owner and Contractor also agree to the following terms and conditions:

- A. Owner and Contractor shall advise the other beforehand of hazardous chemicals to which employees may be exposed in the performance of this Contract. If during the performance of this Contract either one becomes aware of the presence of hazardous chemicals, each shall notify the other's designated safety representative and take whatever steps are necessary, if any, with the other to eliminate, terminate, abate or rectify the condition to protect people and their property from the hazard.
- B. Owner and Contractor agree to provide each other Material Safety Data Sheets (MSDS) for the hazardous chemicals referenced in Paragraph (A.) above using the Owner's form and related instructions. Prior to bringing chemical materials on to the Owner's premises, the Contractor shall submit fully completed MSDS's to the Owner. The Owner's Hazardous Material committee shall timely review the MSDS data and determine how the chemical will be used in each work area. If the chemical is not approved for use, the Contractor agrees to provide an acceptable substitute material without delaying the agreed completion time of construction.
- C. Appropriate warning labels, tags or marks must be attached to or be a part of each container of hazardous chemicals.
- D. The Owner, Contractor and its Subcontractors as employers shall provide appropriate training to their own employees. Safe Use Instruction sheets for hazardous chemicals shall be available for employees to review when requested.
- E. All containers of chemical materials used by the Contractor, including spent materials and unused material, must be removed by the Contractor from the Owner's premises, transported by Environmental Protection Agency-approved transporters when required, and disposed of in compliance with the Environmental Protection Agency rules and regulations including approved disposal sites.

Appropriate special insurance satisfactory to the Owner must be determined beforehand for: (1) the removal activities, (2) transporter, and (3) disposal sites.

The Contractor's removal, transportation, and disposal activities may be audited by the Owner to determine that the Owner is satisfied with the Contractor's action. Contractor acknowledges that such audit does not, in any way, modify, alter, or waive Contractor's duties or obligations under this Contract or under applicable law.

58. JOBSITE SAFETY

- 58.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions in connection with performing its work and that of its Subcontractors under this contract. In addition, the Contractor shall establish and fully enforce a written, project specific Jobsite Safety & Health Program.
- 58.2 A copy of the Jobsite Safety & Health Program shall be provided to the Owner prior to commencement of work and in sufficient time to allow for Owner review. The Jobsite Safety & Health Program shall apply to Contractor and all of its Subcontractors. Therefore, the one (1) Jobsite Safety & Health Program will include all requirements for work performed by the Contractor and its Subcontractors.
- 58.3 The Jobsite Safety & Health Program shall establish responsibility and authority for, among other items as appropriate, the following:
 - A. Designate the individual responsible for the implementation of the program.
 - B. Establish procedures for coordinating safety and health activities with other Contractors on the construction jobsite.
 - C. Specify procedures to ensure that Contractor's employees perform no construction work unless a designated Competent Person(s) is present on the construction jobsite. A Competent Person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authority to take prompt corrective measures to eliminate them.
 - D. Authorize supervisors, foremen, and Health and Safety coordinators to stop work that would place employees, equipment or property in imminent danger, and ensure that all unsafe conditions are corrected.

The following elements shall be included in the Jobsite Safety and Health Program:

- Statement of Contractor's commitment to providing a safe and healthful workplace for all employees.
- Statement that the Contractor shall have the ultimate responsibility for implementation of the Safety and Health Program.
- New-Hire safety and health orientation training at the time of the initial hire of each new employee.
- Periodic safety and health training meetings for each supervisor and employee.
- Specific assignment of responsibilities for jobsite safety and health inspections.
- At least daily inspections for the detection of hazardous conditions or hazardous work performance.
- Procedures for recording and reporting of incidents in accordance with OSHA requirements.

- Procedures for the investigation of job related accidents and illnesses to determine possible cause.
- Procedures to ensure the correction or abatement of all hazardous conditions, and to ensure compliance with the Contractor's Jobsite Safety and Health Program.
- Procedure to monitor the implementations of the Contractor's Jobsite Safety and Health Program.
- Monitoring procedure to determine that accident, injury and illness records are accurate and complete.
- Procedure to maintain all safety and health records required by OSHA, including appropriate safety and health record/logs.
- Procedure to provide each employee with a summary (preferably pocket-sized) of the Contractor's Jobsite Safety and Health Program.
- Specific designation of management person responsible for review of injuries and illness reports.
- An emergency response plan that sets forth the procedures to be followed upon the occurrence of serious injuries, fatalities, structural failures, or other emergencies, including procedures for the administration of first aid and/or other necessary medical treatment.
- A policy with procedures for disciplinary action for the enforcement of the Contractors Jobsite Safety and Health Program.

The program shall establish safe and healthful work practices to the extent that they apply to the work to be performed, including, but not limited to, each of the following:

- Blasting
- Compressed air and gases
- Concrete work
- Confined space
- First aid
- Floor, wall and roof openings
- Hand and power tools
- Hazard communication
- Housekeeping
- Ladders
- Lockout - Tagout
- Material handling
- Mechanized equipment
- Occupational health and environmental hazards
- Cranes
- Electrical hazards
- Excavation, trenching and shoring
- Fall protection
- Fire protection and prevention
- Personal protective equipment and clothing
- Respiratory protection
- Rigging and hoisting
- Scaffolds
- Signs, signals and barricades
- Substance Abuse Policy
- Welding and cutting
- and others as necessary to protect the safety and health of employees.

- 58.4. Contractor shall monitor the effectiveness of the Jobsite Safety and Health Program and take appropriate action to correct deficiencies, including the development of a procedure to address a particular hazard.

All Contractor's employees shall be responsible for complying with the established Contractor's Jobsite Health and Safety Program. Failure to follow the established Contractor's Jobsite Health and Safety Program will be basis for disciplinary action.

- 58.5. Contractor shall provide periodic reports, as directed by Owner, that address the effectiveness of the Jobsite Safety and Health Program.

- 58.6. Contractor shall establish an internal permit system to specifically authorize work to proceed, where appropriate and with proper caution, under conditions recognized to be hazardous.

- 58.7. Contractor shall be responsible for the safety and health training of its employees. Employees assigned to supervisory positions shall be trained to carry out the safety and health responsibilities of the positions to which they are assigned.

Training in safety and health requirements shall be provided to each non-supervisory working employee. Training programs of the following types should be utilized:

- New-Hire Orientation
- Job-Specific Training

- Site-Specific Training
- Safety Conditions

58.8. Alcoholic beverages and controlled substances are not allowed on the Owner's premises at any time.

59. TITLE AND RISK OF LOSS

The risk of loss and all other incidents of ownership of materials removed by Contractor for disposal or of salvaged materials specified to become the property of Contractor, shall pass from Owner to Contractor at the time of removal by the contractor from its fixed position.

60. RIGHT TO AUDIT

The Owner reserves the right to audit and adjust the final Purchase Order price for discrepancies for any compensation amount included in Contract/Purchase Order which was based on methods other than lump sum or fixed price. Contractor must segregate its records in such a manner as to facilitate a complete audit and agrees that such audit may be used as the basis for settlement of charges against this Contract/Purchase Order. Contractor further agrees, for this purpose to preserve all such documents for a period of three (3) years after final payment or acceptance.

APPENDIX A
CONTRACTOR'S GUARANTEE

Date: _____

To All Whom It May Concern:

_____ of the City/Town of _____, County of _____ and State of _____, being duly sworn, deposes and says that he or she is _____ of _____ (hereinafter called the Contractor); and, being duly authorized, makes this statement and guarantee on its behalf; that the Contractor, in completing the performance of a certain contract dated _____ with GM _____ (hereinafter called the Owner) for _____ (the Work) specified as Job No. _____, furnished labor or materials or both, supervision of construction or alterations and/or otherwise, in connection with the site development, remediation and/or the erection and construction of a certain building or buildings, structures and installations, situated on the following property, viz: GM _____, in the City/Town of _____, County of _____, and State of _____; that, for a valuable consideration paid to the Contractor therefor, receipt whereof is hereby confessed and acknowledged, the Contractor does hereby guarantee to the Owner that all labor and materials or both and all work performed is in accordance with the requirements of said Contract and all authorized Supplements thereto; that should any defect develop during the guarantee periods for certain trades or work, as stated herein, due to improper materials, workmanship or arrangements; the same will, upon written notice from the Owner, promptly be made good by the Contractor without expense to the Owner, and that any other work affected in correcting such defects will also be made good by the Contractor without expense to the Owner.

TRADE OR WORK	GUARANTEE FROM	GUARANTEE TO
_____	_____	_____
_____	_____	_____
_____	_____	_____

CONTRACTOR

By: _____
(Signature)

Name: _____
(Print or Type)

APPENDIX B

SUBCONTRACTOR'S GUARANTEE

Date: _____

To All Whom It May Concern:

_____ of the City/Town of _____

County of _____ and State of _____

_____, being duly sworn, deposes and says that he or she is _____

_____ of _____ (hereinafter called the Subcontractor);

and, being duly authorized, makes this statement and guarantee on its behalf; that the Subcontractor, in completing the performance of a certain contract agreement with _____

_____ (hereinafter called the Contractor) for _____

_____ (the Work) required by the Drawings and Specifications (Job

No.) _____, furnished labor or materials or both, supervision of construction or

alterations and/or otherwise, in connection with the site development, remediation and/or the erection and

construction of a certain building or buildings, structures and installations, situated on the following

property, viz: _____, in the City/Town of _____

County of _____, and State of _____; that, for a valuable

consideration paid to the Subcontractor therefor, receipt whereof is hereby confessed and acknowledged,

the Subcontractor does hereby guarantee to the Owner and to the Contractor that all labor or materials or

both furnished and/or work performed is in accordance with the requirements of said Drawings and

Specifications and all authorized alterations and additions thereto; that should any defect develop during

the guarantee periods for certain trades or work, as stated herein, due to improper materials,

workmanship or arrangements; the same will, upon written notice from the Owner or the Contractor,

promptly be made good by the Contractor without expense to the Owner or the Contractor, and that any

other work affected in correcting such defects will also be made good by the Contractor without expense

to the Owner or the Contractor.

TRADE OR WORK

GUARANTEE FROM

GUARANTEE TO

SUBCONTRACTOR

By: _____
(Signature)

Name: _____
(Print or Type)

APPENDIX C

RECEIPT FOR SALVAGED MATERIAL OR EQUIPMENT

CONTRACTOR IDENTIFICATION NAME _____ DIVISION _____
ADDRESS _____ PROJECT LOCATION _____
JOB NO. _____
TELEPHONE NO. _____

SPECIFICATION REQUIREMENT:

GENERAL CONDITIONS - ITEM 39.2B
SPECIAL CONDITIONS - _____
TRADE SPECIFICATION - _____

DESCRIPTION OF MATERIALS AND/OR EQUIPMENT (INCLUDING QUANTITY AND PHYSICAL CONDITION):

STORAGE AREA DESIGNATED BY OWNER:

AREA WHERE ACTUALLY STORED:

QUANTITY & STORAGE APPROVED
OWNER'S REPRESENTATIVE

By: _____
(Signature)

(Date)

Name: _____
(Print or Type)

APPENDIX D

RECEIVING REPORT FOR MATERIALS AND EQUIPMENT FURNISHED BY THE OWNER

CONTRACTOR IDENTIFICATION NAME ADDRESS DIVISION PROJECT LOCATION JOB NO. TELEPHONE NO.

SPECIFICATION REQUIREMENT:

GENERAL CONDITIONS (Item 39.2)

SPECIAL CONDITIONS

TRADE SPECIFICATION

DESCRIPTION OF MATERIALS AND/OR EQUIPMENT (INCLUDING QUANTITY AND PHYSICAL CONDITION):

STORAGE AREA DESIGNATED BY OWNER:

CERTIFIED FOR CONTRACTOR

QUALITY AND CONDITION ACKNOWLEDGED FOR OWNER

By: (Signature)

By: (Signature)

Name: (Print or Type)

Name: (Print or Type)

Date:

Date:

APPENDIX E

FACILITIES, SYSTEMS AND EQUIPMENT ACCEPTANCE

Date _____
Division _____
Project Location _____
Job No. _____
Specification
Section No. _____

The requirements of the Drawings and Specifications for the above mentioned Project have been completed by (Name of Contractor) _____ to the satisfaction of the Owner with the exception of the items written below. This acceptance shall not be construed as a waiver by the Owner of the right to insist upon strict compliance with the requirements of the Drawings and Specification in the event of subsequently discovered items of non-compliance.

Exceptions:

The following items are considered in non-compliance with the requirements of the Drawings and Specification.

- ☐ THE ENTIRE WORK (RESUBMIT)
☐ THE ITEMS WRITTEN BELOW (RESUBMIT)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

- ☐ NO EXCEPTIONS

Signed: _____
Owner's Engineer

APPENDIX F

NON-DISCRIMINATION CLAUSES

A. EQUAL OPPORTUNITY CLAUSE

All provisions of 41 CFR 60-1.4, as amended, pertaining to Equal Opportunity, are hereby incorporated by reference.

B. CERTIFICATION OF NON-SEGREGATED FACILITIES

The Contractor or Subcontractor (hereinafter Contractor) certifies that facilities are provided for employees in such a manner that segregation on the basis of race, color religion, or national origin cannot result; that such segregated use will not be required by written or oral policies, nor will the Contractor tolerate such use by employee custom. The Contractor will insure that its employees are not assigned to perform their services at any location under its control, where the facilities are segregated. The term "facilities" as used herein includes waiting rooms, work areas, restaurants, and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing area, parking lots, drinking fountains, recreation or entertainment area, transportation and housing facilities providing for employees.

C. AFFIRMATIVE ACTION COMPLIANCE PROGRAM CERTIFICATION

The Contractor or Subcontractor certifies that it has developed and presently has in full force and effect a written affirmative action compliance program in accordance with the requirements set forth in Title 41, Part 60-1- Obligations of Contractors and Subcontractor, Section 60-1.40, of the Code of Federal Regulations, effective July 1, 1968, as amended.

D. AFFIRMATIVE ACTION CLAUSES

- 1) All provisions of 41 CRF 60-250, as amended, pertaining to Affirmative Action for Disabled Veterans and for Veterans of the Vietnam Era are hereby incorporated by reference where this contract is for \$10,000 or more.
- 2) All provisions of 41 CRF 60-741, as amended, pertaining to Affirmative Action for Handicapped Workers are hereby incorporated by reference where this contract is for \$2,500 or more.

E. EEO INFORMATION REPORT CERTIFICATION

The Contractor or Subcontractor certifies that E.E.O.-1, Standard Form 100 promulgated jointly by the Office of Federal Contract Compliance and the Equal Employment Opportunity Commission has been and is being filed in accordance with the requirements set forth in Title 41, Part 60-1 effective July 1, 1968, as amended.

APPENDIX G

NOTARIZED SWORN STATEMENT ALL STATES EXCEPT MICHIGAN

Company Name: _____ State of: _____

Payment Application No. _____ Payment Amount Requested: \$ _____

GM Division/Unit: _____ Project Location: _____ (Name - City - State)

Contract Identification: _____

Company Role (Check One):

_____ Prime Contractor	_____ Construction Manager	_____ Subcontractor
_____ Materialman	_____ Laborer	_____ Consultant
_____ Architect/Engineer	_____ Other	

Description of Work: _____

The undersigned company requests payment for work performed under this contract and agrees all funds received will be applied to the company's obligations to its subcontractors, laborers and materialmen as set forth on the attachment to this sworn statement and the company's services which may also include others at various tiers. Laborers shall be listed only when amounts due to them or for them are past due. The stated amount of these funds also corresponds to the work completed as itemized on the attachment for the contract price, change orders or field order prices.

The undersigned company also agrees to provide:

A: Progress Payments

1. Submits with next payment application, partial waivers of lien for the accumulated amount paid completed by subcontractors/materialmen/material suppliers stated on this sworn statement's attachment.
2. Submit sworn statement completed by a subcontractor or materialmen/material supplied when the contract amount is disputed.

B: Final Payment or Single Payment

1. _____ date last worked or materials/equipment furnished.
2. Submit a final waiver of lien and release of all claims completed by the subcontractors, materialmen/material supplier and lien claimants as set forth on the attachment to this sworn statement.
3. Submit contract forms acknowledging contractor's and each subcontractor's guarantee/warranty, acceptance of contractor's work, as-built records and other required documentation.

This work has been provided for physical improvements to the real property of the owner/lessee accurately described in the recorded legal description whose address is:

Address: _____

City: _____ State: _____ County: _____

COMPANY'S REPRESENTATIVE: _____
Name (Print or Type) Signature

SUBSCRIBED, SWORN TO AND ACKNOWLEDGED BEFORE ME THIS _____ DAY OF _____ 19____

NOTARY PUBLIC NAME: _____
Name (Print or Type) Signature

Commission Expires _____, 19____. County: _____ State: _____

APPENDIX G
NOTARIZED SWORN STATEMENT
CONTRACTOR/SUPPLIER PAYMENT SUMMARY
(Page 2 of 2)

Laborer Wages or Fringe Benefit Contributions and Withholdings (due and unpaid) Supplementary Schedule Attached: Yes____ No____

Name of Company requesting payment: _____ Date: _____

[illegible]

The amount declared in Column Five above for payment includes amounts due and unpaid for laborer wages, fringe benefit contributions and withholdings declared on the attached schedule. Amounts should be rounded to nearest dollar (down, under \$.49)

APPENDIX H

PARTIAL WAIVER OF LIEN
ALL STATES EXCEPT MICHIGAN

Owner's/Lessee's Contract _____ Identification _____ Date _____

Owner's/Lessee's Business Unit - Name _____

Premises Location - Name/Address _____

Premises Location - County/State _____

Party Waiving Lien - Name _____

Address _____

Role {Check One}:

_____ Prime Contractor	_____ Construction Manager	_____ Subcontractor
_____ Materialman	_____ Laborer	_____ Consultant
_____ Architect/Engineer	_____ Other _____	

Payment received from - Name _____

Description of Services _____

Accumulated Payment Amount \$ _____

The undersigned, being duly authorized by the party waiving the lien, acknowledges receipt of the stated accumulated payment amount as consideration and satisfaction for furnishing material, labor or services for construction of the named premises location and by signing this partial waiver of lien does waive, surrender and release any and all lien, claim or right of lien (asserted or unasserted) to the date of this Waiver of Lien.

The undersigned covenants that any and all documents requested by the Owner/Lessee to effectuate this partial waiver of lien shall be executed.

AUTHORIZED PERSON

Signature _____
Name (Print or Type) _____
Capacity (Print or Type) _____
Date _____

#1. Original- Records of Owner/Lessee

#2 Copy - Records of _____

#3 Copy - Records of _____

APPENDIX I
FINAL WAIVER OF LIEN & RELEASE OF ALL CLAIMS
ALL STATES EXCEPT MICHIGAN

Owner's/Lessee's Contract _____ Identification _____ Date _____

Owner's/Lessee's Business Unit - Name _____

Premises Location - Name/Address _____

Premises Location - County/State _____

Party Waiving/Releasing - Name _____

Address _____

Role {Check One}:

_____ Prime Contractor	_____ Construction Manager	_____ Subcontractor
_____ Materialman	_____ Laborer	_____ Consultant
_____ Architect/Engineer	_____ Other _____	

Payment received from - Name _____

Description of Services _____

Full & Final Payment Amount \$ _____

The undersigned, being duly authorized by the party to waive the lien and release all claims, acknowledges receipt of the stated full and final payment amount as consideration and satisfaction for furnishing material, labor or services for construction of the named premises location. Also by signing this final waiver of lien and release of all claims, it is agreed to waive, surrender and release any and all lien, claim or right of lien (asserted or unasserted) including any claim for additional costs and expenses directly or indirectly attributable to our contract.

The undersigned covenants that any and all documents requested by the Owner/Lessee to effectuate this partial waiver of lien shall be executed.

AUTHORIZED PERSON

Signature _____
Name (Print or Type) _____
Capacity (Print or Type) _____
Date _____

#1 Original - Records of Owner/Lessee
#2 Copy - Records of _____
#3 Copy - Records of _____

APPENDIX J
INSURANCE REQUIREMENTS (1)
CHART A (Page 1 of 2)
(Dollars in Thousands)

WORK DESCRIPTION	General Liability (2) & (3)	Automotive Liability (2) & (4)	Worker's Comp. Employers' Liability (5)	Contractor Pollution Liability (2) & (6)	Pollution Legal Liability (7)	Aviation Liability (2)
A. All construction managers or general contractors acting as a Construction Manager not involved with hazardous waste, hazardous material.	5,000	5,000	Statutory \$250/250/250 or \$100/500/100	N/A	N/A	(12)
B. All contractors and transporters not involved with hazardous waste, hazardous material or asbestos.	1,000	1,000	Statutory 250/250/250 or 100/500/100	N/A	N/A	(12)
C. All contractors who treat or store hazardous waste on GM property but do not transport hazardous waste or hazardous material.	5,000	1,000	Statutory 250/250/250 or 100/500/100	1,000/2,000	N/A	(12)
D. All contractors who either transport hazardous material to GM property or transport hazardous waste either on or off GM property.	5,000	5,000(8)	Statutory 250/250/250 or 100/500/100	N/A	1,000/2,000 (9)	(12)
E. All contractors who do not transport hazardous waste or hazardous hazardous material but do treat, store, or dispose of hazardous waste off GM property.	5,000	1,000	Statutory 250/250/250 or 100/500/100	N/A	1,000/2,000 (10) or 4,000/8,000	(12)
F. All contractors who handle hazardous waste on GM property, transport off GM property and treat, store or dispose of hazardous waste off GM property.	5,000	5,000(8)	Statutory 250/250/250 or 100/500/100	1,000/2,000	1,000/2,000 (10) or 4,000/8,000	(12)
G. All asbestos contractors who do not transport asbestos.	1,000/5,000(11)	1,000	Statutory 250/250/250 or 100/500/100	N/A	N/A	(12)
H. All asbestos contractors who transport asbestos off GM property.	1,000/5,000(11)	5,000(8)	Statutory 250/250/250 or 100/500/100	N/A	N/A	(12)
I. All contractors involved in blasting and not involved with hazardous waste, hazardous material or asbestos.	10,000	1,000	Statutory 250/250/250 or 100/500/100	N/A	N/A	(12)

PAGE 2 OF CHART A IDENTIFIES ADDITIONAL REQUIREMENTS AND INFORMATION ASSOCIATED WITH LISTED FOOTNOTES.

APPENDIX J
INSURANCE REQUIREMENTS
CHART A (Page 2 of 2)

In the event of a conflict between coverages and limits referenced herein and any governing regulations, the more stringent requirements shall apply.

Certificate(s) of Insurance must be in a form acceptable to Owner, underwritten by Insurance company(ies) satisfactory to Owner and licensed to do business in the state of operation where the work is to be performed. The purchase of appropriate Insurance coverage by Contractor or the furnishing of the certificate(s) of insurance shall not limit or release the Contractor from its respective obligations or liabilities under this contract. All policies of Insurance maintained by Contractor shall be primary to any coverage that may be available to Owner.

- (1) Limits shown are per occurrence minimum limits of coverage except as may be noted otherwise. All policies of Insurance shall be endorsed to provide Owner with written notice thirty (30) days prior to cancellation, modification, or material change to any policy. If professional services are provided under the contract then Professional Liability Insurance of \$5 million is required and must not include a pollution exclusion if the professional services are related to environmental work.
- (2) GM must be named as additional Insured.
- (3) All Commercial (Broad Form Comprehensive) General Liability policies must include products, completed operations (maintained for period of two years from final acceptance of the work by the Owner); and contractual liability coverage. Per occurrence limits shown are combined single limits for personal injury and property damage. All general liability annual aggregate limits of coverage must be at least equivalent to the per occurrence limits shown, except as noted otherwise. All general liability policies (with the exceptions of Work Description C, D, E, and F of Page 1) must be written on an occurrence policy form.
- (4) All Automobile Liability policies must include coverage for owned, hired, and non-owned vehicles. Per occurrence limits shown are combined single limits for bodily injury and property damage.
- (5) All states endorsement is required if performing work outside of home office state.
- (6) Contractor Pollution Liability policy must be endorsed to provide coverage for all services performed by Contract on behalf of Owner.
- (7) Pollution Legal Liability coverage must be maintained for the Contractor's sites being utilized for the work under this contract.
- (8) Automobile liability policy must include Environmental Restoration coverage (MCS-90 Endorsement) at statutory required limits.
- (9) Required if Contractor stores hazardous waste for more than ten (10) days.
- (10) Under the Federal Resource Conservation and Recovery Act (RCRA), hazardous waste treatment, storage and disposal facilities must maintain liability coverage for sudden and accidental pollution incidents at limits at least \$1 million per occurrence, with an annual aggregate of at least \$2 million. Owners and operators of surface impoundment, landfill or land treatment facilities must additionally maintain liability coverage for gradual (non-sudden) pollution incidents of at least \$3 million per occurrence, with an annual aggregate of at least \$6 million. Policies, that is, policies combining coverage for both sudden and accidental and gradual (non-sudden) occurrences, must be at least \$4 million per occurrence (\$1 million sudden plus \$3 million non-sudden and \$8 million annual aggregate (\$2 million sudden plus \$6 million non-sudden)).
- (11) Commercial (Broad Form Comprehensive) General Liability policy must be written on an occurrence basis (without a sunset clause) and include asbestos abatement liability coverage.
- (12) Required limit of aviation liability coverage if \$5 million per occurrence if Contractor utilized aircraft service of any type.

General Motors Corporation CHANGES IN THE WORK

Overhead and Profit / Handling Fees

GM1781

PERFORMING CONTRACTOR _____
PROJECT _____
GM UNIT _____ SITE LOC. _____

DATE _____
OWNER JOB NO. _____
A/E JOB NO. _____

THE FOLLOWING RATES AND FEES ARE TO INCLUDE ALL ELEMENTS OF COST AS DEFINED IN THE CONSTRUCTION GENERAL CONDITIONS, GM1638 - ARTICLE 46, AND WILL BE APPLIED TO WORK ADDED TO, OR DELETED FROM, THE BASE CONTRACT:

ITEM DESCRIPTION	PRIME CONTRACT WORK	Sub-trades: e.g. Architectural, Mechanical, Electrical, etc.			
		SUB-TRADE 1.	SUB-TRADE 2.	SUB-TRADE 3.	SUB-TRADE 4.
1. FIELD LABOR Overhead and Profit - Applied to the sum of base field labor rate & taxable fringes (Line C on GM1783)*	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%
2. MATERIALS Overhead and Profit - Applied to net actual supplier price, including freight charges and taxes, less sales/use tax	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%
3. SUBCONTRACT WORK Handling Fee - Applied to approved subcontractors' total quoted price for Non- Unit Price Work, excluding overtime and shift work premium	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%
4. FIELD LABOR Payroll Taxes & Workers' Compensation - Applied to the sum of base field labor rate and taxable fringes. (Line C on GM 1783)*	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%	<u>ADD / DEDUCT</u> ____% ____%

* GM 1783 is a Hourly Field Labor Rate computation sheet to assist in applying the fees according to the GM terms and conditions.

(Rev 8/92)

General Motors Corporation CHANGES IN THE WORK

Other Rates and Fees

GM1782

PERFORMING CONTRACTOR _____
PROJECT _____
GM UNIT _____ SITE LOC. _____

DATE _____
OWNER JOB NO. _____
A/E JOB NO. _____

THE FOLLOWING RATES AND FEES ARE TO INCLUDE ALL ELEMENTS OF COST, OVERHEAD AND PROFIT AS DEFINED IN THE CONSTRUCTION GENERAL CONDITIONS, GM1638 - ARTICLE 46:

1.	<u>CONSTRUCTION EQUIPMENT</u> Provide a percentage of the monthly rental rate contained in the <i>Rental Rate Blue Book</i> that will be used to calculate the charge for all rented or owned, base contract on-site equipment, either rented or owned. This percentage is to include all markups; see GM1638, Sect. 46.2 (H).	_____%
2.	<u>FIELD ENGINEERING</u> Layout/Survey Hourly Rate for Field Engineering Services not covered by Unit Price.	_____/hr
3.	<u>SHOP WORK</u> A. Drafting Hourly Rate for services not covered by Unit Price. B. Shop Labor Hourly Rate for services not covered by Unit Price.	_____/hr _____/hr
4.	<u>SALES/USE TAX</u> State/Local Sales Tax, applied for non-exempt material.	_____%

NOTE: ABOVE PERCENTAGES AND RATES ARE TO INCLUDE ALL MARK-UPS

(Rev. 4/91)

General Motors Corporation CHANGES IN THE WORK

Hourly Field Labor

GM1783

PERFORMING CONTRACTOR _____	DATE _____
PROJECT _____	OWNER JOB NO. _____
GM UNIT _____	A/E JOB NO. _____
LOCAL UNION NO. _____	N.M.A. (Yes/No) _____
CRAFT/TRADE _____	O.C.I.P. (Yes/No) _____
WORKERS COMP. CLASS CODE _____	DATE WAGE EXPIRES _____
SITE LOC. _____	
TELEPHONE () _____	
CLASSIFICATION _____	

NOTE: The contractor is required to complete one GM1783 for each craft/trade/classification employed continuously at the site.

	STRAIGHT TIME	ADDED FOR 1½ TIME	ADDED FOR DOUBLE TIME
(A) TAXABLE BASE RATE	\$ _____	\$ _____	\$ _____
TAXABLE FRINGES		If Permitted by Trade Agreement	If Permitted by Trade Agreement
Vacation/Holiday \$ _____/Hr		\$ _____	\$ _____
Union Dues _____/Hr		_____	_____
Other (specify) _____/Hr		_____	_____
Other (specify) _____/Hr		_____	_____
(B) Total Taxable Fringes	\$ _____	\$ _____	\$ _____
(C) TOTAL TAXABLE WAGE (A+B)	\$ _____	\$ _____	\$ _____
NON-TAXABLE FRINGES		If Permitted by Trade Agreement	If Permitted by Trade Agreement
Health & Welfare \$ _____/Hr		\$ _____	\$ _____
Pension _____/Hr		_____	_____
All Others _____/Hr		_____	_____
(D) Total Non-Taxable Fringes	\$ _____	\$ _____	\$ _____
(E) TOTAL TRADE AGREEMENT RATE (C+D)	\$ _____	\$ _____	\$ _____
PAYROLL TAXES & WORKERS' COMPENSATION			
F.I.C.A. _____%			
F.U.T.A. _____%			
S.U.T.A. _____%			
Special (specify) _____%			
Subtotal _____% x (C) for 1½ or DbITime Adder		\$ _____	\$ _____
Adder		EXCLUDES WORKERS' COMP.	
Workers' Comp. _____%			
(F) Total _____% x (C) Straight Time	\$ _____	EXCLUDES OVERHEAD & PROFIT	
OVERHEAD AND PROFIT (Same as submitted on GM1781; includes General Liability Insurance)			
(G) _____% x (C) Total Taxable Wage	\$ _____		
TOTAL - HOURLY FIELD LABOR RATE (E+F+G)	\$ _____	\$ _____	\$ _____

NOTICE OF COMMENCEMENT

**GM Form 1650
Dated (06-82)
Michigan Only**

State of Michigan

County of _____

Pursuant to the requirements of the Michigan Construction Lien Act No. 497, Public Acts 1980, as amended, Section 108, the undersigned being duly sworn, deposes and says to lien claimants and subsequent purchasers:

Take notice that work is about to commence on an improvement to the real property described in this instrument. A person having a construction lien may preserve the lien by providing a Notice of Furnishing to the designee named herein and General Contractor, if any, and by timely recording a claim of lien in accordance with law.

A person having a construction lien arising by virtue of work performed on this improvement should refer to the name of the owner or lessee and the legal description appearing in this Notice. A person subsequently acquiring an interest in the land described is not required to be named in a claim of lien.

