MALCOLM PIRNIE

Soil/Fill Management Plan

APPENDIX

A

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Soil/Fill Management Plan

COBEY, LLC SITE

BUFFALO LAKESIDE COMMERCE PARK – PORTIONS OF PARCELS 1 AND 2

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June 2006

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III	Erosion and Surface Water Control Plan (Stormwater Pollution Prevention Plan)
IV	Erosion Control Details
V	Health and Safety Plan

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Introduction

SECTION 1

1.1 Background

The Cobey LLC (Cobey Site) is a vacant industrial property located in South Buffalo. The Site encompasses approximately 12.3 acres of the 113-acre Hanna Furnace Site. The Site consists of portions of Parcels 1 and 2 of the Buffalo Lakeside Commerce Park (BLCP).

A Brownfield Cleanup Program (BCP) Application was submitted to the New York State Department of Environmental Conservation (NYSDEC). The BCP program allows for redevelopment of the property for commercial and industrial purposes. The current development plan for the Site includes light manufacturing.

1.2 Purpose

The purpose of this Soil/Fill Management Plan (S/FMP) is to provide protection of human health and the environment during and subsequent to redevelopment of the Cobey Site.

Previous studies have investigated and assessed the surface and subsurface soil/fill and groundwater in the vicinity of the Cobey Site. While significant investigation of the subsurface has occurred, the nature of subsurface investigations does not allow for 100 percent complete or accurate investigation. Therefore, it is possible that some quantity of unsuspected subsurface soil/fill contamination may be encountered during redevelopment activities and/or after the completion of the voluntary cleanup.

During future redevelopment and infrastructure improvements or routine maintenance activities such as construction of waterlines, sewers, electric power distribution, natural gas piping, road

construction, foundation construction, Site grading and other activities requiring the movement of soils within the Cobey Site, unsuspected contamination may be encountered.

This S/FMP was created to provide known Site background information and to discuss the handling procedures for subsurface contamination, if encountered. The S/FMP provides protocols during the following events for redevelopment and infrastructure improvements:

- Sampling, handling, excavation and grading of on-Site soils.
- Soil/fill acceptability of off-Site sources for on-Site backfill, subgrade fill, or cover material.
- Erosion and dust control.
- Installation of fencing and other Site access control devices.
- Deed or other land use restrictions.
- Health and safety procedures for Site construction work.

As an appendix to the Remedial Action Work Plan, this S/FMP is incorporated into and is an enforceable part of the Brownfield Cleanup Program Agreement. Any disturbance, excavation, grading, or other movement of soils on the Site will be conducted in accordance with this S/FMP.

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Soil/Fill Management

SECTION 2

2.1 Excavation of On-Site Soil/Fill

No excavation, grading or disturbance of the final vegetated soil cover or existing subgrade soil/fill shall be initiated prior to a minimum of three working days notification to the NYSDEC Region 9, Division of Environmental Remediation. A Professional Engineer with remedial investigation experience, representing the Site owner or developer will monitor soil/fill excavations or disturbances. The excavation activities will be conducted in accordance with the protocols detailed in Attachment I and in the sections below.

During excavation, the soil/fill will be inspected for staining and will be field screened for the presence of volatile organic compounds (VOCs) with a photoionization detector (PID). Stained soil is soil that is discolored, tinted, dyed, unnaturally mottled, or contains a sheen. Attachment II contains a Standard Operating Procedure for Soil Screening. Excavated soil/fill that is visibly stained or produces elevated PID readings (i.e., sustained 10 ppm or greater) will be considered potentially contaminated and stockpiled on-Site for further assessment. The potentially contaminated soil/fill will be stockpiled (maximum 20 cubic yard piles) on polyethylene sheeting and then sampled for reuse, treatment, or disposal. The stockpiled potentially contaminated soil/fill will also be completely covered using polyethylene sheeting to reduce the infiltration of precipitation and the entrainment of dust. Sampling and analysis will be completed in accordance with the protocols delineated in Section 2.2. Soil/fill containing one or more constituents in excess of the Site-specific action levels (SSALs) shown in Table 2-1 will be transported off-Site to a permitted waste management facility. Soil/fill awaiting analytical results or awaiting transportation will be stored on-Site under polyethylene sheeting.

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TABLE 2-1
SITE-SPECIFIC ACTION LEVELS
SOIL/FILL HANDLING PLAN

PARAMETER	NYSDEC TAGM VALUES [1]	EASTERN U.S. BACKGROUND RANGE [1]	MAXIMUM CONCENTRATION DETECTED [2]	SITE-SPECIFIC ACTION LEVEL
VOLATILE ORGANIC COMPOUNDS (ug/kg)				
TOTAL VOCs	10,000	-	265	10,000[5]
SEMIVOLATILE ORGANIC COMPOUNDS (ug/kg)				
TOTAL SVOCs	500,000	-	80,750	500,000[3,5]
PESTICIDES / PCBs (ug/kg)				
Total Pesticides	10,000	-	500	10,000[5]
Total PCBs (surface-0 to 1')	1000	-	3820	1000
Total PCBs (subsurface-below 1'	10,000	-	Not Detected	10,000
METALS (mg/kg)				
Arsenic	7.5 or SB	3 - 12	61.7	50
Barium	300 or SB	15 - 600	327	500
Cadmium	(10)	0.1 - 1	19.9	20
Chromium	(50)	1.5 - 40	4,700	200
Lead	(1000)	4 - 500	3,300	1,000
Mercury	0.1	0.001 - 0.2	0.67	1.0
Selenium	2 or SB	0.1 - 3.9	35.9	50
Silver	SB	-	1,170	1,000
Cyanide	1,600[4]	-	43	50

Notes:

(1) Soil Cleanup Guidelines and Eastern U.S. Background Range from NYSDEC TAGM 4046 (1/24/94). Value in parentheses are NYSDEC revised values for nonresidential sites but have not yet been incorporated into TAGM 4046.

(2) Maximum concentration detected during Recra Environmental, Inc.'s 1988 investigation, ABB Environmental Services' 1995 investigation, and Malcolm Pirnie's 1999 and 2000 investigations.

(3) In addition to the SSAL of 500,000 ug/kg for total concentrations of SVOCs, the SSAL for each individual SVOC is 50,000

(4) USEPA Region 3 Soil Screening Level for cyanide.

(5) Total concentration is the sum of concentrations of Target Compound List (TCL) compounds plus estimated concentrations of Tentatively Identified Compounds (TICs).

- Soil cleanup guideline or background range not available.

Any soil/fill with a pH higher than 12.5 is considered hazardous and therefore must be properly disposed off-Site. Additionally, any soil/fill with a pH greater than 9.0 but less than 12.5 may be reused on-Site but only to fill in areas of grade below the final cover system. This soil/fill may not be used as backfill in utility trenches or to create berms or other above grade mounds. This soil/fill must also be covered with clean material in accordance with Section 3.2 of the Remedial Work Plan.

If buried drums or underground storage tanks are encountered during soil excavation activities, excavation will cease and the NYSDEC will be immediately notified. All drums and/or underground storage tanks encountered will be evaluated and the contractor will submit a removal plan for NYSDEC approval. Appropriately trained personnel will excavate all of the drums and/or underground storage tanks while following all applicable federal, state, and local regulations. Removed drums and underground storage tanks will be properly characterized and disposed off-Site. The soil/fill surrounding the buried drums or underground storage tanks will be considered as potentially contaminated and will be stockpiled and characterized.

All excavations or disturbances must be backfilled as soon as the work allows. Backfilled excavations must be covered with suitable cover material within ten working days of backfilling or as otherwise approved by the NYSDEC. The cover system is discussed in the Remedial Work Plan.

Excavated or disturbed backfill may be used as subgrade or excavation subgrade backfill following characterization performed in accordance with Section 2.2.

2.2 Soil/Fill Sampling and Analysis Protocol

All excavated and stockpiled soil/fill with evidence of contamination will be sampled and classified for reuse or disposal. Initially, one composite soil sample and a duplicate sample will be will be collected for each 100 cubic yards of stockpiled soil. The composite sample will be collected in the manner described in the Standard Operating Procedures (SOPs) included in Attachment II from five locations within each stockpile. PID measurements will be recorded for each of the five composite sample locations, and one grab sample and one duplicate sample will

be collected from the location with the highest PID measurement of the five composite locations. The composite sample will be analyzed by a NYSDOH ELAP-certified laboratory for Target Compound List (TCL) semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs), and the metals arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver plus cyanide using current NYSDEC Analytical Services Protocols (ASP). Additionally, pH will be analyzed using SW-846 Method 9045. The grab sample will be analyzed for TCL volatile organic compounds (VOCs).

Excavated soil/fill that exhibits no evidence of contamination (staining or elevated PID measurements) will also require characterization prior to use as subgrade or excavation subgrade backfill at the Site. Characterization samples will be collected and analyzed at a frequency of not less than one sample for 2000 cubic yards of soil/fill, and a minimum of one sample will be collected for volumes less than 2000 cubic yards. The characterization samples will be collected in accordance with the protocols described above; the sampling efforts shall consist of discrete samples for VOCs and composite samples collected from five locations for the remaining analytes.

Any soil/fill that has been characterized and found to meet the SSALs may be reused as subgrade or excavation subgrade backfill. If the analysis of the soil/fill samples reveals unacceptably high levels of any analytes (i.e., greater than one or more SSAL), additional analyses will be necessary to further classify the material for hazardous characteristics for disposal purposes. At a minimum, the duplicate sample will be analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) for the particular analytes that were detected at concentrations exceeding the SSALs. The duplicate sample may also be analyzed for RCRA Characteristics including reactivity, corrosivity, and ignitability. If the analytical results indicate that concentrations exceed the standards for either TCLP or RCRA Characteristic analysis, the material will be considered a hazardous waste and must be properly disposed off-Site at a permitted disposal facility within 90 days of excavation. Additional characterization sampling for off-Site disposal may be required by the disposal facility. To potentially reduce off-Site disposal requirements/costs, the owner or Site developer may also choose to characterize each stockpile individually.

2.3 Subgrade Material

Subgrade material used to backfill excavations or placed to increase Site grades or elevation shall meet the following criteria:

- Excavated on-Site soil/fill shall either exhibit no evidence of contamination (staining and/or elevated PID measurements) or, if evidence of contamination is present, analytical results of the soil/fill indicate that the contaminants are present at concentrations below the SSALs.
- Off-Site borrow soils will be documented as having originated from locations having no evidence of disposal or release of hazardous, toxic or radioactive substances, wastes or petroleum products.
- Off-Site soils intended for use as Site backfill cannot otherwise be defined as a solid waste in accordance with 6NYCRR Part 360-1.2(a).
- If the contractor designates a source as "virgin" soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development or agricultural use.
- Virgin soils should be subject to collection of one representative composite sample per source. The sample should be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and the metals arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver plus cyanide. The soil will be acceptable for use as backfill provided that all parameters meet the SSALs.
- Non-virgin soils will be tested via collection of one composite sample per 500 cubic yards of material from each source area. If more than 1,000 cubic yards of soil are borrowed from a given off-Site non-virgin soil source area and both samples of the first 1,000 cubic yards meet the SSALs, the sample collection frequency will be reduced to one composite for every 2,500 cubic yards of additional soils from the same source, up to 5,000 cubic yards. For borrow sources greater than 5,000 cubic yards, sampling frequency may be reduced to one sample per 5,000 cubic yards, provided all earlier samples met the SSALs.

2.4 Final Cover

Surface coverage over the entire redeveloped parcel or subparcels will be required by the developer or owner as a pre-condition of occupancy. The purpose of the surface cover is to eliminate the potential for human contact with fill material. Surface coverage will consist of clean soil with vegetative cover, asphalt or concrete paving, or buildings with concrete floors.

Prior to placement of final cover, a demarcation layer between the existing contaminated soil/fill and the clean final cover material will be placed in areas that are not being paved. The demarcation layer will be InterNet ¾-inch polypropylene orange mesh (product number OD-1670).

The cover soil material shall meet the following criteria:

- Excavated on-Site soil/fill shall not be used as cover material.
- Off-Site borrow soils will be documented as having originated from locations having no evidence of disposal or release of hazardous, toxic or radioactive substances, wastes or petroleum products.
- Off-Site soils intended for use as Site cover cannot otherwise be defined as a solid waste in accordance with 6NYCRR Part 360-1.2(a).
- If the contractor designates a source as "virgin" soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development or agricultural use.
- Virgin soils should be subject to collection of one representative composite sample per source. The sample should be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and TAL metals plus cyanide. The soil will be acceptable for use as cover material provided that all parameters meet the NYSDEC recommended soil cleanup objectives included in TAGM 4046.
- Non-virgin soils will be tested via collection of one composite sample per 500 cubic yards of material from each source area. If more than 1,000 cubic yards of soil are borrowed from a given off-Site non-virgin soil source area and both samples of the first 1,000 cubic yards meet the TAGM 4046 criteria, the sample collection frequency will be reduced to one composite for every 2,500 cubic yards of additional soils from the same source, up to 5,000 cubic yards. For borrow sources greater than 5,000 cubic

yards, sampling frequency may be reduced to one sample per 5,000 cubic yards, provided all earlier samples met the TAGM 4046 criteria.

- To reduce the potential for disturbance of the soil cover material, berms or mounds composed of clean soil will be constructed in areas in which trees and shrubs will be planted.

- Verification that the final clean cover thickness be verified and documented by surveys conducted both before and after placement of the material. The clean final cover thickness must be a minimum of 12 inches thick.

A certificate of completion will not be issued by the NYSDEC until the clean soil cover has been seeded and vegetation has established itself. The grading and seeding of the soil cover will occur at the start of a growing season.

2.5 Erosion Controls

2.5.1 General Guidelines

When the remedial actions require the disturbance of more than five acres of land, federal and state laws[1] require that the project obtain coverage under the NYSDEC SPDES General Permit for Storm Water Discharges from Construction Activities that are classified as "Associated with Industrial Activity", Permit #GP-93-06 (Construction Storm Water General Permit). Requirements for coverage under the Construction Storm Water General Permit include the submittal of a Notice of Intent Form and the development of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP for the Site (see Appendix III) was prepared in accordance with "Chapter Four: the Storm Water Management and Erosion Control Plan" in Reducing Impacts of Storm Water Runoff from New Development, NYSDEC, 1992. The SWPPP provides the following information:

- A background discussion of the scope of the construction project.

- A statement of the storm water management objectives.

[1] The Federal Water Pollution Control Act (as amended, 33 U.S.C. 1251 et. Seq.) and the New York State Environmental Conservation Law: Article 17, Titles 7 and 8 and Article 70.

- An evaluation of post-development runoff conditions.
- A description of proposed storm water control measures.
- A description of the type and frequency of maintenance activities required to support the control measure.

The SWPPP also address issues such as erosion prevention, sedimentation control, hydraulic loading, pollutant loading, ecological protection, physical Site characteristics that impact design, and Site management planning. The SWPPP also includes a contingency plan to be implemented in the event that heavy rain events are determined to be impacting water quality in the Union Ship Canal due to redevelopment activities. All descriptions of proposed features and structures at the Site includes a description of structure placement, supporting engineering data and calculations, construction scheduling, and references to established detailed design criteria.