A copy of this Notice with an attached form for Notice of Furnishing may be obtained upon making a written request by certified mail to the person with whom you have contracted or the named owner, lessee or the designee.

The following parties are set forth pursuant to statute:

A. Owner/Lessee of real property contracting for the improvement:

NAME: _____
ADDRESS: _____
CAPACITY (indicate whether Owner or Lessee): _____

B. Fee owner of the real property:

NAME: _____
ADDRESS: _____

C. Designee:

CAPACITY: CHIEF FINANCIAL OFFICER (Title Only) _____
NAME: GENERAL MOTORS CORPORATION - _____
Division/Unit
ADDRESS: _____

D. General Contractor (if any): (see Notice of Furnishing provided by Owner/Lessee)

The legal description of the real property on which the improvement is to be made is:

(SEE ATTACHED EXHIBIT - "PROPERTY LEGAL DESCRIPTION" CONSISTING OF ____ PAGES)

This instrument was prepared by _____ who verifies the truth and accuracy of the statements and contents of this Notice of Commencement and whose address is _____

SIGNATURE: _____ DATE: _____ 19

NAME: _____ CAPACITY: _____
(Print or Type) (Print or Type)

Subscribed, sworn to and acknowledged before me this _____ day of _____ 19

NOTARY PUBLIC NAME: _____
(Print or Type) (Signature)

My Commission Expires: _____, 19 _____ County, Michigan

NOTICE OF FURNISHING

GM FORM 1651
Dated (06-82) Rev.
Michigan only

Division/Unit: *

Location* _____

Division/Unit must complete
identification information marked
with an asterisk*

Contract Identification *

Subcontractor To Contractor/General Contractor (preferred):

NAME: * _____

ADDRESS * _____

Subcontractor To Designee (optional):

NAME: * _____

ADDRESS * _____

Please take notice that the undersigned is furnishing to:

NAME: _____

ADDRESS: _____

certain labor and/or material for my contract described
as _____

(description of labor or materials supplied)

\$ _____ in connection with the improvement to the real property described in the
Notice
(contract price)

of Commencement recorded in Liber * _____ on pages * _____ through * _____
County records, or as more particularly described in the attached recorded copy of the Notice of
Commencement.

**WARNING TO THE OWNER: THIS NOTICE IS REQUIRED BY THE MICHIGAN
CONSTRUCTION LIEN ACT. IF YOU HAVE ANY
QUESTIONS ABOUT YOUR RIGHTS AND DUTIES
UNDER THIS ACT, YOU SHOULD CONTACT AN
ATTORNEY TO PROTECT YOU FROM THE
POSSIBILITY OF PAYING TWICE FOR THE
IMPROVEMENTS TO YOUR PROPERTY.**

LIEN CLAIMANT NAME: _____

ADDRESS: _____

BY: _____
(Signature of Authorized Person) (Capacity)

NAME: _____
(Print or Type)

DATE:

TELEPHONE: _____
(Area Code - Number)

For contract identification, the lien claimant should attach a copy of this Notice of Furnishing and
proof of service with a Claim of Lien.

**NOTARIZED SWORN STATEMENT
CONTRACTOR/SUPPLIER PAYMENT SUMMARY**

Owner Project # _____ Division/Unit: * _____ Purchase Order
No. * _____

Location: * _____

_____	Name	City	State
Contractor			
Name	_____		

(Deponent's Name) _____, being duly sworn, deposes and says that being duly authorized makes this statement on behalf of the Contractor who has contracted to make actual physical improvement to the real property described in the Notice of Commencement recorded in Liber # _____, Pages _____ through _____ County, Michigan records; that this is a complete statement by the Contractor including a listing of the subcontractors, suppliers or laborers with whom the Contractor, has contracted or committed for furnishing of labor and/or materials in connection with the Owner's contract, the amounts due them as set forth fully and correctly opposite their names.

That the Contractor has not procured material from or subcontracted with any person other than those set forth on the reverse side or the attached supplementary schedule and owes no money for the improvement other than the sums opposite the persons' names, and that the Contractor shall indemnify, defend and hold General Motors Corporation harmless from and against all costs, liabilities, expenses and damages including court costs and attorney's fees arising out of or resulting from any claim(s) for work performed for, or material provided to the Contractor, by subcontractor(s), supplier(s) or laborer(s) who are not listed on the reverse side claiming by or through or under Contractor for use by Contractor in the construction project and work described in this Sworn Statement including equitable, legal, contract, construction lien and builders trust fund claims. Further Deponent also states that the amount of payment requested will be applied to satisfy the Contractor's specified obligations to subcontractors, suppliers or laborers if such obligations have not been satisfied previously.

Deponent also declares all laborers have been paid in full except for claims of construction liens by laborers which may be provided pursuant to Sec. 109 of the Construction Lien Act, Act No. 497 of the Public Acts of 1980, as amended, being Section 570.1109 of the Michigan Compiled Laws.

Deponent further says that he or she is duly authorized to make this statement for the Contractor for the purpose of representing to the Owner of the described premises and its agents that the described property is free from claims of construction liens or the possibility of construction liens except as specifically set forth and except for claims of construction liens by laborers which may be provided pursuant to Section 109 of the Construction Lien Act, Act. No. 497 of the Public Acts 1980, as amended, being Section 570.109 of the Michigan Compiled Laws.

(*Data From Notice of Furnishing)

WARNING TO OWNER: AN OWNER OR LESSEE OF THE ABOVE DESCRIBED PROPERTY MAY NOT RELY ON THIS SWORN STATEMENT TO AVOID THE CLAIM OF A CONTRACTOR, SUBCONTRACTOR, SUPPLIER,, OR LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING (OR A LABORER WHO MAY PROVIDE A NOTICE OF FURNISHING PURSUANT TO SEC. 109 OF THE CONSTRUCTION LIEN ACT, NO. 497 OF THE PUBLIC ACTS OF 1980, AS AMENDED) TO THE GENERAL CONTRACTOR, IF ANY, CONTRACTOR, OWNER, LESSEE, OR DESIGNEE.

WARNING TO DEPONENT: A PERSON WHO, WITH INTENT TO DEFRAUD, GIVES A FALSE SWORN STATEMENT IS SUBJECT TO CRIMINAL PENALTIES AS PROVIDED IN SEC. 110 OF THE CONSTRUCTION LIEN ACT, ACT NO. 497 OF THE PUBLIC ACTS OF 1980, AS AMENDED, BEING SECTION 570.1110 OF THE MICHIGAN COMPILED LAWS.

My Commission Expires: _____, _____ **County, Michigan**

PARTIAL UNCONDITIONAL WAIVER OF LIEN

**Michigan Only
GM 1653
Rev. 11/85**

Division/Unit: * _____

Location: * _____

Contract Identification: * _____

General Contractor, if any: * _____

I/We have a contract with _____ to provide
(name of party with whom you have a contract)

This contract is in connection with the improvement to the real property described in the copy of the Notice of Commencement furnished by the party with whom I/We have a contract (or otherwise obtained under the Construction Lien Law). The owner or lessee caused the Notice of Commencement to be recorded in Liber * _____ on pages * _____ through * _____, * _____ County records.

In consideration of \$ _____ representing the accumulated amount paid to the undersigned (receipt is acknowledged); I/We waive, release and surrender any and all liens, claims, or right to lien, to the date of this waiver for material, labor and/or services furnished.

NAME: _____
(Contractor/Subcontractor/Supplier/Laborer Waiving Lien) (Print or Type)

ADDRESS: _____

(Print or Type Name of Authorized Party)

Date: _____

(Signature of Authorized party)

(Title/Capacity)

(*Data From Notice of Furnishing)

DO NOT SIGN BLANK OR INCOMPLETE FORMS, RETAIN A COPY

FULL, FINAL AND UNCONDITIONAL WAIVER AND RELEASE OF LIEN

GM 1654
Rev. 11/89
Michigan Only 

Division/Unit: * _____

Location: * _____

Contract Identification: * _____

General Contractor, if any: * _____

I/We have a contract with _____ to provide
(name of party with whom you have a contract)

This contract is in connection with the improvement to the real property described in the copy of the Notice of Commencement furnished by the party with whom I/We have a contract (or otherwise obtained under the Construction Lien Law). The owner or lessee caused the Notice of Commencement to be recorded in Liber * _____ on pages * _____ through * _____, * County records.

In consideration of \$ _____ which represents full and final payment to Lienor and is the accumulated amount paid to the undersigned (receipt is acknowledged); I/We waive, release and surrender any and all construction liens, claims, or right to lien, against the described property.

NAME: _____

(Contractor/Subcontractor/Supplier/Laborer Waiving Lien) (Print or Type)

ADDRESS: _____

(Print or Type Name of Authorized Party)

Date: _____

(Signature of Authorized party)

(Title/Capacity)

The foregoing instrument was acknowledged before me this _____ day of _____, 19____, by

who is the _____ of

Notary Public,

County, Michigan

My Commission Expires

(*Data From Notice of Furnishing)

DO NOT SIGN BLANK OR INCOMPLETE FORMS. RETAIN A COPY

**LINDEN ROAD SITE
FLINT TOWNSHIP, MICHIGAN
TECHNICAL SPECIFICATIONS**

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DIVISION 1—GENERAL REQUIREMENTS

SECTION 01000

SUMMARY OF WORK

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. General Motors Corporation (GM) is soliciting bids for closure of the Linden Road Site (LRS) in Flint Township, Michigan. The work will be conducted in two separate phases. Phase 1 will consist of clearing and grubbing, waste consolidation activities, and backfilling of frontage area excavations. Phase 2 will consist of landfill cover construction, entrance road construction, and utility installations.
- B. Specifically, the scope of work included under Phase 1 construction includes but is not limited to:
 - 1. Preparation of submittals.
 - 2. Construction of temporary facilities, temporary access roads, and fencing as necessary to maintain site security.
 - 3. Clearing and grubbing of existing vegetation and trees from the limits of work as shown on the drawings. Installation of erosion control measures, to include silt fence and erosion control structures.
 - 4. Excavation and relocation of waste materials in the 350-foot frontage area and relocation to the western portion of the site.
 - 5. Backfilling and rough grading of areas within the 350-foot frontage area.
 - 6. Finish grading and temporary seeding of areas identified in the 350-foot frontage area.
- C. The scope of work, as described in this section, is presented solely for the convenience of the Contractor. The Contractor shall include in the total project cost any item of work included in the Contract documents that is not included in a lump sum or unit price item of work. All materials and equipment shall be supplied by the Contractor to complete the finished work.

1.02 SITE LOCATION AND DESCRIPTION

- A. The LRS site is a 40-acre parcel in Flint Township, Genesee County, Michigan, and is located in Section 17 of Township 7 North and Range 6

East. The site is approximately 1.5 miles west of the City of Flint. The site is bounded by Linden Road on the east. The northern boundary of the site is approximately 1/4 mile south of Calkins Road, and the southern boundary is approximately 1/2 mile north of West Court Street. The western boundary of the site is approximately 1/4 mile east of Dye Road.

- B. Based on current knowledge, the site has had three periods of land use during this century as: a source of mined gravel, a landfill, and an unused property. It was first used as a source of mined sand and gravel. The extent of the gravel excavation is uncertain. WESTON's review of an aerial photograph of the site taken in 1941 did not indicate any evidence of large excavations or traces of a filled excavation. For an undetermined number of years preceding 1931, a rubbish incinerator reportedly occupied part of the site. The Chevrolet Division of GM purchased the 40-acre property from several owners in 1931. GM used the site as a general refuse landfill from 1931 until 1969. The refuse reportedly consisted of construction debris, plaster, buffing and grinding wheels, buffing and grinding refuse, metallic chips, and other process wastes. Landfill operations ceased in 1969, and GM constructed a security fence around the site in July 1980. Since landfill activities ceased in 1969, the Linden Road property has been enclosed by a fence and monitored.

1.03 SUMMARY OF PREVIOUS INVESTIGATIONS

WESTON prepared a Remedial Action Plan (RAP) (WESTON, January, 1996) which included a site specific evaluation of potential risks based on various end uses for the site, and a description of the proposed remedial action. In the RAP, GM proposed to remediate the frontage area to meet the MDEQ Generic Commercial Criteria and construct a soil cover on the remaining portions of the landfill. The frontage area would then be rezoned and sold as a commercial development and the balance of the site developed into a recreational facility.

1.04 PROPOSED REMEDIAL ACTION

- A. The proposed remedial action for the site consists of excavation of any waste materials from the 350-foot frontage of the property, relocation of this material into the western portion of the site, and construction of a 2.5-foot soil cover over the waste materials to limit the potential for human contact during subsequent use of the site. The frontage area will be sold as a dedicated commercial-use property following waste removal activities. Once the site is covered with the 2.5-foot cover layer, the site will be further developed as a recreational facility with open grassy areas to support soccer fields.

END OF SECTION

SECTION 01010

SPECIAL REQUIREMENTS

PART 1 GENERAL

1.01 SPECIAL REQUIREMENTS

- A. The Contractor shall have in his possession, at all times, valid identification for all his employees and subcontractors.
- B. During execution of any and all items of the work, extreme care shall be exercised by the Contractor to preclude any interference/disturbance of existing structures, roadways, above-grade and below-grade utilities, or other features not associated with the work.
- C. The Contractor shall prevent damage, movement, settlement, or collapse of structures, roadways, above-grade and below-grade utilities, or other features not associated with the work. The Contractor shall assume the liability for any and all said damage, movement, settlement, or collapse, and shall promptly repair same at no cost to the Owner.
- D. The Contractor shall verify the locations and depths of utilities that could be affected by the work and shall notify the Engineer or the Owner immediately if unknown utilities are evidenced or encountered during execution of the work.
- E. The Contractor shall protect all permanent survey controls and wells identified on the Drawings during the work. The Contractor shall assume the liability for disturbance or damage and promptly replace same at no cost to the Owner.
- F. The Contractor shall obtain any permits, as necessary, for work under or around aerial power or electric lines.
- G. The Contractor is responsible for the development and implementation of a Health and Safety Plan (HASP) for his personnel as specified in Section 01390, "Health and Safety." The HASP shall conform to all federal, state, and local regulations, including those regulations issued by the Occupational Safety and Health Administration (OSHA).
- H. The Contractor shall give all notices and comply with all laws, ordinances, rules, and regulations bearing on the conduct of the work as drawn and specified. If the Contractor performs any work contrary to such laws, ordinances, rules, and regulations, he shall bear all costs arising therefrom.

- I. Storage and security of materials are the sole responsibilities of the Contractor. It is the Contractor's responsibility to ensure an adequate supply of material to maintain steady execution of the work within the project time limit. Material will be stored at areas approved by the Engineer.
- J. Prefinal inspection will be held by the Owner and the Engineer at the point of substantial completion, as determined by the Contractor and the Engineer. At that time, a list of unfinished and/or unacceptable work items (i.e., "punch list") will be made for the Contractor to correct. This "punch list" will be periodically checked by the Engineer prior to the final acceptance of the Project. The "punch list" must be completed, and a final inspection must be conducted by the Engineer before final payment is made by the Owner.
- K. The Contractor shall at all times keep the premises free from the accumulation of water, materials, or rubbish caused by his operations. At the completion of the work, the Contractor shall remove all equipment, tools, and dispose of all debris and rubbish.
- L. The Contractor is responsible for providing temporary electric service to the trailer facility. The Contractor shall secure all necessary permits for this work. Any federal, state, or county roadway excavation, trenching, and backfilling operations associated with this work shall be to the jurisdictioning agencies' standards. All costs associated with temporary services and permits shall be included in the bid items.
- M. The Contractor shall be responsible for securing all necessary permits or agreements required for the transport and delivery of on-site and off-site borrow soil to the work locations.
- N. The Contractor shall take measures to control dust at the site throughout the duration of work. If the Engineer determines the level of dust is unacceptable, the Contractor shall employ measures as necessary to reduce dust to an acceptable level.

END OF SECTION

SECTION 01020

SUBSURFACE EXPLORATION

PART 1 GENERAL

1.01 SUBSURFACE SOIL AND GROUNDWATER CONDITIONS

- A. The attached test boring logs and laboratory test results indicating subsurface conditions at and near the Linden Road Site are for the information of the Contractor only, and in no event is this information to be considered to be part of the Contract. It is expressly understood that the Owner or the Engineer will not be responsible for any interpretation or conclusions drawn therefrom by the Contractor.
- B. Subsurface conditions beneath and in the vicinity of the Linden Road Site were explored during the RI studies and pre-design activities, as described in Section 01000, "Summary of Work."
- C. The locations of the completed soil borings and monitoring wells are shown on the Drawing showing existing site conditions.

1.02 RELATED SECTIONS

Section 01000, "Summary of Work."

1.03 SUMMARY OF ATTACHMENTS

- A. Table 01020-1 includes chemical soil testing results showing results of field and lab analyses of site soil.
- B. Attachment 01020-1 includes the boring logs, well installation diagrams, and geotechnical soil tests conducted in support of groundwater and landfill investigation activities conducted to date.

1.04 LIMITATIONS OF SUBSURFACE INFORMATION INDICATED ON DRAWINGS

- A. Information presented, if any, regarding the presence, size, character, and location of existing underground structures, pipes, and conduits may be indicated on the Drawings for the benefit of the Contractor. There is no certainty of the accuracy of this information; the locations of underground structures indicated may be inaccurate, and other obstructions than those indicated may be encountered.

B. The Contractor hereby distinctly agrees that neither the Owner nor the Engineer is responsible for the correctness or sufficiency of the information given, and:

- In no event is this information to be considered to be a part of the Contract;
- The Contractor shall have no claim for delay or extra compensation or damage against the Owner or the Engineer on account of the incorrectness of information given, or on account of the insufficiency or absence of information regarding obstruction either revealed or not revealed by the Drawings; and
- The Contractor shall have no claim for relief from any obligation or responsibility under the Contract, in case the location, size, or character of any pipe or other underground structure is not as indicated on the Drawings, or in case any pipe or other underground structure is encountered that is not indicated on the Drawings.

PART 2 PRODUCTS

NOT APPLICABLE TO THIS SECTION

PART 3 EXECUTION

NOT APPLICABLE TO THIS SECTION

END OF SECTION

TABLE 01020-1

Summary of Subsurface Sampling
General Motors - Linden Road landfill
Flint, Michigan
(All Depths in feet)

Sample I.D.	Sampling Method	Total Depth	Sample Interval	Type of Sample Material for Chemical Analysis	Organic Vapor Reading
A/B-1	soil boring	8	0-2	Fill - black silt	<1
A-2	auger probe	6	none	none	
A-3	soil boring	4	1-3	Native - brown silty clay	<1
A-4	hand auger	1	none	none	
A-5	hand auger	2	1-1.5	Sediment - black silty clay	<1
A-6	auger probe	8	none	none	
A-7	soil boring	8	0-2	Fill - sand, gravel & clay	1
A-8	auger probe	8	none	none	
A-9	soil boring	8	0-2	Native - top soil & silty clay	2
A-10	auger probe	8	none	none	
A-11	hand auger	3	1.5-2.2	Native - brown silty clay	0
A-12	hand auger	2.4	none	none	
A-13	soil boring	6	2-4	Fill - black silt	<1
A-14	auger probe	4	none	none	
B-2	soil boring	6	2-4	Native - brown soil & silty clay	<1
B-3	hand auger	3	1-1.5	Native - brown silty clay	0
B-4	hand auger	3	1-2	Native - gray sand w/clay	0
B-5	auger probe	6	none	none	
B-6	soil boring	10	6-8	Fill - stained silty clay	1,565
	soil boring	10	8-10	Native - gray silty clay	310
B-7	auger probe	8	none	none	
B-8	soil boring	4	2-4	Native - brown silty clay	<1
B-9	hand auger	2	1-2	Native - brown silty clay	<1
B-10	hand auger	2.5	1-2	Native - brown silty clay	0
B-11	hand auger	3.5	1-2	Native - brown silty clay	<1
B-12	soil boring	4	2-4	Native - brown sand and clay	<1
B-13	auger probe	4	none	none	
B-14	soil boring	4	0-2	Fill - brown silty clay	1.2
C-1	soil boring	8	2-4	Fill - black silty clay	<1
C-2	hand auger	2	none	none	
C-3	hand auger	2	0-1	Native - brown gravelly clay	0
C-4	hand auger	2	none	none	
C-5	hand auger	2	0.5-1	Native - brown clayey gravel	0
C-6	auger probe	8	none	none	
C-7	soil boring	8	4-5	Fill - black sandy gravel	3
	soil boring	8	7-8	Native - gray silty clay	<1
C-8	auger probe	8	none	none	
C-9	soil boring	8	2-4	Fill - silty clay & gravel	1.2
C-10	soil boring	4	2-4	Native - brown silty clay	1
C-11	hand auger	3	1-2	Native - brown silty clay	<1
C-12	auger probe	4	none	none	

Table 3-1

Summary of Subsurface Sampling
General Motors - Linden Road landfill
Flint, Michigan
(All Depths in feet)
(Continued)

Sample I.D.	Sampling Method	Total Depth	Sample Interval	Type of Sample Material for Chemical Analysis	Organic Vapor Reading
C-13	soil boring	6	0-2	Fill - fill material, black silt	<1
C-14	auger probe	4	none	none	
D-1	auger probe	8	none	none	
D-2	soil boring	6	2-4	gray clayey sand & gravel	<1
D-3	hand auger	6	none	none	
D-4	hand auger	1.5	0.5-1	Native - brown sand	<1
D-5	hand auger	3.5	1-2	Fill - Black soil & silt	0
D-6	soil boring	6	2-4	Fill - industrial fill & clay	<1
D-7	auger probe	8	none	none	
D-8	soil boring	8	1-3	Fill - rusty industrial fill & silty clay	1.2
D-9	hand auger	3	1-2	Fill - black sandy sediment	<1
D-10	hand auger	4	2-3	Fill - black organic sediment	<1
D-11	hand auger	2	0-1	Fill - black organic silty clay	<1
D-12	soil boring	4	0-2	Fill - Black industrial fill & silty sand	<1
D-13	auger probe	4	none	none	
D-14	soil boring	6	0-2	Fill - brown/black layered silt & sand	0
E-1	soil boring	8	2-4	Native - gray silty clay w/ sand	<1
E-2	auger probe	8	none	none	
E-3	hand auger	2.5	0-1	Fill - clean top soil & sediment	<1
E-4	hand auger	1	none	none	
E-5	hand auger	1	none	none	
E-6	auger probe	8	none	none	
E-7	soil boring	13	2-8	Fill - industrial fill and silty clay	3.4
E-8	auger probe	8	4-6	Fill - industrial waste w/ silty clay	21
E-9	hand auger	3	0-1	Native - gray silty clay	<1
E-10	hand auger	2	0.5-1.5	Native - gray gravelly clay	3
E-11	hand auger	5	2-4	Fill - brown loose soil w/ nail	<1
E-12	soil boring	6	0-2	Fill - Rusty industrial fill	<1
	soil boring	6	4.5-5.3	Native - brown clayey sand	<1
E-13	soil boring	4	0-2	Native - brown silty clay	0
E-14	auger probe	4	none	none	
Mound A-6/B-6	hand auger	3.5	none	none	
Mound B-10/C-10	hand auger	3.5	none	none	
Mound B-3/C-3	hand auger	4.5	2-4.5	Fill - loose black soil and sediment	0
Mound D-12/E-11	hand auger	5	1-4	Fill - mostly silty sand w/ burned material	0
Mound D-13/E-13	hand auger	3	none	none	

Table 4-1

**Summary of Soil Sampling Analytical Results
General Motors - Linden Road Landfill
Flint, Michigan**

Sample I.D.: Depth (feet): Date:	A/B--1	A-3	A--5	A--7	A--9	A--11	A--13	B--2	B--2 (Dup)	B--3	B--4	MDEQ Generic Criteria	
	0--2	1--3	1--1.5	0--2	0--2	1.5--2.2	2--4	2--4	2--4	1--1.5	1--2	Commercial Subcategory I	Commercial Subcategory II
	4/29/97	4/30/97	5/1/97	4/28/97	4/28/97	4/29/97	4/30/97	4/29/97	4/29/97	4/30/97	5/2/97		
VOCs (mg/kg)													
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11,000	7.2E+06
SVOCs (mg/kg)													
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15,000	1.6E+05
PCBs (mg/kg)													
Aroclor - 1254	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.3	21
Metals (mg/kg)													
Arsenic	122	1.32	18	3.03	1.18	3.35	6.48	3.92	2.38	28.8	ND	6.6	100
Barium	147	54.6	73.4	98.1	94.8	102	114	108	161	393	15.7	30,000	3.2E+05
Cadmium	ND	0.2	ND	0.3	0.31	0.41	0.14	0.22	0.82	1.67	ND	210	2,300
Chromium	11.7	4.8	5.4	16.3	7.2	7.9	5.2	11.6	13.1	5.9	3.8	630,000	1.0E+06
Copper	32.7	6.2	14.2	21.3	7.9	10.9	11.2	16	17.5	31.6	5	16,000	1.7E+05
Lead	37.5	14.5	18.7	44.8	12	19.7	17.8	15.8	12.3	31.2	3.6	400	400
Mercury	2.76	ND	0.14	0.16	ND	ND	ND	ND	ND	1.18	ND	130	1,400
Selenium	2.51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,100	23,000
Zinc	36.7	24.1	28.2	75.6	31.1	45.2	38.3	47.7	50.8	41.2	20.8	1.4 E+5	1.0E+06

ND - Not detected.

ID - Inadequate data to develop criterion.

--- - Not available.

Table 4-1

**Summary of Soil Sampling Analytical Results
General Motors - Linden Road Landfill
Flint, Michigan
(Continued)**

Sample I.D.:	B--6	B--6	B--8	B--9	B--10	B--11	B--12	B--14	C--1	C--3	C--5	MDEQ Generic Criteria	
Depth (feet):	6--8	8--10	2--4	1--2	1--2	1--2	2--4	0--2	2--4	0--1	05.--1	Commercial	Commercial
Date:	4/28/97	4/28/97	4/28/97	4/29/97	4/29/97	4/29/97	4/30/97	4/30/97	4/29/97	4/30/97	5/2/97	Subcategory I	Subcategory II
VOCs (mg/kg)													
Ethylbenzene	220	0.4	0.1	ND	ND	ND	ND	ND	ND	ND	ND	11,000	7.2E+04
Toluene	420	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	24,000	1.6E+05
Xylene	870	0.16	0.1	ND	ND	ND	ND	ND	ND	ND	ND	2.0 E+5	1.0E+06
Butylbenzene	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	I.D.	---
Propylbenzene	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	I.D.	---
1,3,5-Trimethylbenzene	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	340	2.3E+03
SVOCs (mg/kg)													
Naphthalene	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15,000	1.6E+05
Acenaphthene	23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	76,000	8.1E+05
Anthracene	17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16,000	1.0E+06
Benzo(a)anthracene	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	210
Benzo(b)fluoranthene	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	210
Benzo(k)fluoranthene	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	2,100
Benzo(a)pyrene	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.4	21
Chrysene	16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,400	21,000
Dibenzofuran	24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	I.D.	---
Fluoranthene	50	ND	ND	ND	ND	ND	ND	ND	0.5	ND	ND	51,000	5.4E+05
Flourene	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	51,000	5.4E+05
2-Methylnaphthalene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	I.D.	---
Phenanthrene	99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,500	16,000
Pyrene	70	ND	ND	ND	ND	ND	ND	ND	0.3	ND	ND	32,000	3.4E+05
PCBs (mg/kg)													
Aroclor 1254	16.8	ND	ND	ND	ND	ND	ND	ND	1.65	ND	ND	2.3	21
Metals (mg/kg)													
Arsenic	16.5	4.84	3.45	3.36	1.34	1.07	ND	2.65	3.55	1.94	1.24	6.6	100
Barium	1,240	41.4	52.9	33	70.6	102	10.2	70.6	80.1	47.8	25.4	30,000	3.2E+05
Cadmium	0.85	ND	ND	ND	ND	ND	ND	0.3	0.34	0.19	ND	210	2,300
Chromium	712	9.8	10.9	11.1	13.5	12.7	2	7.1	11.8	6.7	4	6.3E+05	1.0E+06
Copper	160	9.6	12	10.8	8.5	7.2	2.8	7.1	13	7.7	4.9	16,000	1.7E+05
Lead	861	6.1	7.4	6.9	6.7	8.9	3.1	30.1	16.7	17.8	7.3	400	400
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	0.12	ND	ND	130	1,400
Silver	0.56	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,000	21,000
Zinc	114	31.7	45.2	40.1	33.8	35.8	14	40.5	52.2	48.3	16.1	1.4 E+5	1.0E+06

ND - Not detected.

ID - Inadequate data to develop criterion.

--- - Not available.

Table 4-1

Summary of Soil Sampling Analytical Results
General Motors - Linden Road Landfill
Flint, Michigan
(Continued)

Sample I.D.: Depth (feet): Date:	C--7	C--7 (Dup)	C--7	C--9	C--10	C--11	C--13	D--2	D--4	D--5	D--6	MDEQ Generic Criteria	
	4--5	4--5	7--8	2--4	2--4	1--2	0--2	2--4	0.5--1		2--4	Commercial	Commercial
	5/1/97	5/1/97	5/1/97	4/28/97	4/28/97	4/29/97	4/30/97	4/29/97	5/2/97	5/2/97	5/1/97	Subcategory I	Subcategory II
VOCs (mg/kg)												2.0 E+5	1.0E+06
Xylene	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
SVOCs (mg/kg)													
Naphthalene	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15,000	1.6E+05
Acenaphthene	50	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	76,000	8.1E+05
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	1,500	1.0E+06
Anthracene	90	40	ND	ND	ND	ND	70	ND	ND	ND	14	4.2 E+5	1.0E+06
Benzo(a)anthracene	120	60	ND	ND	ND	ND	110	ND	ND	ND	33	14	210
Benzo(b)fluoranthene	110	40	ND	ND	ND	ND	90	ND	ND	ND	31	14	210
Benzo(k)fluoranthene	100	60	ND	ND	ND	ND	130	ND	ND	ND	34	140	2,100
Benzo(a)pyrene	120	60	ND	ND	ND	ND	110	ND	ND	ND	32	1.4	21
Chrysene	140	70	ND	ND	ND	ND	130	ND	ND	ND	39	1,400	21,000
Dibenzofuran	40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	I.D.	---
Fluoranthene	210	100	ND	ND	ND	ND	160	ND	ND	ND	46	51,000	5.4E+05
Flourene	50	20	ND	ND	ND	ND	ND	ND	ND	ND	8	51,000	5.4E+05
2-Methylnaphthalene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	I.D.	I.D.
Phenanthrene	300	140	ND	ND	ND	ND	240	ND	ND	ND	44	1,500	16,000
Pyrene	610	260	ND	ND	ND	ND	490	ND	ND	ND	153	32,000	3.4E+05
Benzo(ghi)perylene	70	30	ND	ND	ND	ND	60	ND	ND	ND	20	1,500	14,000
Indeno(1,2,3-cd)pyrene	60	30	ND	ND	ND	ND	ND	ND	ND	ND	16	14	210
PCBs (mg/kg)													
Aroclor - 1254	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	2.3	21
Metals (mg/kg)													
Arsenic	4.77	3.62	4.96	3.34	3.38	0.65	3.37	0.86	0.99	17.5	4.66	6.6	100
Barium	194	73.4	44.5	53.1	72.1	101	175	38.2	12.3	60.3	363	30,000	3.2E+05
Chromium	50.2	13.8	10.7	11.4	13.9	10.9	10.1	5.4	3.3	14.8	201	6.3E+05	1.0E+06
Copper	108	29.8	36.8	11.3	10.3	5.2	153	4.9	3.4	19.6	953	16,000	1.7E+06
Lead	76.6	28.4	6.7	7.6	6.3	6.6	43	3.6	5.6	144	931	400	400
Zinc	430	153	36.8	42.8	43.3	29.4	97.8	16.2	13.3	54.2	688	1.4 E+5	1.0E+06
Cadmium	0.31	0.19	ND	ND	ND	ND	0.48	ND	ND	0.59	3.62	210	2,300
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.77	2,000	21,000
Mercury	ND	ND	ND	ND	ND	ND	0.33	ND	ND	0.5	0.43	130	1,400

ND - Not detected.

ID - Inadequate data to develop criterion.

--- - Not available.

Table 4-1

**Summary of Soil Sampling Analytical Results
General Motors - Linden Road Landfill
Flint, Michigan
(Continued)**

Sample I.D.: Depth (feet): Date:	D--8	D--9	D--10	D--11	D--12	D--14	E--1	E--3	E--7	E--7 (Dup)	E--8	MDEQ Generic Criteria	
	1--3	1--2	2--3	0--1	0--2	0--2	2--4	0--1	2--8	2--8	4--6	Commercial Subcategory I	Commercial Subcategory II
	5/1/97	5/1/97	4/29/97	4/29/97	4/30/97	4/30/97	4/29/97	4/30/97	5/1/97	5/1/97	5/1/97		
VOCs (mg/kg)													
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	400	I.D.	I.D.
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,300	11,000	7.2E+04
n-Propylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	600	I.D.	I.D.
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200	24,000	1.6E+05
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	450	3,100
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	500	340	2,300
Xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,600	2.0 E+5	
SVOCs (mg/kg)													
Acenaphthelene	ND	ND	0.4	ND	ND	ND	ND	ND	ND	ND	11	76,000	1.0E+06
Anthracene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	37	16,000	1.0E+06
Benzo(a)anthracene	30	ND	0.2	ND	ND	ND	ND	ND	ND	ND	7	14	210
Benzo(b)fluoranthene	30	ND	3.5	ND	2.0	ND	ND	ND	0.3	ND	5.0	14	210
Benzo(k)fluoranthene	30	ND	3.7	ND	2.0	ND	ND	ND	0.3	ND	5.0	140	2,100
Benzo(g,h,i)perylene	20	ND	ND	ND	2.0	ND	ND	ND	ND	ND	ND	1,500	14,000
Benzo(a)pyrene	30	ND	3.2	ND	1.0	ND	ND	ND	0.3	ND	4.0	1.4	21
Chrysene	30	ND	2.5	ND	1.0	ND	ND	ND	0.3	ND	9.0	1,400	21,000
Indeno(1,2,3-cd)pyrene	20	ND	ND	ND	1.0	ND	ND	ND	ND	ND	ND	14	210
Dibenzofuran	20	ND	0.3	ND	ND	ND	ND	ND	ND	ND	7.0	I.D.	I.D.
Fluoranthene	50	0.3	5.2	ND	1.0	ND	ND	ND	0.3	400.0	20.0	51,000	5.4E+05
Fluorene	20	ND	0.5	ND	ND	ND	ND	ND	ND	ND	9.0	51,000	5.4E+05
Phenanthrene	60	0.3	4.5	ND	1.0	ND	ND	ND	0.3	300.0	35.0	1,500	16,000
Pyrene	140	0.6	6.2	ND	4.0	ND	ND	ND	1.0	800.0	52.0	32,000	3.4E+05
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.0	I.D.	I.D.
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.0	15,000	1.6E+05
PCBs (mg/kg)													
Aroclor - 1254	ND	ND	ND	ND	3.8	ND	ND	ND	ND	ND	1	2.3	21
Metals (mg/kg)													
Arsenic	3.62	7.37	10.8	22.8	2.84	1.72	2.46	0.8	2.26	3.07	37	6.6	100
Barium	297	156	130	189	159	93.5	47.3	25.6	1,480	1,280	298	30,000	3.2E+05
Cadmium	1.43	0.52	ND	0.13	0.57	0.31	ND	ND	3.63	3.3	1.35	210	2,300
Chromium	383	18.3	7.7	6.9	252	5.2	7.2	3.9	93.7	141	772	6.3E+05	1.0E+06
Copper	245	169	361	31.2	98.5	9.4	12.1	9.1	278	599	298	16,000	1.0E+06
Lead	392	112	24.5	33.8	110	12.7	10.8	8.9	1,170	971	621	400	400
Mercury	ND	0.2	0.11	0.25	0.63	ND	ND	ND	0.41	0.73	ND	130	1,400
Silver	0.31	ND	ND	ND	ND	ND	ND	ND	0.32	0.33	0.66	2,000	21,000
Zinc	218	169	362	135	131	30.7	30.8	21.2	669	665	180	1.4 E+5	1.0E+06

ND - Not detected.

ID - Inadequate data to develop criterion.

--- Not available.

Table 4-1

**Summary of Soil Sampling Analytical Results
General Motors - Linden Road Landfill
Flint, Michigan
(Continued)**

Sample I.D.: Depth (feet): Date:	E-8 (Dup) 4-6 5/1/97	E-9 0-1 5/1/97	E-10 0.5-1.5 5/1/97	E-11 2-4 4/29/97	E-12 0-2 4/30/97	E-12 4.5-5.3 4/30/97	E-13 0-2 4/30/97	Mound B-3/C-3 5/2/97	Mound B-3/C-3 (Dup) 5/2/97	Mound D-12/E-11 5/2/97	MDEQ Generic Criteria	
											Commercial Subcategory I	Commercial Subcategory II
VOCs (mg/kg)												
Ethylbenzene	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	11,000	7.2E+04
Toluene	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	24,000	1.6E+05
Isopropylbenzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	I.D.	I.D.
1,2,4-Trimethylbenzene	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	450	3,100
1,3,5-Trimethylbenzene	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	340	2,300
Xylene	7.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.0 E+5	1.0E+06
SVOCs (mg/kg)												
Acenaphthene	8	ND	ND	ND	ND	ND	ND	ND	ND	1	76,000	8.1E+05
Anthracene	25	ND	ND	1	ND	ND	ND	ND	ND	4	4.2 E+5	1.0E+06
Benzo(a)anthracene	5	ND	ND	0.3	ND	ND	ND	ND	ND	6	14	210
Benzo(b)fluoranthene	5	ND	ND	0.5	ND	ND	ND	ND	ND	6	14	210
Benzo(k)fluoranthene	3	ND	ND	0.4	ND	ND	ND	ND	ND	5	140	2,100
Butyl benzo phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	68,000	7.2E+05
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	1,500	14,000
Benzo(a)pyrene	3	ND	ND	0.5	ND	ND	ND	ND	ND	5	1.4	21
Bis(2-ethylhexyl)phthalate	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	700	11,000
Chrysene	6	ND	ND	0.4	ND	ND	ND	ND	ND	7	1,400	21,000
Dibenzofuran	5	ND	ND	ND	ND	ND	ND	ND	ND	1	I.D.	I.D.
Fluoranthene	14	ND	ND	0.7	ND	ND	ND	ND	ND	11	51,000	5.4E+05
Flourene	7	ND	ND	ND	ND	ND	ND	ND	ND	2	30,000	5.4E+05
2-Methylnaphthalene	5	ND	ND	ND	ND	ND	ND	ND	ND	12	I.D.	I.D.
Phenanthrene	23	ND	ND	0.4	ND	ND	ND	ND	ND	20	1,500	16,000
Pyrene	36	ND	ND	0.7	ND	ND	ND	ND	ND	ND	220	3.40E+05
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	14	210
PCBs (mg/kg)												
Aroclor - 1254	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.3	21
Metals (mg/kg)												
Arsenic	34.5	2.86	3.26	9.25	1.52	1.89	1.53	24	16.8	10.5	6.6	100
Barium	243	312	79.6	182	53.7	26.2	89	161	164	195	30,000	3.2E+05
Cadmium	2.36	0.11	1.32	1.28	ND	ND	ND	0.09	ND	0.1	210	2,300
Chromium	675	93.4	9.04	19.9	15	5.7	7.8	7.8	7.3	10.3	6.3E+05	1.0E+06
Copper	504	46.4	15.5	93.4	11	9.1	9.7	15.1	14.7	32	16,000	1.0E+06
Lead	446	57.5	13.9	193	72.9	23	12	14.6	13.9	30.6	400	400
Mercury	ND	ND	ND	0.42	ND	ND	ND	0.17	0.18	1.86	130	1,400
Selenium	ND	5.16	ND	ND	ND	ND	ND	ND	ND	ND	2,100	23,000
Silver	0.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,000	21,000
Zinc	350	1,300	52.4	94	41.6	29.5	34.8	26.7	24.4	64.3	1.4 E+5	1.0E+06

ND - Not detected.

ID - Inadequate data to develop criterion.

--- - Not available.

ATTACHMENT 01020-1
SOIL SAMPLING LOGS

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.
										GM - LRLF			A/B-1
DRILLER			DRILL METHOD			BOREHOLE DIAMETER			WELL DIAMETER		TOTAL DEPTH		
4/29			4/29										
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED							
R. Lounsbury						1'							
SPLIT DISTANCE BETWEEN A1 AND B1 DUE TO ACCESS 42' E AND 10' N of B1 0.0m													
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	BVA readings (in units)		
											BZ: Breathing Zone	BH: Borehole	
1	22	2	2		1					0-5 TOP SOIL - GY BN		<1	
			3							.5-1.8 - SILT BLACK W/CLAY DET			
2	10	4	2		2					1.8 SILTY CLY GY BN, TRACE FIRM		<1	
			3		3								
3	16	2	2		4					SAND - BN TRACE CLAY AND FINE GRAVEL		<1	
			3		5					AT SATURATED			
			3		6								
4	18	8	5		7					6-7 CLAY/ GRAVEL; BN SATURATED		<1	
			6		8					7-8 SILTY CL W/ LITTLE GRAVEL; FIRM			
										TRACE FINE SAND			
					9								
					10								
					11								
					12								
					13								
					14								
					15								
					16								
					17								
					18								
					19								

*ASTM D1586 ST = SHELBY TUBE

SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER

D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION GM - LRLI 2285'E/1100'N		PAGE NO.	HOLE NO. A2
4/29 DRILLER MATECO			DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH				
LOGGER R. Lounsbury		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'							
Auger Point NO ANALYTICS										5' W of STAKE		H5	
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM GVA readings (in units)		
	CT				1					0-1.5 Fg SOLL 1.5-1.5 SILT W/CLAY BLACK; ORGANIC, SATURATED	<1		
	CT				2					1.5-3.5 CL; GY BN MORGANIC TANCE FINE GRAVEL / SAND	<1		
	CT				3					2-4 M/A MADE SEAM AT 4.5-4.7'	<1		
	CT				4					3.5-4.5 CL GY BN FINE; W/ LITTLE SAND AND	<1		
	CT				5					4.7-5.0 GRAVEL	<1		
					6								
					7								
					8								
					9								
					10								
					11								
					12								
					13								
					14								
					15								
					16								
					17								
					18								
					19								

*ASTM D1586 ST = SHELBY TUBE
 SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
 D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION Gm-LRLF 2285'E / 1200'N				PAGE NO. HOLE NO. A3				
		DRILLER MATECO		DRILL METHOD		BOREHOLE DIAMETER				
LOGGERS AE R. Lounsbury		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1"				
SOIL BORING 5' W OF STAKE EDGE of MARSH										
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOBS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	20	1 3 4		1				0-5 Top soil 5-1-BN dirt w/ TRACE of pebbles 1-2 SCT CLY BN TR - fine gravel AND SAND	
2	SS	24	3 3 5 5		2 3 4				2-4 - SCT CLY BN w GRAY VERTICAL NOTHING TR - 5' GR	
					5					
					6					
					7					
					8					
					9					
					10					
					11					
					12					
					13					
					14					
					15					
					16					
					17					
					18					
					19					

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PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.
										GM- LRLF		2285E/1300'N	A-4
START		FINISH		DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH	
5/1				MATECO								1	
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED							
AxE						1'							
R. Lounsbury													
No samples										1st MARSH		HS	
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM Borehole readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace		
					1					0-.5 - SEP/SCT CLAY; 0.4 w/ SAND .5-1' SCTY CLAY AND SAND; 4L BN SAT	< 1 0		
					2								
					3								
					4								
					5								
					6								
					7								
					8								
					9								
					10								
					11								
					12								
					13								
					14								
					15								
					16								
					17								
					18								
					19								

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PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM- LRLF			2300'E / 1400' N		PAGE NO.	HOLE NO. A-5
START 5/1	FINISH	DRILLER MATECO	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 2			
LOGGER R. Lounsbury	TOP OF CASING ELEV.		GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'					

HAND AUGER

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1				1.5	0-2' BLK SLTY CLAY SED. ORGANIC H2O AT 1.5'	
					2				1.5-2'	SLT CLY + XL-BN AND GRAY MUDING TRACE VF-F SAND AND GRAVEL	
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

SAMPLE
1-1.5'

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO. HOLE NO.	
START		FINISH		DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH	
5/1				MATECO									
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED							
R. Lounsbury						1'							
10' W of STAKE Amen Point										NO ANALYTICS		HS	
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOKS	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	ORM DWA readings (in units)	BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace	
1	SS				1					0-1 TOP SOIL BN 1-2 SFT CL; BLACK; LOOSE SAME VF SAND	<1		
2	SS				2 3					A/A TO 3.5' SAT AT 2' 3.5' SAND VF DK BN; UNIFORM (SAT)	<1		
3	SS				4 5					4.5 CLAY ET GRAVEL Y/BN SAT SOME SAND VF-F	<1		
4	SS				6 7					6-8 SFT CLAY Y/BN; most plastic TRACE S/G	<1		
					8								
					9								
					10								
					11								
					12								
					13								
					14								
					15								
					16								
					17								
					18								
					19								

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 = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. | HOLE NO.

2300 E/1600 N

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION 6M-LRLF		PAGE NO. 1	HOLE NO. A7
4/28	RILLER MATECO	DRILL METHOD U.W. 4A	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 8
LOGGER R. Lounsbury	TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'		

4' W OF STAKE

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1		24	5 10 11 10		1					FILL - FINE COARSE, OXIDIZED; SAND GRAVELS; F-m-SAND; CLAY SMALL	1
2		12	5 4 4 4		2 3 4					AA TO 30' CLAYEY GRAVEL; FINE; ADHESIVE GRAVEL; SAND AND SILT (SATURATED)	< 1
3		K	1 3 3 4		5 6					A/A TO 5.5' SAND CLAY SAND; LITTLE GRAY MOTTLED TR FINE SAND AND GRAVEL	< 1
4		22	3 5 6 11		7					SAND CLAY A/A	< 1
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

*ASTM D1586

SS = SPLIT SPOON
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PAGE NO. | HOLE NO.

2285'E/1700'N

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.			
4/28			DRILLER MATECO		DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 8			
LOGGER R. Lounsbery		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'					
Area probe 5' W of stake HS											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	ORV OVA readings (in units)
CT					1					0-2 Top soil - black; some fine sand	<1
					2					AVA TO 2.5	
CT					3					2.5-40 silty sand and gravel BN rounded gravel; f-vf sand. possible clean back fill.	<1
					4					SAT AT ~ 4.5'	
CT					5					AVA TO 6.0'	<1
					6					6.0-6.5 silty clay; BN; trace fine gravel; sand	
					7					6-8	<1
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
*ASTM D1586 ST = SHELBY TUBE SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER D = DENNISON CT = CUTTINGS BA = BUCKET AUG.											
										PAGE NO.	HOLE NO.

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION GM - LRL 2282'E/1800'N				PAGE NO. HOLE NO. 1 A9	
		DRILLER 4/28 MATECG		DRILL METHOD 4.25 H/A		BOREHOLE DIAMETER	
WELL DIAMETER		TOTAL DEPTH 6					
LOGGER R. Lounsbury		TOP of CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1"	

5' W OF STAKE
0vm

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA HS readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
											1
2	10*		9-11 10-10		2-					2.5' - CLAYEY GRAVEL BN, SOME SAND AND 10' SILT, (SAT) 0.3'	< 1
3	20		3-7 10-11		5-					5.5-6' SATY CLAY gy BN - OXIDATION AROUND SMALL GRAVEL NOODLES SLIGHTLY PLASTIC.	< 1 < 1
					6-						
					7-						
					8-						
					9-						
					10-						
					11-						
					12-						
					13-						
					14-						
					15-						
					16-						
					17-						
					18-						
					19-						

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PAGE NO. | HOLE NO.
 _____ | _____

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION			PAGE NO.	HOLE NO.				
			GM - LRLF 2282'E/1900'N			1	A-10				
4/28		DRILLER MATECO	DRILL METHOD 4.25"		BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 8'				
LOGGERS A.E. R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'						
4 ft w of STAKE Auger Point No Sampling											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOBS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM
											SVA readings (in units)
CT					1					0-1 - Top soil BLK sandy clay 1-2 - sandy silt - BN vf-sand; trace gravel	< 1
					2					2-4 - sand (fine) LBN; vf; uniform slightly moist	< 1
					3						
					4						
					5					CLAYEY GRAVEL AT ≈ 5.25' LBN; GRAVEL SUBANGULAR; some sand and silt; (SAT)	< 1
↓					6					A/A TO ≈ 6.75'	< 1
					7					6.75' silty CL; gray; sat at top; trace small gravel / fine sand	
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. HOLE NO.

2000' A-11

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION GM- LRLF		PAGE NO. 2000' HOLE NO. A-11	
START 5/2	FINISH	DRILLER MATECO	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER
LOGGER A&E R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1"	

HAND AUGER - NO SANDWICHES

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-1.5- TOP SOIL DRBN 1.5-1.5 BLACK SLT; moist, LOOSE	0
					2					1.5-2.2 DRBN SLT CL w/ 25% TR. CLAY	0
					3					2.2-3.0 SLT CLAY w/ GRAVEL BN-4LBN WET AT GRAVEL	0
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11					SAMPLE 1.5-2.2'	
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

A-12

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM- LRLF			2300'E / 2100'N			PAGE NO.	HOLE NO. A-11
START 5/2	FINISH	DRILLER MATECO	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH				
LOGGER A+E R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'						

Hand Auger No ANALYSIS

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-1 TOP SOIL / SEDIMENT G.B.N	0
					2					1-1.5 SILTY SAND Y/LBN SAT	0
					3					2-1.5-2.0 - SILTY SAND Y/LBN W/ SOME BLACK SAT	0
					4					2.0-2.4 - SILTY Y LBN W GRAUL	
					5						
					6						
					7						
					8						
					9						
					10						
					11					EDGE of marsh	
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION GM LRLF 2280'E/2200'N				PAGE NO. HOLE NO. A-13				
		DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 6				
LOGGER R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1"						
5' FT W OF STAKE HS										
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION SAMPLE INTERVAL	DESCRIPTION	OVM EVA readings (in units)
1	SS	20	4		1				0-1.7' TOP SOIL; BN; IN LOW AREA SATURATED	<1
			5		2			1.7-2' CLAYEY GRAVEL W/ SAND (JAT) COBBLES		
2	SS	6	2		3				2-4' LOOSE BLACK SILT; HEAVING; POOR RECOVERY	<1
			3		4					
3	SS	6	5		5				4-6' CLAYEY GRAVEL AND COBBLES 4'-DN HEAVING; (JAT)	0
			6		6					
					7					
					8					
					9					
					10					
					11					
					12					
					13					
					14					
					15					
					16					
					17					
					18					
					19					

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PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG	PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.
	G m - LRLF		2280'E/2300'N	A-14

4/30	RILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
	MATECO				
LOGGER	TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED		
R. Lounsbury			/		

ANGER POINT N6 ANALYTICAL

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)
											BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
		18	1		1					0.5-1.0 - .5 TO 1.0 J/L BN 5-1 BLACK SILT (SAT) 1-2 CLAYEY SILT (BN)	
		20	2		2					CLAYEY SILT GRADING TO CLAYEY SAND YL-BN w/ gray mottling; WET TO SAT	
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.			
			GM-LRLF 2200'E/1100'N					B-2			
4/29		DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER			
		MATECO		4.25" HSA				TOTAL DEPTH			
LOGGERS		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED					
AKC R. Lounsbury						1"					
								OVM			
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVR readings (in units)
1	SS	8	9		1					0-0.5 Top Soil	<1
			14					1-2 SILT; w/ CLAY BLK; ORGANIC			
2	SS	16	3		2					0.5-1 STRATIFIED	<1
			3		3			1-2 SILT CLY BN; SOFT; HEAVY OXIDATION			
			5				23.5 GY BN SOIL w/ LEAVES, STEMS ETC				
3			6		4				3.5 SILTY CLAY; BN FIRM TRACE GRAVEL	<1	
			7		5			GRAY MOTTLING			
			8				4.5-5.0- SILTY CL VL-BN w/ GRAY MOTTLING				
					6				TRACE OF F-SAND AND GRAVEL NODULES		
					7				TRACE BLK CARBON SPICKS		
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
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								PAGE NO.	HOLE NO.		

0850 B-3

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.	
4/30				2200' E / 1200' N				8-2		
DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH		
R. Lounsbury										
LOGGER		TOP of CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED				
						1'				
HARD ANGLED from core of marsh HS										
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION SAMPLE INTERVAL	DESCRIPTION	ORM OUB readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1				0-1.5' SEDIMENT from marsh (BAD) CLAYEY SILT; DK GN ORG. M.C.	O
					2				1.5-1.7' SILTY CLAY; DK GN SOME SAND	O
					3				1.5-3.0' YELLOW GN V.F. FINE V/CLAY FINE GRAY MUD; WET	O
					4					
					5					
					6					
					7					
					8					
					9					
					10					
					11					
					12					
					13					
					14					
					15					
					16					
					17					
					18					
					19					
*ASTM D1586 ST = SHELBY TUBE SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER D = DENNISON CT = CUTTINGS BA = BUCKET AUG.									PAGE NO. HOLE NO.	

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.
										GM- LRLF		2200' E / 1300' N	B-4
START	FINISH	DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH			
5/1		MATECO								3			
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED							
R. Lounsbury						1'							
HAND AUGER LOCATION 25' N of STAKE (in marsh).													
SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)		
					1					0-0.5- sediment blue (clay)	0		
					2					0.5-2- SAND Gy VF-F w/ clay	0		
					3					little for mottled (SAT)	0		
					4					2-3 SAND YL-BU VF-F (SAT)	0		
					5								
					6								
					7								
					8								
					9								
					10								
					11								
					12								
					13								
					14								
					15								
					16								
					17								
					18								
					19								
										SAMPLE 1E 1-2'			
*ASTM D1586										PAGE NO.			HOLE NO.
SS = SPLIT SPOON										ST = SHELBY TUBE			
C = CORE										CS = CONTINUOUS SAMPLER			
BT = BIT TUBE										CA = CRACKER AUGER			

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.			
START				FINISH				DRILLER				
5/1				MATECO				2200'E/1400'N				
LOGGER				TOP OF CASING ELEV.				TOTAL DEPTH				
R. Lounsbury				GROUND ELEVATION				6				
AXE				DEPTH/ELEVATION GROUNDWATER - DATE MEASURED				1'				
Angel Point				NO ANALYTICS				H				
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	0.1m OUP readings (in units)	
					1					0-1.5 SCL CLY PLT, some E SAND 1.5-3.0 CLAYEY GRAVEL Y/LBN (SAT)	<1	
					2					3-4 SAND Y/LBN VF UNIFORM (SAT)	<1	
					3					4-5.7 SAND: GRAVEL w/ SCL CL Y/LBN 5.7-6 SCL CL Y/LBN; FIRM TR S/G	<1	
					4							
					5							
					6							
					7							
					8							
					9							
					10							
					11							
					12							
					13							
					14							
					15							
					16							
					17							
					18							
					19							
*ASTM D1586 ST = SHELBY TUBE SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER D = FENWICK BA = BUCKET AUG.											PAGE NO.	HOLE NO.

B-6

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.
4/28				6M-LRLF 2200'E/1500'N				1	10
DRILLER				DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER	
TOP of CASING ELEV.				GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED		TOTAL DEPTH	
LOGGER									
R. Lounsbery									
								OVM	
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	DESCRIPTION
1	3 4 10 6	16			1				0-6' SOIL 6-2' FILL/WASTE; FINE CLAYED; WOOD TRUNKS BLACK STAINING AND BROWN WOOD.
2	6 8 3 2	16			2 3 4				AYATO 5'; BLACK STAINING; WOOD BLOCKS ODOR 3-4 - CLAYEY GRAVEL; BRN; BLK; SOME SAND; TR SITE (SATURATED)
3	4 4 2 3	6"			5				4-6 CONTINUE FILL AIA POOL RECOVERY 2 WOOD BLOCK ODOR
4	3 4 8 8	10"			6 7 8				6-7.5 SILTY GRAVEL AND FILL MATERIAL (SAT) CONTINUE BLACK STAINING; ODOR WOOD PIECES 7.5-50% CLAYEY BRN; SOME SAND; GRAVEL 8.0 50% CLAY; BRN 6% BRN AIA
5	3 5 8 9	16"			9 10 11 12 13 14 15 16 17 18 19				

*ASTM D1586 ST = SHELBY TUBE
 SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
 D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION			PAGE NO.	HOLE NO.				
			GM LRLF 2200'E/1600' N				B-7				
5/1 MATECO			DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH					
AXE 			TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED						
R. Lounsbury					1'						
Auger Point			NO ANALYTICAL			HS					
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOBS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM readings (in units)
											BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-2 CLEAN FILL; SLTY CL; 1" DIA GRAVEL mois; SL-plastic; MBN	2
					2					POSSIBLE ACCESS ROADWAY BACKFILL	
					3					A/A LETS GRAVEL; 94 BN SLTY-CL	1
					4					3.5-50	
					5					CLAYEY GRAVEL; SAT YBBN;	
					6					5.0-6.0 SLTY CL YLBN W/ GR/S.	<1
					7					6-8 SLTY-CL; GYBN; FILM; W/ GRAVE/SAM	<1
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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 D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION			PAGE NO.	HOLE NO.					
4/29 MATECO			1800' N 5200' E / 100			B-9	2'					
DRILLER R. Lounsbury		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER						
TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'								
HAND ANGLE IN MARK 0.7m												
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	GUA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace	
					1					0-1.5 - Top soil VEGETATION	K	
					2					1.5-2 - SLT CL 84 SN; Trace f-sand		
					3					AND SMALL GRAVEL		
					4							
					5							
					6							
					7							
					8							
					9							
					10							
					11							
					12							
					13							
					14							
					15							
					16							
					17							
					18							
					19							
*ASTM D1586 ST = SHELBY TUBE SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER D = DENNISON CT = CUTTINGS BA = BUCKET AUG.											PAGE NO.	HOLE NO.

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION				PAGE NO. HOLE NO.		
		2200'E / 1900' N				B-10		
4/29		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		
R. Lounsbury		TOP of CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED		
HAND AUGER IN MARSH								
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	
							CLASS- IFICATION SAMPLE INTERVAL	
					1			
					2			
					3			
					4			
					5			
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
0-5' TOP SOIL VEGETATION 5-2.5' SILTY CL; BN; Flamm; TRACE FINE AND SMALL GRAVEL OXIDATION							OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace	
*ASTM D1586 ST = SHELBY TUBE CS = CONTINUOUS SAMPLER SS = SPLIT SPOON C = CORE BA = BUCKET AUG. D = DENNISON CT = CUTTINGS								PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION <i>E2200' / N2000'</i>				PAGE NO. HOLE NO. <i>B-11</i>					
		DRILLER <i>4/29</i>		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH	
LOGGER <i>R. Lounsbury</i>		TOP of CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <i>1'</i>					
<i>Ang HARD ANGEL 10'W of STAKE</i>											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-1.5 TOP SOIL	<1
					2					1.5-1.5 SLT CL; BN; MOIST TRACE GRAVEL	
					3					1.5-2.5 GRAVELLY GRAVELLY CLAY; SATURATED MED GRAVEL; BROWN	
					4					2.5-3.5 SLT CL; BN w/ grey bottling	
					5					TRACE FINE GRAVEL; FLOW	
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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SS = SPLIT SPOON C = CORE BA = BUCKET AUG.

D = DENNISON CT = CUTTINGS

PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION GM-LRLIF 2200'E/2100'N		PAGE NO.	HOLE NO. B-12
4/30		RILLER MATECO	DRILL METHOD 4.25-HJA	BOREHOLE DIAMETER	WELL DIAMETER
LOGGERS R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'	

										0VM	
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	HS OVR readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	22	9 5 1		1					WOOD BLOCKS AT SURFACE AREA 0-.5- SLT-CL FILL W/ CINCHERS/SLAG DK BN	<1
					2					.5-1.7 BLACK SILTY CLASS; WET	
2	SS	16	1 3 6 5		3					1.7- SLT CLAY; DK BN WET; PLASTIC A/A TO	1
					4					1.7-3.0 CLAYEY SAND YL BN SAT SOME GRAVEL	
					5					3-4 SILTY SAND YL BN; SAT	<
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION

6M LRLF

2200' E/2200' N

PAGE NO. HOLE NO.

B-13

RILLER

DRILL METHOD

BOREHOLE DIAMETER

WELL DIAMETER

TOTAL DEPTH

4/30

LOGGER

NE
R. Lounsbury

TOP of CASING ELEV.

GROUND ELEVATION

DEPTH/ELEVATION GROUNDWATER - DATE MEASURED

1'

Auger Probe

NO ANALYTICS

15' N of STAKE

0.7m

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	TO OFA readings (in units)
					1					0-1" Top Soil	
					2					1.5-1.8 PER SILT, CLAY, SAT	
					3					1.8-1.9 - BN LOUSE CLAYEY SILT	
					4					1.9-2.0 CLAY SAND YLBN SAT	
					5					2.0-2.5 - SILT CLAY YLBN DDD PLATIC	
					6					2.5-4.0 - SILTY SAND VF YL-BN; SAT.	
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

*ASTM D1586

SS = SPLIT SPOON

D = DENNISON

ST = SHELBY TUBE

C = CORE

CT = CUTTINGS

CS = CONTINUOUS SAMPLER

BA = BUCKET AUG.

PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION G.M. - LRLIF		PAGE NO. HOLE NO. 2200'E / 2300'N B-14	
4/30 DRILLER MATECU		DRILL METHOD 4.25-HSA		BOREHOLE DIAMETER WELL DIAMETER TOTAL DEPTH	
LOGGER A.E. R. Lounsbury		TOP OF CASING ELEV.		GROUND ELEVATION DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1"	

										HS	
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM BVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	18	1 2		1					0-2 Pn SILT CLAY-FILL moist loose TRACE GRAVEL	1.2
2	SS	10	1 3 34		2 3 4					2-3 A/A 3-4' CLAYey SAND w/ SILT & GRAVEL YL-BN; SATURATED	<1
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION			PAGE NO.	HOLE NO.
4/29			6m - LRLF			2100'E/1000'N	C1
DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER	
MATECO		4.25 HSA					
TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED			
LOGGERS				1'			
R. Lounsbury							
OVM							
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION
1	SS	22	2		1		
2		20	2		2		
3		20	2		3		
4		10	2		4		
			2		5		
			2		6		
			2		7		
			4		8		
					9		
					10		
					11		
					12		
					13		
					14		
					15		
					16		
					17		
					18		
					19		
DESCRIPTION							
0.5 TOP SOIL							
.5-2 SILT CLY 6% BN; TRACE SAND AND FINE GRAVEL; THIN BL SILT LENS							
2-4 SILT; BLACK MOTTLED; SOME GRAY-BN SAT;							
TRAPPING TO 1/2 K SILT CLAY AT 3.5'							
4-5 SILT CL 9% BN; OXIDATION; TRACE FINE GRAVEL/SAND, FIRM							
8-6 SILT CL 9% BN/SOME LENS; (SAT) VERY FINE SAND							
6-7.5 SAND/GRAVEL; 9% BN MED GRAVEL SAT							
7.5 SILT CL BN-8% BN OXIDATION; TRACE SAND/FINE GRAVEL MOD PLASTIC							
H5							
OVM readings (in units)							
BZ: Breathing Zone							
BH: Borehole							
SP: Sample							
HS: Headspace							

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.				
		2100'E/1200'N					C-3				
DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER					
4/30						2'					
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED					
R. Lounsbury						1'					
Hand Auger on edge of marsh							0VM				
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION	H ₂ S readings (in units)
											BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-1 GRAVELLY CLAY W/ SAND (SAT) YLOW	0
					2					1-2 SILTY CLAY; SAT. W/ FINE SAND AND SMALL GRAVEL	<1
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM- LRLF 2100'E/1300'N			PAGE NO.	HOLE NO. C-4
START 5/2	FINISH	DRILLER MATECO	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 2	
LOGGER AxE R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'			

HAND AUGER NO ANALYTICS

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-1.5 TOG SOIL DRBN 1.5-1.5 SAND; TRAVEL; YLBN SAT	0
					2					1.5-2 SAT CL; YLBN; TR ST/S; VARY FIRM	0
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM- LRLF			PAGE NO.	HOLE NO. C-5
START 5/2	FINISH	DRILLER MATECO	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 2	
LOGGER AxE R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'			

HAND AUGER 25' W OF STAKE

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-1.5- TOP SOIL DK BN LOOSE	0
					2					1.5-2 CLAYEY GRAVEL W/ SAND	0
					3					KL-BN SAT AT 1.5'	
					4						
					5						
					6						
					7						
					8						
					9						
					10					SAMP 1.5' 0.51'	
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

*ASTM D1586
 SS = SPLIT SPOON
 ST = SHELBY TUBE
 C = CORE
 CS = CONTINUOUS SAMPLER
 CT = CUTTING
 RA = RUCKET AUG

PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM LLLF 2100' E / 1500' N			PAGE NO.	HOLE NO. C-6
START 5/1	FINISH	DRILLER MATECA	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH	
LOGGER R. Lounsbury	TOP OF CASING ELEV.		GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'			

Anger Point

NO ANALYTICS

10' N of STAKE

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					BROWN-FILL, SATY CLAY; 9/15/78 0-2 WIRE LOOSE	<1
					2						
					3					2-4 BLK SAT CLAY FILL; pieces of wood sm gravel; moist LOOSE; 9/15/78 PLASTIC	<1
					4					H2O at 4'	
					5					4.5 CLAYEY GRAVEL 4 LBN SAT W/ SAND	<1
					6					5.7 SAT CLAY; 4 LBN W/ TR AND / GRAVEL	
					7					6.2-8 SAT CL; 9 GRAY; VENTY PLASTIC TR GRAVEL	<1
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS RA = RUCKST AUG

PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.					
			GM - LRLF		2800' E / 1600' N	CB-7					
DRILLER		DRILL METHOD		BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH					
3/1		MATECO		4.25 - HSA							
LOGGER	TOP OF CASING ELEV.		GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED							
R. Lounsbury				1'							
HS											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOBS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	6	33 6 8		1					0-2 ft. heavy SLAG, CINDERS, ASH, boulder BLK w/ OXIDATION, wood blocks w/ SLT-CL Take 0-2' spoons	28
2	SS	12	14 7 6 4		2 3 4					2-4 INO. WASTE, CINDERS, SLAG, WOOD, BURNED MATERIAL; oily TEXTURE ASSOC. BLK SLT CLAY	7
3	SS		2 2 3 7		5 6					4-5 SAND w/ GRAVEL f-c; 0/KOILY STAINING SAT 5-6 SLT CLAY 4L BN	3
4	SS		5 8 8 12		7 8					6-7 SAND/GRAVEL 249N m-c (SAT) 7-8 SLT CL; 6Y CN; FIRM TR SAND/GL	<1
					9 10 11 12 13 14 15 16 17 18 19					AUGER REFUSEL HAD TO MOVE 20' WEST OF STAKE AREA LOOK LIKE OLD BURN AREA; LOTS OF CINDERS, SLAG, ASH	
*ASTM D1586 ST = SHELBY TUBE SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER D = DENNISON CT = CUTTINGS BA = BUCKET AUG.											

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.
										5M - LRLF		2100'E/1700'N	C-8
DRILLER					DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH		
5/ MATECO											8'		
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED							
AXE						1'							
R. Lounsbury													
Auger Point (NO SAM ANALYTICAL)												15	
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM Readings (in units)		
					1					0-1.5' TOP SOIL			
					2					1.5-1.9' IMP WASTE MOSTLY BN SLTY-SAND w/ METAL, PLASTIC, RED pigment	40		
					3					1.9-5' CLAY w/ SAND DK-LY - BLK; LOOSE ODR - INWTRIAL; PIECES OF PLASTIC METAL	58		
					4								
					5					4-5' A/A SAT			
					6					5-5.5' CLAYEY TRAVEL GY BN SAT	13		
					7					5.5-5' CLAY GY BN; w/ SAND/GRAVEL			
					8					6-6.5' CLAY GY w/ TRACE S/GRAV SL PLASTIC	6		
					9								
					10								
					11								
					12								
					13								
					14								
					15								
					16								
					17								
					18								
					19								

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION			PAGE NO.	HOLE NO.				
4/28			GM-LRLF 200E/1800N				C-9				
DRILLER			DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH					
R. Lounsbury			4.25 HSA	4.25		8					
LOGGER	TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED								
AVE			1'								
5 FT W OF STAKE											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)
1	SS	14	1		1					0-1 TOP SOIL BLACK	<1
			3		2					1-2 CLAYEY GRAVEL; BN w/ f.m. SAND SILT	
2		8	4		3					SLTY CLAY w/ GRAVEL; BN SOME VF-F SAND MOST	1,2
			6		4					POOR RECOVERY IN BED ROCK WET AT 4.5'	
		24	3		5					4A TO 5' w/ CLAY	<1
			4		6					5-6- SILT; BN w/ SMALL GRAVEL WET	
			10		7					5-7- SLTY CLAY w/ GRAVEL/AND - BN MOST	<1
		V22	5		8					7-8' SLT CLAY; G, BN; ARM; SOME SUB ANGULAR GRAVEL	
			6		9						
			10		10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
*ASTM D1586 ST = SHELBY TUBE SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER D = DENNISON CT = CUTTINGS BA = BUCKET AUG.											

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION			PAGE NO.	HOLE NO.					
			5M - LREF. 2100E/1900N				C-10					
4/28 MATECO		DRILL METHOD 4.5" HSA		BOREHOLE DIAMETER		WELL DIAMETER						
TOTAL DEPTH 4												
LOGGER A.E. R. Lounsbery		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'						
Oym												
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	H.S.	
											BSA Readings (in units)	
BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace												
1	SS	24	3		1					0-2 SLY CLAY - BN; SOME MAY BE MOUNTAIN LAKES RICE GRAVEL/SAND; MOD PLASTIC	1	
2	SS	24	10 11 13 15		2 3 4					2-4 A/A; TURNING SW/8Y AND 83.4' FIRM; 4/ GRAVEL	1	
3					5							
					6							
					7							
					8							
					9							
					10							
					11							
					12							
					13							
					14							
					15							
					16							
					17							
					18							
					19							
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											PAGE NO.	HOLE NO.

GEOLOGIC DRILL LOG	PROJECT NAME AND LOCATION 2100' E / 2000' N	PAGE NO.	HOLE NO. C-11
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4/29 LOGGER R. Lounsbury	TOP OF CASING ELEV.	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
			DEPTH/ELEVATION GROUNDWATER - DATE MEASURED /		

HAND AUGER 10' 5" OF STAKE

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)
					1					0.0-0.5- Top SOIL	< 1
					2					0.5-3 SLTY CL; Br H GRAY & TLMG	
					3					BELOW to SURFACE WATER; TRACE	
					4					FINE GRAVEL AND SAND	
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

1640

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.			
4/30			6m LPLF		2100 E/3100 N			C-12			
DRILLER			DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER	TOTAL DEPTH			
MATECO								4			
LOGGER		TOP OF CASING ELEV.	GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED						
A.E.					1'						
R. Lounsbury											
Ange probe 2 NO ANALYTICS 10'5 of STAKE											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOBS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	DESCRIPTION	INTERVAL	OVA readings (in units)
			1		1				0-2 SILTY CL-BLACK		<1
			2		2				1-2 SILTY CL BROWN LOOSE POSSIBLE PILL		
			3		3				2-3 SAND VF. UNIFORM; 1/2 YLBN		<1
			4		4				30-7.5 ECT CLY YLBN PLASTIC; SOME GRAY		
			5		5				2.5-4. SAND A/N		
			6		6						
			7		7						
			8		8						
			9		9						
			10		10						
			11		11						
			12		12						
			13		13						
			14		14						
			15		15						
			16		16						
			17		17						
			18		18						
			19		19						

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 SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
 D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.		
				Gm LRLF				2100'E / 2200'W	C-13		
4/30		DRILLER MATECO		DRILL METHOD HSA 4.25		BOREHOLE DIAMETER		WELL DIAMETER			
LOGGER AxE R. Lounsbury		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'					
10' DOWN WEST OF STAKE											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)
1	SS	20	3 2 1 3		1					0.5- IMPURE FILL, WOOD; CINDER, SLT, SLT DKBN LOOSE 0.5-1.5 CLAYEY SILT; BN; LOOSE; 1.5-2- BLACK SILT; SAT	<1 WOOD PLOCKS AT SURFACE
2	SS	18	3 2 3		2 3					2-3- SLT FILL DKBN; SOFT TRACE CLAY TILL, SMALL GRAVEL 3-4- 2nd SLT CL w/ GRAVEL; YELLOW BN SATURATED	<1
3	SS	22	6 5 8 8		4 5					A/A TO 4.5 4.5-6 SLT CLAY; YL-BN TRACE SM GRAVEL/SAND FIRM	<1
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION			PAGE NO.	HOLE NO.				
4/20			6M-LLF			2100'E/2500'N	C-14				
DRILLER		DRILL METHOD	BOREHOLE DIAMETER		WELL DIAMETER	TOTAL DEPTH					
MATECO		4.25 HS				4'					
LOGGER		TOP OF CASING ELEV.	GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED						
R. Lounsbury					1'						
Auger Point NO ANALYTICS											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)
			1		1					Top soil 0-.5	0
			2		2					.5-1- BLK SILTY CL LOOSE	
			3		3					1-2 CLAYEY SILT DK BN - LOOSE	
			4		4					2-2.5 CLAYEY SAND YL-BN MIST-WG	<1
			5		5					2.5-4.0 SILTY-SAND VF-F YEL BN SAT	
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
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						PAGE NO.	HOLE NO.				

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.			
			GM-LRLF E2000'/1000'N					D-1			
DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH			
4/29		MARECO		4.25							
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED					
R. Lounsbury						1"					
Auger Sampling NO ANALYSIS								0vm			
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	GA readings (in units)
1	CT				1					0-5.70g SOIL BLACK 5-2 SOIL CL GYBN W/OXIDATION TRACE FINE GRAVEL/SAND	<1
	G				2					A/A	<1
	CT				3						
	CT				4					A/A	
	CT				5					THIN GRAVEL SEAL AT 5.0'	<1
	CT				6					GRAVEL SEAL AT 6.5'	<1
					7					GRAVEL AND CLAYEY GRAVEL AT 6.5'	
					8					LARGE GRAVEL, BN, SOME SAND OXIDATION AND BLACK ORGANIC MATERIAL (SILTY)	
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
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										PAGE NO.	HOLE NO.

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.
5m - LRLF 2000'E/1100'N													D-2
4/29 MATECO			DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH		
LOGGERS TOP OF CASING ELEV.			GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED								
R. Lounsbury 1'													
7' N - 6' W of STAKE													
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)		
1	SS	24	8 4 5 4		1					0-2 Top soil; organics, PLK; very soft	< 1		
2	SS	20	1 7 9 8		3					SAND / GRAVEL w/ CL. 94% BN; v-f-m sand; gravel fine to med	< 1		
3	SS		7 6 4 3		5					A/A FINE SAND; (SAT) SLT CL AT 5.8' plastic; BN; trace sand; gravel.	< 1		
					6								
					7								
					8								
					9								
					10								
					11								
					12								
					13								
					14								
					15								
					16								
					17								
					18								
					19								

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SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER

D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION				PAGE NO. HOLE NO.		
		E2000' / 1000' N				D-3		
DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		
TOTAL DEPTH		LOGGING		TOP OF CASING ELEV.		GROUND ELEVATION		
R. Lounsbury		1'		DATE MEASURED		1'		
HANG AREA DU TO ACCESS RESTRICTIONS								
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	
CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION			OVM readings (in units)			
						BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace		
					1			
					2			
					3			
					4			
					5			
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
CONCRETE block AT SURFACE 5' CL BN 5-1.5 - BLACK SLT CL, UPPR CL 1.5-5 - CLAYEY GRAVEL YELLOW BN F-C GRAVEL, SAT AT 3.0' 5.5' SLT CLY CY BN								
<1 <1 <1								

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 D = DENNISON

ST = SHELBY TUBE
 C = CORE
 CT = CUTTINGS

CS = CONTINUOUS SAMPLER
 BA = BUCKET AUG.

PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION			PAGE NO. HOLE NO.					
			GM- LRLF			2000 E / 1300' N					
START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH					
5-2		MATECO				2 15'					
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED					
AxE R. Lounsbury						1'					
145											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM over readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-.5 TOP SOIL .5-.8 YL BN SAND VF-F SAT 1-1.5 SLT CLY YLGN w/ fr mottling	< 1 0
					2						
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
SAMPLED 0.5-1.0'											
*ASTM D1586 ST = SHELBY TUBE CS = CONTINUOUS SAMPLER SS = SPLIT SPOON C = CORE											
											PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM- LRLF 2000'E / 1400'N				PAGE NO. HOLE NO. D-5					
START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 3.5						
LOGGER AXE R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'								
Hand Auger MOVED LOCATION 20' S TO ALSO TEST MOUNT HS												
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM readings (in units)	
											BZ: Breathing Zone	BH: Borehole
					1					0-2.5 BLK SOIL/FILT AND GRAVEL LOOSE	6	
					2					2-2.5 3.5 T SAND M-VL SAT; LOOSE	0	
					3					YLBW TL GRAVEL		
					4							
					5							
					6							
					7							
					8							
					9							
					10							
					11							
					12							
					13							
					14							
					15							
					16							
					17							
					18							
					19							
										CONCRETE PIECES * 12" DIA AT SURFACE		

*ASTM D1586

SS = SPLIT SPOON

ST = SHELBY TUBE

C = CORE

CS = CONTINUOUS SAMPLER

BT = BRACKET AUG

PAGE NO. | HOLE NO.

1530

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.		
G M - L R L F				2000'E / N 1500'					D-6		
START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH					
5/1		MATECO	4.25 HSA								
LOGGER	AXE	TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED							
R. Lounsbury				1'							
5' NE OF TAKE								HS			
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	ORM BVA readings (in units)
											BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	69	1		1					INDUSTRIAL FILL/WASTE VERY LOOSE; SET CLAY DK BN w/ WOOD; METAL FRAGMENTS METAL SHAVINGS; CINDERS AT 1-4' OXIDATION	<1
2	SS	8	4		2					A/A	0
			3		3						
			4		4						
3			4		5					4-4.5 SLTY CL YL BN; TRACE S/GR VENE FIRM	<1
			7		6						
			9		7					4.5-6.0 SET CLAY & FIRM GRADING TO PLASTIC; TRACE S/GR	
			12		8						
					9						
					10					SAMPLE 1: 4-6' : DUP 11470 2-4'	
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM LRLI		3000'E / 1000'N		PAGE NO.	HOLE NO. D-7
START 5/1	FINISH	DRILLER MATECO	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH		
LOGGER Ax R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED /				

Anger Point

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
										BN FILL w/ wood pieces	
					1					0-1.5 Top Sam / Soil Fill 1.5-2.0 SLT CLAY w/ wood; METAL 'GRIMINGS' DK-GY L. BLK	27
					2						
					3					2-4 SLT CL L1 GRAVEL BLK; bits of WOOD, METAL; ORANGE/RED pigment STRONG ODOR	13
					4						
					5					4-6 BLACK OILY SAND; METAL BANDS, NAILS MOD STRONG ODOR	46
					6						
					7					6-8.5 LBN SLT CL 6.5-8 94 clay plastic; w/ TR S/G	17
					8					ODOR from above	
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.			
5/1			5m LRLF				2000'E / 1700'N	D-8			
DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH			
DATECO		4.25-HRA						8			
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED					
R. Lounsbury						/					
								HS			
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	0V m OVR readings (in units)
1	SS	18	4 5 6 7		1					0-.7 - Top SOIL LT BN	1-2' 24'
					2					.7-2. FILLING WASTE; WOOD; METAL FRAGMENTS, CINDERS, OXIDATION SLT CLAY MIXED W/ WASTE	
2	SS	74	3 4 5 6 7		3					2-4 AFA INCREASE IN AMOUNT OF SLTY CLAY	1.2
					4						
3	SS	18	1 1 1 1		5					4-6 SLT CL BLACK; 50 FT V F SAND; WET SOME GRAY; ORGANIC	< 1
					6						
4	SS		3 4 5 6 7		7					6-6.5 CLAYST GRAVEL; PY-BN; FAT W/ SAND 6.5-7.2' - SLTY CLAY YL-BN; FIRM TR S/CL 7.2-8' - SLTY CLAY GRAY; W/ TR S/CL SLIGHT PLASTIC	< 1
					8						
					9						
					10					SAMPLE 1-3'	
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
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GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION <i>2000' E / 1800' N</i>		PAGE NO.	HOLE NO. <i>D-9</i>
START <i>5/1</i>	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER
LOGGER <i>R. Lounsbury</i>		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <i>1'</i>	
TOTAL DEPTH <i>3</i>					

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-2 SEPIMENT, BLK; SANDY SATURATED	<1
					2					2-3 CLAYEY FRAVEL: YL-BN (SAT) SOME SAND	<1
					3						
					4						
					5					SAMPLE 0.5-1.5 1-2'	
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. | HOLE NO.

1700

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO. HOLE NO.	
4/29				2000 E' / 1900' N		D-10			
DRILLER				DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER	
R. Lounsbury								TOTAL DEPTH	
TOP OF CASING ELEV.				GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED			
						1'			
HAND DUGGER								HS	
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOBS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL
					1				0-3 soft black silty sediment organic; slight sheen on surface water
					2				3-4 silty clay, very plastic
					3				TRACK JAM/Gravel; very firm
					4				
					5				
					6				
					7				
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				

Oym
 BZ: Breathing Zone
 BH: Borehole
 SP: Sample
 HS: Headspace

*ASTM D1586 ST = SHELBY TUBE
 SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
 D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION 2000'E/2000'N				PAGE NO.	HOLE NO. D-11				
		DRILLER 4/29	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 2					
LOGGER R. Lounsbury		TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER · DATE MEASURED 1'							
HAND AUGER 5' S of STAKE											
SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-.5 TOP SOIL / SCL CL OF CLAYEY SCLT / CLAY; ROOTS, (SAT) 1-2 SCL CL; BN W/ MAY MOTTLING TRACE SM GRAVEL; VERY PLASTIC	< 1
					2						
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION				PAGE NO. HOLE NO.				
			6 m LRLF		200'E/1900'N						
4/30			MATECO				TOTAL DEPTH D-12				
LOGGER R. Lounsbury			TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'				
SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)
1	SS		4 6 12 8		1					0-0.5 - Dk SCL, DRY, LOOSE 0.5-1.5 - INDUSTRIAL WASTE RNT COALLES METAL FRAGMENTS 1.5-2.0 BN SANDY SILT	<1
2	SS		4 3 8		3					2.0-2.5 FIA 2.5-4.0 SCL YL BN nipp m. HLing 100% of black carbon; some gravel sand very fine	<1
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. | HOLE NO.

D-13
~~D-14~~
~~C-18~~

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION GM-1 RLF 2000'E / 2200'N		PAGE NO. HOLE NO. C-18
4/30	DRILLER MATECO	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER
LOGGERS R. Lounsbury	TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'	

Anger Point No ANALYTICS

OV M

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	Readings (in units)
			2							0-2 POSSIBLE FILL; 94 BN w/tan;	
			2		1					4L-BN SILTY CLAY; loose;	<1
			2		2					SOME LAYERED BULK SILT/CLAY	
			2							2-25 A/A	
			4		3					2.5-3 CLAYEY SILT 4L-BN SAT	1.2
			4							3-4 SAND VF, SAT, 4L-BN	
			6		4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. HOLE NO.

D-14

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION <i>GM - LRLP</i>		2300' E 1900' R / 2300' N		PAGE NO. <i>5-14</i>	
		DRILLER <i>MATECO</i>		DRILL METHOD		BOREHOLE DIAMETER	
4/30		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED	
LOGGER <i>R. Lounsbury</i>		TOTAL DEPTH <i>6</i>		WELL DIAMETER		DATE MEASURED <i>1</i>	

Auger Point NO ANALYTICS 3' W OF STAKE

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	24	1 3 5		1					0 - .7' TOP SOIL BN to 4L-BN	
					2					.7 - 1' BLK SILTY SAND; 1-2 CLAY SILT; DKBN LOOSE	0-1 1/2 CLEAN fill
2	ST	18	3 4 6		3					2-2.5' 1A/A	
					4					LS CLAYEY SAND XL-BN VF-F MOSTLY SAND AT 3-4' (SAD)	<1
3	SS		2 1 3 4		5					4A TO 5.3'	<1
					6					5.3-6.0 SILEY CL; 4LBN W/G.M. ILING	
					7					SOME FINE GRAVEL AND THIN SILT / ENCL	
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.
										5M-LRFP		1900 E/1000 N	E1
DRILLER					DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH		
4/29					MATECO		4.25						
LOGGER		TOP OF CASING ELEV.			GROUND ELEVATION			DEPTH/ELEVATION GROUNDWATER - DATE MEASURED					
R. Lounsbury								1'					
9' N : 4' W OF STAKE										OVM			
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM HS BVA readings (in units)		
1	5	22	2 3 4 5		1					0-1 TOP SOIL PLACK	0		
					2					1.5-2 SILTY CLAY CY 8N W/ OXIDATION LOW THROUGHOUT; TRACE SMALL GRAVEL FINE SAND			
2		22	2 3 4 5		3					2-3 TO 3' 3-4 INTERBEDDED SILTY CLAY w/ THIN SAND LENSES; MOUT TO WET FINE GRAINED OXIDATION THROUGHOUT	<1		
3		22	4 4 4 3		5					4-4.5 AFA WET IN SEAMS 4.5-5.5 CLAYTAN; VF; 6Y; SAT. 5.5 SILTY CLAY; 7Y; VERY PLASTIC; TRACE FINE SAND	<1		
4		24	3 3 4 7		7					SILTY CLAY; VERY PLASTIC; 6Y; TRACE SMALL GRAVEL NODULES	<1		
					8								
					9								
					10								
					11								
					12								
					13								
					14								
					15								
					16								
					17								
					18								
					19								

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PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.			
			GM LRLF 1700'E/1100'N				E-2				
DRILLER 4/29 MATEW		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH 8			
LOGGER AXE R. Lounsbury		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED /					
Auger Point NO sampling - ANALYSIS ovm											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	HS
											OVA readings (in units)
	CT				1					0-1 TOP SOIL BLACK 1-2 CLAYEY SAND F-M; F.N. FINE GRAVEL AND GRAY (SAT)	<1
	CT				2					CLAYEY SILT; W/ SAND, VF G & BN W/ OXIDATION SAT	<1
	CT				4					4.5-6 SAND AND GRAVEL SAND M-C ANGULAR GRAVEL FINE; BROWN	<1
	CT				6					6-8 - SILEY CLAY; GRAY; VERY PLASTIC; MOVT; TRACE FINE GRAVEL.	<1
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						
*ASTM D1586 SS = SPLIT SPOON D = DENNISON ST = SHELBY TUBE C = CORE CT = CUTTINGS CS = CONTINUOUS SAMPLER BA = BUCKET AUG.											
										PAGE NO.	HOLE NO.

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION <i>1901 E / 120th</i>				PAGE NO. HOLE NO. <i>E3</i>					
		DRILLER <i>4/90</i>		DRILL METHOD		BOREHOLE DIAMETER WELL DIAMETER					
LOGGER R. Lounsbury		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <i>1'</i>					
<i>Hwy 101 Ave on ESR of Marsh</i>											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-1 Top soil / sediment	0vm <1
					2					1-1.5 LATE SATURATED SILTY CLAY D&BN	
					3					1.5-2.5 CLAYEY GRAVEL w/ SAND Y&BN, SATURATED	0vm <1
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION <i>GM- LRLF 1900' E/1300' N</i>			PAGE NO.	HOLE NO. <i>E-4</i>
START <i>5-2</i>	FINISH	DRILLER <i>MATECO</i>	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH <i>1</i>	
LOGGER <i>AXE</i> <i>R. Lounsbury</i>		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <i>1'</i>			

										HS	
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM OVR readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-.5 SEDIMENT BLK SAT .5-1 SAND AND GRAVEL YLGN SAT	0
					2						
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION <i>GM- LRLF</i>			PAGE NO. HOLE NO. <i>E-5</i>	
START <i>5/2</i>	FINISH	DRILLER <i>MATECO</i>	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH <i>1</i>	
LOGGER <i>AxE</i> <i>R. Lounsbury</i>		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <i>1'</i>			

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS- IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-.3' SEDIMENT & SAT .3-1 GRAVEL w/ SAND	0
					2						
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

*NO
SAMPLE
TOO GRAVELLY*

0750

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.	
										EM - LRLF		190' E / 150' N	EE	
4/30					DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH	
R. Lounsbury					TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED		1'		8'	
Auger point										NO ANALYTICS		TS		
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace			
					1					FILL MATERIAL MUDY FINE-GRAINED SANDS - SAND W/ W/ TRENTED WOOD FRAGMENTS; SMALL PIECES OF PLASTIC AND BLOCKS	1			
					2					2-4 A/A; ANGLED PIECES OF WOOD DRILLED UP OLD TIE-ROD; PLASTIC PIECES	4			
					3									
					4					4-6 A/A H2O ≈ 5.0'				
					5					4-5.5'	2			
					6					5.5-7.5' CLAYEY GRAVEL; 4L-BN, SKT				
					7									
					8					7.5' CLAY - CLY. FINE MOUNT-WET RECYCLED PLASTIC TRAIL SAND/GRAVEL				
					9									
					10									
					11									
					12									
					13									
					14									
					15									
					16									
					17									
					18									
					19									
										TD = 8'				

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PAGE NO. HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.		
5/1			C.M. L.L.F. 192E/100N				E-7			
DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH		
11A1200		4.25 HSA						27 13'		
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED				
R. Lounsbury						1'				
								HS		
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	DESCRIPTION	QUANTITY (in units)
1	SS	16	16		1				TOP SOIL Fill 0-1.0' BK & N. retaining pieces sand GRAVEL 1-2 SAND AND GRAVEL FILL TAN W/CL	0
2	SS	10	2		2				2-4 INS WASTE: CYCLOPS, SLAS METAL SHAVING W/ DRON JET CLY FULL RECOVERY - LIME; PIECES OF CONCRETE	3.4
3	SS	6	2		3				4-6 FOOT FILL LARGE ≈ 1-2" GRAVEL MIXED W/ WASTE; VERY SOFT LIME SET CLAY (BN) MIXED W/ WASTE; POOR RECOVERY	0
4	SS	7	1		4				6 FOOT FILL A/R; HEAVY OXIDATION FILL TO 8.5 / 8.5-90 SANDY CLAY GRAVEL SATURATED; BN	2
5	SS	12	8		5				8-10 SET CLY & BN W/ PM MCHLING 9.7-7 VERY FIRM dry 9.7-10 SILTY SAND 94 V.F. SAT.	1
6	SS		6		6				TO 10.5' 10.5-13 - SET CLAY TRAY; VERY PLASTIC; TAN SAND / GRAVEL	1
			5		7					
			7		8					
			7		9					
					10					
					11					
					12					
					13					
					14					
					15					
					16					
					17					
					18					
					19					
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								PAGE NO.	HOLE NO.	

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.					
DRILLER		DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH							
LOGGER	TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED									
4/30												
R. Lounsbury					1'							
HAND AUGER							QVA					
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOW'S*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	QVA readings (in units)	
											BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace	
					1					0-5 TOP SOIL	< 1	
					2					1.5-1.5 SILTY CLAY, BLACK, ORGANIC	< 1	
					3					1.5-3.0 DK BN SILTY SAND, LOOSE VF	< 1	
					4					3-6 YL BN CLAY SAND VF W/ SILT	< 1	
					5					TRACE SMALL GRAVEL	< 1	
					6							
					7							
					8							
					9							
					10							
					11							
					12							
					13							
					14							
					15							
					16							
					17							
					18							
					19							
*ASTM D1586 ST = SHELBY TUBE SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER D = DENNISON CT = CUTTINGS BA = BUCKET AUG.											PAGE NO.	HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.			
			GM-LRLF 1900'E/1700'N					E-8			
5/1		MATECO		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER			
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED					
AXE						1'					
R. Lounsbury											
Anger Point NO ANALYTICS) MOVED 5'E TO AVOID METAL CHUNKS HS											
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVM
											OVR readings (in units)
1	SS				1					0.5-5-Top Soil	25
					2				1.5-2.5-LT CLAY PLACK W/ IND WASTE WASTE; METAL SCRAP ODOR		
2	SS				3					2-4 IND WASTE; BLACK OIL/GREASE METAL PIECES / WOOD CHUNKS / FIBERS HEAVY ODOR	28
					4						
3	SS				5					A/A HEAVY CONTAMINATION H2O x 4.5-5.0	21
					6						
4	SS				7					6.5-7.5-CLAYST GRAVEL W/ SAND (SAT) COLOR = GRAY?	19
					8				2.5-5-LT CLAY GRAY; VERY PLASTIC		
					9					COLLECTED SAMPLES/DAY AT 4'-6'	
					10						
					11						
					12						
					13						
					14						
					15						
					16						
					17						
					18						
					19						

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PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.	
START 5/1		FINISH		DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH 3'		
LOGGER R. Lounsbury				TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'						
<i>Hand Auger</i>														
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace			
					1					0.5' sediment top soil	<1			
					2					5-7' SCLL; 4 SUNE 5/61				
					3									
					4									
					5									
					6									
					7									
					8									
					9									
					10									
					11									
					12									
					13									
					14									
					15									
					16									
					17									
					18									
					19									
*ASTM D1586 ST = SHELBY TUBE SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER D = DENNISON CT = CUTTINGS BA = BUCKET AUG.											PAGE NO.		HOLE NO.	