The erosion and surface water control plan included in Attachment III details the methods of erosion control that must be followed during Site redevelopment activities. The use of appropriate temporary erosion control measures such as silt fencing and/or hay bales will be required around all soil/fill stockpiles and unvegetated soil surfaces during redevelopment activities. These methods are described below, and Attachment IV includes details for various erosion control measures that might be used during Site redevelopment activities. Stockpiles shall be graded and compacted as necessary for positive surface water runoff and dust control. Stockpiles of soil/fill will be placed a minimum of ten feet from the property boundary.

2.5.2 Temporary and Permanent Erosion Control Measures

2.5.2.1 Temporary Measures

Temporary erosion and sedimentation control measures and facilities will be employed during active construction stages. Prior to any construction activity, temporary erosion and sediment control measures shall be installed and maintained until they are no longer needed, or until such time that permanent erosion control measures are installed and effective. Additional sediment control measures may also be necessary. Structural measures, as described below, will be

designed and installed to provide the required sediment and erosion control. The following temporary measures will be incorporated into construction activities:

- Silt fencing.
- Straw bales.
- Temporary vegetation/mulching.

2.5.2.1.1 Silt Fencing

Regrading and capping activities may result in sheet flow to various areas of the Site; therefore, silt fencing will be used as the primary sediment control measure. Prior to extensive clearing, grading, excavation, and placement of cover soils, silt fences will be installed along all construction perimeter areas to prevent sedimentation in low areas and drainage areas. The location and orientation of silt fencing to be used during redevelopment operations will be field determined. There may be breaks and overlaps in the silt fencing to allow construction vehicles access to the construction areas.

Intermediate silt fencing will be used upslope of perimeter areas where phased construction activities are occurring. This measure will effectively lower sheet flow velocities and reduce sediment loads to perimeter fencing. In addition, silt fencing around soil stockpiles will be employed.

As sediment collects along the silt fences, they will be cleaned to maintain desired removal performance and prevent structural failure of the fence. Removed sediment will be disposed on-Site as general fill in a designated area. The perimeter silt fences will remain in place until construction activities in the area are completed and vegetative cover or other erosion control measures are adequately established. Silt fences will be provided and installed in accordance with the details presented in Attachment IV.

2.5.2.1.2 Straw Bales

Straw bales will be used to intercept sediment-laden runoff from storm water channels as needed during various phases of construction. Additional straw bale dikes may be necessary in some areas during some phases of construction.

Use of straw bales will be limited to swales and/or diversion ditches where the anticipated flow velocity will not be greater than 5 feet per second (fps). Where flows may eventually exceed 5 fps along a swale or diversion ditch, an intermediate straw bale barrier will be installed upgradient of the final bale barrier. The intermediate bale barrier will effectively reduce flow velocities and sediment load to the final barrier.

As with the silt fencing, sediment will be removed to maintain performance and prevent overtopping or failure of the straw bale barrier. Removed sediment will be disposed of on-Site as general fill in a designated area. Sediment laden straw bales that have lost their structural integrity and/or effectiveness will be disposed of off-Site as a solid waste. Straw bale barriers will remain in place until construction activities contributing sediment to the barrier are complete and vegetative cover or other erosion control measures are adequately established. Straw bales will be provided and installed in accordance with the details presented in Attachment IV.

2.5.2.1.3 Temporary Vegetation and Mulching

As a result of phased construction and split construction schedule, portions of the Site may be left in intermediate/incomplete conditions. Intermediate areas may include rough graded areas awaiting finer grading or areas awaiting topsoil placement. Intermediate areas where activities will not resume for a period in excess of two weeks shall be seeded with a quick germinating variety of grass or covered with a layer of straw mulch.

The temporary cover will act to stabilize the soil and reduce erosion. As construction progresses, areas containing temporary vegetation or straw mulch can be covered without removal of the temporary vegetation or mulch.

2.5.2.2 Permanent Control Measures

Permanent erosion control measures and facilities will be incorporated during cover construction and during Site redevelopment for long-term erosion protection. Permanent measures and

facilities will be installed as early as possible during construction phases. Parking and building systems associated with redevelopment shall not include dry wells or other subsurface injections/disposal piping or facilities.

2.5.2.2.1 Design Features

The remedial construction activities will involve the installation of cover system including asphalt, concrete, or clean fill over the entire Site. Permanent erosion control measures incorporate a combination of design features to limit overall erosion and sediment problems to practical design limits, and the placement of permanent facilities during Site restoration for long term erosion protection. The soil cover system will be designed based on the following criteria:

- Maximum slope of 33% (3H: 1 V) to limit erosion.
- Minimize the potential contact with, and migration of, waste fill.
- Provide a medium for the growth of vegetation to control erosion.

Design features incorporated into the construction plans to control erosion will include limiting steep slopes, routing runoff to surface water collection channels, limiting flow velocities in the collection channels to the extent practical, and lining collection channels, where appropriate. In areas where flow will be concentrated (i.e.; collection channels) the channel slopes and configuration will be designed to maintain channel stability.

2.5.2.2.2 Construction Features

Any final slopes greater than 33 percent will be reinforced or have a demarcation layer under the clean cover to indicate if erosion has extended into the subgrade. Following the placement of final cover soils over regraded areas, a revegetation program will be implemented to establish permanent vegetation. Vegetation serves to reduce erosion, enhance evapotranspiration, and improve runoff water quality. The areas to be grassed will be seeded in stages as construction in is completed with 70 lbs./acre of seed conforming to the mix included in 3.2.1 of the Remedial Work Plan. In addition to the above seed mixture, mulch, mulch blankets, or synthetic fabric will be placed to prevent erosion during turf establishment. Mulch will be placed on all slopes less than 15% and a mulch blanket on all slopes greater than 15%. Synthetic

erosion control fabric will be placed in drainage ditches and swales. As an aid to turf establishment, seeded areas will be fertilized with a starter fertilizer.

2.6 Dust Controls

The surface of unvegetated or disturbed soil/fill areas will be wetted at all times with water or other dust suppressive agents to control dust during construction. There shall be no visible dust generated during redevelopment activities. Any subgrade material left exposed during extended interim periods (greater than 90 days) prior to placement of final cover shall be covered with a temporary cover system (i.e., tarps, spray type cover system, etc.) or planted with vegetation to control fugitive dust to the extent practicable. Particulate monitoring will be performed along the downwind occupied perimeter of parcels during subgrade excavation, grading, and handling activities in accordance with the Community Air Monitoring Plan further detailed in Section 4.2. Weekly submittal of all air/dust monitoring collected during intrusive construction activities (i.e., when soil/fill is being excavated and/or graded) to the NYSDEC is required.

Dust suppression techniques will be employed at the Site in accordance with NYSDEC TAGM 4031 (Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites). This TAGM describes guidance for dust monitoring, and includes a list of effective dust suppression techniques. Dust monitoring is more fully described in Appendix V (Minimum Requirements for Health and Safety). As per TAGM 4031, dust suppression techniques that may be used at the Site include applying water on roadways, wetting equipment, spraying water on buckets during excavation and dumping, hauling materials in properly covered or watertight containers, covering excavated areas and material after excavation activity ceases, establishing vegetative cover immediately after placement of cover soil, and reducing the excavation size and/or number of excavations. If the BUD for the reuse of water treatment residuals is acceptable to the NYSDEC, dust suppression techniques will also be constantly employed during soil blending. The use of atomizing sprays is recommended so that excessively wet areas will not be created but fugitive dust will be suppressed.

2.7 Fencing and Access Control

Access to soil/fill on parcels adjacent to occupied on- or off-Site parcels must be controlled until final cover is placed to prevent direct contact with subgrade materials. A six-foot tall chain link fence currently surrounds portions of the Site. To better control Site access, obvious access points will be gated. All existing fencing will be posted with "No Trespassing" signs. The entire Site will be completely covered with clean fill or vegetated via hydroseeding to limit dust generation.

2.8 Property Use Limitations

The use of the property will be restricted through verbiage in the BCP Agreement, to which this Plan will be attached.

2.9 Notification and Reporting Requirements

The following minimum notification and reporting requirements shall be followed by the property owner prior to and following Site development, as appropriate:

- The NYSDEC and NYSDOH will be notified that subgrade activities are being initiated a minimum of five working days in advance of construction.
- A construction certification report stamped by a New York State licensed Professional Engineer will be prepared and submitted to the NYSDEC and NYSDOH within 90 days after development of each parcel or subparcel. At a minimum, the report will include:
- An area map showing the parcel or subparcel that was developed and the property's tax map number.
- A topographic map of the developed property showing actual building locations and dimensions, roads, parking areas, utility locations, berms, fences, property lines, sidewalks, green areas, contours and other pertinent improvements and features. The topographic map will be stamped by a New York State licensed surveyor.
- Plans showing areas and depth of fill removal.
- Copies of daily inspection reports.
- Description of erosion control measures.
- A text narrative describing the excavation activities performed, health and safety monitoring performed (both Site specified and Community Air Monitoring), quantities and locations of soil/fill excavated, disposal locations for the soil/fill, soil sampling locations and results, a description of any problems encountered, location and acceptability test results for backfill sources, and other pertinent information necessary to document that the Site activities were carried out properly.

- Plans showing before and after survey elevations on a 100-foot grid system to document the thickness of the clean soil cover system.
- A certification that all work was performed in conformance with the S/FMP.

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Quality Assurance and Quality Control (QA/QC)

SECTION 3

3.1 Analytical Methods

All characterization samples collected during redevelopment activities will be analyzed using EPA-approved analytical methods using the most recent edition of the EPA's "Test Methods for Evaluating Solid Waste" (SW-846). Methods for Chemical Analysis of Water and Wastes "(EPA 600/4-79-020), Standard Methods for Examination of Waste and Wastewater" (prepared and published jointly by the American Public Health Association, American Waterworks Association and Water Pollution Control Federation).

3.2 Laboratory

The laboratory proposed to perform the analyses will be certified through the New York State Department of Health Environmental Laboratory Approval Program (ELAP) to perform Contract Laboratory Program (CLP) analysis and Solid Waste and Hazardous Waste Analytical testing on all media to be sampled during this investigation. The laboratory will maintain this certification for the duration of the project.

3.3 Data Submittal

The laboratory will perform the analysis of samples in accordance with the most recent NYSDEC Analytical Services Protocol (ASP). Analytical data will be submitted in complete ASP Category B data packs including documentation of laboratory QA/QC procedures that will provide legally defensible data in a court of law. If requested, the Category B data packs will be submitted to the NYSDEC.

Procedures for chain of custody, laboratory instrumentation calibration, laboratory analyses, reporting of data, internal quality control, and corrective actions shall be followed as per SW-846 and as per the laboratory's Quality Assurance Plan. Where appropriate, trip blanks, field blanks, field duplicates, and matrix spike, matrix spike duplicate shall be performed at a rate of 10% and will be used to assess the quality of the data. The laboratory's in-house QA/QC limits will be utilized whenever they are more stringent than those suggested by the EPA methods.

3.4 Data Usability Summary Reports

After receipt of analytical results, the data package will be sent to a qualified, third party, data validation specialist for evaluation. A Data Usability Summary Report (DUSR) will be prepared. The DUSR will provide a determination of whether or not the data meets the project specific criteria for data quality and data use.

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Health and Safety Procedures for Intrusive or Maintenance Activities

SECTION 4

4.1 Construction Personnel Protection

Contractors engaged in subsurface construction or maintenance activities (e.g., foundation and utility workers) will be required to implement appropriate health and safety procedures. These procedures will involve, at a minimum, donning adequate personal protective equipment, performing appropriate air monitoring, and implementing other engineering controls as necessary to mitigate potential ingestion, inhalation and contact with residual constituents in the soils. A Site-specific, activity-specific health and safety plan has been prepared for the Site (see Appendix V). Recommended health and safety procedures include the following:

- While conducting invasive work at the Site, the Contractor should provide working conditions on each operation that shall be as safe and healthful as the nature of that operation permits. The Contractor shall comply with all New York State Department of Labor regulations and published recommendations and regulations promulgated under the Federal Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, as amended, and with laws, rules, and regulations of other authorities having jurisdiction. Compliance with governmental requirements is mandated by law and considered only a minimum level of safety performance. The Contractor shall insure that all work is performed in accordance with recognized safe work practices.

- The Contractor is responsible for the safety of the Contractor's employees, the public and all other persons at or about the Site of the work. The Contractor is solely responsible for the adequacy and safety of all construction methods, materials, equipment and the safe prosecution of the work.

- The Contractor shall stop work whenever a work procedure or a condition at a work Site is deemed unsafe by the safety professional or his trained safety representative(s).

- The Contractor shall employ a properly qualified safety professional whose duties shall be to initiate, review and implement measures for the protection of health and prevention of accidents. The Contractor shall also employ safety representative(s) whose duties, working under the direct supervision of the safety professional, shall include the implementation the safety program for the work at the Site.

- Recognition as a safety professional shall be based on a minimum of certification by the Board of Certified Safety Professionals as a Certified Safety Professional and 5 years of professional safety management experience in the types of construction and conditions expected to be encountered on the Site.

- The safety representative(s) who will work under the direction of the safety professional will have appropriate qualifications. The required qualifications shall include a minimum of: five years of relevant construction experience, two years of which were exclusively in construction safety management; successful completion of a 30-hour OSHA Construction Safety and Health training course; 40-hour training as per 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response; and, if confined space entry is required, training as per 29 CFR 1910.146, Permit-Required Confined Spaces.

- The safety professional shall visit and audit all work areas as often as necessary but at least once each week and shall be available for consultation whenever necessary.

- The safety representative(s) must be at the job Site full-time (a minimum of 8 hours per working day) whenever work is in progress. When multiple shift work is in progress more than one safety representative may be required.

- The safety professional and his safety representative(s) shall be responsible for ensuring Contractor compliance with governing laws, rules and regulations as well as of good safety practice.

- The safety staff shall maintain and keep available safety records, up-to-date copies of all pertinent safety rules and regulations, Material Safety Data Sheets, and the Contractors' Site specific health and safety plans (HASPs) and the Site emergency response plan with emergency and telephone contacts for supportive actions.

- The responsible safety professional shall sign and seal the Contractor's written Site-specific HASP and the Plan shall be available to workers on Site. The Contractor shall provide copies of the HASP to the Contractors' insurer, if required.

- The safety professional and/or his trained safety representative(s) shall as a minimum:

  - Schedule and conduct safety meetings and safety training programs as required by law, the health and safety plan, and good safety practice. A specific schedule of dates of these meetings and an outline of materials to be covered shall be provided with the health and safety plan. All employees shall be instructed on the recognition of hazards, observance of precautions, of the contents of the health and safety plan and the use of protective and emergency equipment.

  - Determine that operators of specific equipment are qualified by training and/or experience before they are allowed to operate such equipment.

  - Develop and implement emergency response procedures. Post the name, address and hours of the nearest medical doctor, name and address of nearby clinics and hospitals, and the telephone numbers of the appropriate ambulance service, fire, and the police department.

  - Post all appropriate notices regarding safety and health regulations at locations that afford maximum exposure to all personnel at the job Site.

  - Post appropriate instructions and warning signs in regard to all hazardous areas or conditions that cannot be eliminated. Identification of these areas shall be based on experience, on Site surveillance, and severity of hazard. Such signs shall not be used in place of appropriate workplace controls.

  - Ascertain by personal inspection that all safety rules and regulations are enforced. Make inspections at least once a shift to ensure that all machines, tools and equipment are in a safe operating condition; and that all work areas are free of hazards. Take necessary and timely corrective actions to eliminate all unsafe acts and/or conditions, and submit to the Engineer each day a copy of his findings on the inspection check list report forms established in the health and safety plan.

  - Provide safety training and orientation to authorized visitors to ensure their safety while occupying the job Site.

  - Perform all related tasks necessary to achieve the highest degree of safety that the nature of the work permits.

- The Contractor shall have proper safety and rescue equipment, adequately maintained and readily available, for foreseeable contingencies. This equipment may include such applicable items as: proper fire extinguishers, first aid supplies, safety ropes and harnesses, stretchers, water safety devices, oxygen breathing apparatus, resuscitators, gas detectors, oxygen deficiency indicators, combustible gas detectors, etc. This equipment should be kept in protected areas and checked at scheduled intervals. A log shall be maintained indicating who checked the equipment, when it was checked, and that it was acceptable. This equipment log shall be updated monthly and be submitted with the monthly report. Equipment that requires calibration shall have copies of dated calibration certificates on Site. Substitute safety and rescue equipment must be provided while primary equipment is being serviced or calibrated.

- All personnel employed by the Contractor or his subcontractors or any visitors whenever entering the job Site, shall be required to wear appropriate personal protection equipment required for that area. The Contractor may remove from the Site any person who fails to comply with this or any other safety requirement.

- Because water with elevated pH may act as a skin irritant, care must be taken to inhibit dermal contact when handling any groundwater at the Site. Actions to inhibit contact with groundwater may include the use of latex or other waterproof gloves by on-Site workers.

- The Site specific Health and Safety Plan is included in Attachment V.

4.2 Community Air Monitoring Program

Ambient air monitoring will be conducted on a real-time basis during all subsurface construction activities using a minimum of a photoionization detector and a dust meter. Battery charge level for each instrument will be checked at the beginning and end of each day. The instruments will be calibrated at a frequency recommended by the manufacturer. All air monitoring readings will be recorded in a logbook and will be available for review by the NYSDEC and New York State Department of Health (NYSDOH).

Baseline conditions will be measured at proposed intrusive activity locations prior to commencement of operations. Air quality within the work zone will be monitored in accordance

with the Site-specific health and safety plan created by the Site developer or contractor. In addition to monitoring the work area for worker health and safety, volatile organic compounds will be monitored at the downwind perimeter of the work area every hour. If downwind perimeter organic vapor levels exceed five parts per million (ppm) above the upwind work area perimeter concentrations, the Vapor Emission Response Plan will be implemented.

As described in Section 2.6, appropriate dust suppression techniques will be employed at all times during Site redevelopment activities. Using a dust meter, particulates will be continuously monitored immediately downwind in the work area and integrated over a period not to exceed 15 minutes. If the downwind particulate level is more than 150 ug/m^3, then upwind (background) levels must be measured immediately. If the downwind levels are more than 100 ug/m^3 above background, additional dust suppression measures must be taken.

Weekly submittal of all air/dust monitoring data collected during intrusive construction activities (i.e., when soil/fill is being excavated and/or graded) to the NYSDEC is required.

4.2.1 Vapor Emission Response Plan

If the downwind area perimeter air concentrations of organic vapors exceed the upwind work area perimeter concentration by 5 ppm but less than 25 ppm, the following actions will be taken:

- Every 30 minutes monitor the perimeter work area location.
- Every 30 minutes monitor the organic vapor concentration 200 feet downwind of the work area perimeter or half the distance to the nearest receptor, whichever is less. If this reading exceeds the perimeter work area upwind organic vapor concentration by 5 ppm, all work must halt and monitoring increased to every 15 minutes. If, at any time, this reading exceeds the perimeter work area upwind concentration by 10 ppm, the Major Vapor Emissions Response Plan will be initiated.
- If organic vapor levels 200 feet downwind of the perimeter work area or half the distance to the nearest downwind receptor, whichever is less, exceeds by 5 ppm the work area perimeter upwind concentration persistently, then air quality monitoring must be performed within 20 feet of the nearest downwind receptor (20-foot zone). If the readings in the 20-foot zone exceed the perimeter work area upwind concentration by 5

ppm for more than 30 minutes, then the Major Vapor Emissions Response Plan will be implemented.

- Work activities can resume only after the downwind 200 foot reading and the 20-foot zone reading are less than 5 ppm above the perimeter work area upwind concentration. In addition, the downwind perimeter work area concentration must be less than 25 ppm above the perimeter work area upwind concentration.

4.2.2 Major Vapor Emission Response Plan

If the downwind work area perimeter organic vapor concentration exceeds the upwind work area perimeter concentration by more than 25 ppm, then the Major Vapor Emission Response Plan will be activated. Upon activation, the following activities will be undertaken:

1. All work will halt.

2. All Emergency Response Contacts as listed in the Health and Safety Plan will be contacted.

3. The NYSDEC, NYSDOH, and the Erie County Health Department will be notified and advised of the situation.

4. The local police and fire department authorities will immediately be contacted by the Safety Officer and advised of the situation.

5. Frequent air monitoring will be conducted at 30-minute intervals within the 20-Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer and work may resume.

EXCAVATION AND HANDLING OF POTENTIALLY CONTAMINATED SOIL/FILL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. Provide all labor, materials, equipment and incidentals required to perform all excavating, backfilling, filling and grading, and disposing of soil/fill materials as required for construction of structures, manholes, vaults, conduits, pipelines, roads, and other facilities.
   2. Stockpile and characterize soil/fill in which evidence of contamination (staining, odors, elevated pH and/or elevated photoionization detector measurements) is observed. Stained soil is soil that is discolored, tinted, dyed, unnaturally mottled, or contains a sheen.
   3. Prepare all waste disposal applications and shipping manifests and make all arrangements for transportation and disposal of contaminated material.

1.2 QUALITY ASSURANCE

A. Permits and Regulations:
   1. Obtain all necessary permits for work in roads, rights-of-way, railroads, etc. Also obtain permits as required by local, state and federal agencies for discharging water from excavations.
   2. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Reference Standards: Comply with applicable provisions and recommendations of the following.
   1. OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Section .650 (Subpart P - Excavations).

1.3 SUBMITTALS

A. No excavation, grading or disturbance of the final vegetated soil over or existing subgrade soil/fill shall be initiated prior to a minimum of five working days written notification to the NYSDEC Region 9, Division of Environmental Remediation. The notification will include a description of planned excavation activities and protective measures, and the name of the site supervisor.

B. Provide waste manifests, bills of lading, certified weight scale tickets, or other transportation records for soil/fill material removed from the site, to the NYSDEC, if requested.

C. Test Reports – Characterization of Soil/Fill and Borrow Materials:
   1. Provide NYSDEC analytical results, if requested, for the following :
      a. Tests of soil/fill with evidence of contamination of material removed during excavation.
      b. Tests, if necessary, of off-site material that will be used as fill or cover material at the site.

1.4 JOB CONDITIONS

A. Subsurface Information: Refer to Remedial Work Plan and previous investigation reports on subsurface conditions. Data is not intended as a representation or warranty of continuity of conditions between soil borings nor of groundwater levels at dates and times other than date and time when measured.

B. Existing Structures and Utilities: Due to site history, underground structures and utilities may be present at the site.
   1. CONTRACTOR may need to explore ahead of the required excavation to determine the exact location of all structures and utilities.
   2. Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during all operations.
   3. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult piping or utility owner immediately for directions as to procedure. Cooperate with utility owner in keeping services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
   4. Should underground storage tanks or drums be encountered, the CONTRACTOR shall notify the NYSDEC immediately. The CONTRACTOR shall also take appropriate measures to protect the health and safety of on-site workers. Any tanks or drums encountered shall be evaluated to the satisfaction of the NYSDEC and properly closed in place or removed and properly disposed.
   5. Should foundations be encountered, the CONTRACTOR shall either remove the foundation in areas necessary to complete the work or modify the work to accommodate the foundations.

D. Protection of Persons and Property: Barricade open excavations occurring as part of the work and post with warning lights, if necessary. Operate warning lights, if necessary, during hours from dusk to dawn each day and as otherwise required.
   1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

E. Dust Control: Conduct all operations and maintain areas of activity, including sweeping and sprinkling of roadways, to minimize creation and dispersion of dust.

MALCOLM PIRNIE

Excavation and Handling of Potentially Contaminated Soil/Fill

ATTACHMENT

I

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 -EXECUTION

3.1 INSPECTION

A. Provide NYSDEC with sufficient notice and with means to examine the areas and conditions under which excavating, filling, and grading are occurring.

3.2 SITE PREPARATION

A. Clear all areas to be excavated of all trees, brush, roots, stumps, logs, wood and other materials and debris. All contaminated waste materials shall be removed from site and properly disposed. Burning will not be permitted unless permitted by the appropriate authorities.

B. If cover material was previously placed in the area to be excavated, the cover material may be stripped from the surface and stockpiled separately for reuse.

3.3 TEST PITS

A. CONTRACTOR may, if necessary, excavate and backfill, in advance of construction, test pits to determine conditions or location of existing facilities. The test pit operations will be conducted in accordance with the excavation procedures outlined below.

3.4 EXCAVATION

A. Perform all excavation required to complete the work as necessary. Excavations shall include earth, sand, clay, gravel, hardpan, boulders not requiring drilling and blasting for removal, decomposed rock, pavements, rubbish and all other materials within the excavation limits.

B. All work shall be completed in accordance with all air quality standards as determined by applicable federal, state, and local regulations.

C. Excavations for structures and utilities shall be open excavations. Provide excavation protection system(s) required by ordinances, codes, law and regulations to prevent injury to workmen and to prevent damage to new and existing structures or pipelines. Unless shown or specified otherwise, protection system(s) shall be utilized under the following conditions.

1. Excavation Less Than 5 Feet Deep: Excavations in stable rock or in soil conditions where there is no potential for a cave-in may be made with vertical sides. Under all

other conditions, excavations shall be sloped and benched, shielded, or shored and braced.

2. Excavations More Than 5 Feet Deep: Excavations in stable rock may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded or shored and braced.
3. All excavations or disturbances must be covered using appropriate cover material within 10 working days of backfilling or as otherwise approved by the NYSDEC.

D. Pumping of water from excavations, if necessary, shall be done in such a manner to prevent the carrying away of particulates, soil/fill, or unsolidified concrete materials, and to prevent damage to the existing subgrade.

1. Water from the excavations will be disposed properly in accordance with all applicable regulations in such a manner as not to endanger public health, property, or any portion of the work under construction or completed.
2. In areas of high pH, the pH of the water in excavations will be measured using a field pH meter. Based on the groundwater analytical results, water in the excavations may be discharged to the ground surface unless staining or elevated PID measurements are observed in the excavation, a sheen is present on the water surface or if pH is less than 6.5 or greater than 8.5. If any of these conditions exist, the water pumped from the excavations will be containerized or may be discharged to the Buffalo Sewer Authority under a discharge permit if the water quality falls within the conditions of the permit. If the water quality is such that the permit requirements will be exceeded, the groundwater removed from the excavation will be containerized and sampled. Containerized water not meeting the Surface Water and Groundwater Quality Standards set forth in 6 NYCRR Part 703.5 will be transported off-site for proper disposal.

E. Utility Trench Preparation:

1. No more than 200 feet of trench may be opened in advance of utility laying.
2. Trench width shall be minimized to greatest extent practical but shall conform to the following:
    a. Sufficient to provide room for installing, jointing and inspecting utilities.
    b. Enlargements at pipe joints may be made if required.
    c. Sufficient for shoring and bracing, or shielding and dewatering.
    d. Sufficient to allow thorough compaction of backfill adjacent to bottom half of utility.
    e. Do not use excavating equipment that requires the trench to be excavated to excessive width or depth.

F. Field Screening of Excavated Materials:

1. The soil/fill removed during excavation will be inspected for staining and will be field screened for the presence of volatile organic compounds (VOCs) with a photoionization detector (PID).
2. Excavated soil/fill with no evidence of contamination (no staining or elevated PID measurements) may be used as subgrade or excavation subgrade backfill. However, soils with high pH (8.5 to 12.5) will not be used as backfill in utility trenches or as subsurface material in the construction of berms.
3. Excavated soil/fill that is visibly stained or produces elevated PID readings (i.e., sustained 10 ppm or greater) will be considered potentially contaminated soil/fill. Potentially contaminated soil/fill will be stockpiled on polyethylene sheeting and then sampled for reuse, treatment or disposal.
    a. Sampling and analysis of soil/fill exhibiting staining and/or elevated PID measurements will be completed in accordance with the protocols delineated in the Soil/Fill Management Plan (S/FMP). Sampling and analysis will also be completed in accordance with the requirements of the disposal facility at which the soil/fill with concentrations of contaminants above the site-specific action levels (SSALs) will be disposed.
    b. Soil/fill containing one or more constituents in excess of SSALs in the S/FMP will be transported off-site to a permitted waste management facility.
    c. Excavated or disturbed soil/fill that has been analyzed and found to meet SSALs may be used as subgrade or excavation subgrade backfill.

G. Material Storage:

1. Stockpile soil/fill with no evidence of contamination (no staining or elevated PID measurements) in approved areas in approximately 50 cubic yard piles, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.
    a. Locate and retain soil materials away from edge of excavations.
    b. Dispose of excess soil material and waste materials appropriately.
2. Stockpile soil/fill with evidence of contamination (staining and/or elevated PID measurements) in approved areas in approximately 50 cubic yard piles, until sample analysis is completed. Place, grade and shape stockpiles for proper drainage. Ensure effective weather proofing of potentially contaminate soil stockpiles.
    a. Locate and retain soil materials away from edge of excavations.
    b. The stockpiled soil/fill will be placed on top of and be completely covered using polyethylene sheeting with a minimum thickness of 8-mil to reduce the infiltration of precipitation and the entrainment of dust. A berm wall shall be constructed around the stockpile using uncontaminated material covered with the same sheeting as the stockpiled material. The stockpile area shall be protected from stormwater runoff. Edges of the sheeting shall overlap a minimum of two feet and duct tape shall be applied along all seams to prevent movement of sheeting and infiltration of precipitation into the stockpiled soil.

Non-soil weights (e.g. tires) may be necessary to inhibit movement of the cover sheeting by wind.