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION <i>1905' N / 1900' E</i>		PAGE NO.	HOLE NO. <i>E-10</i>
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START	FINISH <i>5/1</i>	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
LOGGER <i>R. Lounsbury</i>		TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED <i>1"</i>		

<i>HS</i>					
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SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	<i>SSM</i> SSM readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-5-SEDIMENT BLK; 1/2 IN. 1/2	3
					2					1.5-1.5-GRANULAR CLAY 94% N 5-10% SAND	
					3					1.5-2.0 SET CL; YL BN, W/ 5/6K	1.5
					4					SAMPLE 2.5-1.5	
					5						
					6						
					7						
					8						
					9						
					10						
					11						
					12						
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*ASTM D1586	ST = SHELBY TUBE	PAGE NO.	HOLE NO.
SS = SPLIT SPOON	C = CORE		
D = DENNISON	CT = CUTTINGS		
	CS = CONTINUOUS SAMPLER		
	BA = BUCKET AUG.		

1620

E-11

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.						
			1900 E, 2000 N 2000 E, 1900 N			D-10						
DRILLER		DRILL METHOD		BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH						
4/29												
LOGGER	TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED									
R. Lounsbury			1"									
HAND ANGLE												
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)	
					1					0-2 LOOSE SILTY SOIL; DRY; TRACE WOOD FRAGMENTS AND ROOTS; LITTLE MED-GRAVEL	<1	
					2					LOOSE SOIL; PROBABLY FILL SOIL; FOUND RUSTY NAIL AT 3'	<1	
					3					4-5 CLAYEY GRAVEL; SATURATED; SOME SAND-F-M GRAVEL 5-M	<1	
					4							
					5							
					6							
					7							
					8							
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*ASTM D1586 ST = SHELBY TUBE SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER D = DENNISON CT = CUTTINGS BA = BUCKET AUG.											PAGE NO.	HOLE NO.

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.
				GM	LRLF	1900'E/2100'N			E-12
4/30				DRILLER		DRILL METHOD		BOREHOLE DIAMETER	WELL DIAMETER
				MATECO		4.25-HSA			TOTAL DEPTH
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED			
AxE R. Lounsbury						1'			
HS									
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	DESCRIPTION
									ovm OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	22	2 8 5 4		1				0-1.5 Tm JWL 1.5-1 BM SLT CLAY LOOSE 1-1.5 TWT INDUSTRIAL FILL WASTE 1.5-2.0 CLAYEY SILT/MS YL-BN, FIRM
2	SS	14	4 5 5 9		2				2-4 BN(CD) SLT-CLAY - FILL? OXIDATION, SL FIRM 1RY
3	SS		7 4 4 5		3				4.5-5.5 CLAYEY SAND AND GRAVEL YL BN SAT
					4				5.5-6.0 SLT CL; GY BN FIRM SOME GRAVEL
					5				
					6				
					7				
					8				
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					11				
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 D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. | HOLE NO.

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM-LRLF 1900'E/2200'N				PAGE NO.	HOLE NO. E-13				
DRILLER 4/30 AXE		DRILL METHOD 4.25-145A		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH 4				
LOGGER R. Lounsbury		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'						
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	H.S.	
											OVM OVA readings (in units)	
1	SS	20	1		1					0-1.5 Top Soil	0	
			2					1.5-1.5 SLT CL LT BN; LOOSE; OXIDATION				
			3				1.5-2.0 SLT CL DK BN; soft					
2	SS	3	4		2				2-4 2.5-4 SLT CL YL BN; FIRM	0		
			5				TRACE GRAVEL / SAND; CARBON SPECKS					
			6									
3	SS	4	7		3							
			8									
			9									
			10		4							
			11		5							
			12		6							
			13		7							
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			30		24							

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SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. | HOLE NO.

1815

GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO.	HOLE NO.		
				6M LRLF				1900'E/2300'N	E14		
4/30		METACO		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER	TOTAL DEPTH		
									6		
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED					
AXE R. Lounsbury						1"					
Anger Point				NO ANALYTICS				HS			
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	GVN GVN readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	20	2 3 4		1					0-1.5 TOP SOIL 1.5-2 CLAYEY SAND AND GRAVEL YLBN	<1
2	SS	14	2 3 4 6		2 3					2-3.5 CLAYEY SILT; DKBN, LOOSE 3.5-4 CLAYEY SAND WET; YLBN; VF	6.6
3	SS	20	4 4 3 2		4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19					4-5.5 A/A SATURATED 5.5-7 SILTCL YLBN w/ GRAY MOTTLING SL PLASTIC; TRACE GRAVEL	2.2

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SS = SPLIT SPOON
D = DENNISON

ST = SHELBY TUBE
C = CORE
CT = CUTTINGS

CS = CONTINUOUS SAMPLER
BA = BUCKET AUG.

PAGE NO. | HOLE NO.

mound B3/C-3

GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.								
START										FINISH		DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH	
5/2												MATECO									
LOGGER										TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER - DATE MEASURED							
R. Lounsbury														1'							
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)										
					1					0-3.5' BLACK SLTY CL; LOOSE ORGANIC	0										
					2					3.5-4.0' BLACK SILT/CLAY; SATURATED	0										
					3					4-4.5' BN SLT/CLAY; SURROUNDING SURFACE											
					4																
					5																
					6																
					7																
					8																
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GEOLOGIC DRILL LOG				PROJECT NAME AND LOCATION				PAGE NO. HOLE NO.																																																																																																																																																																																																																																																													
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5/2				MATECO																																																																																																																																																																																																																																																																	
LOGGER		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER		DATE MEASURED																																																																																																																																																																																																																																																													
R. Lounsbury								1'																																																																																																																																																																																																																																																													
<table border="1"> <thead> <tr> <th>SAMPLE NO.</th> <th>SAMPLE TYPE</th> <th>RECOVERY %</th> <th>SAMPLE BLOWS*</th> <th>ELEV</th> <th>DEPTH</th> <th>GRAPHIC LOG</th> <th>WELL CONSTRUCTION</th> <th>CLASS-IFICATION</th> <th>SAMPLE INTERVAL</th> <th>DESCRIPTION</th> <th>OVA readings (in units)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>rebar; concrete on side</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>0-2.5 DK BN CLAY SAND; LOOSE w/ GRAVEL</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td>2.5-3.0 SAND; MD-BN w/ SILT CLAY</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td>3.0-3.5 DK BN SLTY CLAY</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>10</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>11</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>12</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>13</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>14</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>15</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>16</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>17</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>18</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>19</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>										SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)											rebar; concrete on side							1					0-2.5 DK BN CLAY SAND; LOOSE w/ GRAVEL	0						2					2.5-3.0 SAND; MD-BN w/ SILT CLAY	0						3					3.0-3.5 DK BN SLTY CLAY	0						4												5												6												7												8												9												10												11												12												13												14												15												16												17												18												19						
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GEOLOGIC DRILL LOG										PROJECT NAME AND LOCATION		PAGE NO.	HOLE NO.
START		FINISH		DRILLER		DRILL METHOD		BOREHOLE DIAMETER		WELL DIAMETER		TOTAL DEPTH	
5-2				MATECO								3.5'	
LOGGER		AXE		TOP OF CASING ELEV.		GROUND ELEVATION		DEPTH/ELEVATION GROUNDWATER		DATE MEASURED			
R. Lounsbury													
1" DIA. CABLE STICKING OUT OF SIDE OF mound													
SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units)		
					1					0-5' TOP SOIL			
					2					5-2' BROWN SLT CLAY w/LARGE GRAVEL			< 1
					3					2-2.5' SANDY CLAY w/ GRAVEL 4% BN			0
					4					2.5-3.5' YLBN SLTCL w/ gray mottling			0
					5								
					6								
					7								
					8								
					9								
					10								
					11								
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					13								
					14								
					15								
					16								
					17								
					18								
					19								
										Auger Refusal			
										5.0 Auger Total			

MOUING D-12/E11

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM- LRLF			PAGE NO.	HOLE NO.
START 1/2	FINISH	DRILLER MATECO	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 5	
LOGGER AxE R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'			

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SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-1 SOIL BN SETCL LOOSE W/ GRAVEL	0
					2					1-4 POSSIBLE FILL YL-BN W/ BLACK LAYERS; MAINLY SETY SAND	0
					3					PIECES OF BURNING OR COAL	
					4					LOTS OF GRAVEL AT 3'	
					5					4-5' BLK ORGANIC MATERIAL	
					6					HIT LAGE ROCK REFUSAL	
					7						
					8						
					9						
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					19						

MOUND D-13/E-13

GEOLOGIC DRILL LOG			PROJECT NAME AND LOCATION GM- LRLF			PAGE NO.	HOLE NO.
START 5/2	FINISH	DRILLER MATECO	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH 3'	
LOGGER A&E R. Lounsbury		TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED 1'			

SAMPLE NO.	SAMPLE TYPE	RECOVERY %	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	OVA readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					0-3 SILENT & LBN. - 2 5/6 VERY FIRM, SOME PYROCLASTIC AND OXIDATION	0
					2					HIT LARGE ROCK AT 2'	0
					3					ALL NATIVE MATERIAL	
					4						
					5						
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SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 RELATED WORK

- A. Contract Conditions
- B. Summary of Work: Section 01000

1.02 DESCRIPTION

- A. A general outline of the principal features of each item as listed does not in any way limit the responsibility of the Contractor for making a thorough investigation of the Drawings and Specifications to determine the scope of work under the entire Contract. Payment to the Contractor of the amounts based on the quantities of work as measured in accordance with the specific methods of measurement and the prices stipulated in the accepted bid will constitute complete compensation for all work shown in the Drawings, provided in the specifications or other Contract Documents and all costs of accepting the general risks, liabilities and obligations expressed or implied. Payment under all items shall include, but not necessarily be limited to, compensation for furnishing all supervision, labor, equipment, and materials and services (including overhead and profit), as well as performing all work required to accomplish and complete the work specified under each item and all other work required.
- B. For Unit Price Items:
 - 1. The estimated quantities of unit price items are not guaranteed and are solely for the purpose of comparison of bids and determining initial contract price.
 - 2. The Contractor will be paid for the actual amount of work performed and accepted by the Engineer. Final measurements will be made to determine the quantities for the various unit price bid items, and shall be the basis for final payment.
- C. For Lump Sum Items, the Contractor shall submit prior to initiating site activities, a schedule of values for the various components of work associated with the lump sum item. The schedule of values will be reviewed by the Engineer, and must be approved by the Engineer prior to authorizing any payment for the lump sum item. The Contractor will be paid on the basis of actual work completed in accordance with the approved schedule of values.

Upon completion of the item, 100 percent of the lump sum price may be paid, subject to the terms of the Contract Documents.

- D. The Contractor shall prepare payment applications for each request for payment. Partial payment requests may be made at the end of each month for work completed to date. Payments will be made to the Contractor as stated in the Agreement, subject to retainage and other terms of the Contract as applicable. A schedule of anticipated partial payment values shall be prepared by the Contractor and submitted with the Contractor's schedule.
- E. All units of measurements shall be standard United States convention as applies to the specific items of work.

1.03 SCOPE OF PAYMENT

- A. Payments to the Contractor will be made for the actual quantities of the contract items performed and accepted in accordance with the Contract Documents. Upon completion of construction, the Contractor will be paid for the actual quantities as measured at the bid price, and no adjustments will be made to the contract unit prices, should these quantities increase or decrease from the estimated quantities stated in the bid.
- B. The Contractor shall accept compensation in full payment for furnishing all materials, labor, tools, equipment, and incidentals necessary to perform the work as required by the Contract Documents; for all loss or damage arising from the nature of the work, or from difficulties which may be experienced during prosecution of the work, or from unfavorable weather conditions, or from expenses incurred in consequence of the suspension of work as authorized by the Contract Documents.
- C. No extra payment shall be made to the Contractor for any delays caused by lack of progress, defective workmanship, or rescheduling of work by other contractors, subcontractors, or material and equipment suppliers.

1.04 CHANGE ORDERS

- A. Should the scope of work require alteration due to unanticipated conditions or conditions differing materially from the Contract Documents, the Contractor shall immediately notify the Engineer of such. If a Change Order is deemed necessary by the Engineer, equitable adjustment will be made to the Contract for a changed scope of work as provided in the Contract Document.

1.05 ELIMINATED ITEMS

- A. If any unit price item of work is found to be unnecessary by the Engineer, that item of work will be eliminated. Any such elimination of items shall in no

way invalidate the Contract, and no allowance will be made to the Contractor as compensation for eliminated unit price items.

- B. Should any work to be performed as part of a lump sum item be eliminated by the Engineer, a Change Order shall be issued providing for a negotiated equitable adjustment to the Contract.

1.06 PARTIAL PAYMENTS

- A. The Contractor may prepare partial payment applications as work progresses. Applications shall be monthly for work completed to the last day of the application month.
- B. Payment will not be authorized for work which in the opinion of the Engineer, is incomplete, faulty, or otherwise not in conformance with the Contract Documents.
- C. Retainage shall be withheld from payments as specified by the Contract Documents.
- D. Materials stored on-site will not be measured and paid for.

1.07 FINAL PAYMENT

- A. Upon completion of the work and acceptance by the Engineer, final quantities will be computed for the items of work. Final payment will be made based on the final quantities and any contract change order adjustments, after deducting therefrom, all previous payments.

1.08 INCIDENTAL WORK

- A. The Contractor is to provide at no additional cost to the Owner, all such incidental materials, labor, equipment and services to complete the intent of the Contract. All costs and expenses for such incidental work shall be included in the Contractors prices as set forth in the Bid Schedule.

1.09 ITEMS OF WORK

Item No. 1—General Conditions

- A. Method of Measurement: Lump Sum.
- B. Payment: Payment shall be at the contract lump sum price which shall constitute full compensation for all additional work required to complete the work items included in Division 1, "General Conditions" of the specifications that is not otherwise included elsewhere as a separate bid item. This bid item

will be paid in equal monthly installments based on the length of contract period.

Item No. 2—Mobilization and Demobilization

- A. Method of Measurement: Lump Sum.
- B. Payment: Payment shall be at the contract lump sum price which shall constitute full compensation for all labor, materials, equipment and tools required to complete all work associated with mobilization and demobilization of materials, personnel, and equipment to and from the project site, supply and installation of Engineer and Contractor temporary offices, temporary utilities, project construction sign, and preparation of the Contractors Health and Safety Plan. The amount bid for this item shall not exceed ten percent (10%) of the total contract price. Payment will be made for sixty percent (60%) of the amount bid for this item upon completion of mobilization of equipment and personnel, installation of temporary facilities, including utilities, and Engineer's review and acceptance of the Contractor's Health and Safety Plan. The balance of this item will be paid upon final cleanup and demobilization from the project site.

Item No. 3—Erosion and Sediment Control Structures

- A. Method of Measurement: Lump Sum.
- B. Payment: Payment shall be at the contract lump sum price which shall constitute full compensation for all labor, materials, equipment and tools required to purchase and install silt fencing, hay bales, and rip rap as detailed in the specification. Item also includes removal of all erosion control measures to include built up sediment at the completion of construction. Payment will be made for seventy five (75%) of the amount bid for this item upon completion of installation of all erosion control structures as detailed in the contractor's Erosion Control Plan and as required by the local permitting authority. The balance of this item will be paid upon completion of the project including appropriate maintenance of the structures during the construction period, and removal of sediment at the completion of construction.

Item No. 4—Clearing and Grubbing

- A. Method of Measurement: The quantity measured for payment shall be the actual number of acres cleared and grubbed in accordance with the specifications. The area will include the western portion of the site, the 66-foot proposed right-of-way (ROW) and only that area in the 350-foot frontage required to be cleared in order to conduct waste consolidation activities. Limits of clearing will be measured by survey. Survey shall be conducted by

a Professional Land Surveyor registered in the State of Michigan. Measurement will be conducted by the surveyor to the nearest 0.1 acre.

- B. **Payment:** Payment shall be at the contract unit price per acre which shall constitute full compensation for all labor, material, equipment and tools required to complete all work associated with clearing and grubbing including but not limited to: tree cutting, chipping, and removal off-site, stump grubbing, grinding or chipping, and disposal on-site, and relocation of miscellaneous debris to the limits of the final cover, complete as shown on the drawings and in accordance with these specifications.

Item No. 5—Waste Excavation, Relocation and Placement

- A. **Method of Measurement:** The quantity measured for payment shall be the actual number of in-place cubic yards of waste materials excavated and relocated as measured by survey. Volume will be calculated based on established grades prior to excavation; and following completion of waste removal activities, but prior to backfilling. Grades will be measured by conducting a waste consolidation survey as detailed in the specifications. Survey shall be conducted by a Professional Land Surveyor registered in the State of Michigan. Measurement shall be conducted by the surveyor and shall be to the nearest cubic yard.
- B. **Payment:** Payment shall be at the contract unit price per cubic yard of waste excavated which shall constitute full compensation for all labor, material, equipment and tools required to complete all work associated with waste excavated, and relocated, and all other costs to complete this activity in accordance with the specifications and as directed by the Engineer.

Item No. 6—Off-site General Fill

- A. **Method of Measurement:** The quantity to be measured for payment shall be the actual number of cubic yards of off-site general fill material required to achieve the minimum preparatory grades in the frontage area as shown on the plans. Measurement will be performed by a registered land surveyor retained by the contractor utilizing survey's conduct before and after general fill material and topsoil placement. Measurement will be to the nearest cubic yard.
- B. **Payment:** Payment shall be at the contract unit price for off-site general fill placement minus the volume of topsoil to be paid for as measured in Bid Item 8, and shall constitute full compensation for all labor, material equipment, permits, and fees as required to purchase, deliver, compact and test off-site general fill material in accordance with the Plans and Specifications.

Item No. 7—Off-Site Granular/Aggregate Backfill

- A. Method of Measurement: The quantity to be measured shall be the actual number of cubic yards of off-site granular/aggregate backfill material placed as described in the specifications. Measurement will be performed by a registered land surveyor retained by the contractor utilizing survey's conducted before and after granular fill material placement. Measurement will be to the nearest cubic yard.
- B. Payment: Payment shall be at the contract unit price for off-site granular fill material, and shall constitute full compensation for all labor, material equipment, permits and fees as required to transport place, compact and test off-site granular fill material in accordance with the plans and specifications.

Item No. 8—Topsoil

- A. Method of Measurement: The quantity to be measured for payment shall be the actual number of cubic yards of topsoil placed in accordance with the specifications. Area to be measured for payment will consist of the area of the general fill activities in the frontage area as shown on the plans. Measurement of the area topsoiled will be performed by a registered land surveyor retained by the contractor based on survey's conducted at the site. Thickness of the topsoil layer shall be 4 inches with an acceptable deviation of 0.5 inch. Any topsoil material in excess of 4.5 inches will not be measured for payment. Measurement of the depth will be by field verification by the engineer through test excavations performed at the engineers discretion. Calculation of the quantity for payment shall be the area of general fill activities times 4 inches unless the engineer identifies areas of topsoiling not in conformance with the specifications. Measurement will be to the nearest cubic yard. Restoration activities in areas disturbed by the contractor but not in a designated general fill area will not be measured for payment and will be considered incidental to the work of overall site restoration.
- B. Payment: Payment shall be at the contract unit price for topsoil layer material placed in 4-inch compacted thickness and shall constitute full compensation for all labor, material equipment, permits and fees as required to deliver material from on-site stockpiles, compact and test topsoil layer material in accordance with the plans and specifications.

Item No. 9—Finish Grading and Temporary Seeding

- A. Method of Measurement: The quantity to be measured shall be the actual number of square yards of the frontage area finish graded and seeded in accordance with the specifications. Area to be measured for payment shall be the area of topsoil activities as shown on the plans and as measured for Bid Item 8. Measurements will be performed by a registered land surveyor retained by the contractor. Measurement will be to the nearest square yard.

Restoration activities in areas disturbed by the contractor but not included in the area measured for topsoil placement will not be measured for payment and will be considered incidental to the work of overall site restoration.

- B. **Payment:** Payment shall be at the contract unit price for finish grading and seeding and shall constitute full compensation for all labor, materials and equipment required to prepare the seedbed, fertilize and sow seed, provide and install mulch and maintain seedbed until accepted by Engineer in accordance with the specifications.

END OF SECTION

SECTION 01030

SUBSTITUTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. General Material and Equipment Requirements.
- B. Products.
- C. Product Options and Substitutions.
- D. Transportation and Handling.
- E. Storage and Protection.

1.02 RELATED SECTIONS AND REQUIREMENTS

- A. General and Specific Requirements—as stated in the Contract Documents.
- B. Section 01000—"Summary of Work."
- C. Section 01300—"Submittals."

1.03 GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS

- A. Unless otherwise indicated on the Drawings or the Specifications, only new products shall be incorporated in the work. All products furnished by the Contractor, or by the vendor as appropriate, to be incorporated into the work shall be subject to the inspection and approval of the Engineer. No product shall be processed for, fabricated for, or delivered to the work without prior approval of the Engineer.
- B. For the purpose of indicating the standards of type, quality, design, and performance of product to be provided under this Contract, various materials and equipment may be named in the Contract Documents as commercial brands or equal.
- C. Where manufacturers' names appear in the Contract Documents, the names are presented for consideration by the Contractor, or by the vendor if appropriate, in preparing his Bid. Manufacturers may be listed on the basis of the Owner's knowledge of or experience with the various manufacturers, and the listing does not represent that the manufacturers will meet the detailed requirements of the Specifications. It is the responsibility of the Contractor, in preparing his Bid, to inform and satisfy himself that the manufacturer selected for each item will meet the detailed requirements of the Contract Documents, whether the manufacturer selected is one of the named manufacturers or not.

1.04 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the work. Products may also include existing materials or components required for reuse.
- B. Provide interchangeable components of the same manufacturer for similar components.

1.05 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. The Contract Documents have been prepared using particular product items in order to provide a complete set of Plans and Specifications. This is not meant to imply that products of other manufacturers or other models from the same manufacturers, cannot perform equally as well. Unless stated to the contrary in these Contract Documents, another product may be substituted if approved by the Owner (and the Engineer, if appropriate). A Record Drawing shall be maintained by the installing Contractor showing the product as actually installed. The Engineer (or other party performing similar services) shall be reimbursed by the party making the substitution for any engineering work required as a result of the substitution.
- B. The following procedures will be followed relative to substitutions:
 - 1. The General Contractor, as part of his Bid, shall submit a list of requested substitutions, which shall be accompanied by the following information:
 - a. Catalog information of the proposed product.
 - b. Other Drawings and manufacturer's information necessary to fully describe the product as intended for its specific use in this project.
 - c. A letter from the manufacturer certifying that the recommended substitution will meet the performance requirements for that product.
 - d. Identification of changes required in the installation of the substituted product compared to the information presented in the Contract Documents.
 - e. Any notable differences between the substituted product and the information presented in the Contract documents.

2. The Engineer shall review the requested substitution within 10 calendar days and shall make recommendations to the Owner relative to the acceptability of the substituted equipment or material. This review will not relieve the Contractor of the responsibility for the proper functioning of the product. The Owner will retain the final decision as to the acceptability of the substitution.
 3. Substitutions can also be made after the Contract has been awarded, if approved by the Owner (and Engineer, if appropriate) prior to the purchase of the equipment or material and its incorporation into the work. In this case, the request for the substitution must be clearly identified and submitted as a Shop Drawing, as described in Section 01300, "Submittals." Any changes in cost must be clearly explained. Approval for the substitution or other action as appropriate will be provided in accordance with the procedures for the review of Shop Drawings.
 4. The Contractor will maintain accurate record drawings showing the equipment or materials as actually installed.
- C. In cases where a product is purchased directly by the Owner or by others, the following procedures will be followed:
1. The product supplier will submit the information noted in Part 1.05 B.1 above as part of his Bid or Proposal in addition to any other information requested by the Contract Documents. The Owner, with the advice of the Engineer, if appropriate, will make the final decision relative to the acceptability of the recommended substitution.
 2. Shop Drawings must be submitted for approval prior to fabrication or incorporation into the work, in accordance with Section 01300, "Submittals." The Shop Drawings must include the information identified in Part 1.05 B.1 above relative to any substitutions made after the award of the initial purchase.
 3. The installing contractor shall maintain accurate Record Drawings related to equipment or material as actually installed.
- D. In cases where other purchasing and/or installation contractual arrangements are involved, specific arrangements relative to substitutions will be addressed in the Contract Documents for that specific project. The general requirements of Part 1.05 of this section will still apply, unless specifically stated otherwise.

END OF SECTION

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SECTION 01050

SITE SURVEY

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers the specific survey tasks required under this Contract, including proper field procedures, reporting practices, and accuracy requirements.
- B. Additional requirements, though not specifically mentioned in this section, shall apply as required under normal professional surveying practices, and if necessary, for the accurate completion of the work described under this Contract.

1.02 GENERAL REQUIREMENTS

- A. The Contractor shall provide all necessary field and office surveying work for the accurate location of all features of the existing site, the construction layout, and preparation of record drawings. This work includes but is not limited to the following activities:
 - 1. Verify site benchmark.
 - 2. Stake limits of clearing and grubbing.
 - 3. Complete survey after clearing and grubbing has been completed.
 - 4. Complete survey of waste consolidation excavation for payment.
 - 5. Complete final regrading survey to determine volume of general fill and topsoil placed.
- B. Ensure reference benchmarks used during remedial design activities are shown on the Drawings.

1.03 QUALITY CONTROL

- A. The Contractor's representative (Surveyor) shall be a qualified and Registered Land Surveyor in the State of Michigan. The Surveyor shall have a minimum of two years of experience in construction surveying layout and record construction drawing maintenance. Record construction drawings will be reviewed by the Engineer to verify accuracy.

- B. All survey instruments shall be calibrated or otherwise inspected prior to the start of work. Periodic field tests/inspections will be conducted to ensure the accuracy of each instrument.

1.04 SUBMITTALS

- A. Surveyor Qualifications: The Contractor shall present the name, address, and telephone number of the selected survey firm, along with a resume showing related experience and data verifying Surveyor's qualifications to complete the survey work.
- B. Accuracy Verification: Upon the Engineer's request, submit documentation verifying the accuracy of the survey work. This documentation includes computer calculations, closures on perimeter survey or areas, and/or field notes.
- C. Field Notes and Records: Record surveys in duplicate page field notebooks or provide certified photocopies of fieldbook pages. Furnish copies of field notebooks to the Engineer when completed.
- D. Record Drawings: Upon completion of waste consolidation and regrading activities, complete a topographic survey of the new grades and prepare a Record Drawing using the base map supplied by the Engineer. The Contractor shall provide the Record Drawings in an electronic file format in AutoCAD Release 12 format. Contractor shall also provide one reproducible and three bond copies of all drawings submitted.

1.05 HEALTH AND SAFETY

All field survey crew personnel shall comply with health, safety, and training requirements in accordance with 29 CFR 1910 and the approved site Health and Safety Plan.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 GENERAL FIELD MEASUREMENTS

- A. Perform all measurements with instruments, tapes, and the like in good adjustment and with corrections made for temperature, pull, air properties, etc.
- B. Make all measurements carefully, and maintain proper balance between precision of angular and distance measurements. The unadjusted error of

closure shall not exceed 1 part in 10,000 parts. All elevation surveys shall be ± 0.01 feet and all horizontal measured distances shall be ± 0.01 feet.

- C. After the above precision has been achieved, adjust the data by accepted methods, such as least squares or compass rule, and present a mathematically exact closure.
- D. Perform all surveys at the specified maximum grid intervals except for areas of changing slope or other significant feature at which the survey interval shall be appropriately adjusted to account for the changing condition.

3.02 ELEVATION DATA AND BENCHMARKS

- A. Verify existing site benchmark elevations and use these verified benchmarks during survey activities.
- B. Reestablish existing site benchmark elevations and provide correction factor if not in agreement with USGS Datum.

3.03 COORDINATE SYSTEM

- A. Establish horizontal control for benchmarks based on Michigan State Plane Grid Coordinates.

3.04 SITE PREPARATION

- A. The Contractor shall stake out the limits of clearing and grubbing and obtain approval from the Engineer prior to commencing work. The limits of the temporary access road and office support and staging areas shall also be delineated.

3.05 WASTE CONSOLIDATION SURVEY

- A. Prior to conducting waste excavation, but after completion of all clearing activities, the Contractor shall complete a survey of the limits of the site. Survey shall be on a 100-foot grid interval within the limits of waste excavation, the survey grid interval shall be 50 feet.
- B. Following waste excavation and prior to backfilling, a survey of the limits of waste excavation only shall be conducted to determine the volume of waste excavated and relocated. Survey shall be on a 50-foot grid interval in the area of waste excavation. This survey shall serve as the base survey for use in measuring volume of waste excavation and for use in conducting general fill layer measure for payment.

3.06 GENERAL FILL/TOPSOIL GRADING SURVEY

- A. Following placement of topsoil, the Contractor shall complete a survey of the limits of the site to verify that the proposed grading layer elevations have not been exceeded and to determine the volume of topsoil and general fill material placed. The survey shall be conducted on a 100 foot grid interval. This survey shall serve as the base survey for Phase II construction activities.

END OF SECTION

SECTION 01080

CODES AND STANDARDS

PART 1 GENERAL

1.01 CODES, STANDARDS, AND SPECIFICATIONS

- A. Published standards, codes, or standard specifications referenced shall be the latest standard code, specification, or tentative specification of the technical society, organization or body referred to which is in effect on the date of printing of the Drawings, unless otherwise specified. Where specific articles, sections, paragraphs, or subsections of referenced publications are not specified, the full referenced publication shall apply.
- B. Satisfactory evidence that materials and methods comply with referenced standards and codes shall be furnished when required.

1.02 ORGANIZATIONS

The following is a partial listing of organizations and their abbreviations that publish codes and/or standards that may apply in the execution of the work:

AA	Aluminum Association
AAMA	American Architectural Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AHA	American Hardboard Association
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISE	American Iron and Steel Engineers
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute
APA	American Plywood Association
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ASA	Acoustical Society of America
ASHRAE	American Society of Heating, Refrigerating and Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers' Association

AWPB	American Wood Preservers' Bureau
AWPI	American Wood Preservers' Institute
AWS	American Welding Society
AWWA	American Water Works Association
BLA	Brick Institute of America
BOCA	Building Officials and Code Administration International
CABO	Council of American Building Association
CBM	Certified Ballast Manufacturers
CMAA	Crane Manufacturers Association of America
CPSI	Consumer Products Safety Commission
CRSI	Concrete Reinforcing Steel Institute
DOC	United States Department of Commerce
DHUD	United States Dept. of Housing and Urban Development
EIA	Electronic Industries Association
ETL	Electrical Testing Laboratories, Inc.
FM	Factory Mutual Laboratories
FmHA	Farmers Home Administration, U.S. Dept. of Agriculture
FS	Federal Specification
GA	Gypsum Association
HPMA	Hardwood Plywood Manufacturers Association
IBR	Institute of Boiler and Radiator Manufacturers
IEEE	Institute of Electrical and Electronics Engineers
IMLAWC	International Masonry Industry All Weather Council, International Masonry Institute
IPCEA	Insulated Power Cable Engineers Association
MBMA	Metal Building Manufacturers Association
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFOPA	National Forest Products Association
OSHA	United States Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	Product Standard
RCSHSB	Red Cedar Shingle and Hand Split Shave Bureau
SCS	U.S. Soil Conservation Service
SDI	Steel Door Institute
SFES	Southeastern Forest Experiment Station
SJI	Steel Joist Institute
TFS	Texas Forest Service
TPI	Truss Plate Institute, Inc.
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USD	United States Diving, Inc.

U.S. EPA
WWPA

United States Environmental Protection Agency
Western Wood Products Association

PART 2 STANDARDS

2.01 STANDARD SPECIFICATION

Construction methods and materials for applicable items of work shall be in accordance with the State of Michigan Department of Transportation Standard Specifications for Construction, 1996 Edition (Standard Specification).

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SECTION 01090

ABBREVIATIONS AND SYMBOLS

PART 1 GENERAL

1.01 DESCRIPTION

- A. The following is a listing of common abbreviations and symbols that may be found in the Contract Documents. Since this is a general listing, it is to be expected that not all abbreviations will appear.
- B. Abbreviations for published codes, standards, and regulations of organizations and federal agencies are defined in Section 01080, "Codes and Standards."
- C. Abbreviations and/or symbols not specifically defined shall be industry and standard definitions. Clarification of symbols and/or abbreviations shall be forwarded to the Engineer, who will furnish definitions in writing.

1.02 ABBREVIATIONS

The following is a partial listing of abbreviations and meanings that may apply in the Specifications:

AC or ac	Alternating Current
a or A	Amperes
AFF	Above Finished Floor
amp or AMP	Amperes
Alum.	Aluminum
Asph.	Asphalt
Aux.	Auxiliary
AWG	American or Brown and Sharp Wire Gauge
Bit. Conc.	Bituminous Concrete
Btu	British Thermal Unit
CB	Circuit Breaker
Cl.	Class
cm	Centimeter
C.O.	Clean Out
Conc.	Concrete
Cont.	Continuous
Cu.	Cubic
cc	Cubic Centimeters
cu ft	Cubic Feet
CFM or cfm	Cubic Feet Per Minute
CFS or cfs	Cubic Feet Per Second
cu yd	Cubic Yards

CT	Current Transformer
DC or dc	Direct Current
Dia.	Diameter
DWG. or dwg	Drawing
Dr.	Drive
Ea. or ea.	Each
EF	Each Face
EW	Each Way
Eff. or eff	Efficiency
El. or Elev.	Elevation
Fin. Gr.	Finished Grade
fps	Feet Per Second
ft	Feet
ftg.	Footing
g	Grams
Ga. or ga	Gauge
gal	Gallon
Galv.	Galvanized
GPC or gpd	Gallon Per Day
GPM or gpm	Gallons Per Minute
H-O-A	Hand-off-automatic
Hp	Horsepower
Hz or hz	Hertz
I.D.	Inside Diameter
Inv.	Invert
IP	Instrument Panel
KVA or kva	Kilovolts-amperes
KW or kw	Kilowatt Hours
lb	Pounds
lin ft	Linear Feet
LPA	Lighting Panel "A"
L.S.	Lump Sum
m	Meters
mA.	Milliamperes
Max. or max.	Maximum
MCC	Motor Control Center
mg	Milligrams
MGD or mgd	Million Gallons Per Day
mi.	Miles
Min. or min.	Minimum
mm	Millimeters
No. or no.	Number
nom.	Nominal
NPT	National Pipe Thread
N.T.S.	Not To Scale
O.D.	Outside Diameter
oz	Ounce

pb	Pushbutton
PPD	Pounds Per Day
P/B	Pullbox
pri.	Primary
psf	Pounds Per Square Foot
psi	Pounds Per Square Inch
psig	Pounds Per Square Inch, Gauge Pressure
PT	Potential Transformer
Pvt. or Pvmt.	Pavement
R.	Radius
R.O.W.	Right-Of-Way
Sch.	Schedule
sec.	Secondary or Seconds
Sq or sq	Square
sq ft	Square Feet
S/S/P	Stop-Start-Pilot Station
Std. or std.	Standard
sq yd	Square Yard
T&B	Top and Bottom
Typ.	Typical
U.O.N.	Unless Otherwise Noted
V	Volts
VAC or vac	Alternating Current Voltage
VDC or vdc	Direct Current Voltage
V.F.	Vertical Feet
Vol.	Volume
W	Watts
w.c.	Water Column
WSP	Working Steam Pressure
yd	Yard

1.03 SYMBOLS

The following is a list of commonly used symbols and meanings that may be found in the Drawings and Specifications:

0	Phase, Diameter, or Round (as applicable)
°F, °C	Degrees (F = Fahrenheit, C = Centigrade)
/	Per or Divided By
3:1	3 horizontal to 1 vertical (slope)
1 on 3	1 vertical on 3 horizontal (slope)

END OF SECTION

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SECTION 01100

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.01 SUMMARY

Protect the environment in its natural state to the greatest extent possible during remediation activities. Environmental protection requires considerations of noise level and protection of air, water, and land resources. It involves solid waste management and activities aimed at the abatement of pollution in general.

1.02 RELATED WORK

- A. Section 01500, "Temporary Facilities and Controls."
- B. Section 02540, "Erosion and Sediment Control."

1.03 SUBMITTALS

- A. Submit to the Engineer for approval a proposal for implementing an environmental protection plan as part of the Mobilization Plan submittal after the Notice of Award. This plan shall outline and provide for environmental protective measures to reduce or control unwanted environmental impacts that develop during normal construction practices. Comply with federal, state and local regulations pertaining to the environment, including but not limited to water, air, and noise pollution.
- B. Preconstruction Survey: The Contractor shall participate in a preconstruction survey of the project site with the Engineer and shall photograph existing environmental conditions on and adjacent to the site.

1.04 COMPLIANCE WITH LAWS

Ensure that all applicable federal, state, county, and municipal laws concerning unwanted environmental impacts of rivers, streams, waterways and drainage channels are being complied with by personnel and subcontractor(s). When a condition of noncompliance exists, the Engineer may issue an order stopping all or part of the work until satisfactory corrective actions are taken. All time lost due to stop orders will be at the Contractor's expense. Assume responsibility for the identification and acquisition of all permits required to complete the work.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 NOISE LEVELS

Excessive use of vehicle horns and unmuffled exhaust systems will not be permitted. Take corrective action to address such deficiencies.

3.02 CONTROL AND DISPOSAL OF PETROLEUM PRODUCTS

Petroleum Products: Conduct the fueling and lubricating of equipment and motor vehicles to protect against spills and evaporation. Properly dispose of lubricants to be discarded and all excess oil in accordance with state regulations. In the event of a spill, immediately notify the Engineer and take countermeasures.

3.03 LAND RESOURCES PROTECTION

A. Preservation

1. Preserve all land resources within site premises in their present condition or restore them to a natural condition at the completion of the remedial action, except as otherwise delineated by the Plans or Specifications.

B. Erosion Protection

1. Selectively place materials to minimize erosion and to prevent excessive quantities of sediment from entering waterways or storm sewers.
2. Protect side slopes upon completion of rough grading through the use of mulching or temporary seeding.
3. Plan and conduct earthwork to minimize the duration that unprotected soil is exposed.
4. Comply with all applicable laws concerning soil erosion and sediment control.
5. Construct sedimentation or erosion control barriers as required to eliminate any impacts to adjacent properties.

3.04 WATER RESOURCES PROTECTION

Water Pollution: Do not pollute or allow the pollution of the drainage channels with fuels, oils, solvents, acids, insecticides, herbicides, trash, or other harmful materials and substances.

3.05 AIR RESOURCES PROTECTION

- A. Smoke:** Minimize pollution of air by adhering to the Health and Safety Plan guidelines. Take measures to prevent fires and excessive vehicle smoke. Open burning of clearing debris, brush, demolition debris, or any other material on-site is prohibited.
- B. Dust Control:** Keep dust down at all times, including nonworking periods. Sprinkle or treat the soil at the site and other areas disturbed by remediation activities with dust palliatives.

3.06 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL DISCOVERIES

Any objects having apparent historical or archaeological value discovered in the course of construction activities shall be faithfully preserved. Leave item undisturbed, and immediately notify the Engineer of any such discovery. It will be the Engineer's responsibility to notify the proper archaeological or historical authorities.

3.07 PROTECTION OF FISH AND WILDLIFE

Perform all work in a manner that will not endanger fish and wildlife in the adjacent properties. Do not alter water flows or otherwise disturb native habitat in the areas adjacent to the work area.

3.08 DISPOSAL OF DEBRIS, RUBBISH, AND SOLID WASTE

- A. Rubbish:** Remove and dispose of rubbish generated on the site. Transport and disposal shall comply with all applicable federal, state, and local laws. Such materials are to be removed from the site prior to final completion and acceptance of the work.
- B. Solid Waste:** Place solid wastes in containers that are regularly emptied. Do not prepare, cook, or dispose of food on-site. Prevent contamination of the site and other areas when handling and disposing wastes. Upon project completion, remove the solid waste containers and any solid waste on-site.

3.09 SEWAGE, ODOR, AND PEST CONTROL

Dispose of sewage through the use of portable chemical toilets or comparably effective units, and arrange to periodically empty wastes by approved, sanitary means, as discussed in Section 01500, "Temporary Facilities and Controls." Make provisions for pest control and the elimination of odors, if necessary.

3.10 MAINTENANCE OF EROSION CONTROL FACILITIES DURING CONSTRUCTION

Maintain all facilities provided for erosion and sediment control under this contract as long as construction operations continue. Specifications for erosion control structures can be found in Section 02540, "Erosion and Sediment Control."

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION

This section includes general requirements and procedures related to the Contractor's responsibilities for preparing and transmitting submittals to the Engineer to demonstrate the performance of the work will be in accordance with the Contract requirements. Submittals include schedules, test results, topographic surveys, Contractor's Shop Drawings, samples, manuals, methods of construction, and Record Drawings. Detailed requirements for submittals are specified under applicable sections of the Specifications pertaining to each item of work.

1.02 SUBMITTAL REQUIREMENTS

- A. Not later than 10 days after the receipt of Notice to Proceed, submit in writing a list of materials and equipment that will be purchased giving name, address, and telephone number of supplier, manufacturer, or processor. No material shall be incorporated into the work until approval of the source has been given. Delivery of materials to the Contract site prior to approval is made at the Contractor's risk and is subject to immediate removal at no cost to the Owner should it be determined the source is not acceptable.
- B. Submittals shall be scheduled and coordinated with the Engineer. Submittal dates will be identified on the Contractor's construction schedule.
- C. The schedule for submittals shall be arranged so related equipment items are submitted concurrently. The Engineer may require changes to the submittal schedule to permit concurrent review of related equipment.
- D. The Contractor shall prepare a submittal log to track the proposed submittal date, the actual submittal date, the approval date, and the current status. The Contractor shall maintain an updated accurate log and shall bring this schedule to each scheduled progress meeting with the Engineer. The Submittal log shall contain a brief description and a unique file number for use in tracking status of submittals.

1.03 SCHEDULES

- A. Within five days after the construction start date set forth in the Notice to Proceed, prepare and submit to the Engineer for review a detailed construction schedule showing the order in which the Contractor proposes to carry out the work and the dates upon which he proposes to start and complete each major work item. The schedule shall be an elaboration of the Bid Schedule with completion dates remaining unchanged. The schedule shall show each major work item and shall include the dates for submittals, sample testing, approval of materials, and Contractor's Shop Drawings, as well as dates for the procurement of materials, plant, and equipment. The construction schedule shall be in chart form showing contemplated completion percentages and arranged to record actual completion percentages at stated intervals. The schedule will outline in detail the proposed equipment, manpower, and production rates necessary to achieve the schedule. The Contractor shall update the schedule every two weeks with any and all changes in equipment, manpower, etc., annotated.
- B. The Contractor shall furnish such additional information and data required to justify the basis of the schedule.
- C. The accepted construction schedule shall be kept up to date as work progresses, including work added by change order, and shall be submitted to the Engineer every two weeks. If the Contractor fails to submit the required updated schedule within the time prescribed, the Engineer may withhold approval of progress payment estimates until such time as the Contractor submits the required updated schedule.
- D. The construction schedule shall, in general, determine the order in which the work is to proceed. However, the Engineer may order and authorize minor changes to this schedule whenever such changes are of definite advantage to or necessary for the efficient continuation of the work.
- E. The Contractor may use any construction scheduling software approved by the Engineer. The schedule shall be arranged in general accordance with the bid form, and projected dollar cash flow requirements shall be shown for each month of construction.
- F. Schedule Revision
 - 1. The Engineer shall review and provide approval, if applicable, to the initial detailed construction schedule within 21 days of receipt of submittal.
 - 2. Two-week schedule updates will be provided in a manner that shows the original approved schedule and the actual revised schedule on the

same form. The original approved construction schedule will not be altered during construction.

3. The Contractor will include with each schedule chart update a narrative of each specific revision, the reason for change, the impact on schedule completion or milestone dates, and the potential for cost changes on current Contract.
4. Two copies of each schedule update shall be submitted to the Engineer for review. The Engineer will provide approval, if applicable, to schedule updates within seven days of receipt of submittal. Rejected schedule updates will be returned to the Contractor with comments on reason for rejection. Resubmittal of schedule updates shall be subject to a seven-day review period.
5. No progress payment requests shall be approved by the Engineer until there is an approved construction progress schedule update on hand.

G. Each submittal shall be identified with a unique 10-digit numbering system.

1. The first digit shall be a D, an S, or an M, representing Shop Drawings or product data (D), material samples (S), or operation and maintenance manuals (M).
2. The next five digits shall be the applicable Specification number.
3. The next three digits shall be the numbers 001 through 999 to indicate each sequential individual submittal under each Specification section number.
4. The last digit shall be a letter, A-Z, corresponding to the revision number (e.g., A = first submission, B = second submission, etc.).
5. A typical submittal number would be as follows:

D — 02710 — 003 — B

D	=	Shop Drawing
02710	=	Specification section for chain-link fence and gates
003	=	Third submittal under this specification
B	=	Second submission (1st resubmittal) of that particular Shop Drawing

1.04 CONTRACTOR'S SHOP DRAWINGS

- A. The Contractor's Shop Drawings shall be neat in appearance, legible, and explicit enough for proper review to ensure Contract compliance. They shall

be complete and detailed to show fabrication; assembly and installation details; material layout and connections; wiring and control diagrams; catalog data; pamphlets; descriptive literature; and performance and test data. They shall be accompanied by calculations or other sufficient information to provide a comprehensive description of the structure, machine, or system provided and its intended manner of use. If the Contractor's Shop Drawings deviate from the Contract documents, the Contractor shall advise the Engineer in writing with the submittal and state the reason for the deviation.

- B. No portion of the work requiring a Contractor's Drawing shall be started nor shall any materials be fabricated, delivered to the site, or installed prior to the approval by the Engineer of such items. Fabrication performed, materials purchased, or on-site construction accomplished that does not conform to approved Contractor's Shop Drawings shall be at the Contractor's risk. The Owner will not be liable for any expense or delay caused by corrections or remedies required to accomplish conformity.
- C. The review and approval of Contractor's Shop Drawings by the Engineer shall not relieve the Contractor from his responsibility for fulfilling the terms of the Contract. All risks of error and omission are assumed by the Contractor; therefore, the Engineer shall have no responsibility.
- D. Contract work, materials, fabrication, and installation shall conform with approved Contractor's Shop Drawings.
- E. Submit installation Drawings that depict Contractor-designed items and methods of construction. Requirements for the Drawings will be cited in appropriate specification sections. Drawings shall be accompanied by calculations or other information to completely explain the structure, machine, or system described and list its intended use. Review and approval of such Drawings by the Engineer shall not relieve the Contractor from his responsibility for the fulfilling the terms of the Contract. All risks of error are assumed by the Contractor.
- F. Manufacturer's installation recommendations and instructions shall provide written detailed step-by-step preparation and installation instructions for the materials and products, including recommended quality control testing, seaming and joining, and repair Specifications.
- G. When so specified or directed by the Engineer, submit proposed method of construction for specific portions of the work for review and approval. This submittal shall include a detailed written description of all phases of the installation operation to fully explain to the Engineer the proposed method of construction. If required by the Specifications, submit installation Drawings to supplement the description. Review and approval by the Engineer will be in accordance with approval process herein and shall not relieve the Contractor from his responsibility for fulfilling the terms of the Contract. All

risks associated with the proposed method remain the Contractor's responsibility; therefore, the Engineer shall have no responsibility. After review and approval, if, in the opinion of the Contractor, modifications are necessary, submit such modifications in detail, including reasons for the modifications. Modifications shall not be implemented without review and approval by the Engineer.

- H. Each Contractor's Drawing submitted by the Contractor shall have affixed to it the following certification statement signed by the Contractor:

"Certification Statement:

By this submittal, I hereby present that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers, and pertinent data, and I have checked and coordinated each item with other applicable approved Drawings and all Contract requirements."

- I. All Drawing submittals for approval shall have the following identification data, as applicable, contained thereon or permanently adhered thereto:
1. Owner's name.
 2. Project name and location.
 3. Product identification.
 4. Drawing title, Drawing number, revision number, and date of Drawing and revision.
 5. Applicable Contract Drawing numbers, Specification section, and Specification paragraph numbers.
 6. Subcontractor's and vendor's and/or manufacturer's names, addresses, and phone numbers.
 7. Contractor's certification statement.
 8. For catalog product data or brochures submitted in packages of multiple items, the identification is needed only on the exterior. In such instances, the identification shall include page and catalog item numbers for items submitted for approval. If one or more of the items in such a submittal are not approved, resubmittal of only the unapproved items is required. Catalog, product data, or brochures containing various products, sizes, and materials shall be highlighted to show the particular item being submitted. Likewise, items not

applicable to the Contract shall be marked "not applicable" or shall be crossed out.

- J. Vacant space approximately 2.5 inches high by 4 inches wide shall be provided adjacent to the identification data to receive the Engineer's status stamp.
- K. For the original submittal and each subsequent resubmittal that may be required, submit six legible prints each of all Shop and Working Drawings, and six copies of catalog data, method of construction, and manufacturer's installation recommendation to the Engineer for approval. Three copies of all Contractor's Shop Drawings will be returned to the Contractor.
- L. Allow 10 calendar days for checking and appropriate action by the Engineer. Contractor's Shop Drawings will be returned stamped with one of the following classifications:
 - 1. NO EXCEPTION TAKEN—No corrections, no marks. Submittal Approved.
 - 2. MAKE CORRECTION NOTED—A few minor corrections. All items may be fabricated as marked without further resubmission. Resubmit a corrected copy to the Engineer.
 - 3. REVISE AND RESUBMIT—Minor corrections. Items not noted to be revised and corrected may be fabricated. Resubmit Drawings as per original submission with corrections noted. Allow 10 days for checking and appropriate action by the Engineer.
 - 4. REJECTED—Requires corrections or is otherwise not in accordance with the Contract documents. No items shall be fabricated. Resubmit and allow 10 days for checking and appropriate action by the Engineer.
 - 5. SUBMIT SPECIFIED ITEM—Used in conjunction with Items 1 through 4. Used to identify additional submittals required.

1.05 MATERIALS AND PRODUCT CERTIFICATIONS

- A. The Contractor is required to conduct testing of materials and soil samples to certify they meet the requirements of the Specifications. The costs of sample testing shall be borne by the Contractor and included in the lump sum or unit prices shown on the Bid form. These certified test results will be submitted by the Contractor to the Engineer for approval of the material. The Engineer may conduct separate testing of material samples to confirm test results.
- B. Within 10 days after the Notice to Proceed, submit names of material suppliers and borrow sources, if applicable, along with samples required by

the Specifications or requested by the Engineer. Unless otherwise specified, the original submittal shall be a sample of each item and the associated testing results showing conformity with the Specifications. Approval shall be obtained prior to delivery of the material to the site. Each sample shall be representative of the actual material proposed for use in the project and of sufficient size to demonstrate design, color, texture, and finish when these attributes will be exposed to view. If samples deviate from the Contract Documents, the Contractor shall so advise the Engineer in writing with the submittal and state the reason for the deviation.

- C. Each sample and laboratory test data result shall have the following identification data permanently attached:
 - 1. Contractor name, address, and phone number.
 - 2. Project name and location.
 - 3. Product identification.
 - 4. Applicable Contract Drawing and Specification section number.
 - 5. Unique identification number.
 - 6. Subcontractor's and vendor's, and/or manufacturer's names, addresses, and phone numbers.
- D. Allow 10 days for verification and appropriate action by the Engineer. Certain samples may be tested for specified requirements by the Owner before approval is given. Failure of a sample to pass such tests will be sufficient cause for refusal to consider further samples of the same brand and make of that material. Rejected samples will be returned upon request, and any or all resubmittals required shall consist of new samples and an additional 10 days for verification and approval. All sample testing will be performed by the Contractor at the Contractor's own expense. Upon approval, one sample so noted will be returned, and the remainder will be retained by the Engineer until completion of the work.
- E. Samples of various materials or equipment delivered to the site or during placement may be taken by the Engineer for testing. Samples failing to meet Contract requirements will automatically void previous approvals, and resubmittal or retesting of the samples will be required.

1.06 RECORD DOCUMENTS

- A. The Contractor shall keep one record copy of all Contract Documents at the site in good order and annotated to show all revisions made during construction. Such annotations shall be kept current and may be inspected by

the Engineer at any time. Failure to maintain current Record Drawings will be cause to delay progress payments. Record Documents shall be available to the Engineer at all times during the life of the Contract. All Contract Drawings, Specifications addenda, change orders, and other Modifications to the Contract shall be made a part of the Record Documents.

- B. Recorded information will consist of measured distances and depths of installed or removed utilities, locations of concealed portions of the work in reference to visible surface features, and field changes in dimensions or detail.
- C. At the completion of the Contract, or at the Engineer's request and before final payment is made, furnish the Engineer with one set of reproducible of the final Record Documents reflecting all revisions herein described.
- D. The Contractor shall be responsible for coordination and cooperation with Owner personnel and shall not permanently cover subbase or material surfaces until after as-built surveys have been made. The Contractor shall assist Owner personnel as required in ascertaining necessary location information.

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 ESTIMATE

Within 10 days after execution of this Contract, the Contractor shall furnish a detailed estimate (Schedule of Values) giving a complete breakdown of the contract price by items of work.

1.02 USE

The costs given in this Schedule of Values will be used only for determining the basis of partial progress payments, and will not be considered as fixing a basis for additions to or deductions from the Contract price.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

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SECTION 01390

HEALTH AND SAFETY

PART 1 GENERAL

At all times, the Contractor shall conduct construction work safely and in accordance with applicable local, state, and federal requirements concerning construction health and safety. This specification provides a framework for preparation of a detailed site-specific Health and Safety Plan (HASP), which shall be submitted to the Engineer for approval prior to the start of any construction activities.

1.01 WORK INCLUDED

- A. Health and Safety Requirements for the Contractor. Health and safety is the sole responsibility of the Contractor. The Contractor shall take precautions to prevent damage, injury, or loss to all employees on the work site and to other persons who may be affected thereby.
- B. Principal Work Items.
 - 1. Project-specific HASP development and implementation.
 - 2. Waste Excavation Contingency Plan development and implementation.

1.02 REFERENCES

- A. The site-specific HASP shall be consistent with the requirements of:
 - 1. 29 Code of Federal Regulations (CFR) 1926—"Safety and Health Regulations for Construction," latest version.
 - 2. 29 CFR 1910—"Occupational Safety and Health Standards" (General Industry).
 - 3. 29 CFR 1910.120—"Hazardous Operations and Emergency Response."
- B. "Requirements for Worker Health and Safety" included in the "National Oil and Hazardous Substances Contingency Plan" (40 CFR 300.38).
- C. "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH Publication No. 85-115, October 1985.
- D. The Standard Operating Safety Guidelines, U.S. EPA, November 1984.
- E. Site-specific analytical data results from the RI are included as general information on the extent of contamination present at the site.

1.03 SUBMITTALS

- A. The Contractor shall submit the proposed HASP within 10 working days from the date of the Pre-construction Meeting and prior to conducting any mobilization or related site work.
- B. The HASP shall include, at a minimum:
 - 1. Name, qualifications and telephone number of Contractor's physician.
 - 2. Employee training documentation.
 - 3. Employee compliance agreements.
 - 4. Logs and reports.
 - a. Safety Inspection Log.
 - b. Weekly Health and Safety Report.
 - c. Check In/Check Out Log for the Site.
 - 5. Qualifications of Health and Safety Officer (HSO).
 - 6. Qualifications of Site Safety Officer.
 - 7. Waste Excavation and Drum Removal Contingency Plan.
 - 8. Overall site operations safety plan.
 - 9. Emergency and contingency plans.
- C. Specific plan requirements are listed in Part 3—"Execution," of this Specification.

1.04 DEFINITIONS

- A. HSO. Contractor's representative responsible for development, submittal, and implementation of the HASP.
- B. Site Safety Officer. Contractor's representative directly responsible for the daily implementation of the HASP.
- C. Contaminated Material. Material that has come into contact with landfill subsurface soil and/or waste materials and has not been tested or decontaminated to the satisfaction of the Engineer.
- D. Gaseous Conditions. (Use OSHA definition).
- E. Potentially Gaseous Conditions. (Use OSHA definition).
- F. Non-gaseous Conditions. (Use OSHA definition).
- G. OSHA Permissible Exposure Limits (PELs). Time weighted average (TWA) concentrations to which most workers can be exposed for 8 hours per day, 40 hours per week on a permanent basis with no significant health effects. These

concentrations are enforceable OSHA standards. (Source: NIOSH/OSHA; Pocket Guide to Chemical Hazards, June, 1990.)

- H. Immediately Dangerous to Life and Health (IDLH). Concentrations representing a maximum level from which one could escape within 30 minutes without any escape-impairing symptoms or irreversible health effects. (Source: NIOSH/OSHA; Pocket Guide to Chemical Hazards, June, 1990.)
- I. Threshold Limit Values—Time Weighted Averaged (TLV—TWA). Time weighted average concentrations to which most workers can be exposed for 8 hours per day, 40 hours per week on a permanent basis with no significant health effects. They are similar to PELs except that they are not enforceable standards and are updated annually. (Source: ACGIH Threshold Limit Values and Biological Exposure Indices for (1990-91.)

1.05 SITE SAFETY REGULATIONS

- A. The Contractor shall report any suspected contaminated material to the Engineer upon discovery.
- B. Contact with contaminated or suspected contaminated surfaces should be avoided.
- C. Alcoholic beverages and controlled substances shall not be allowed on-site.
- D. A site HASP shall be developed for all phases of site operations and made available to all personnel.
- E. All personnel shall be familiar with standard operating safety procedures and any additional instructions and information contained in the site HASP.
- F. All personnel shall adhere to the site HASP. Personnel entering the site will be required to read and sign the HASP demonstrating their concurrence with the requirements and understanding of the safety procedures of the plan.
- G. All personnel going on-site shall be adequately trained and thoroughly briefed on anticipated hazards, safety equipment to be employed, safety practices to be followed, emergency procedures and communications, and responsible safety personnel on-site.
- H. Entrance and exit locations shall be designated and posted, and emergency escape routes shall be delineated. Warning signals for site evacuation must be established and communicated to all personnel.

1.06 MEDICAL CARE

Medical care is divided into routine health care and emergency medical care and treatment.

- A. Routine Health Care. Routine health care shall provide special pre-assignment and periodic medical examinations.

Any special tests needed depend on the chemical substance to which the individual could be or has been exposed, as recommended by the physician.

Care and counseling in the case of potential, known, or suspected exposure to toxic substances shall also be provided.

- B. Emergency Medical Care and Treatment. The Medical Program shall address emergency medical care and treatment of project personnel.

1. Posted name, address, and telephone number of nearest medical facility with map, travel time, and directions from each job site.
2. Investigation of local emergency organizations to respond to potential emergencies at the site. If local organizations are unable to adequately respond, other emergency prearrangements shall be made.
3. Arrangements shall be made to quickly obtain emergency services. Telephone numbers and procedures shall be posted.
4. Local Medical Facility:

1.07 PERSONNEL

- A. HSO.

1. Qualifications.
 - a. Two or more years of relevant experience.
 - b. HSO Certified Safety Professional (CSP) or a Certified Industrial Hygienist (CIH).
 - c. Management/supervisor training course completed in accordance with 29 CFR 1910.120(e)(4).

2. Responsibilities.

- a. Develop, submit, and implement HASP.
- b. Conduct site inspections to monitor compliance with HASP.
- c. Provide and coordinate training sessions.
- d. Conduct incident investigations and follow-up.

3. Authority.

- a. Suspend work because of HASP violations, health-related incidents, and other increased risk situations.
- b. Remove personnel from site if actions endanger.
- c. Authorize personnel to enter.

B. Site Safety Officer.

1. Qualifications.

- a. One or more years of relevant experience.
- b. Current certification in first aid and CPR procedures.
- c. Management/supervisor training course completed in accordance with 29 CFR 1910.120(e)(4).

2. Responsibilities.

- a. Direct health and safety activities on-site.
- b. Report safety-related incidents to HSO and fill out incident forms as required.
- c. Implement HASP.
- d. Maintain health and safety equipment.
- e. Perform air monitoring as required by the HASP under the supervision of the HSO.

3. Authority.

- a. Suspend field activities if health and safety of personnel are endangered.

- b. Suspend an individual from field activities for infractions of the HASP.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.01 GENERAL

- A. The written Health and Safety Program shall contain and/or address the following:
 - 1. An organizational structure.
 - 2. A comprehensive work plan.
 - 3. Project-specific HASP.
 - 4. Health and Safety Training Program.
 - 5. The Medical Surveillance Program.
 - 6. Standard operating procedures (SOPs).
 - 7. Any necessary interface between general program and site-specific activities.
- B. Contractor shall be solely responsible for ensuring Health and Safety Program meets all requirements of 29 CFR 1910.120(b).

3.02 HASP

A. General.

- 1. Minimum requirements for the HASP are presented in this section. The Contractor shall develop the HASP using these elements as a basis, adding additional requirements as deemed necessary by the Contractor. Contractor shall not commence work prior to the Engineer's review of the HASP.
- 2. The HASP shall establish guidelines for the safety of personnel during the conduct of work. The Contractor shall make available a copy of the HASP to each employee. All employees shall be required to read and understand the HASP, sign a compliance agreement, and abide by all provisions of the HASP. Plan may be modified by the HSO with

written review and comments from the Engineer in response to site conditions.

3. The HASP shall include:

- a. Site Description. Physical description of site and site conditions. Site-specific data pertaining to hazards. Identifies hazards known at time. If additional hazards are discovered, they should be added to this section by change order.
- b. Project Description. Project-specific description of work to be performed.
- c. Hazard Assessment. Hazard assessment shall include a task-by-task risk assessment that provides strategies for protection of workers against the following hazards:
 1. For activities that involve no hazardous material contact, primary hazards are physical hazards associated with construction, use of heavy equipment, and fire hazards.
 2. For activities that involve only limited hazardous material contact or the potential for hazardous material contact, the following hazards shall be appropriately protected against:
 - a. Physical hazards associated with construction, use of heavy equipment, and fire hazards.
 - b. Heat stress/cold stress.
 - c. Inhalation of contaminants.
 - d. Skin or eye contact with contaminants.
 - e. Ingestion of contaminants.
 3. For activities that involve direct contact with hazardous materials, the following hazards shall be appropriately protected against:
 - a. Physical hazards associated with construction, use of heavy equipment, and fire hazards.
 - b. Heat stress/cold stress.
 - c. Inhalation of contaminants.

- d. Skin or eye contact with contaminants.
- e. Ingestion of contaminants.
- d. List of Key Personnel. HASP shall identify key Contractor personnel responsible for site safety as outlined in Part 1.05. A list of the names, telephone numbers, organizations, and addresses of these individuals shall be conspicuously posted at the site.
- e. Air Monitoring Program.
 - 1. HASP shall designate personnel responsible for implementing the air monitoring program.
 - 2. The Site Safety Officer shall be responsible for enforcing established air action levels.
 - 3. The Air Monitoring Program shall be described in detail in the HASP and at a minimum shall include:
 - a. Work Area Monitoring Program during construction activities.
 - b. Personnel monitoring, as appropriate.
 - 4. During construction activities, a Work Area Monitoring Program shall be implemented, including surveys of work areas and vicinity with at least the following:
 - a. Combustible Gas Indicator (CGI).
 - b. Photoionization Detector (PID).
 - c. Detector tubes for periodic measurements of specific compounds, as appropriate.
 - 5. Action Levels.
 - a. CGI measurements are applicable to confined spaces on the site.
 - i. The CGI shall measure concentrations of flammable gases in the air as a percentage of the Lower Explosive Limit (LEL).