H. Sample Collection and Analysis:
   1. Collect a minimum of one composite sample, and one duplicate sample using five grab samples per 100 cubic yards of potentially contaminated soil as described in the Soil/Fill Management Plan. The characterization samples should be collected from stockpiled potentially contaminated soil/fill within five days of excavation.
   2. Engage the services of a NYSDOH ELAP certified analytical laboratory to analyze samples in order to determine the proper handling and disposal of potentially contaminated soil/fill material as listed below.
   3. Required Analyses:
      a. Target Compound List (TCL) Volatile Organic Compounds (VOCs) by New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) 95-1.
      b. TCL Semivolatile Organic Compounds (SVOCs) by NYSDEC ASP 95-2.
      c. TCL pesticides and polychlorinated benzenes (PCBs) by NYSDEC ASP (95-3).
      d. Target Analyte List (TAL) metals and cyanide by NYSDEC ASP.
      e. pH by SW-846 Method 9045.
   4. If contaminants are present at concentrations above the SSALs, additional analysis will be required by the disposal facility and will likely include:
      a. Toxicity Leaching Characteristic Procedure (TCLP)
      b. RCRA Characteristics (Ignitability, Corrosivity, and Reactivity).

3.5 LOADING AND TRANSPORTING

A. Furnish all labor, materials, equipment, and incidentals required to load and transport all contaminated soil/fill from the site.

B. Notify the NYSDEC in writing when loading of contaminated soil/fill will occur and include the name and location of the disposal facility to be used. Submit to the NYSDEC, if requested, a full description of the disposal facility, licenses, permits, and compliance status.

C. Do not load and transport contaminated soil and debris until receipt of approval from the disposal facility that the contaminated soil and debris will be disposed in.

D. Conduct all loading and transportation activities in accordance with all applicable federal, state, and local regulations, including but not limited to United States Department of Transportation and USEPA regulations 40 CFR 172-179.

E. Conduct all loading activities to minimize the formation of dust.

F. Obtain and comply with the required permits and authorization for transportation of contaminated soil and debris in accordance with State and local jurisdictions. The contaminated soil and debris shall be transported by a licensed waste hauler.

G. All trucks transporting contaminated soil and debris for off-site disposal shall be lined, covered, and secured in accordance with all federal, State, and local regulations. Any liner that cannot be decontaminated shall be disposed of with the contaminated soil and debris. Trucks used for transportation of contaminated soil and debris shall travel on authorized roads in accordance with all federal, state and local regulations.

H. Contaminated soil and debris shall be transported for disposal in containers that are watertight. Leaking containers shall be unloaded at the site and any leaked liquids cleaned up as spills.

I. Contaminated soil and debris transport containers shall be covered to prevent release of dust and particulates and exposure of the contaminated soil and debris to precipitation.

J. Employ a temporary transport vehicle pad for vehicle loading operations to control and contain contaminated soil and debris spillage.

K. Inspect and clean loaded transport vehicle tires and undercarriage to remove any adhering contaminated soil and debris prior to vehicle departure from the site.

3.6 DISPOSAL OF EXCAVATED MATERIALS

A. Soil/Fill with concentrations of contaminants above the SSALs will be disposed off-site within 90 days of excavation at an appropriate, permitted disposal facility.

B. Prepare all applications for waste disposal at appropriate disposal facilities and waste transportation and disposal manifests and any other documents necessary for the off-site disposal of contaminated soil/fill material. Submit waste transportation and disposal documentation to the NYSDEC, if requested.

C. Prepare a waste transportation and disposal manifest, and all other documents required for waste shipment, for each load of waste material that is transported from the site.

D. Maintain a waste disposal log on-site containing pertinent waste disposal information. If requested, the NYSDEC on-site representative may review the log.

3.7 SOIL/FILL COVER SYSTEM

A. Backfill all excavations as promptly as work permits.

B. Replace cover material within 10 days of backfilling excavations. The cover material shall be consistent with and will be placed in accordance with the Remedial Work Plan.

C. If working conditions require the excavation to remain open for a period greater than ten days, plastic or metal sheeting will be used to cover the entire or portions of the excavation during periods of inactivity.

+ + END OF SECTION + +

MALCOLM PIRNIE

Standard Operating Procedures

ATTACHMENT

II

Appendix ____: Item ____ - ____COMPOSITE SAMPLE PROCEDURE FOR NON-VOLATILE ORGANICS ANALYSIS

Applicability: _____ Revision No.: _____Date:

Prepared By: _____Date: _____ Approved By: _____ Date: _____

1.0 INTRODUCTION

This guideline addresses the procedure to be used when soil samples are to be composited in the field.

2.0 METHODOLOGY

1. Transfer equal portions of soil from individual split-spoon samples to a large precleaned stainless steel (or Pyrex glass) mixing bowl.

2. Thoroughly mix (homogenize) and break up the soil using a stainless steel scoop or trowel.

3. Spread the composite sample evenly on a stainless steel tray and quarter the sample.

4. Discard alternate (i.e. diagonal) quarters and, using a small stainless steel scoop or spatula, collect equal portions of subsample from the remaining two (2) quarters until the amount required for the composite sample is acquired. Transfer these subsamples to a precleaned stainless steel (or glass Pyrex) mixing bowl and re-mix.

5. Transfer the composite sample to an appropriate precleaned jars provided by the laboratory and label. Store any excess sample from the stainless steel tray in separate, precleaned, sample containers, and submit to the laboratory for holding in case additional analysis is necessary.

6. Decontaminate all stainless steel (or glass Pyrex) trays, spoons, spatulas, and bowls in accordance with the sampling equipment decontamination procedure provided.

MALCOLM PIRNIE

Erosion and Surface Water Control Plan

(Stormwater Pollution Prevention Plan)

ATTACHMENT

III

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

for

CONSTRUCTION OF COBEY LLC BUFFALO LAKESIDE COMMERCE PARK BUFFALO, NY

December 9, 2005

Applicant Information:
The Krog Corp.
4 Centre Drive
Orchard Park, NY 14127

Contact Person:
Patrick Sheedy
Tel: (716) 667-1234
Fax: (716) 667-1258

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

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APPENDICES

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APPENDIX C Storm Runoff Analysis and Storm Drainage System Design
APPENDIX D Certifications
APPENDIX E Inspection Reports
APPENDIX F Notic of Intent (NOI)

1.0 INTRODUCTION

This Stormwater Management Pollution Prevention Plan (SWPPP) has been prepared in accordance with the State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-02-01); the New York Standards and Specifications for Erosion and Sediment Control; and the August 2003 New York State Stormwater Management Design Manual.

According to the SPDES General Permit, an Erosion and Sediment Control Plan is required for this project because construction activities will result in a disturbance greater than 1 acre. The project does not meet Condition A because it is not located in a TMDL watershed. The project meets Condition B because the disturbance is greater then 5 acres. This project requires the development of a full SWPPP.

The following sections of this SWPPP will provide general project information, a description of construction activities, erosion and sediment control plans, a discussion regarding water quantity management, a discussion regarding water quality management, and certification forms.

A complete set of construction drawings and specifications are provided as separate documents, however, they should be considered an integral component of the SWPPP and are referenced throughout the document.

The general contractor and subcontractors performing any activity that involves soil disturbance will be responsible to comply with the terms and conditions of the SWPPP for the project identified as a condition of authorization to discharge stormwater. The Contractor shall provide signed certifications for itself and all applicable subcontractors. These signed certifications shall be included as part of the SWPPP. The SPDES General Permit and SWPPP must be kept on file at the project construction site.

The SWPPP should be kept current and shall be amended according to the conditions described in the SPDES General Permit.

2.0 GENERAL PROJECT INFORMATION

2.1 Project Location

This project involves the development of a new production plant and office space for Cobey LLC on an approximately 12.25 acre site within the Buffalo Lakeside Commerce Park, formerly the Union Ship Canal Redevelopment Area in the City of Buffalo, Erie County, New York. The City of Buffalo recently completed an environmental remediation of the area and constructed 2,800 lf of roadway,

including public infrastructure, landscaping and site lighting. The project site is located at the intersection of Ship Canal Parkway and Hanna Drive. The property is zoned industrial and is currently owned by the City of Buffalo. See Figure 1 for a General Location Map and Figure 2 for a Project Location Map.

General Location Map

North

Figure 1

Project Location Map

Figure 2

2.2 Project Description

The proposed project involves the construction of a 90,000 square foot building; and 77,192 square feet of paving for driveways, parking, and truck loading and unloading areas. Future expansion is not currently planned but has been incorporated into the drawings for consideration under this SWPPP. Future expansion includes an additional 57,000 square feet of building and 31,097 square feet of paving. Ownership and maintenance of the property will be turned over to Cobey LLC upon the completion of construction. .

2.3 Existing Conditions

The existing land use within the vicinity of the project is industrial. The project site is vacant. The majority of the site is covered with ground cover and brush. The terrain surrounding the area is predominantly flat with grades ranging from level to 1.25%.

The project site occupies a portion of the site formerly know as the Hanna Furnace Site. The Hanna Furnace Site surrounds the eastern portion of the Union Ship Canal, and encompasses approximately 113 acres, including the Former Railroad Yard. A Remedial Action Work Plan (RAWP) was prepared in February 2002 to support a voluntary cleanup of the Former Railroad Yard to allow for future commercial and industrial development such as the proposed project for Cobey LLC.

There are closed drainage systems existing throughout the area surrounding the project site. The current stormwater system along Ship Canal Parkway is a closed drainage system, with stormwater runoff being collected in pipes and then discharged into the Union Ship Canal.

The Soil Survey of Erie County, New York shows Ud - Urban Land (Hydrologic Soil Group D) covering the project area. Careful onsite investigation is necessary to determine the suitability and limitations of abandoned areas for proposed use. See Appendix B for the soils map, and description of the soil types within the project vicinity. Fill material is present at the site at an average thickness of 9 feet and a maximum thickness of 12 feet. Underlying the fill material is a native material consisting of a layer of peat underlain by gray silt and clay. Groundwater is present in the fill material and can exhibit elevated pH levels.

2.4 Proposed Conditions

The project site will be cleared of all vegetation and developed to include a 90,000 square foot (2.066 acre) building, 77,192 square foot (1.772 acres) of concrete and asphalt paving and 366,393 square foot (8.411 acres) of green space.

The total area that will be disturbed during construction, in order to provide the aforementioned improvements, is approximately 12.25 acres. A total of 167,192 square foot (3.83 acres) of new impermeable surface will be added to the site in order to incorporate the proposed project. This represents a 31 % increase in the impervious area that will remain on the site after the completion of construction. Future build-out will increase the total impervious area to 5.86 acres.

A closed drainage system is proposed for the site. The outflow from the proposed site will be directed into the existing storm sewer system along Ship Canal Parkway. The Cobey site closed drainage system was designed to handle a 10-year storm.

See the contract documents for detailed drainage design including inlet and outlet locations and pipe sizes.

3.0 CONSTRUCTION ACTIVITES

3.1 Construction Phasing Plan

During construction, site access will be limited to two locations off Ship Canal Parkway. Since the total site disturbance is approximately 12.25 acres, a potential exists to disturb five acres or more at one time. Disturbance will be kept to the minimal amount possible. If disturbance exceeds five acres, daily inspection reports will be completed. All sediment and erosion control measures will be required to be in place before any soil disturbance takes place. The proposed phasing of work is as follows:

1. Phase I – Install temporary sediment and erosion control measures.
    a. Silt fence shall be installed around the perimeter of the site. Construction entrances shall be stabilized.

2. Phase IIA – Clear and grub site vegetation.

3. Phase IIIA – Regrade on-site fill material and cover site with clean soil, asphalt and concrete as per the requirements outlined in the Remedial Action Plan.

4. Phase IIIB – Construct building pad and parking/loading areas.
    a. Both the building pad and parking/loading areas shall be stoned as soon as final subgrade is achieved.
    b. Drainage inlets within the parking/loading area once installed should be maintained during construction to prevent sediments from migrating off the project site.

The Krog Corporation will be responsible for all redevelopment construction activities. After the construction activities are completed, Krog will petition the NYSDEC for liability releases under the Voluntary Clean-up Agreements, which led to the development of the RAWP.

3.2 Utility Involvement

Underground utilities exist throughout the surround project area. The following table lists those utilities affected by the implementation of the proposed project and their respective owners.

Owner	Utility
Niagara Mohawk Power Corporation	Underground lines
Verizon	Underground lines
National Fuel Gas Distribution Corp.	Gas lines
City of Buffalo	Street lighting, Waterlines, Hydrants, and Sanitary Sewer Lines and Manholes.
Adelphia Cable Communications	Underground lines

A utility corridor easement parallels the existing Ship Canal Parkway and Hanna Drive. All construction connections/conflicts have been identified and agreements for the required work have been made with the appropriate utility companies.

3.3 Pollution Prevention Measures

A site-specific soil erosion and sediment control plan was developed for the project to contain and control the migration of water and wind dispersed soil and dust particles. Potential impacts on water quality during construction will be controlled by temporary soil erosion and water pollution control measures. All disturbed areas will be temporarily and permanently revegetated to control erosion.

The general contractor will be responsible for the removal of waste and debris from the project site. The general contractor will be responsible for this issue to minimize exposure of the materials to stormwater, and for spill prevention and response.

4.0 EROSION AND SEDIMENT CONTROL

4.1 Erosion and Sediment Control Practices

A site-specific soil and erosion and sediment control plan was developed for the project. Silt fence, and temporary seed and mulch are included in the project contract documents for soil erosion and sediment control. The Erosion Control Plan (Drawing EC-1) identifies the location of all erosion and sediment control measures and provide details for installation.

A description of each practice is given below. All soil erosion and sediment controls shall be installed according to the plan and details (EC-1).

Silt fence – Silt fence will be placed at the perimeter of the site during construction in order to prevent erosion and sedimentation by reducing runoff velocity and impeding sediment transport. The standard detail on Drawing EC-1 shows the proper usage and layout of the silt fence and give requirements for installation. The silt fence should be inspected once a week or after significant rainstorms, and sediment should be removed when accumulation reaches one-half the fence height. The temporary silt fence can be removed once construction has been completed and the disturbed areas are stabilized with vegetation or pavement.

Temporary Seed and Mulch – All disturbed area within the project site shall be completely isolated with erosion control treatments. If site work on disturbed areas has ceased temporarily or permanently for more than five business days, the general contractor is responsible for stabilizing exposed soils with temporary seeded and mulch.

4.2 Implementation Schedule

The general contractor is required to prepare a progress schedule showing the order in which the contractor and subcontractors propose to carry on the work, the date on which major items of work will begin (including but not limited to excavation, drainage, paving, structures, mobilization, soil erosion and sediment control, etc.) and the critical features and the contemplated dates for completing the same. The Contractor's schedule and methods shall be consistent with the SWPPP or amended SWPPP. Once prepared, the progress schedule shall be included in the SWPPP.

The following implementation schedule for temporary and permanent soil erosion and sediment control practices includes a summary of the basic requirements for assisting the general contractor in developing a process schedule.