- ii. Action Level: At 10 percent or greater of the LEL, all ignition sources shall be shut off and personnel shall be restricted from the affected area.
- b. PID readings. The HSO shall use data from the Site Characteristics Summary to determine known and suspected air contaminants and to establish level of protection upgrade/downgrade action levels to be based on PID readings.
- f. Emergency Response Procedures.
 - 1. Emergency Response Procedures shall be included in the HASP.
 - 2. Response actions to control releases of contaminants shall be included in the HASP.
- g. Decontamination Procedures

Decontamination procedures shall be developed and implemented for all appropriate phases of work.
- h. Confined Space Entry Procedures

Confined space entry procedures shall be developed and implemented in accordance with the 14 January 1993 Final Rule of 129 CFR 1910.146.
- i. Spill Containment Program

Where spills may occur, a spill containment program shall be implemented to contain and isolate the entire volume of the potentially hazardous material, liquid, etc.
- j. Personal Protective Equipment

A written personal protective equipment program (which is part of the Health and Safety Program) to address the protective equipment requirements for each of the site tasks and operations to be conducted.

k. Site Control Measures

A Site Control Program and appropriate procedures shall be implemented to control employee exposure to hazardous substances as part of the Health and Safety program.

3.03 TRAINING REQUIREMENTS

A. The Contractor shall provide training to all of his employees and subcontractors that will be assigned to the project. The training shall comply with the requirements of 29 CFR 1926.21 and other applicable portions of 29 CFR 1910 and 1926. Training shall cover (at a minimum):

1. Names of personnel and alternates responsible for site health and safety.
2. Health and safety hazards present on-site.
3. Personal protective equipment use, care, and limitations.
4. Work practices that minimize risks from hazards.
5. Safe use of engineering controls and equipment on-site.
6. Hazard communication (Right-to-Know Program).
7. Site control measures.
8. Site SOPs.
9. Contingency plan.
10. Confined space entry procedures.
11. Identification and avoidance of harmful plants/animals and related first aid procedures.

In addition, employees who are responsible for responding to emergency situations shall be trained in how to respond to any anticipated emergency conditions.

B. Emergency Response Training.

1. Site Evacuation Drill. One site evacuation drill shall be conducted during the first full week of work to test the effectiveness of evacuation protocols.

2. Fire Extinguisher Training. At least one member of each crew shall be trained in the use of portable fire extinguishers in accordance with 29 CFR 1910.157(g).
- C. Visitor Training. The Contractor shall be responsible for training visitors to the site to make them aware of hazards associated with the site and to explain emergency procedures.

3.04 SOPs

The Contractor shall develop and implement SOPs. At a minimum, the following SOPs shall be written:

- A. Heat Stress/Cold Stress Prevention Plan.
- B. Respiratory Protection Plan.
- C. Hearing Conservation Plan
- D. Bloodborne Pathogens Exposure Control Plan
- E. Incident/Accident Reporting Procedures.
- F. Site Control Procedures.
 1. Security Procedures.
 2. Communication Procedures.
 3. Site Layout.
 4. Work Zones.
 5. Documentation of Site Access.
- G. Emergency Preparedness.
 1. Procedures to address the following emergency situations:
 - a. Medical emergencies.
 - b. Fires.
 - c. Spills.
 - d. Accidents.
 - e. Safety equipment problems.
 2. Provisions for emergency equipment such as (at a minimum):
 - a. First aid kits.
 - b. Fire extinguishers.
 - c. Splints.
 - d. Blankets.
 - e. Eyewashes and emergency showers.
 - f. Bloodborne pathogens kits (biohazard cleanup)

3.05 INSPECTIONS

It shall be the responsibility of the Contractor to determine and document that the Health and Safety Program is being followed in accordance with the minimum requirements of this Specification and any additional requirements of the Contractor HASP. This shall be accomplished through the use of inspections and audits conducted by the Site Safety Officer and staff on a daily basis and by the HSO as required.

3.06 RECORD-KEEPING

The Contractor shall maintain, at a minimum, the records specified in this section and any additional records required to develop, implement, and maintain requirements of the Contractor HASP.

3.07 REPORTING

- A. The Contractor shall provide submittals in accordance with Part 1.03 of this section.
- B. The Contractor shall notify the Engineer when work may affect adjacent properties. All damage, injury, or loss of any property caused by the work shall be remedied by the Contractor at no additional cost to the Engineer.

PART 4 PAYMENT

4.01 GENERAL

Payment for all work necessary for preparing, implementing, and managing a Health and Safety Program, including preparation of a site-specific HASP, shall be considered incidental to the Contract and shall be included in the appropriate lump sum and unit prices stated in the bid form.

END OF SECTION

SECTION 01400

CONTRACTOR'S QUALITY CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

This Section includes requirements of a general nature related to the Contractor's responsibility for quality control involving inspections, tests, certificates, and reports. This section also details the requirements for preparing a Construction Quality Control (CQC) Plan.

1.02 RELATED WORK

- A. Section 02930, "Finish Grading and Seeding."
- B. Section 02200, "Earthwork."

1.03 INSPECTIONS

- A. The Engineer has the right to inspect all materials and equipment at all stages of development or fabrication, and shall be allowed access to the site and to the Contractor's and supplier's shops to conduct such inspection. On-site work will be subjected to continuous inspection. Inspection by the Engineer will not release the Contractor from responsibility or liability with respect to material or equipment. The Engineer will provide the Contractor a minimum of 24 hours' notice prior to unscheduled off-site inspections.
- B. When local codes or laws require approval and inspection of the work by other agencies or organizations before installation or operation, the Contractor shall obtain such approval and shall submit one signed original and three copies of the approval to the Engineer.

1.04 PRECONSTRUCTION MATERIAL TESTING

- A. Prior to construction, identify sources of borrow soil and rock required and test each source to determine whether it meets the required material specifications.
- B. The following chemical tests shall be conducted on two representative samples of each off-site general fill, or off-site topsoil borrow source supplied to the project site:
 - 1. Target Analyte List (TAL) Parameters.
 - 2. Target Compound List (TCL) Parameters.

The testing shall be conducted at a laboratory pre-approved by GM. A list of approved analytical laboratories can be provided to the Contractor at the Contractor's request. In addition, the Contractor shall provide a specific affidavit for each borrow source proposed for use certifying that the property is currently free from any environmental impacts. The affidavit will include a detailed discussion of the historical uses of the borrow source for the past 10 years.

- C. The following geotechnical tests shall be performed on two representative samples of each off-site general fill borrow source supplied to the project site.

1. ASTM D422—Particle Size Analysis
2. ASTM D1557—Moisture/Density Relationship
3. ASTM D2216—Moisture Content
4. ASTM D2488—Unified Soils Classification

- D. Topsoil will be tested for compliance with the Specifications prior to placement. Results of this testing will be used to determine requirements for fertilizer or other soil amendments that might be needed to meet the Specifications listed in Section 02930, "Finish Grading and Seeding." One representative sample from the on-site topsoil stockpile and two representative samples from each off-site topsoil borrow site will be tested for the following:

1. pH
2. Nitrogen
3. Phosphorous
4. Potassium
5. USDA Classification

- E. A representative sample of waste materials expected to be removed during waste consolidation activities shall be tested for the following to determine placement and compaction requirements during construction activities:

1. ASTM D422—Particle Size Analysis
2. ASTM D1557—Moisture/Density Relationship
3. ASTM D2216—Moisture Content
4. ASTM D2488—Unified Soils Classification

- F. All geotechnical material evaluation tests shall be performed by the independent laboratory retained by the Contractor and approved for use by the Engineer.

- G. Testing results shall be submitted to the Engineer for approval prior to bringing the materials on-site.

1.05 CONSTRUCTION QUALITY CONTROL TESTING

- A. All quality control testing during construction shall be completed by the Contractor in accordance with the methods and frequencies stated in the Specifications and in the approved CQC Plan.
- B. Routine testing frequencies for material evaluation during construction are shown in Table 01400-1 of this section.
- C. During construction, the frequency of testing may increase as a result of the following conditions:
 - 1. Adverse weather conditions
 - 2. Breakdown of equipment
 - 3. Material's failure to meet Specifications.
 - 4. Work area is reduced
- D. Defects in material placement or quality of materials will be corrected by the Contractor at no cost to the Engineer. Deficient work will be either scarified, reworked, and compacted to meet the Specifications or removed and replaced with new materials meeting the requirements of the Specifications.

1.06 REPORTS

- A. Where transcripts or certified test reports are required by the Contract documents, they shall meet the following requirements:
 - 1. Submit for approval by the Engineer required transcripts, certified test reports, certified copies of the reports of all tests required in referenced Specifications or specified in the Contract documents, and have subsequent approval of the Engineer before delivery of materials. The testing shall have been performed in an approved independent laboratory within six months of submittal of the reports for approval. Transcripts of test reports shall be accompanied by a notarized certificate in the form of a letter from the manufacturer or the supplier certifying that the tested material meets the specified requirements and is of the same type, quality, manufacturer, and make as that specified. The certificate shall be signed by an officer of the manufacturer or supplier.
- B. At the option of the Engineer, or where specified, the Contractor may, in lieu of the specified tests and other tests required in the various reference documents, submit for approval a notarized Certificate of Compliance in the form of a letter from the manufacturer. The Certificate shall state the following:

1. Manufacturer has performed all required tests.
2. Materials supplied meet all test requirements.
3. Tests were performed within six months of submittal of the Certificate.
4. Materials that were tested are of the same type, quality, manufacture, and make as those specified.
5. The Certificate shall include identification of the materials.

The Certificate shall be signed by an officer of the manufacturer. Materials shall not be delivered until written approval of the Certificate is made by the Engineer.

- C. The Contractor shall submit Manufacturer's Certificates for the installation of those items listed in the Specifications.
- D. Manufacturer's Certificates shall state that the product has been installed under either the continuous or the periodic supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative, and that it is operating in accordance with the specified requirements to the manufacturer's satisfaction.

1.07 CONSTRUCTION QUALITY CONTROL PLAN

- A. The Contractor shall prepare and submit a CQC Plan for approval within 14 days of the notice to proceed.
- B. The CQC Plan shall include a statement and a description of the Contractor's overall quality control program, to include procedures for sampling and document control.
- C. Specifically, the CQC Plan shall include, at a minimum, the following:
 1. A description of Contractor's quality control organization, including a chart showing lines of authority, and an acknowledgement that the quality control staff shall conduct inspections for all aspects of the work specified.
 2. The name, qualifications, responsibilities, and authority of each person assigned to a quality control function.
 3. A copy of a letter to the CQC Manager, signed by an authorized official of the firm, that describes the responsibility and delegates authority to the CQC Manager.

4. Procedures for scheduling and managing submittals, including those of subcontractors, fabricators, suppliers, and manufacturers.
5. Control procedures for laboratory and field sampling.
6. Procedures for reporting testing results and for maintaining records during construction.
7. List of all specified tests and the frequency of their performance and verification that the procedures are in accordance with the Contract requirements.
8. Method of notification of deficient work and procedures for correcting deficiencies or replacing work at the sole expense of the Contractor.

1.08 EQUIPMENT CALIBRATION

- A. All field test equipment will be kept under control of the Contractor's Quality Control Officer or geotechnical subcontractor. The Quality Control Officer and the geotechnical subcontractor will be fully trained in the use of equipment, test procedures, and interpretation of results for each piece of test equipment. A copy of the Calibration Certificate will be kept by the Quality Control Officer and supplied to the Engineer.
- B. Calibration of nuclear-density gauges shall conform to the frequencies and methods outlined in ASTM D2922-78 and D3017. Unstable or erratic gauges shall not be used in density testing and shall be immediately removed from the site in accordance with applicable local, state, and federal regulations.

END OF SECTION

Table 01400-1

**Construction Quality Control Testing Frequency
Phase I Construction
Linden Road Site
Flint Township, Michigan**

Material	Test/Method	Frequency
Off-Site General Fill (Non-Roadway Areas)	• Grain size through No. 200 sieve (ASTM D422)	1 per 10,000 cu yd
	• Moisture/density relationship (ASTM D1557)	1 per 10,000 cu yd
	• Moisture content (ASTM D2216)	1 per 10,000 cu yd
	• Unified Soils Classification (ASTM D2488)	1 per 10,000 cu yd
	• Field moisture/density (ASTM D3017/D2922)	100-foot grid pattern for each lift
Off-Site Granular/Aggregate Backfill (Roadway Areas)	• Grain size through No. 200 sieve (ASTM D422)	1 per 10,000 cu yd
	• Moisture/density relationship (ASTM D1557)	1 per 10,000 cu yd
	• Moisture content (ASTM D2216)	1 per 10,000 cu yd
	• Unified Soils Classification (ASTM D2488)	1 per 10,000 cu yd
	• Field moisture/density (ASTM D3017/D2922)	100-foot grid pattern for each lift
Topsoil	• pH, nitrogen, phosphorous, potassium USDA classification	1 2,000 cu yd for off-site topsoil
Seeding and Fertilizer	• Certification of Guaranteed Analysis	1 per acre

Note: See Section 1.04 B for pre-construction material testing requirements.

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 LIGHT AND POWER

- A. Each Contractor shall provide, at his own expense, temporary portable electric power and lighting, as required, for the proper execution of the work. If, in the opinion of the Engineer, the facilities provided by the Contractor are inadequate, the Contractor will not be permitted to proceed with any portion of the work affected thereby.
- B. Power service wiring, metering, and distribution from the existing service shall be furnished and installed by the Contractor at his own expense.
- C. All wiring for electric light and power shall be installed by a licensed electrician and shall be maintained in an acceptable manner.

1.02 WATER

- A. Municipal water may be available via a fire hydrant located at the entrance to the site. The Contractor will be required to coordinate with the water system owner, install a meter, and pay the standard water rate and hydrant use fee for all water used.
- B. The Contractor shall bring in water, as required, via closed pipe and/or hose from the off-site municipal water supply or by truck. The Contractor shall provide backflow prevention and meet all usage requirements of the local water company.
- C. Pumps, hose extensions, and trucks shall be provided as required to deliver water to point of use.

1.03 TEMPORARY HEATING AND VENTILATION

- A. Each Contractor shall provide temporary heat and ventilation as required for work carried on during cold or hot weather and to prevent damage to the work carried on during cold or hot weather.
- B. Temporary office areas shall be provided with heat and air conditioning, as required, for year-round use.

1.04 SANITARY REGULATIONS AND PROVISIONS

Each Contractor shall prohibit and prevent the committing of nuisances on the site of the work, or on adjoining properties, and shall discharge any employee who violates this rule. Temporary toilet facilities shall be provided by the Contractor for use by his personnel. At least one portable toilet shall be provided for each 25 persons and one portable toilet shall be provided for women. Temporary toilet facilities shall be serviced regularly by a qualified waste management company. Sanitary waste shall be disposed of in accordance with applicable rules and regulations.

1.05 TELEPHONE

The Contractor shall make provisions for providing telephone service to the site for the Contractor's operations and also for the Engineer's field office. All costs for such service shall be paid by the Contractor and included in his Bid. The Engineer's trailer will require two telephone lines with one dedicated for fax service. The Engineer shall pay for long distance charges, and the Contractor shall pay for all other connection and monthly service charges.

1.06 FIRST AID

- A. Each Contractor shall furnish and keep upon the site a completely equipped first aid kit and shall provide ready access to this kit at all times when personnel are employed on the work.
- B. The first aid kit shall be furnished for a minimum crew size of 10 people.

1.07 FIRE AND SAFETY PROTECTION

- A. The Contractor must have available on-site, at a minimum, a combustible gas meter and an oxygen meter that are in good working condition. The Contractor's approved HASP will dictate other requirements for air monitoring. Confined work areas (e.g., manholes, trenches) could result in a dangerous work environment as the result of the presence of combustible gases at explosive levels and/or decreased oxygen levels. Prior to the entry of personnel into any confined work area, monitoring for combustible gas and oxygen levels shall be performed. Proper ventilation shall be maintained in confined work areas when occupied by personnel.
- B. The Contractor shall have on-site not less than four UL-rated, class "ABC" dry chemical fire extinguishers, 20-pound capacity. One fire extinguisher shall be permanently mounted in each break trailer or storage trailer on-site. Extinguishers shall be inspected monthly and serviced as required.

1.08 CONTRACTOR'S FIELD OFFICE

Each Contractor shall furnish his own field office and any temporary buildings or shelter required for proper storage and protection of materials. The Contractor shall provide the Engineer with a plan view map showing the number and locations of temporary facilities planned for the site.

1.09 ENGINEER'S FIELD OFFICE

- A. The Contractor shall provide a separate trailer for exclusive use by the Engineer and his field inspection staff. The mobile office trailer shall be a Class 2 field office with minimum dimensions of 10 by 30 feet. Pressurized water for testing is not required. The field office shall meet all applicable requirements of Section 809, "Field Office" of the Standard Specifications.
- B. In addition to the requirements for a Type C field office, the Contractor shall provide the following:
 - 1. Two telephone lines with one dedicated for fax use.
 - 2. One drafting table with minimum dimensions of 36 by 48 inches.
 - 3. One draftsman's stool.
 - 4. One office desk, with drawers and locks and a minimum dimension of 30 by 60 inches.
 - 5. Two swivel desk chairs.
 - 6. Two steel folding chairs.
 - 7. Two fireproof steel file cabinets with four letter-width drawers, and locking capability.
 - 8. One drawing rack with drawing hangers.
 - 9. Two wastepaper baskets.
 - 10. One coat rack.
 - 11. One fire extinguisher, wall-mounted, 6 pounds or larger, meeting the requirements for Classes A, B, and C of the NFPA code.
 - 12. Bottled water service with cooler capable of producing hot and cold water, including paper cup dispenser and supplies.

13. One telephone with conference speaker, touch-tone, and 12-foot coiled handset.
14. One plain paper fax machine with telephone capabilities.
- C. Field office shall be maintained and cleaned weekly, and all expendable supplies (e.g., paper cups, toner cartridges, etc.) shall be replenished by the Contractor throughout the duration of the project.

1.10 MAINTENANCE

Temporary facilities shall be maintained, including weekly cleaning of toilet facilities, and shall remain on-site until the end of the project or until permission is granted by the Engineer in writing to remove them.

1.11 TEMPORARY FENCING

- A. The Contractor shall provide temporary fencing to maintain site security during construction.
- B. Temporary fencing shall be a 6-foot-high chain-link-type with driven posts.
- C. Temporary gates shall be 6 feet high, double leaf with locking capability.
- D. Temporary fencing shall be installed as needed to maintain site security.

END OF SECTION

SECTION 01505

MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

- A. This Specification section covers the following information:
 - 1. Organization and mobilization of Contractor's forces and equipment.
 - 2. Transportation of tools, materials, and equipment to the site.
 - 3. Erection of temporary facilities required to support initial mobilization and waste consolidation.
 - 4. Subsequent removal of temporary facilities, construction equipment, materials, and supplies, including decontamination of equipment and facilities, cleaning of the site, and restoration and reseedling of areas disturbed during construction activities not covered under other portions of the Specification.
- B. Temporary facilities and other mobilization items are specified in Section 01500, "Temporary Facilities and Controls."

1.02 RELATED WORK

- A. Section 01500, "Temporary Facilities and Controls."
- B. Section 02120, "Clearing and Grubbing."
- C. Section 02500, "Access Roads."

1.03 REFERENCE

State of Michigan, Department of Transportation, Standard Specifications for Construction, 1996 Section 150, "Mobilization."

1.04 GENERAL

- A. The limits of construction that constitute areas designated for waste consolidation activities and Contractor support and staging areas are shown on the Drawings.
- B. In the event additional space is required by the Contractor for completion of the work, and the area is within the limits of work, the Contractor shall request approval from the Engineer for additional space. If required space

is outside the property limits, the Contractor shall make his own arrangements and obtain the necessary permits and/or pay for such additional space.

- C. The Contractor shall obtain the necessary permits and make the required arrangements for all utility service required under this Contract.
- D. The Contractor shall submit in writing a mobilization plan delineating the location of access roads, parking areas, and support area office trailer locations. The Engineer shall approve the plan prior to commencing mobilization activities.
- E. Mobilization shall include the following:
 - 1. Construction of all temporary facilities and mobilization of all construction equipment, materials, supplies, and appurtenances required to perform the work.
 - 2. Installation of the temporary gates and fencing as shown on the Drawings to provide security during construction.
- F. Demobilization shall include the following:
 - 1. Decontamination of all temporary facilities, equipment, materials, supplies, and appurtenances.
 - 2. Removal of all construction equipment, materials, supplies, appurtenances, and decontamination facilities.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.01 SITE CLEARING

Areas to be used for access roads and parking office trailers shall be cleared and stripped, in accordance with Section 02120, "Clearing and Grubbing," prior to placement of aggregate-wearing surface.

3.02 ACCESS ROAD

A temporary access road, if constructed by Contractor, will be constructed in accordance with Section 02500, "Access Roads."

3.03 PARKING AREAS

The Contractor shall supply ample all-weather parking areas to support office and site management activities. Specific requirements for parking area surfaces are specified in Section 02500, "Access Roads."

3.04 DEMOBILIZATION

A. The Contractor shall:

1. Conduct final inspection of site in preparation for subcontract completion.
2. Remove all property, temporary structures and materials, equipment, and appurtenances not required as part of the completed work.
3. Leave drainage channels and slopes open and in a condition satisfactory to the Engineer.

B. At completion of the work and immediately prior to the final inspection by the Engineer, clean and restore the entire project area and remove all debris and rubbish.

1. If the Contractor does not remove rubbish and debris or restore the site to the satisfaction of the Engineer and in accordance with the Specification, the Engineer reserves the right to have final cleaning completed at the sole expense of the Contractor.

END OF SECTION

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SECTION 01700
CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 DESCRIPTION

This section includes requirements for cleanup, restabilization, and restoration, as required to prevent accidents to personnel, public, and owner employees, to protect all work in place, to restabilize and restore all disturbed areas, to remove all evidence of construction activities, and to effect completion of the contract in an orderly manner.

1.02 RELATED WORK

- A. Section 02930, "Finish Grading and Seeding."
- B. Section 02200, "Earthwork."

1.03 CLEANUP

- A. Construction cleanup shall proceed as construction progresses and shall consist of the removal of all mud, oil, grease, soil, gravel, trash, scrap, debris, and excess materials that are unsightly or may cause the tripping or sliding of workmen, ladders, or equipment.
- B. Immediately prior to the Contractor's written request for a final inspection of the Contract work or any portion thereof, perform final cleanup.
- C. No items shall remain on or be discarded on this site, or on any other owner's site. Items and excess materials that are to be discarded shall be removed and legally disposed of off-site.

1.04 RESTORATION AND RESTABILIZATION

- A. All areas disturbed by the Contractor's operation shall be restored and restabilized as specified herein. This shall include but not be limited to all areas within the frontage area disturbed during clearing, waste consolidation or backfilling activities.
- B. Final restoration and restabilization shall proceed in accordance with the construction schedule. This shall include seeding when season allows. Disassemble and remove all temporary construction facilities constructed by the Contractor and leave the site in an orderly and restored condition, as required by the Contract documents.

- C. Preserve signs, markers, and fences, and maintain in their existing locations and condition unless written permission is obtained from the Engineer for their removal and restoration or replacement. Repair or replace damaged items when directed, at no cost to the Owner.
- D. Gravel surfaces and access roads shall be restored as near as practicable to their condition prior to being disturbed. Replace with new material of same quality and gradation. Materials and methods of construction shall be in accordance with Specification requirements and with applicable permits secured for this Contract.

1.05 DISPOSAL OF WASTE AND EXCESS MATERIALS

- A. Construction waste and excess construction materials shall be disposed of in the approved off-site disposal facilities or as directed by the Owner.
- B. Waste and excess material disposed of in an unauthorized area shall be removed by the Contractor, and the area shall be restored as near as practicable to its condition before disturbance, at no cost to the Owner.

1.06 REMOVAL OF CONDEMNED MATERIAL

Material delivered to the site that has been determined by the Engineer to be unsuitable or not in accordance with the Contract documents shall be removed from the work site and disposed of in an approved off-site disposal facility at no cost to the Owner.

1.07 FINAL INSPECTION

Upon receiving the Contractor's written request for substantial completion inspection, the Engineer will perform a walk-through of the site area with the Contractor's and the Owner's representatives. The walk-through shall identify and document (via a punch list) the additional construction items required to declare the site area to "substantial completion." If, in the opinion of the Engineer, the site area can be fully used for the purposes it was intended, a "Certificate of Substantial Completion" shall be issued. If, in the opinion of the Engineer, the site area cannot be fully used for the purposes it was intended, no "Certificate of Substantial Completion" will be issued, and another walk-through will be scheduled. All punch list items identified by the walk-throughs shall be repaired or replaced, as required to the satisfaction of the Engineer. Final payment will not be made until all of the punch list items are resolved to the satisfaction of the Engineer.

END OF SECTION

DIVISION 2—SITE WORK

SECTION 02080

DECONTAMINATION

PART 1 GENERAL

1.01 SUMMARY

- A. This section describes the requirements for equipment and personnel decontamination and includes construction of decontamination facilities.
- B. The Contractor shall provide all necessary personnel, equipment, and temporary facilities, as required, for proper decontamination of equipment materials and personnel, as specified in this section and the site-specific HASP. The Contractor shall provide suitable pumping and tank equipment to collect rinsewaters and will drum all decontamination waters for disposal. Decontamination water disposal shall be conducted during Phase 2 construction (by others).
- C. Decontamination of personnel, tools, and equipment shall be required prior to leaving the exclusion zone. Decontamination shall be required prior to breaks, when picking up equipment or tools in the support zone, or during any other activity when the potential for contamination transfer exists.
- D. The decontamination pad shall consist of an area at the edge of the construction limits sufficiently large enough to decontaminate the largest piece of equipment that may potentially come in contact with contaminated soil or waste. The pad shall be constructed on stable subgrade soil with a geotextile separator fabric, a geomembrane liner, a sump area to collect liquids, and a minimum 1-foot layer of sand or gravel to act as a wearing surface. The Contractor shall include within the mobilization plan the location and design of a decon pad for review by the Engineer.

1.02 RELATED WORK

- A. Section 02120, "Clearing and Grubbing."
- B. Section 02200, "Earthwork."

PART 2 PROCEDURES

- A. The Contractor shall provide the appropriate brushes, tubs, detergents, and pressure wash units required to complete decontamination of personnel and equipment.

- B. Pressure wash units shall be portable high-pressure units with self-contained water storage tankage and a pressurizing system. Each unit provided shall be capable of heating wash waters to 180°F and providing a nozzle pressure of 150 psi.
- C. The geotextile filter fabric shall be 8-oz non-woven polyester or polypropelene material providing sufficient strength to maintain stability for the duration of construction activities. The geomembrane liner shall be a 40 mil HDPE or LLDPE membrane.
- D. Aggregate shall be locally available sands and gravels appropriate for use in decon pad construction. The Contractor shall submit a material list to the Engineer for approval in the Mobilization Plan Submittal.

PART 3 EXECUTION

3.1 PERSONNEL DECON

- A. The Contractor shall perform personnel decon as specified in the Contractor's site-specific HASP. At a minimum and if required by the site HASP, decon shall include an equipment drop, a boot and outer glove wash using detergent and brushes, a boot and glove rinse, and a drop location for disposing of spent personal protective equipment.
- B. The personnel decon facility shall be designed by the Contractor and approved by the Engineer. Details of the personnel decon facility shall be included in the Contractor's site-specific HASP.

3.2 DECONTAMINATION PAD CONSTRUCTION

- A. The Contractor shall construct a decontamination pad to allow for heavy equipment decontamination prior to leaving the exclusion zone. This facility shall be located near the staging and support area to allow control of site access and to ensure decontamination is completed prior to equipment leaving site.
- B. Geotextile filter fabric and geomembrane shall be placed directly onto the prepared surface. Surface shall be free from rocks debris or sharp objects that may cause damage to the fabric and membrane. Subgrade shall be inspected by the Engineer for acceptance prior to placement of geotextile fabric. Provide at least a 1-foot overlap at each seam.
- C. Carefully place aggregate over liner material. The aggregate shall be placed in two equal lifts and compacted using a smooth drum roller.

3.3 EQUIPMENT DECONTAMINATION

- A. The Contractor shall perform the following steps during equipment decontamination:
 - 1. Scrape, brush, or otherwise remove all visible earthen material and debris from the equipment.
 - 2. Pressure wash all surfaces with a portable high-pressure hot water steam cleaner to remove any residual waste, dirt, or debris.
- B. All decontamination facilities shall be removed by the Contractor at the completion of the project. The area disturbed by decon operations shall be restored to its original pre-construction condition.

END OF SECTION

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SECTION 02120
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers work relating to removing trees and brush from within the limits of work and removing stumps.
- B. The Contractor shall protect from damage or defacement all vegetation and trees designated to remain.
- C. The Contractor shall stake the limits of proposed clearing and stripping. The Engineer shall review and approve the proposed limits prior to conducting work. The Contractor shall satisfy himself as to the obstacles to be encountered and account for such obstacles within the cost for completion of the work.
- D. The Contractor shall install silt fence and other erosion control structures, as applicable; along the limits of clearing prior to beginning clearing operations. Silt fence will be installed at the locations shown in the Drawings and will conform to the Specification for silt fence in Section 02540, "Erosion and Sedimentation Control."

1.02 RELATED WORK

- A. Section 02200, "Earthwork."
- B. Section 02210, "Waste Consolidation."
- C. Section 02540, "Erosion and Sediment Control."

PART 2 PRODUCTS

2.01 GENERAL

The Contractor shall provide all materials and equipment in suitable and adequate quantity as required to safely and efficiently accomplish the work shown and as necessary to complete the work.

PART 3 EXECUTION

3.01 CLEARING

- A. All existing trees shall be cleared by cutting or by other methods to completely remove the trees, including all branches and limbs or associated

brush. Roots or Rootmat which contains soil material will not be included as clearing debris, but will be managed as grubbing debris.

- B. All trees and brush shall be collected, chipped or other wise reduced in size. All trees and tree material shall become the property of the contractor and shall be removed and disposed of off-site.
- C. All trees shall be cut such so they are felled into an area designated for clearing to protect vegetation designated to remain. Trees shall be cut to within six inches of the ground surface.
- D. Any tree limbs removed or damaged during construction on trees designated to remain shall be treated with an approved tree sealant.

3.02 GRUBBING

- A. All stumps, root structures, or any other material containing significant amounts of site soils, shall be removed, chipped or ground in place. Stumps or stump material (chips) shall not be removed from the site.
- B. Chips and grindings shall be spread over the existing landfill surface and evenly incorporated into the fill. Concentration or stockpiling of chips/grindings in any one location shall be avoided.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers the material requirements and construction techniques necessary to complete construction of the final cover system and all other necessary earthwork not otherwise specified.
- B. Off-site general fill as defined in this section shall be used for all backfilling operations in the frontage area and any backfilling outside the property to be retained by GM. Granular/aggregate backfill material shall be used to backfill waste excavation areas within the 66-foot ROW area. Other general fill materials provided by GM can be used in areas designated to remain the property of GM.
- C. Section 01400, "Contractor's Quality Control," identifies the specific quality control tests required to be performed by the Contractor prior to borrow source approval and during construction of the final cover system.
- D. The Engineer may perform periodic quality assurance testing in accordance with the Construction Quality Assurance Plan. The Contractor will cooperate with the Engineer in providing support, such as leveling small test areas or other work as needed to complete the testing. The location and frequency of testing shall be determined by the Engineer. Backfilling and restoring areas shall be the responsibility of the Contractor.

1.02 RELATED WORK

- A. Section 01400, "Contractor's Quality Control."
- B. Section 02120, "Clearing and Grubbing."
- C. Section 02210, "Waste Consolidation."
- D. Section 02500, "Access Roads."

1.03 FINAL COVER SYSTEM

The final cover system consists of a minimum 2-foot vegetative cover soil, and 0.5 feet of topsoil. The intent of the final grading plan is to utilize waste soils excavated from the designated frontage area and along the western edge of the site to shape the site as shown in the site grading plan. General fill is only required in the frontage area and on the western site boundary. Cover soils and topsoil will then be used to create the final grades as shown on the plans.

1.04 IMPORTED MATERIAL ACCEPTANCE

The Contractor shall perform all required prequalification soil tests and deliver the required submittals prior to bringing any material on-site. The Engineer reserves the right to reject any material not meeting the Specifications or not previously approved for use in the work included under the scope of this Contract.

PART 2 PRODUCTS

2.01 GENERAL FILL MATERIAL

- A. General fill material shall be classified as CL, ML, CL-ML, SC, SM, SW, GC, GH, or GW, according to the USCS, unless otherwise approved by the Engineer. The maximum clod size shall not exceed 4 inches.
- B. Imported general fill material shall be free from roots, organic matter, brush debris, rocks larger than 3 inches, and any other deleterious material. This material may be inorganic clayey fill, sand, gravel, or any combination meeting the requirements listed above.
- C. All materials proposed for use as a general fill will be approved by the Engineer for their intended use prior to bringing the material on-site. Foundry sand shall not be utilized as general fill material during backfilling/ regrading of the frontage area following waste consolidation activities except within the area of the main access road.

2.02 GRANULAR/AGGREGATE BACKFILL

Material used as granular backfill under roadway areas shall be Class 22A granular material in accordance with Section 902.06 of the MDOT standard specifications.

2.03 COVER LAYER

The cover soil shall be a minimum of 2 feet in the thickness and shall consist of natural loam, sandy loam, silt loam, silty clay loam, or clay loam humus-bearing soil capable of sustaining plant life and retaining sufficient moisture for plant growth. Foundry sand supplied by the owner shall be substituted for the lower 1 foot of the cover layer if the material is available. The cover soil shall be free from rocks, sticks, debris, or other deleterious material greater than 2 inches in diameter.

2.04 TOPSOIL

- A. Topsoil for use in the final cover system may be imported or be from on-site topsoil stockpiles and shall meet the following specifications:
 - 1. Topsoil shall be natural loam, sandy loam, silt loam, or clay loam humus-bearing soil capable of supporting vigorous plant growth.

2. Topsoil shall be of mineral origin, exclusive of any peat or muck.
3. Topsoil shall be neither excessively acid nor excessively alkaline.

2.05 COMPACTION EQUIPMENT

- A. Compaction shall be of suitable type and size to obtain the required densities and/or permeabilities specified.
- B. In the event the supplied equipment does not provide the manufacturer's rated compactive effort or tests reveal the required densities are not being achieved, the Contractor shall provide different and/or larger types of equipment to meet the densities/permeabilities stated in this Specification.

PART 3 EXECUTION

3.01 SAFETY

All earthwork shall be completed in strict accordance with the approved site-specific HASP. Personal protective equipment, decontamination protocols, and air monitoring requirements are as stated in the approved HASP.

3.02 SITE PREPARATION

The site shall be cleared and grubbed in accordance with Section 02120 "Clearing and Grubbing." Access roads and parking areas will be constructed as specified in Section 02500, "Access Roads."

3.03 WASTE CONSOLIDATION

Waste excavation and placement shall occur prior to construction of any final cover system element.

3.04 GENERAL FILL

- A. Perform placement of the general fill, as required, to achieve the lines and grades shown on the Drawing. Shape, trim, or regrade areas to achieve a stable surface on which to construct the final cover layer. Foundry sand shall not be used as general fill in frontage areas.
- B. Place general fill material in maximum 8-inch loose lifts and compact to 90 percent of maximum unit weight. A moisture content of +0 to +3 percent of the optimum moisture content will be maintained to ensure grading layer material meets the compaction requirements of this section. The Contractor shall determine the optimum moisture content when general fill material is identified.

3.05 PROOF-ROLLING OF GRADING LAYER

- A. Following placement of the excavated waste, the limits of waste placement shall be proof-rolled on-grade using heavy-duty roller equipment with a minimum weight of 10 tons, unless otherwise approved by the Engineer. A minimum of four passes of the roller shall be completed over the entire area. Proof-rolling in this manner shall be completed on all landfill areas to ensure the overlying specified fill materials will be placed on a reasonably uniform and stable surface. Towing of the compaction rollers using a winch line or a cable will be permitted on the landfill sideslope areas, as needed.
- B. Following completion of proof-rolling, the entire area shall be visually inspected and hand-probed by the Engineer. Should any loose or otherwise unstable zones be detected by the visual inspection/hand-probing activities, these areas shall be recompacted using the vibratory roller, with as many passes as are necessary to densify these materials to the satisfaction of the Engineer.

3.06 GRANULAR/AGGREGATE BACKFILL

Aggregate shall be placed and spread in uniform layers not exceeding 8 inches and compacted to 95% of the maximum dry density using a smooth drum vibratory roller. A moisture content of +0 to +3 percent of the optimum moisture content shall be maintained during drilling operations.

3.07 COVER SOIL PLACEMENT

- A. Place cover soil layer in maximum 8-inch loose lifts and compact to 90 percent of maximum unit weight.
- B. Cover soil layer shall have a final compacted depth of 2 feet.

3.08 TOPSOIL

- A. Topsoil shall be placed and spread by lightweight tracked or rubber-tired equipment. Soil will be obtained from on-site stockpiles provided by the owner or off-site materials supplied by the contractor and approved by the Engineer.

- B. Topsoil will be compacted only to the degree required to provide stability and required lift thickness.
- C. Topsoil layer shall have a final compacted depth of 4 inches.

END OF SECTION

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SECTION 02210

WASTE CONSOLIDATION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The Contractor shall furnish all labor, materials, tools, and equipment necessary for the landfill final cover system subgrade preparation, including excavation, consolidation, and grading of waste materials; proof-rolling of proposed fill areas; subgrade stabilization, if necessary; excavation, grading, and ancillary items required to prepare a stable landfill subgrade to the design elevations, and grades and limits indicated on the Drawings and specified herein.
- B. The subgrade preparation work will require the excavation, grading and controlled placement and compaction of on-site subsoil and municipal wastes, as well as grading and controlled placement and compaction of off-site soil.
- C. Excavation of waste in the frontage area will occur during Phase I and relocation of waste along the western edge of the site will occur during Phase II. The limits of waste consolidation have been shown on the drawings. The Engineer will obtain confirmation samples from each excavation. Samples will be tested by the Engineer to determine if clean-up objectives have been achieved. If sampling results indicate the presence of soils exceeding the removal criteria, excavation will continue at the direction of the Engineer until all waste soils exceeding the removal criteria have been relocated.
- D. Contractor shall secure excavations as needed until sampling results are received and backfilling of excavations are approved by the Engineer.

1.02 RELATED WORK

- A. Section 02120, "Clearing and Grubbing."
- B. Section 02540, "Erosion and Sediment Control."

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 GENERAL

- A. Cutting and filling, including the excavation and relocation of landfilled waste and soil materials, will be necessary to achieve subgrade elevations and shall be considered as part of the site grading operations in preparation for placement of the final cover. All excavation, filling, grading, and compaction to achieve prepared subgrade elevations shall be performed in accordance with the Specifications of Section 02200, "Earthwork."
- B. Where it is necessary to excavate waste to construct the final cover system or to remove waste materials from the frontage area, the waste materials shall be redeposited in areas of the landfill that require filling to attain prepared subgrade elevations, as determined by the Drawings. All exposed or excavated and redeposited waste soil shall be properly compacted or recompacted.
- C. Where unstable conditions are encountered during excavation in waste soils, the Engineer may order overexcavation of materials and backfilling with suitable soil.

3.02 EXCAVATION

- A. Prior to commencing any earthwork activities (including clearing and grubbing), the Contractor shall install all necessary erosion and sedimentation control measures/structures in accordance with the Drawings and Section 02540, "Erosion and Sediment Control," of these Specifications. Air monitoring shall be conducted in accordance with the HASP. Proper personal protective equipment shall be worn by all personnel involved in waste excavation activities.
- B. Areas where excavation is to occur shall be cleared and grubbed in accordance with Section 02120, "Clearing and Grubbing" of these Specifications.
- C. Excavation (and surface grading as required) of materials shall be completed to the lines, grades, and limits indicated on the Drawings. All waste materials and debris present outside the limits of the proposed waste limits shall be excavated, transported, and placed by the Contractor within the limits of the proposed final cover system, at locations designated by the Engineer and shown on the Drawings.
- D. Waste excavation and consolidation activities shall be conducted in the appropriate level of personal protective equipment as stated in the Contractor's HASP. Air monitoring will be conducted continuously during waste excavation. In the event unknown materials (e.g., liquids, drums,

containers) are discovered, or air monitoring instruments register elevated levels of contaminants, all work will cease, and the Engineer will be notified.

- E. The Contractor shall transport and dispose of all other excavated, unsuitable materials within the limits of the proposed final cover system, as shown on the Drawings. When required to transport soft or wet materials (soil or waste) over access roads, the Contractor shall use suitably tight (water-tight) vehicles to prevent spillage. The Contractor shall clear away spillage of materials on roadways at no expense to the Owner.
- F. The Contractor shall implement the necessary means and methods to minimize and control fugitive dust emissions. The Contractor shall maintain the work in a condition that prevents dusting between work shifts and following completion of subgrade preparation, and shall implement a watering schedule using appropriate equipment to prevent fugitive dust emissions.

END OF SECTION

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SECTION 02500

ACCESS ROADS

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes requirements for construction of a temporary access road to support construction activities, as well as requirements for a permanent site access road. This section also includes work related to repair, maintenance, and restoration of wearing surface areas impacted by temporary access road construction.
- B. The proposed alignments for temporary access road and parking areas, and Certificates of Compliance for materials to be used in access road construction shall be submitted in the Mobilization Plan to be reviewed and approved by the Engineer.

PART 2 PRODUCTS

- A. Selected backfill soil for temporary access road construction shall be excavated from within roadway limits or from off-site material of any suitable gradation free from stones, roots, and organic material for satisfactory compaction. The maximum size of particles shall be 3/4 inch in their greatest dimension.
- B. Wearing Surface Aggregate shall conform to Class 22A and Base Course Aggregate shall conform to Class 21A, in accordance with Section 902.06, Table 902-1, "Grading Requirements" of the Standard Specifications.
- C. Geotextile fabric shall consist of standard roadway separator fabric appropriate for use in heavy equipment traffic applications. Geotextile proposed for use shall meet the minimum requirements listed in Table 1, and follow Table 910-1 of MDOT specifications for Geotextile Separator.
- D. Granular material shall conform to the requirements of Section 902.08 of the Standard Specifications.

Table 1

Test	Method	Value (Minimum)
Grab Tensile Strength (lb)	ASTM D-4632	270
Puncture Strength (lb)	ASTM D-4833	100
Mullen Burst (lb/in. ²)	ASTM D-3786	390

- E. Culverts, if required, shall be 12-inch-diameter corrugated steel pipe conforming to Section 909.05 corrugated steel pipe of the Standard Specifications. Riprap for culvert inlet/outlet shall be as specified on the Drawing.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

- A. The area to receive access roads shall be stripped of all topsoil, organic material, and vegetation prior to placement of select backfill material.
- B. Subgrade shall be brought to the lines and grades required by grading or placement of select backfill material. Material shall be backfilled and compacted in accordance with Section 02200, "Earthwork."
- C. Subgrade areas will be visually observed during placement and proof-rolled with a loaded dump truck following completion to look for soft, spongy, or yielding areas. Unsatisfactory areas will be excavated, replaced with suitable backfill, and compacted. The finished grade shall provide a satisfactory base for the road and shall be acceptable to the Engineer.

3.02 AGGREGATE BASE COURSE PLACEMENT

- A. Geotextile road fabric shall be placed between the subgrade and base course to ensure road bed stabilization and subgrade separation. Aggregate shall be placed and spread in uniform layers over the geotextile and compacted to achieve a final thickness of 12 inches. Aggregate base course shall be compacted to 95 percent relative compaction using a smooth drum vibratory roller.
- B. Water shall be added by the Contractor, as necessary, to control dust and aid compaction.
- C. Ruts and irregularities will be graded and smoothed during the compaction process until the final elevation and conformance to the grades shown is obtained.

3.03 CULVERTS

- A. Excavate trenches for culverts to a width sufficient to permit thorough tamping of the backfill under and around the pipe, but no greater than pipe diameter plus 18 inches. Excavate trench so culvert will be seated on a sand bedding of at least 6 inches. Pipe bedding shall be granular backfill, in accordance with Section 902.08 of the Standard Specifications. Dig bell holes to ensure complete length of barrel will be provided uniform support.
- B. Pipe shall be laid starting from the lowest end of the culvert section. Unnecessary handling of barrel in the trench shall be avoided.
- C. Pipe trench will be backfilled with select backfill material in 8-inch loose lifts and compacted with hand tampers. Backfill shall be moistened as necessary to aid compaction. Compaction will proceed evenly on both sides of barrel to ensure stability of the culvert section.

3.04 ACCESS ROAD MAINTENANCE

- A. Access roads will be adequately maintained to prevent the generation of dust during road usage. The Contractor shall provide sufficient water or other additive, as approved by the Engineer, at a frequency necessary to control dust. Additional stone may be required in areas continually susceptible to dust generation.
- B. Failed areas, ruts or potholes will be excavated, filled, or graded as necessary to maintain reasonable smooth travel over all access roads during completion of this Contract.
- C. Culvert sections shall be cleared of brush, limbs, debris, or sediment, as needed, to maintain drainage through each culvert. Culverts that become damaged or restricted from failure of the culvert construction or overloading will be replaced by the Contractor at no cost to the Engineer.

END OF SECTION

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SECTION 02540

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

Work includes furnishing all labor, equipment, and materials needed to complete the work as shown on the Drawings and specified herein.

1.02 RELATED WORK

- A. Section 01300, "Submittals."
- B. Section 02930, "Finish Grading and Seeding."

1.03 REQUIREMENTS OF REGULATORY AGENCIES

A. Erosion and Sedimentation Control Plan:

1. Following the Notice to Proceed, the Contractor shall prepare an Erosion and Sedimentation Control Plan for approval by the Engineer. The Contractor will be responsible for applying for and complying with all local and state Erosion Control Permit requirements applicable to the site.
2. Prior to initiating earthmoving activities, implement the soil erosion and sedimentation controls as shown on the Contract Drawings and contained in the Erosion and Sediment Control Plan.

B. Fines and related costs resulting from failure to provide adequate protection against soil erosion and sedimentation are the obligation of the Contractor.

1. Silt, sediment, and mud leaving the site will be construed as damage to neighboring property and evidence of negligence on the part of the Contractor.
2. Damages to neighboring property or adjoining wetlands outside the limits of work shall be rectified and/or restitution shall be paid by the Contractor.

C. Erosion and sedimentation control measures employed will be subject to approval and inspection by local governing authorities having jurisdiction over such work.

1.04 SUBMITTALS

- A. Samples: Submit samples and Certificates of Compliance for all materials being used to the Engineer for approval, including names, sources, and descriptions.
- B. Erosion and Sedimentation Control Plan: Submit in accordance with Section 01300, "Submittals," and applicable regulations.

1.05 QUALITY ASSURANCE

- A. All erosion and sediment control work shall comply with applicable requirements of governing authorities having jurisdiction. The specifications and Drawings are not comprehensive, but rather convey the intent to provide complete slope protection and erosion control for both the Owner's property and the adjacent property.
- B. Erosion control measures shall be established at the beginning of construction and maintained during the entire period of construction. On-site areas that are subject to severe erosion and off-site areas that are especially vulnerable to damage from erosion and/or sedimentation are to be identified and receive special attention.
- C. All land-disturbing activities are to be planned and conducted to minimize the size of the area to be exposed at any one time and to minimize the time of exposure.
- D. Surface water runoff originating upgradient of exposed areas should be controlled to reduce erosion and sediment loss during the period of exposure.
- E. All land-disturbing activities are to be planned and conducted in a manner that minimizes off-site sedimentation damage.

PART 2 MATERIALS

2.01 EROSION BALES

Erosion bales shall be straw, hay, or other approved material. Bales shall be either wire-bound or string-tied.

2.02 SILT FENCE

- A. The silt fence shall consist of woven or nonwoven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride meeting the requirements of Section 910.04 and 916.02, Silt Fence, of the Standard Specifications.

B. Physical Requirements for Geotextile shall be:

Test	Method	Value
Grab tensile strength (lb)	ASTM D4632	100 (min.)
Mullen burst strength (psi)	ASTM D3786	280 (min.)
Apparent opening size (U.S. standard sieve)	ASTM D4751	0.60 (max.)
Trapezoid Tear Strength	ASTM D4553	45 (min.)
Permittivity (sec ⁻¹)	ASTM D4491	0.1 (min.)

- C. Geotextile fabric shall be insect-, rodent-, mildew-, and rot-resistant.
- D. Silt fence support/anchoring system shall be as recommended by the manufacturer and provided as required to maintain stability, integrity, and proper functioning of the erosion control system.

PART 3 EXECUTION

3.01 EROSION BALE BARRIERS

- A. Erosion bale barriers shall be constructed at the locations shown on the Drawings. Excavation shall be to the width of the bale and the length of the proposed barrier, to a minimum depth of 4 inches.
- B. Bales shall be placed in a single row, lengthwise on proposed line, with ends of adjacent bales tightly abutting one another. In channels and ditches, the barrier shall extend to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale.
- C. Staking shall be accomplished to securely anchor bales by driving at least two wooden stakes or rebars through each bale.

3.02 SILT FENCING

Silt fencing shall be constructed at the locations shown on the Drawings.

- A. Excavate a 6-inch-by-6-inch trench as part of the installation procedure for premanufactured silt fencing, as detailed on the Drawings.
- B. Install the silt fence in accordance with the manufacturer's recommendations and the details shown on the Plans.
- C. Sections of silt fence shall be overlapped at least 1m.

- D. In areas where water ponds behind the silt fence, a stone filter may be needed to outlet the water and prevent failure.
- E. The Contractor shall maintain silt fencing by routinely removing sediment build-up from behind silt fence and/or repairing/reconstructing silt fence damaged by natural or construction activity until final acceptance by the Engineer.

3.04 TEMPORARY VEGETATIVE COVER

- A. Temporary seeding may be required in areas that have no further earthwork required but will not have final seeding completed within 21 days. Temporary seeding may also be necessary in areas of excessive erosion.
- B. Spread the seed mix and mulch as specified in Section 02930, "Finish Grading and Seeding," uniformly at the specified rate.
- C. Apply mulch either during application or immediately after placement to avoid loss of seed by wind and water.

3.05 DUST CONTROL

Dust generated from the Contractor's performance of the work, either inside or outside the limit of work, shall be controlled by the Contractor with the approval of the Engineer so as not to cause detriment to the safety, health, welfare, or comfort of any person or cause damage to any property, residence, or business.

3.06 SOIL STABILIZATION

Following initial soil disturbance or redistribution, permanent or temporary stabilization shall be completed in accordance with Section 02930, "Finish Grading and Seeding." The in-place sediment control measures will be maintained on a continuing basis until the site is permanently stabilized and all permit requirements are met.

END OF SECTION

SECTION 02930

FINISH GRADING AND SEEDING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers the work necessary for finish grading and establishment of vegetation, including furnishing and delivering material, finish grading, seeding, fertilizing material testing, mulching, and seed bed maintenance.
- B. Temporary seeding is required for all work topsoiled under the scope of Phase 1 construction, and all other areas disturbed by construction activities and requiring restoration.

1.02 SUBMITTALS

Submit certificates of compliance before delivery of materials, as specified in Section 01300, "Submittals," for the following items:

- Seed.
- Fertilizer.
- Lime.
- Mulch.
- If hydroseeding, number of pounds of materials to be used per 100 gallons of water for hydroseeding.

PART 2 PRODUCTS

2.01 SEED MIXTURE

- A. Permanent Seed (non-field areas) - Seed mixture for all areas will conform to Section 816 "Turf Establishment", of the Standard Specifications, Permanent Seed (non-field areas -- Mixture THM). Mixture THM shall be composed of certified seed of the purity, germination, and proportions, by weight, according to Section 917.10, Table 917-1A and shall be furnished in durable bags seed mixture shall be as follows:

Kentucky Blue Grass	30%
Perennial Rye Grass	20%
Creeping Red	50%

Permanent Seed (Athletic field mix) - All athletic fields and to 20 foot outside the field boundary shall be seeded with athletic field turf mix. Athletic turf mix shall be composed of:

Nublu Kentucky Bluegrass	25%
Kelly Kentucky Bluegrass	25%
APM Perennial Ryegrass	25%
Accent Perennial Ryegrass	12.5%
Target Perennial Ryegrass	12.5%

Temporary Seed (Mixture TSM) - Mixture TSM shall be composed of certified seed of the purity, germination, and properties, by weight, according to Section 917.10, Table 918-1A and shall be as follows:

Perennial Ryegrass	50%
Spring Oats	50%

2.02 FERTILIZER

- A. Fertilizer shall not be applied to topsoiled areas designated to receive temporary seed mixtures.
- B. Fertilizer for use in connection with permanent seeding shall be standard commercial packaged or bulk products in granular or liquid form, conforming to Section 917.09 of the Standard Specifications for Class A fertilizer. Fertilizer shall be applied to a rate which will provide 270 kg/ha of chemical fertilizer nutrient.
- C. Fertilizer shall be uniform in composition and delivered in original unopened containers bearing the manufacturer's invoice indicating the minimum percentages of total nitrogen, available phosphoric acid, and soluble potash in the contents.

2.03 MULCH

- A. Mulch shall consist of any straw or marsh hay in an air-dry condition. Hay in an air-dried condition will be permitted only when straw mulch or marsh hay is unavailable. Mulch materials shall be undamaged, rot-free, clean, substantially free of weed seed and other objectionable foreign matter.
- B. Other mulch materials shall be approved by the Engineer prior to use and shall follow the specifications of Section 917.13 of MDOT standards.

2.04 WATER

Water for use in seed application or maintenance shall be potable water free from oils, acids, alkalies, salts, or any other substance injurious to plant life. The Contractor is responsible for providing an ample supply of acceptable water for use in conducting seeding activities, in accordance with this Specification.

2.05 TURF MULCH BLANKETS

- A. Mulch blankets shall have net covering on one side. The net for the blanket shall meet Subsection 917.13.D.1.
- B. Mulch blankets shall be made of excelsior or straw material.
 - 1. The excelsior mulch blankets shall be made from a uniform layer of interlocking excelsior fibers cut from sound, green timber. Roll weight when manufactured shall average 0.05 to 0.1 lbs/ft².
 - 2. The straw mulch blankets shall be made of a uniform layer of straw. The straw shall be clean wheat straw free of weeds and weed seed. The straw and net covering shall be securely stitched together to create a uniform mat. The blankets shall on the average weigh 0.05 lbs/ft².

PART 3 EXECUTION

3.01 SEED BED PREPARATION

All areas that are disturbed by earthmoving activities and are not paved, stoned, or otherwise covered, shall be stabilized by the establishment of vegetation as soon as possible following completion of earthmoving for that area.

- A. Area to be seeded shall be topsoiled in accordance with Section 02200, "Earthwork." The Contractor shall verify that prepared soil base is ready to receive seeding in accordance with this specification. Beginning of installation means acceptance of existing site conditions.
- B. Finish grade area to be seeded by raking, discing, or rototilling to a uniform grade. Objectionable material such as stones (2 inches or larger), clods, brush, roots, and trash will be removed.
- C. Fertilizer shall be evenly applied on the prepared topsoil at a rate which will provide 241 lb/acre of chemical fertilizer nutrient and shall be incorporated into the upper 1 to 2 inches of the topsoil by light discing or harrowing. Fertilizer may be incorporated into the water/seed mixture if hydroseeding techniques are to be used. The Contractor shall lightly water fertilized areas to aid the dissipation of fertilizer.
- D. Finished grades shall be lightly compacted with appropriate equipment to ensure a stable seed bed and to limit erosion.

3.02 SEEDING

- A. All areas topsoiled during Phase 1 Construction shall be seeded with a temporary seed mixture as described in this specification. Sowing shall be conducted in accordance with Section 816.03 C.1.A of the Standard Specifications.
- B. Seeding shall be conducted under favorable weather conditions and when temperatures and moisture conditions are suitable for the work.
- C. Seed shall be inoculated within the time limits and procedures recommended by the manufacturer.
- D. Sow areas to be reseeded evenly with a mechanical drill or hydroseeder at a rate of 5 lbs per 1,000 sq ft.
- E. Apply temporary seed, if required, at a rate of 1.5 pounds per 1,000 square feet.
- F. Apply water evenly as prescribed by the seed manufacturer immediately after each area has been sown.
- G. Mulch each area seeded uniformly using approximately 2 tons of mulch per acre. Slopes greater than 10 percent and drainage channels with slopes greater than 3 percent shall receive turf mulch blankets. The Contractor shall not seed area in excess of that which can be mulched on same day. Mulch that becomes displaced shall be replaced at the Contractor's expense.
- H. Turf mulch blankets shall be placed parallel to the slope or in the direction of flow and stapled per the manufacturer's recommendations.
- I. Erosion bales and silt fencing may be required on slopes and ditches if excess erosion of the final cover occurs following construction. The Engineer shall determine the need for these additional erosion control measures. Material and installation requirements will be as specified in Section 02540, "Erosion and Sediment Control."

3.03 MAINTENANCE

- A. Begin maintenance activities after each section of the site has been seeded.
- B. Maintain seeded surfaces by supplying additional topsoil, seed, fertilizer, mulch, or other erosion control measure where necessary to control erosion of the final cover.
- C. Water surfaces to ensure uniform seed germination and to keep surface of soil damp. Apply water slowly and in a fine spray to limit ponding.

- D. Mow frequently enough to maintain a maximum height of 6 inches until area is accepted.
- E. Replant damaged areas showing root growth failure, deterioration, bare or thin spots, and eroded areas.

3.04 INSPECTION FOR ACCEPTANCE AND GUARANTEE PERIOD

- A. Seeded areas shall be accepted by the Engineer when a full and uniform stand of grass has become established. A satisfactory stand of grass or section of grass shall be defined as an area of 10,000 square feet or larger that has:
 - 1. No bare spots larger than 3 square feet.
 - 2. Not more than 10 percent of area with bare spots larger than 1 square foot.
- B. The Contractor shall provide a one-year guarantee on all seeded areas from the date of acceptance by the Engineer. Acceptance will be based on the criteria as stated in Part 3.04 A, as determined by the Engineer.

END OF SECTION

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**PHASE 2 CONSTRUCTION
TECHNICAL SPECIFICATIONS
LINDEN ROAD SITE
FLINT TOWNSHIP, MICHIGAN**

VOLUME 3

Prepared for

**GENERAL MOTORS CORPORATION
Environmental and Energy Staff
Remediation Group**

Prepared by

**ROY F. WESTON, INC.
Three Hawthorn Parkway
Vernon Hills, Illinois 60061**

February 1998

Work Order No. 01138-079-002

**General Motors Corporation
R.F.Q.**

CONTRACTORS BID PROPOSAL FOR ALL TRADE WORK

We, the undersigned, have prepared and submitted this bid as directed for the GM Linden Road Site, Soil Cover System Remedial Action, in Flint Township, Michigan. The Seller shall provide services in strict accordance with the Drawings, Specifications, and Attachments. All costs, including taxes, labor, materials, etc. to perform the work are included in the Total Base Bid amount of \$_____.

No.	Description	Qty.	Units	Unit Price	Extended Price
1	General Conditions	1	LS		
2	Mobilization and Demobilization	1	LS		
3	Waste Excavation, Relocation, and Placement	13,500	CY	/CY	
4	Site Preparation/Rough Grading	1	LS		
5	Foundry Sand Protective Cover Layer	40,750	CY	/CY	
6	Off-Site General Fill Protective Cover Layer	40,750	CY	/CY	
7	Topsoil	20,400	CY	/CY	
8	Concrete Parking Area and Concrete Slab Work	1	LS		
9	Gravel Access Road, Parking Areas, and Walkway Path	1	LS		
10	Stormwater Drainage Structures	1	LS		
11	Pre-Engineered Metal Building Including Electrical/Telephone Service	1	LS		
12	Fence and Gates—Chain-Link	1,130	LF	/LF	
13	Finish Grading and Seeding	123,420	SY	/SY	
14	Landscaping	1	LS		
15	Parking Bumpers, Goal Posts, and Corner Markers purchased and installed	1	LS		
16	Post and Cable Fence	3,100	LF		
17	Repainting/Restoring Existing Fence	3,400	LF		
Total Bid Price					\$

Contractor shall acknowledge all addendums issued for bid to be considered responsive.

The TOTAL Base Bid reflects all charges for Addendum/Pre-Contract Bulletins numbered:

Contractor must bid according to bid documents. Exceptions or qualification statements must be included in this bid form. This bid form must be completed in its entirety at time of submission unless otherwise noted. Failure to provide the requested information at the time bid is submitted will be sufficient cause for the rejection of any bid or any part of any bid as stated in the General Conditions, Page 2, Item 4, "Tenders."

The following are the General Motors attachments to this proposal:

1. General Motors Corporation Construction General Conditions, GM 1638 (12/95).
2. Owner's Technical Specifications dated _____.
3. Owner's Design Plans dated _____.

The prices in this bid will stay in effect for at least 90 days after the proposals are received.

Company Name: _____ DUNS# _____

Address: _____

Telephone Number: _____ FAX Number: _____

Prepared By: _____ Title: _____

Submitted By: _____

Signature: _____

Title: _____

Date: _____

SUBCONTRACTORS

The contractor shall state here the names of the Subcontractors which form the basis of his bid. If any of the Subcontractors indicated are not required for this project, the Contractor shall state "not required."

Work Item	Subcontractor's Name
Waste Consolidation Activities	
Excavation, Backfilling, Compaction	
Construction Stormwater Management	
Chain Link Fence and Other Fencing Material Installation/Removal	
Final Site Grading	
Storm Sewer Installation Including Culverts and Detention Basin Outlets	
Topsoil Backfilling, Compacting, and Grading	
Seeding and Maintenance	
Curb and Gutter Construction	
Site Survey Services	
Concrete Pavement Construction	
Geotechnical/Materials Testing Laboratory	

UTILIZATION OF MINORITY CONTRACTORS

The lump sum base bid includes the utilization of minority business enterprises as identified below:

Description of Work or Materials	Contractor or Supplier's Name, Address, and Contract Person	Material Bid Value
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
_____	_____	\$ _____
Total Value of Minority Involvement:		\$ _____

CHANGES IN THE WORK:

The Contractor shall include and bill as a separate item Sales and/or Use Tax except for items marked, in the Bulletin/Field Order, as follows:

PP—Personal Property

QP—Qualified Personal Pollution Control Facilities

For any marked items in the Bulletin/Field Order, the Contractor shall furnish the selling price, which shall include the price of materials including fabrication labor, installation labor and all other charges. For marked items, GM assumes the responsibility for the amount of any applicable sales and/or use tax.

**LINDEN ROAD SITE
FLINT TOWNSHIP, MICHIGAN**

TECHNICAL SPECIFICATIONS

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