1. **Prepare a schedule of work** – The Contractor shall begin sitework only after preparing a schedule of work and including the schedule in the SWPPP. The contractor shall designate an erosion and sediment control supervisor with adequate training, experience, and authority to implement and maintain all erosion and sediment control measures.

2. **Install perimeter sediment and erosion controls –** All sediment and erosion controls shall be installed prior to performing clearing, excavation, and cut or fill operations. The Contractor shall limit the area of disturbance (including clearing and grubbing, excavation, and borrow and embankment operations in progress) to the minimum amount practicable, commensurate with their capability to install temporary and permanent erosion control measures in accordance with the project plans and specifications. At no time shall the contractor have five acres or more disturbed. If disturbance exceeds five acres, the general contractor shall be responsible for monitoring these areas every business day, and have the ability to implement immediate stabilization measures as needed to prevent excessive exposure in critical areas (adjacent to surface waters, steeply sloped areas and adjacent to tributary drainage). This monitoring shall be done by the designated erosion and sediment control supervisor, and reported in a Daily Inspection Report.

3. **Grade Site –** The site shall at all times be graded and maintained such that all of stormwater runoff is diverted to soil erosion and sediment control facilities. The locations of sediment and control measures may require field adjustment depending on the sequence of construction activities, construction methods, and/or actual field conditions.

4. **Install additional soil erosion and sediment controls as needed –** Under no condition shall soil exposed by grubbing, excavation, borrow, or fill or other work be left without the application of temporary or permanent erosion controls for a period greater than seven calendar days. The designated erosion and sediment control supervisor may determine that a potential for erosion or sediment transport exists and instruct the Contractor to install temporary erosion controls earlier. When permanent soil erosion and sediment control measures cannot be installed due to seasonal or other limitations, temporary soil erosion and sediment control measures shall be installed.

5. **Provide regular maintenance and inspection** –The temporary soil erosion and sediment control devices specified in this contract shall be checked and repaired as necessary, at least every seven calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater. Periodic cleaning of the soil erosion and sediment control devices shall be necessary and as directed by the delegated erosion and sediment control supervisor. Specific site assessment and inspection requirements are outlined in the SPDES General Permit for Stormwater Discharges from Construction Activities (GP-02-01). The property owner and the Contractor shall agree upon a method for meeting these requirements prior to beginning sitework.

6. **Stabilize Site** – All soil erosion and sediment controls shall remain in place until the site is permanently stabilized. All storm drainage outlets shall be stabilized, as required, before the discharge points become operational. All proposed permanent vegetation (trees, shrubs, groundcover, turf, sod, etc.) shall be installed/ planted as soon as the final grade is established in accordance with the contract documents.

7. **Remove temporary sediment and erosion controls** – All temporary soil erosion and sediment controls shall be completely removed as the disturbed site become permanently stabilized and discharge points become operational.

8. **Final Inspection** – Before the project is fully accepted by the property owner, it shall be inspected for any evidence of erosion or slope failure. If any such condition becomes apparent upon final inspection, temporary soil erosion and sediment controls shall be installed immediately and/or the situation should be corrected in accordance with a schedule agreed to by the owner and the general contractor or subcontractor.

5.0 WATER QUANTITY MANAGEMENT

In order to be in compliance with the New York State Stormwater Management Design Manual regarding water quantity management, the following criteria must be met:

1. **Channel Protection** - 24 –hour extended detention of the post-developed 1-year, 24-hour storm event
2. **Overbank Flood** - Control of the peak discharge from the 10-year storm to 10-year predevelopment rates
3. **Extreme Storm** - Control of the peak discharge from the 100-year storm to 100-year predevelopment rates and safely pass the 100-year storm event

The New York State Stormwater Design Manual states that the Channel Protection Volume (Cp_v) is not required at sites where the resulting diameter of the extended detention orifice required in a detention pond to detain the Cp_v is too small, to prevent clogging. A minimum 3" orifice is recommended to prevent clogging. Channel protection volume was computed for project and it was determined that it would require an orifice less than 3 inches in order to provide the required detention. Therefore, the channel protection requirement was not provided.

The New York State Stormwater Design Manual also states that the Overbank Flood and Extreme Storm are not required at sites where the water outlets to a fourth order stream or greater. The surface water at this location discharges into the Union Ship Canal which is considered a fourth order stream or greater.

6.0 WATER QUALITY MANAGEMENT

The unified approach for sizing Stormwater Management Practices in the State of New York to meet pollutant removal goals requires the calculation of the Water Quality Volume (WQ_v). WQ_v is designed to improve water quality sizing to capture and treat 90% of the average annual stormwater runoff volume.

The water quality volume was calculated for the proposed project. The associated calculations are provided in the attached report titled *Stormwater Runoff Analysis, Detention Pond and Storm Drainage System Design, October 27, 2005.* The total WQ_v for the proposed drainage area is 0.418 acre-feet.

In accordance with GP-02-01, the final WQ_V must be treated by one of the following "acceptable" stormwater management practices (SMP's):

- "Stormwater Ponds – Practices that have either a permanent pool of water or a combination of a permanent pool and extended detention capable of treating the WQ_V."
- "Stormwater Wetlands – Practices that include significant shallow marsh areas, and may also incorporate small permanent pools and extended detention storage to achieve the full WQ_V."
- "Infiltration Practices – Practices that capture and temporarily store the WQ_V before allowing it to infiltrate into the soil."
- "Filtering Practices – Practices that capture and temporarily store the WQ_V and pass it through a filter bed of sand, organic matter, soil, or other acceptable treatment media."
- "Open Channel Practices – Practices explicitly designed to capture and treat the full WQ_V within dry or wet cells formed by check dams or other means."

The WQ_V required for this project was calculated using the following formula:

$$\mathbf{WQ_v = [(P)(R_v)(A)] / 12}$$

Where,

P	= 90 Percent Rainfall Number
$\mathbf{R_v}$	= 0.05 + 0.009(I)
	= (Minimum Rv = 0.2)
I	= Impervious Cover (Percent)
A	= Site Area (Acres)

Although each practice was considered, it was determined that excavation to provide an acceptable practice could result in potential exposure risks associated with direct contact with existing site fill material and therefore would be in conflict with the NYSDEC-approved Remedial Action Work Plan. Therefore, collection

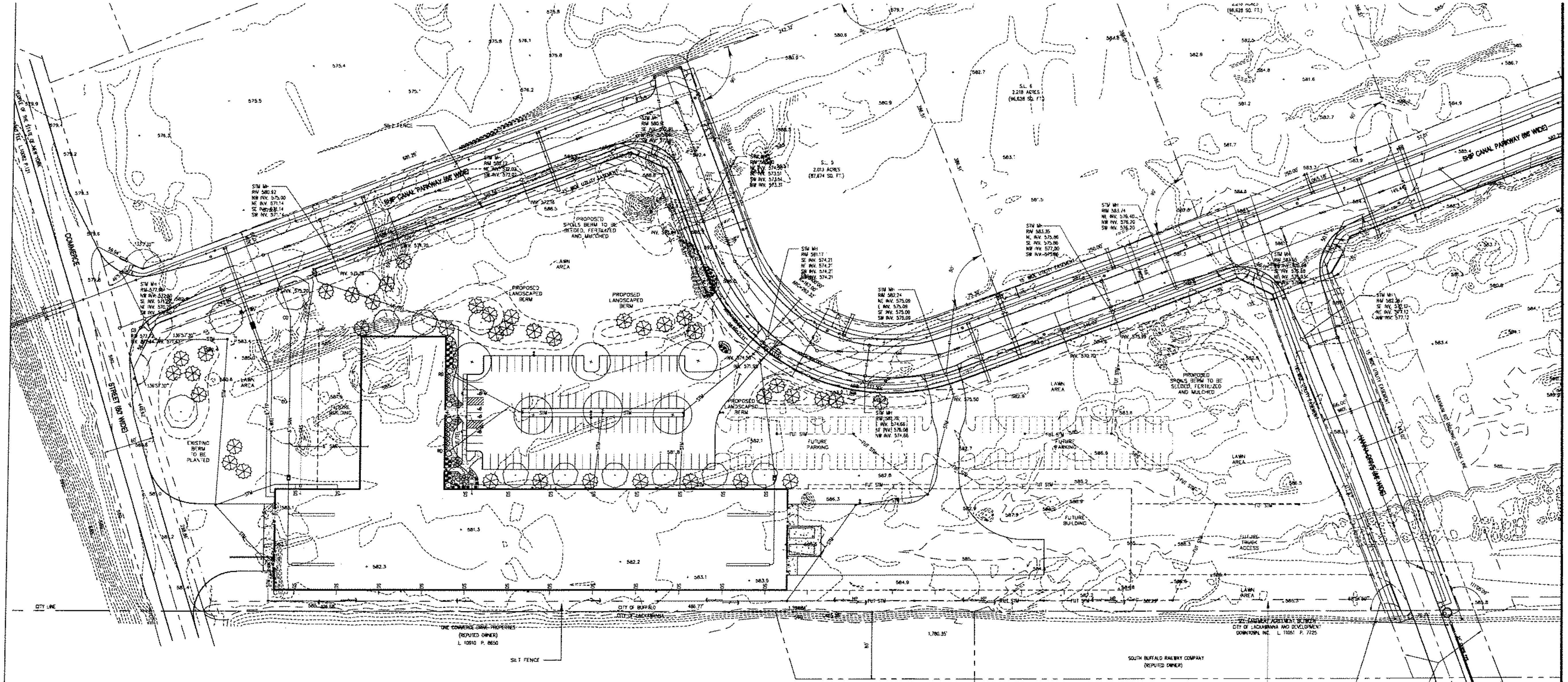
and conveyance of storm water in a closed drainage system with discharge to the Union Ship Canal, a fourth order stream, has been utilized as a permanent means to control storm water runoff at the site.

7.0 POST CONSTRUCTION MAINTENANCE

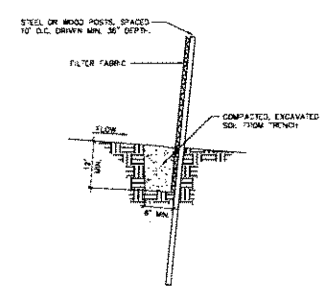
Ownership and maintenance of the developed site will be turned over to Cobey LLC upon the completion of construction. Good housekeeping practices to keep the pavement areas free and clear of potential surface water pollutants and sediments will be used post construction to maintain the water quality of surface water leaving the site.

APPENDIX A

PROJECT PLANS



① SITE PLAN
SCALE: 1" = 50'



MATERIALS:

POSTS: STEEL T-POST OR CHANNEL POST 2"X2" WOOD STAKE

FILTER FABRIC: CONTRACTOR'S OPTION; FILTER X, MIRAFI 100X, LAUREL EROSION CONTROL CLOTH, ECOIM, POLYFILTER X; OR OTHER APPROVED EQUAL.

CONSTRUCTION NOTES:

1. EXCAVATE TRENCH AS PER DETAIL AND SET POSTS, 10' O.C.
2. ATTACH FILTER FABRIC TO POSTS, ALLOWING EXTENSION INTO TRENCH AS SHOWN. SECURE WITH WIRE TIES SPACED 24" O.C. AT TOP AND MID-SECTION.
3. BACKFILL WITH COMPACTED, EXCAVATED SOIL FROM TRENCH.

② SILT FENCE
NTS

LEGEND

PROPERTY LINE	——— — — ———
EXISTING CONTOUR	····
SILT FENCE	— · — · —
SPOT GRADE	+ 000.00
DRAINAGE ARROW	←⁄\—

MAINTENANCE NOTES

1. ALL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CHECKED FOR STABILITY AND OPERATION WITHIN 24 HOURS AFTER RAINFALL OF GREATER THAN 0.5 INCHES BUT IN NO CASE LESS THAN ONCE EVERY WEEK. ANY NEEDED REPAIRS WILL BE MADE IMMEDIATELY TO MAINTAIN ALL PRACTICES AS DESIGNED.
2. THE CATCH BASINS WILL BE CLEANED OUT THROUGHOUT CONSTRUCTION SO THAT THE BASINS ARE FREE OF DEBRIS.
3. SEDIMENT WILL BE REMOVED FROM BEHIND THE SILT FENCE WHEN IT BECOMES ABOUT 0.5 FT DEEP AT THE FENCE. THE SILT FENCE WILL BE REPAIRED AS NECESSARY TO MAINTAIN A BARRIER.
4. ALL SEEDED AREAS WILL BE FERTILIZED, RESEEDED AS NECESSARY, AND MULCHED ACCORDING TO SPECIFICATIONS TO MAINTAIN A VIGOROUS, DENSE VEGETATIVE COVER.

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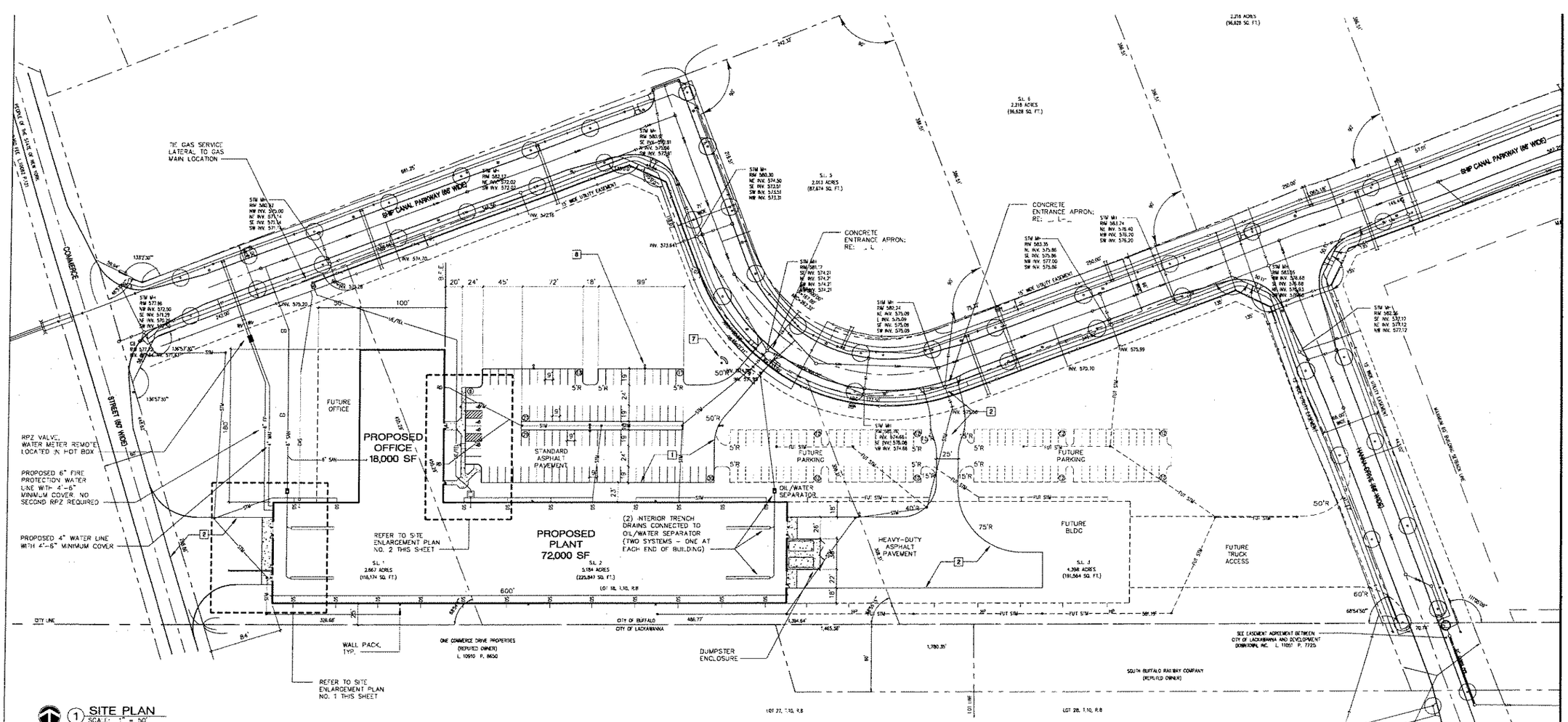
COBEY LLC

**1 SHIP CANAL PARKWAY
BUFFALO, NEW YORK**

SITE EROSION AND CONTROL PLAN

CK & ASSOCIATES
53 East Home Road
Bowmansville, New York 14026
p.716.684.6256
Landscape Architecture • Site Planning and Development

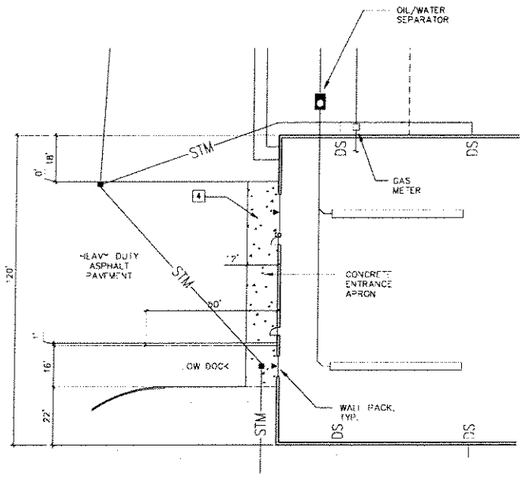
DRAWN BY:	CAR
APPROVED BY:	CAR
DATE:	NOVEMBER 21, 2005
SCALE:	AS NOTED
PROJECT NO:	05-005
DRAWING NO:	**EC - 1**



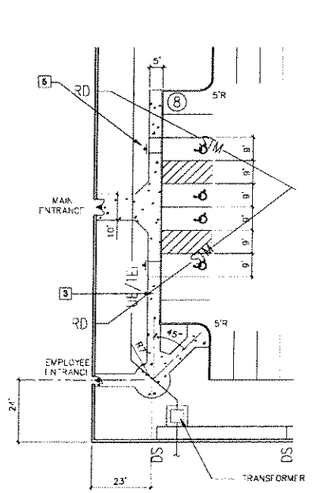
① SITE PLAN
SCALE: 1" = 50'

SITE IMPROVEMENT NOTES

1. ALL CAR PARKING AREAS SHALL BE ASPHALT PAVEMENT - TYPE 1; RE: 1, L-4.
2. ENTRANCES, TRUCK ACCESS ROADS, AND TRUCK TURNING AREAS SHALL BE ASPHALT PAVEMENT - TYPE 2; RE: 2, L-4.
3. ALL SIDEWALKS SHALL BE CONCRETE PAVEMENT - TYPE 1; RE: 3, L-4.
4. CONCRETE APRONS SHALL BE CONCRETE PAVEMENT - TYPE 2; RE: 4, L-4.
5. INSTALL (2) POSTS AND HANDICAPPED SIGNS; RE: 5, L-4.
6. FURNISH AND INSTALL CONCRETE FILLED FENDER POST; RE:
7. LIGHTED ENTRANCE SIGN AND FLAGPOLE. COORDINATE POWER AND LOCATION WITH OWNER OR OWNER'S REPRESENTATIVE.
8. INSTALL LIGHT POLE, CONCRETE BASE AND HIGH-PRESSURE SODIUM FIXTURE AS REQUIRED TO MEET THE FOLLOWING STANDARDS; RE: 8, L-5 & 9, L-5:
   1.0 FOOT CANDLE - PARKING AREAS, DRIVEWAYS, STREETS
   0.5 FOOT CANDLE - WALKWAYS, BUILDING ENTRANCES AND GATHERING AREAS



② SITE ENLARGEMENT PLAN NO. 1
SCALE: 1" = 20'



③ SITE ENLARGEMENT PLAN NO. 2
SCALE: 1" = 20'

NOTES:
1. NO ON-SITE PARKING SHALL BE DEVELOPED WITHIN THE FRONT YARD
2. PARKING WILL BE ALLOWED IN SETBACKS IF PARKING IS TO BE LINKED OR SHARED AMONG USES IN THE URBAN RENEWAL AREA

SITE DATA REQUIREMENTS

ZONING DISTRICT	= Urban Renewal							
SUPPLEMENTAL HEIGHT, LOT, YARD AND BULK REGULATIONS	Min. Lot 5 ac.	Width 350'	Depth 625'	Front	Side	Rear	Max. Bldg. Hgt. 40'	Max. Lot Coverage 35 75%
				STRUCTURE 60'	15'	15'		
				PARKING, LOADING & STACKING NOTE 1	NOTE 2	NOTE 2		
PARKING REQUIREMENTS (SIX (SIX) (0.6) OF A PARKING SPACE PER EMPLOYEE FOR TWO CONSECUTIVE SHIFTS)	= Space size = 9' x 19' = 171 sf. min.							
	Spaces required = 32							
	Spaces provided = 76							
SITE ACREAGE	= 12.249 ac.	533,585 sf.						
BUILDING SIZE	= 2.066 ac.	90,000 sf.						
PARKING/PAVEMENT	= 1.772 ac.	77,192 sf.						
GREENSPACE	= 8.411 ac.	366,393 sf.						

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NO.	DATE	REVISION DESCRIPTION	APPROV.
1	01-19-06	REVISED PER SITE PLAN REVIEW COMMENTS	CAR

COBEY LLC

1 SHIP CANAL PARKWAY
BUFFALO, NEW YORK

SITE LAYOUT AND UTILITIES PLAN

CK ASSOCIATES
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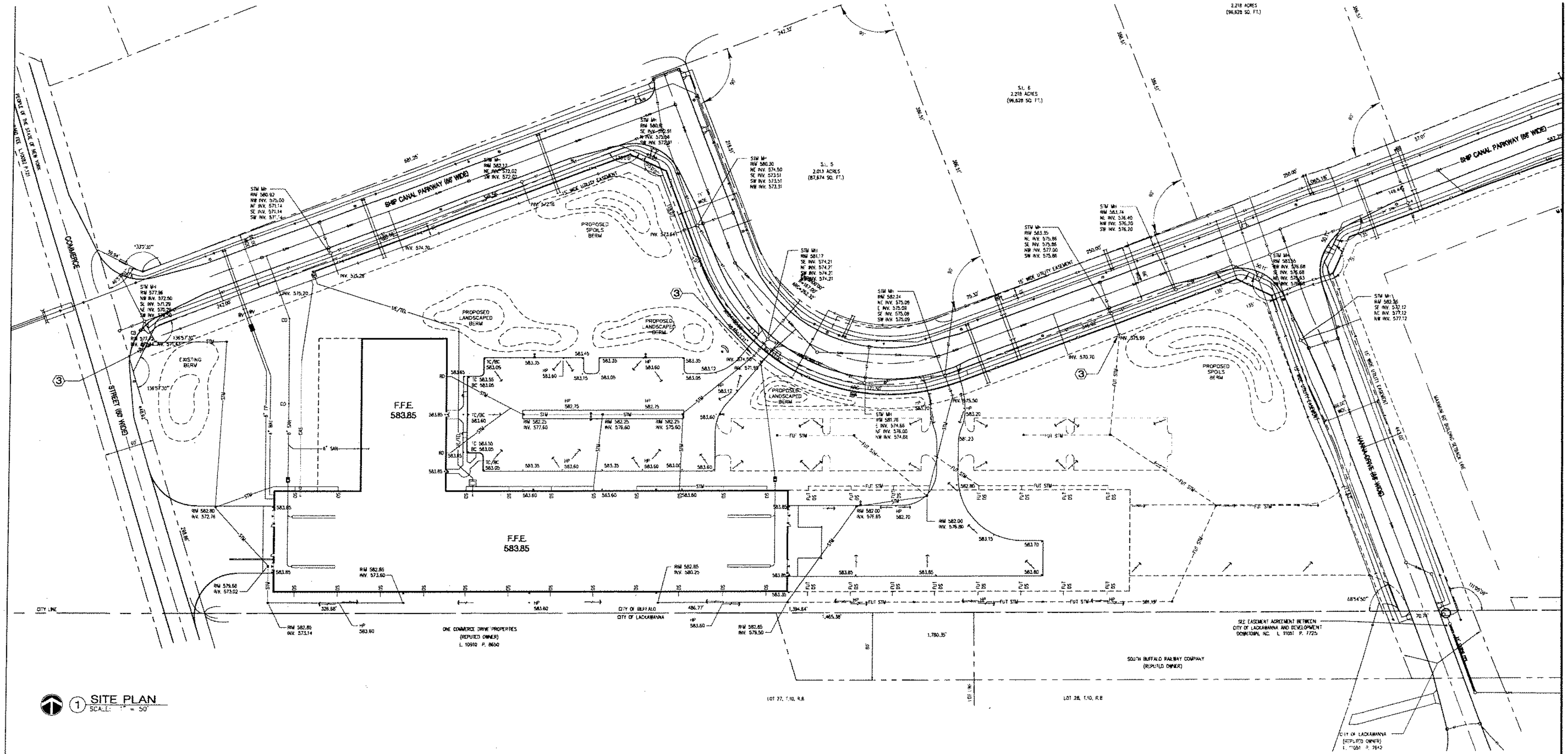
p.716.684-6256
Landscape architecture • Site Planning and Development

DRAWN BY:	CAR
APPROVED BY:	CAR
DATE:	NOVEMBER 21, 2005
SCALE:	AS NOTED
PROJECT NO:	05-005
DRAWING NO:	L - 1



1 SITE PLAN
SCALE: 1" = 50'

SITE GRADING AND DRAINAGE NOTES

1. REFER TO DETAILS 11, L-4 AND 12, L-4 FOR CATCH BASIN, AND PIPE BEDDING AND BACKFILL INFORMATION.
2. ALL STORM CONNECTIONS TO EXISTING STORM LATERALS SHALL HAVE A CLAY DAM INSTALLED.
3. FURNISH AND INSTALL CLAY DAM AT ALL STORM CONNECTIONS TO EXISTING STORM SYSTEM.

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SITE GRADING AND DRAINAGE PLAN

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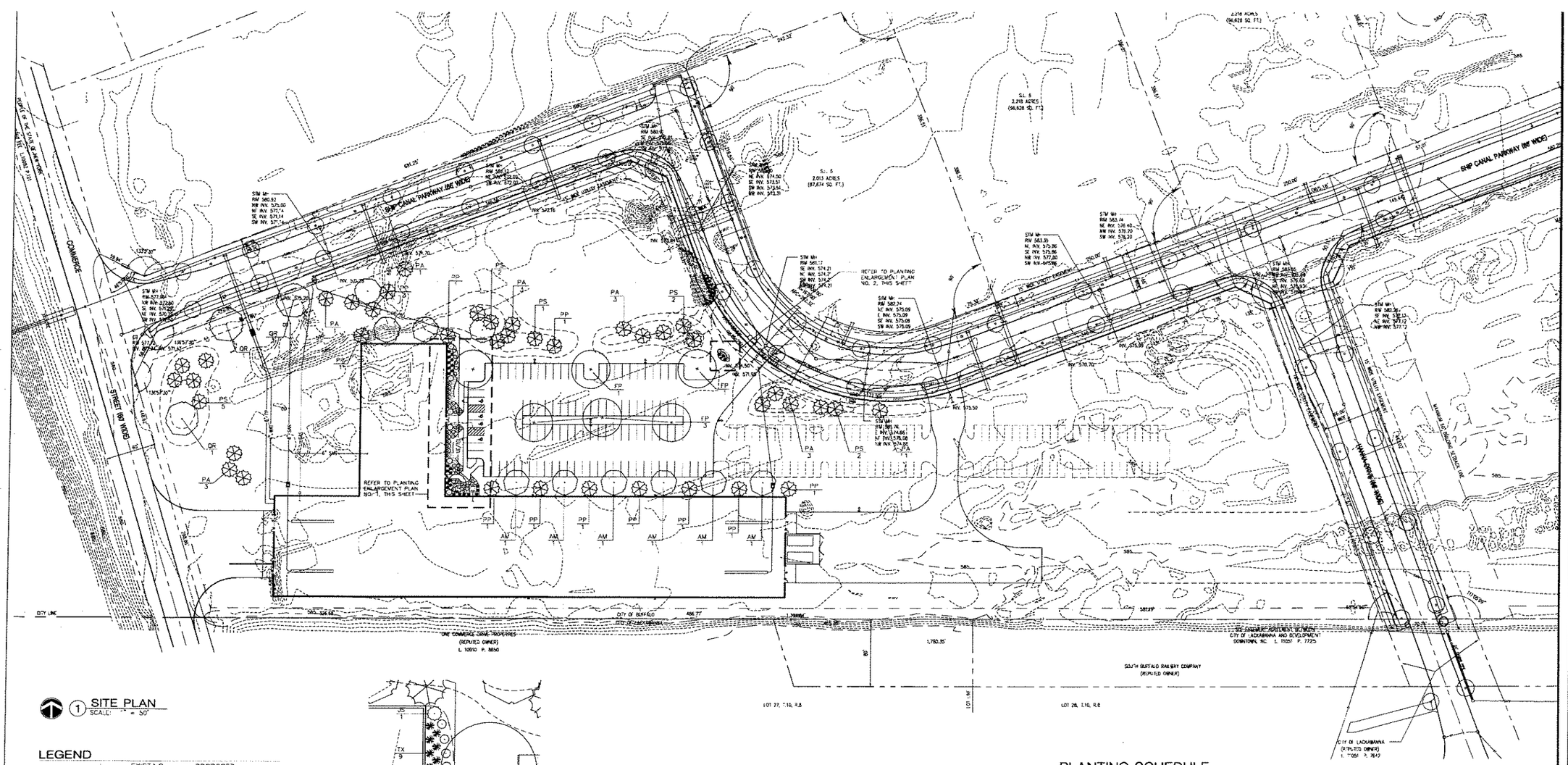
DRAWN BY:	CAR
APPROVED BY:	CAR
DATE:	NOVEMBER 21, 2005
SCALE:	AS NOTED
PROJECT NO:	05-005
DRAWING NO:	**L-2**



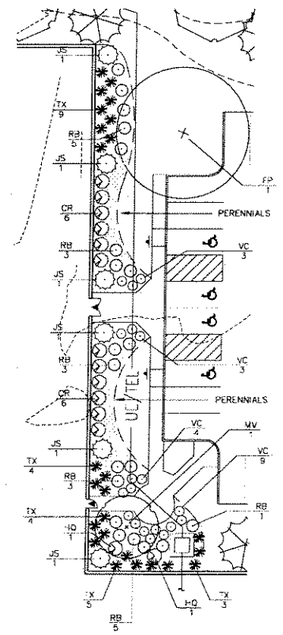
① SITE PLAN
SCALE: 1" = 50'

LEGEND

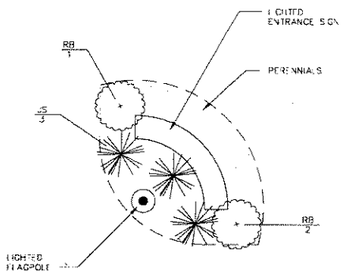
	EXISTING	PROPOSED
EVERGREEN TREE		
DECIDUOUS TREE		
SHRUB MASSES		
PLANT BED EDGE		

GENERAL LANDSCAPING NOTES

1. PRIOR TO MAJOR CLEARING OPERATIONS, SITE SHALL BE CLEARED ONLY AS REQUIRED TO ALLOW STAKING OF BUILDING & PARKING LOTS. AT COMPLETION OF STAKEOUT, ARCHITECT &/OR OWNER'S REPRESENTATIVE SHALL REVIEW & DETERMINE IF ADDITIONAL TREES SHALL BE RETAINED OR REMOVED. TREES TO REMAIN, WILL BE TAGGED BY THE ARCHITECT.
2. CARE OF EXISTING TREES TO REMAIN: SELECTIVELY PRUNE EXISTING TREES IN DESIGNATED AREAS UNDER DIRECTION OF LANDSCAPE ARCHITECT. REMOVE SUCKER GROWTH, DEAD, RUBBING & DAMAGED BRANCHING. SELECTED DECIDUOUS TREES SHALL HAVE THE HEAD PRUNED APPROXIMATELY 1/3 TO COMPENSATE FOR LIGHT SHOCK.
3. NEW PLANT MATERIAL SHALL CONFORM TO THE CURRENT ISSUE OF THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
4. DISTURBED AREAS REMAINING AFTER BUILDING & PAVEMENT CONSTRUCTION IS COMPLETED, SHALL RECEIVE MIN. 4" TOPSOIL, BE FINE GRADED, FERTILIZED, SEEDED OR SODDED PER SPECIFICATIONS.



② PLANTING ENLARGEMENT PLAN NO. 1
SCALE: 1" = 20'



③ PLANTING ENLARGEMENT PLAN NO. 2
SCALE: 1" = 5'

PLANTING SCHEDULE

KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	SPACING	REMARKS
TREE SCHEDULE							
FP	6	Fraxinus pennsylvanica 'Patmore'	Patmore Ash	2" cal.	B&B	40' o.c.	RE: 13, L-4
AC	4	Acer campestre	Hedge Maple	2 1/2" ca.	B&B	25' o.c.	RE: 13, L-4
QR	3	Quercus rubra	Red Oak	2" cal.	B&B	40' o.c.	RE: 13, L-4
PP	13	Picea pungens	Colorado Spruce	6' Ht.	B&B	20' o.c.	RE: 14, L-4
PA	15	Picea abies	Norway Spruce	5' Ht.	B&B	30' o.c.	RE: 14, L-4
PS	12	Pinus sylvestris	Scotch Pine	6' Ht.	B&B	40'	RE: 14, L-4
MV	1	Magnolia virginiana	Sweetbay Magnolia	6' Ht.	B&B		RE: 13, L-4
AM	6	Amelanchier canadensis	Shadblow Serviceberry (Multistem)	6' Ht.	B&B		RE: 13, L-4
SHRUB SCHEDULE							
CR	12	Cornus racemosa 'Hurzen'	Hurzen Grey Dogwood	#5 Cont.		4' o.c.	RE: 15, L-4
HQ	2	Hydrangea quercifolia	Oakleaf Hydrangea	#5 Cont.	#3 Cont.	4' o.c.	RE: 15, L-4
JS	8	Juniperus sabina 'Wichita Blue'	Wichita Blue Juniper	4' Ht.	B&B	8' o.c.	RE: 15, L-4
RB	20	Rhododendron 'Boursault'	Boursault Rhododendron	24" Ht.	B&B	5' o.c.	RE: 15, L-4
TX	25	Taxus x. media 'Sebian'	Sebian Yew	15" Ht.	B&B	5' o.c.	RE: 15, L-4
VC	19	Viburnum opulus 'Nanum'	Dwarf European Cranberrybush	#5 Cont.	B&B	5' o.c.	RE: 15, L-4

ASSORTED PERENNIALS - CHOOSE FROM THE FOLLOWING - MIN. OF 5 OF ANY VARIETY

PROVIDE MIN. 2 GALLON SIZE FOR ADEQUATE COVERAGE

Hemerocallis	DAYLILIES (MIN. 50% STELLA D'ORO VARIETY)
Rudbeckia fulgida 'Goldstrum'	BLACK-EYED SUSAN
Chrysanthemum	SHASTA DAISY
Echinacea purpurea	PURPLE CONEFLOWER
Hosta	PLANTAIN LILY / HOSTA
Astilbe	ASSORTED ASTILBE

Assorted mix of perennials

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Contractors Engineers Developers

NO.	DATE	REVISION DESCRIPTION	APPVD
1	01-19-06	REVISED PER SITE PLAN	CAR

COBEY LLC

1 SHIP CANAL PARKWAY
BUFFALO, NEW YORK

SITE PLANTING PLAN

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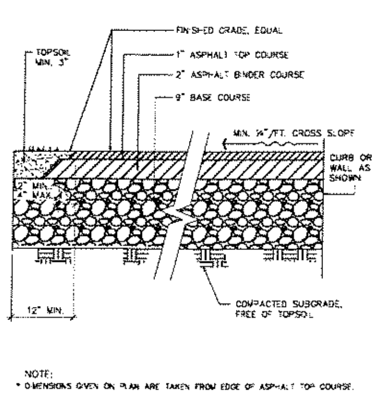
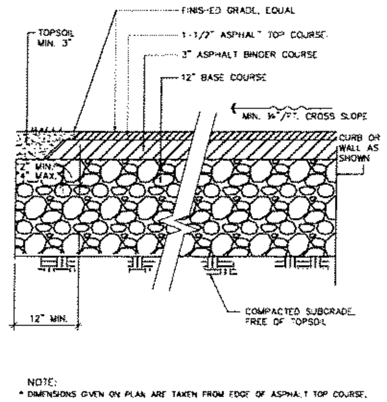
Bowmansville, New York 14026
716-684-6234
Landscape Architecture • Site Planning and Development

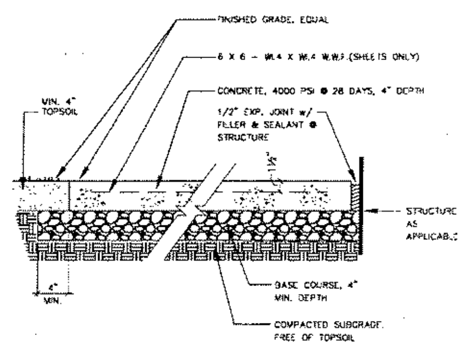
DRAWN BY:	CAR
APPROVED BY:	CAR
DATE:	NOVEMBER 21, 2005
SCALE:	AS NOTED
PROJECT NO:	05-005
DRAWING NO:	**L - 3**



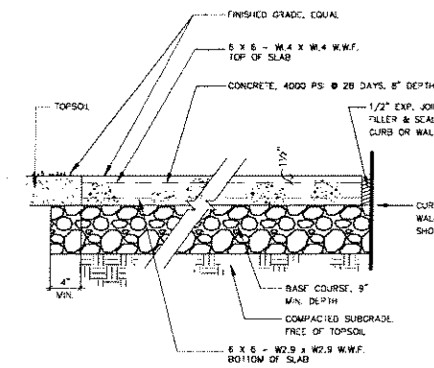
1 ASPHALT PAVEMENT - TYPE 1 NTS



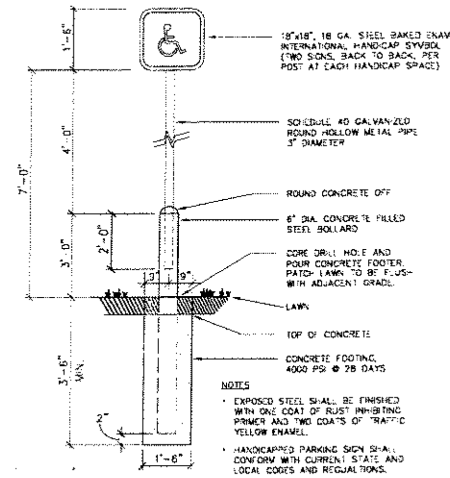
2 ASPHALT PAVEMENT - TYPE 2 NTS



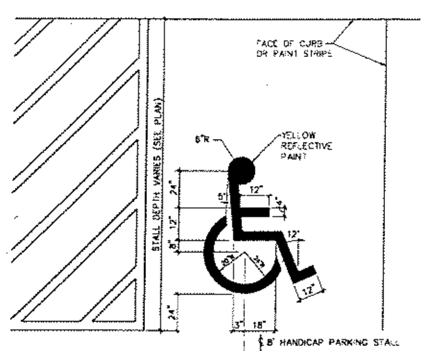
3 CONCRETE PAVEMENT - TYPE 1 NTS



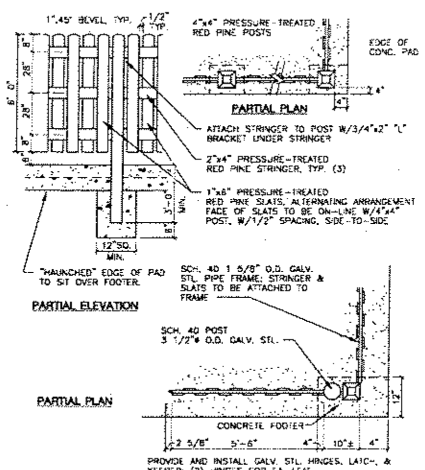
4 CONCRETE PAVEMENT - TYPE 2 NTS



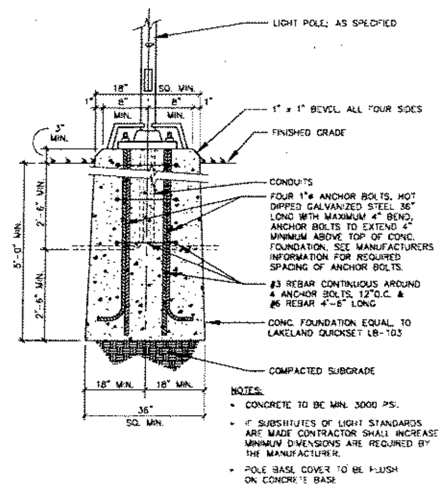
5 HANDICAPPED PARKING SIGN IN LAWN NTS



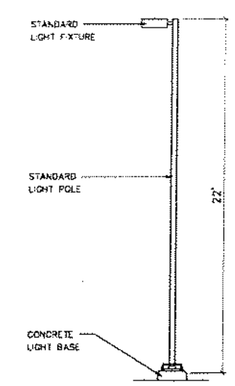
6 HANDICAP PARKING SPACE SYMBOL NTS



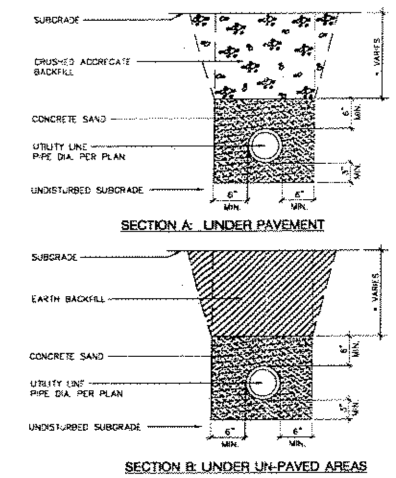
7 DUMPSTER ENCLOSURE NTS



8 CONCRETE LIGHT BASE NTS

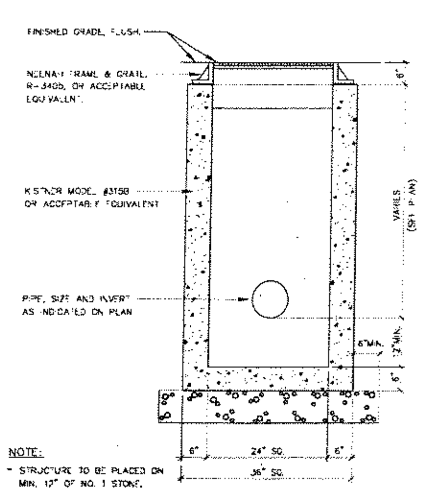


9 LIGHT POLE & FIXTURE NTS

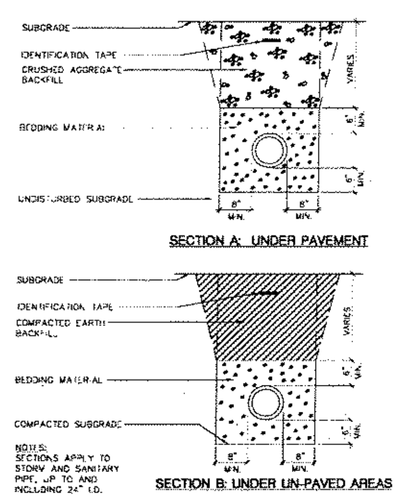


WATER	4'-6" MIN. COVER
ELEC.	2'-6" MIN. COVER
GAS	2'-6" MIN. COVER
TELE.	2'-6" MIN. COVER

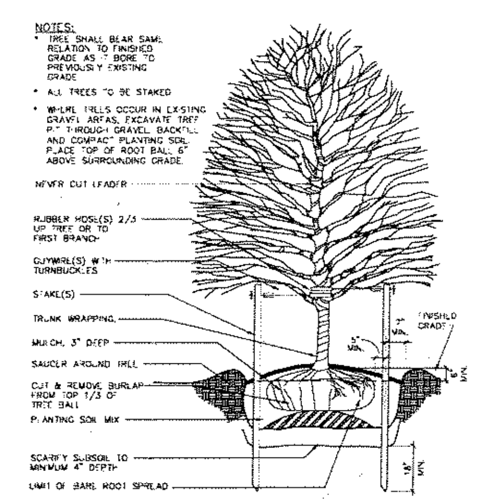
10 UTILITY TRENCH NTS



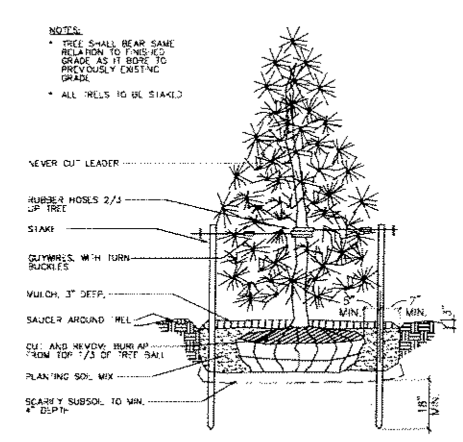
11 PRECAST CATCH BASIN NTS



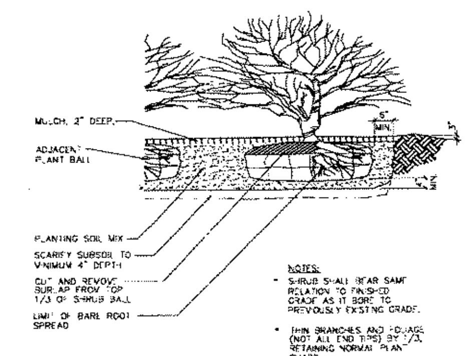
12 PIPE BEDDING & BACKFILL STORM & SANITARY NTS



13 DECIDUOUS TREE PLANTING W/ STAKES NTS



14 EVERGREEN TREE PLANTING NTS



15 SHRUB PLANTING N.T.S.

THE KROG CORP.
4 CENTRE DRIVE
ORCHARD PARK, NEW YORK 14127
716-667-1234
Fax. 716-667-1258
Contractors Engineers Developers

NO.	DATE	REVISION DESCRIPTION	APPRVD	CAR
1				

COBEY LLC

1 SHIP CANAL PARKWAY
BUFFALO, NEW YORK

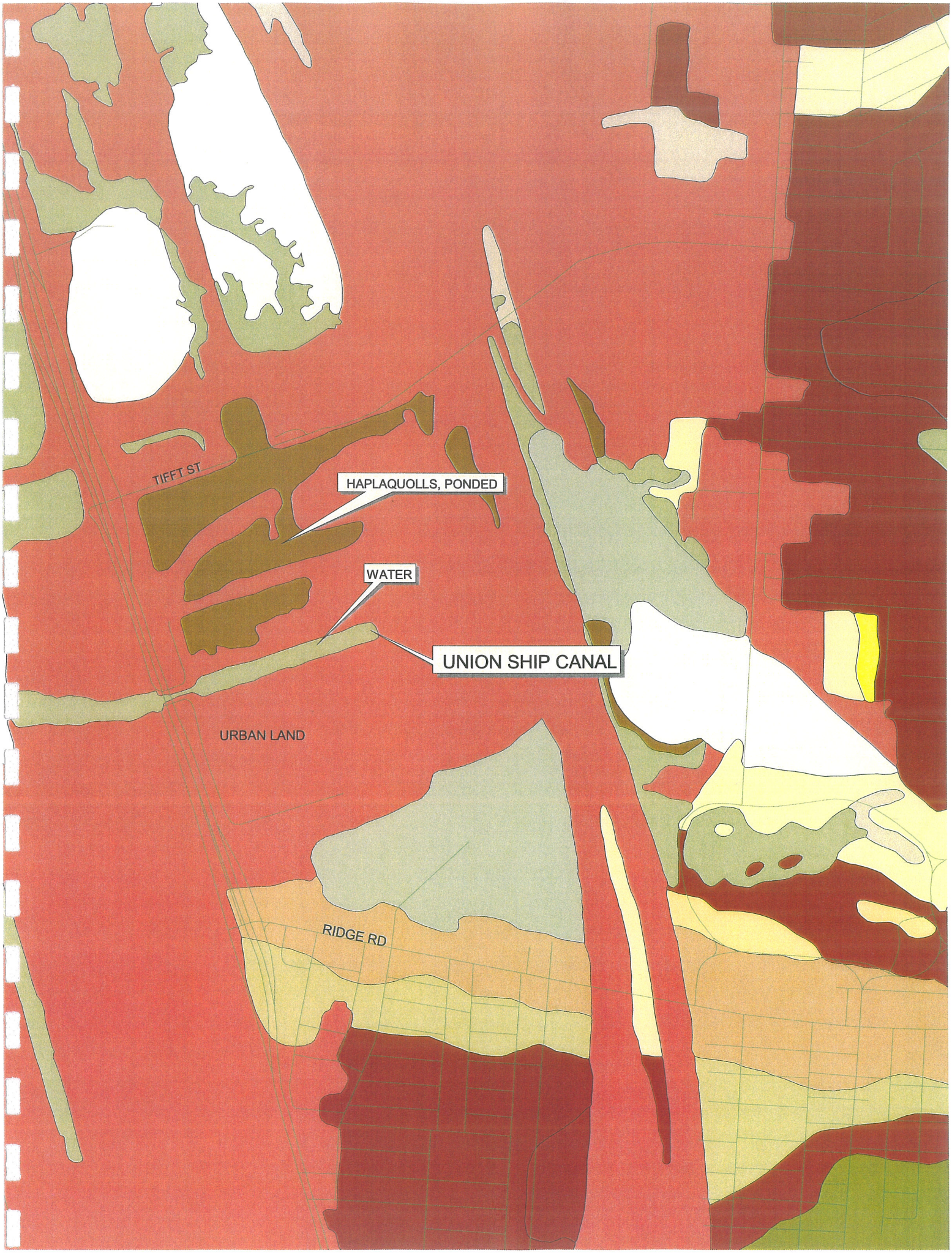
SITE DETAILS

CK & ASSOCIATES
53 East Home Road
Bowmansville, New York 14026
Landscape Architecture • Site Planning and Development

DRAWN BY:	CAR
APPROVED BY:	CAR
DATE:	NOVEMBER 21, 2005
SCALE:	AS NOTED
PROJECT NO:	05-005
DRAWING NO:	L - 4

APPENDIX B

SOILS MAP AND DECRIPTIONS


TIFFT ST
HAPLAQUOLLS, PONDED
WATER
UNION SHIP CANAL
URBAN LAND
RIDGE RD

crops and sod crops in the cropping system
the surface from scour when flooding occurs.
arly level soil is well suited to special crops that
irrigation and a stone-free plow layer.
soil is also well suited to pasture and hay.
azing can restrict plant growth and cause the loss
pasture seeding. Proper stocking, rotation of
s, yearly mowing, and deferment of grazing when
is wet are the main management concerns.
tions of lime are needed for optimum growth of
grasses.
potential of this soil for wood crops is good. Only
acreage is wooded. There are few limitations for
production. Trees that require acid conditions do
this soil.
ding is a serious limitation for most urban uses of
l. Where the soil is used for septic tank
tion fields, pollution of the water supply can occur
e of flooding and because the substratum is
tely to rapidly permeable. Some areas are well
o recreational uses, such as athletic fields that
a gravel- and stone-free, nearly level site. This
an excellent source of topsoil.
Tioga soil is in capability class I.

Udorthents, smoothed. These soils formed in
anmade cuts or fills. Most of these areas are
dustrial sites, urban developments, or construction
hese soils consist of various kinds of excavated
material that has been stockpiled for use as fill or
ssing, soil and rock material that has been trucked
ther areas and leveled, or soil deposits that are
areas that have been excavated or deeply
d. Fill material is variable in composition, but
earthy material is dominant. In some places, the
ixed with slag or cinders around abandoned
d yards. In other places, the earthy fill contains up
ercent concrete or asphalt and other trashy
.
map unit is mainly nearly level or gently sloping.
areas are steeper, particularly at the edge of cuts
ong the sides of mounded fill. The areas are
e in shape, depending mostly on ownership
aries. They range from 5 to 700 acres or more.
rger areas are in the city of Buffalo and adjacent
s near the larger industrial complexes.
rthents are too variable to have a typical profile,
one of the more common profiles the surface layer
vn or grayish brown very gravelly loamy sand to
ay loam 1 to 8 inches thick. The substratum is
only light olive brown, brown, or dark yellowish
and varies widely in texture from very gravelly
sand to silty clay.
t areas are idle and support scattered weeds and
s. A few areas have reverted to brush and tree
gs. Some areas, particularly around railroad yards,
ed for urban development.

These Udorthents are mostly excessively drained to moderately well drained. Often the fill has been placed on very poorly drained to moderately well drained soils. Texture, stone content, soil reaction, and depth to bedrock vary considerably from one area to another. Bedrock, however, is usually at a depth of more than 5 feet. Depth to the seasonal high water table and permeability are variable and depend on topography, degree of compaction, soil texture, and other related factors.

These cut and fill areas are usually poorly suited to farm or recreational uses. Onsite investigation is essential to determine the feasibility of using areas for any purpose.

These Udorthents have not been assigned a capability subclass.

Ud—Urban land. This map unit is a miscellaneous area in which 80 percent or more of the soil surface is covered by asphalt, concrete, buildings, or other impervious structures. It includes parking lots, shopping and business centers, and industrial parks—in the cities of Buffalo and Lackawanna but also the business districts and adjacent shopping centers of villages in the suburban area near Buffalo. These areas generally range from 3 to 500 acres or more and are mostly nearly level to sloping.

Included in mapping are some landfills that have not been built upon or covered with asphalt. In many of these, several feet of fill has been placed over marshes and flood plains. The included areas range up to 3 acres.

It was not practical to examine and identify the soils underlying these impervious Urban land areas. Careful onsite investigation is necessary to determine the suitability and limitations of any abandoned areas for any proposed use. Some abandoned areas are suitable for asphalt-covered playgrounds or other recreation uses requiring a hard, impervious surface.

These Urban lands have not been assigned a capability subclass.

UeB—Urban land-Benson complex, 3 to 6 percent slopes. This complex is made up of gently sloping areas of Urban land and excessively drained and somewhat excessively drained Benson soils. Some areas of the Benson soils have been graded, scalped, or filled during urbanization. This complex is underlain by shallow limestone bedrock. These areas are generally about 5 to 100 acres. Slopes are long and gradual and are occasionally interrupted by ledges of rock outcrop.

A typical area of this complex is about 60 percent Urban land that is covered by concrete, asphalt, buildings, or other impervious surfaces; about 25 percent undisturbed Benson soils; and 15 percent other soils. Urban land and Benson soils occur together in such an

APPENDIX C

STORM RUNOFF ANALYSIS
AND
STORM DRAINAGE SYSTEM DESIGN REPORT

COBEY INCORPORATED
CITY OF BUFFALO, NEW YORK

October 27, 2005

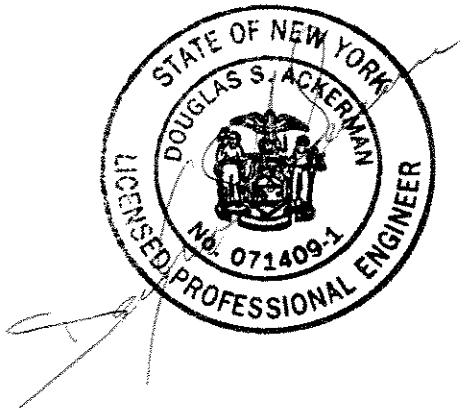
STORM RUNOFF ANALYSIS, DETENTION POND AND STORM DRAINAGE SYSTEM DESIGN

Prepared for and Requested by:

C K Associates
53 East Home Road
Bowmansville, New York 14026

Prepared by:

Douglas S. Ackerman, P.E., NYS PE License #071409-1
Traian Cainaru Land Surveying, P.C.



STORM RUNOFF ANALYSIS, DETENTION POND AND STORM DRAINAGE SYSTEM DESIGN

1.0 Introduction

This evaluation concerns the site for **COBEY INCORPORATED** located within the at the intersection on Ship Canal Parkway and Hanna Drive in the City of Buffalo, Erie County, New York. The primary objective of this report is to provide the City of Buffalo with the project's storm drainage runoff analysis including SPDES related calculations. This report also includes the design of the closed drainage system (pipe sizes, type as well as slope).

2.0 Design Considerations

The proposed project will involve the development of approximately 12.25 acres. The outflow from the proposed site will be directed into the existing storm sewer system along Ship Canal Parkway.

The storm drainage analysis was performed in conjunction with the Erie and Niagara Counties Regional Planning Board (ENCRPB) Storm Drainage Manual and the Soil Conservation Service's Soil Survey of Erie County, New York, New York State Stormwater Management Design Manual as well as TR-55 - Urban Hydrology for Small Watersheds and the WinTR-55 and HY-8 software programs.

The closed drainage system was designed to handle a 10-Year Design Storm and was designed though Hydrain software, an approved Federal and State hydrology program.

3.0 Existing (prior to any development) Runoff Conditions

The existing site has an undeveloped configuration of the following:

Area = 12.25 acres

The soil characteristics are described as Urban Land - 'C' in conjunction with the Soil Survey of Western New York by the Soil Conservation Service. The Hydrologic Soil Group for the site has been determined to be 'D' based upon the soil classification and the discussion provided in Appendix A of the TR-55 manual. The description of the urban soil used in conjunction with Appendix A of the TR-55 manual was taken from recent soil borings in proximity to the project site and were performed within the last year.

The computed CN_{avg} utilizing the above area, soil characteristics and ground cover was found to be **89.00** (Reference the attached Worksheet 2's).

The time of concentration T_c calculations (Reference the attached Worksheet 3's) determined a maximum T_c of 0.739 hr.

The peak discharge for the undeveloped site for the 1, 10, 25 and 100-Year Design Storm events were calculated by the Graphical Peak Discharge Method storms through TR-55 - Urban Hydrology for Small Watersheds and WinTR-55 software program. The output Hydorgraphs are attached for the 1, 10, 25 and 100 Design Storm events.

4.0 - Proposed Site Conditions

Upon completion of the proposed project, the developed area (12.25 acres) will be divided as follows:

Building & Parking Areas - 5.86 Acres
Open Space / Grass Areas - 6.39 Acres
Total - 12.25 Acres

The computed CN_{avg} utilizing the above areas, soil characteristics and proposed ground cover was found to be **94.00** (Reference the attached Worksheet 2's).

The time of concentration T_c calculations (Reference the attached Worksheet 3's) determined a maximum T_c of 0.900 hr (53.80 min.).

The peak discharge for the developed site for the 1, 10, 25 and 100-Year Design Storm events were calculated by the Graphical Peak Discharge Method storms through TR-55 - Urban Hydrology for Small Watersheds and WinTR-55 software program. The output Hydorgraphs are attached for the 1, 10, 25 and 100 Design Storm events.

The closed drainage system design is covered on pages 17 thru 27 of the attached Design Calculation Worksheets with a summary table provided.

5.0 - Drainage and Volume Calculations

Water Quality Volume: (Reference page 16 of 27 of the attached worksheets)

Water Quality Volume(WQv): 18,208.0 cu. ft.

Channel Protection Volume: (Reference page 16 of 27 of the attached worksheets)

Channel Protection Volume: 13,220.0 cu. ft.

Drainage Summary Table

Design Storm	Existing Flowrate	Proposed Flowrate
1-Year	9.33	10.91
10-Year	20.56	21.04
25-Year	23.63	23.69
100-Year	30.54	29.73

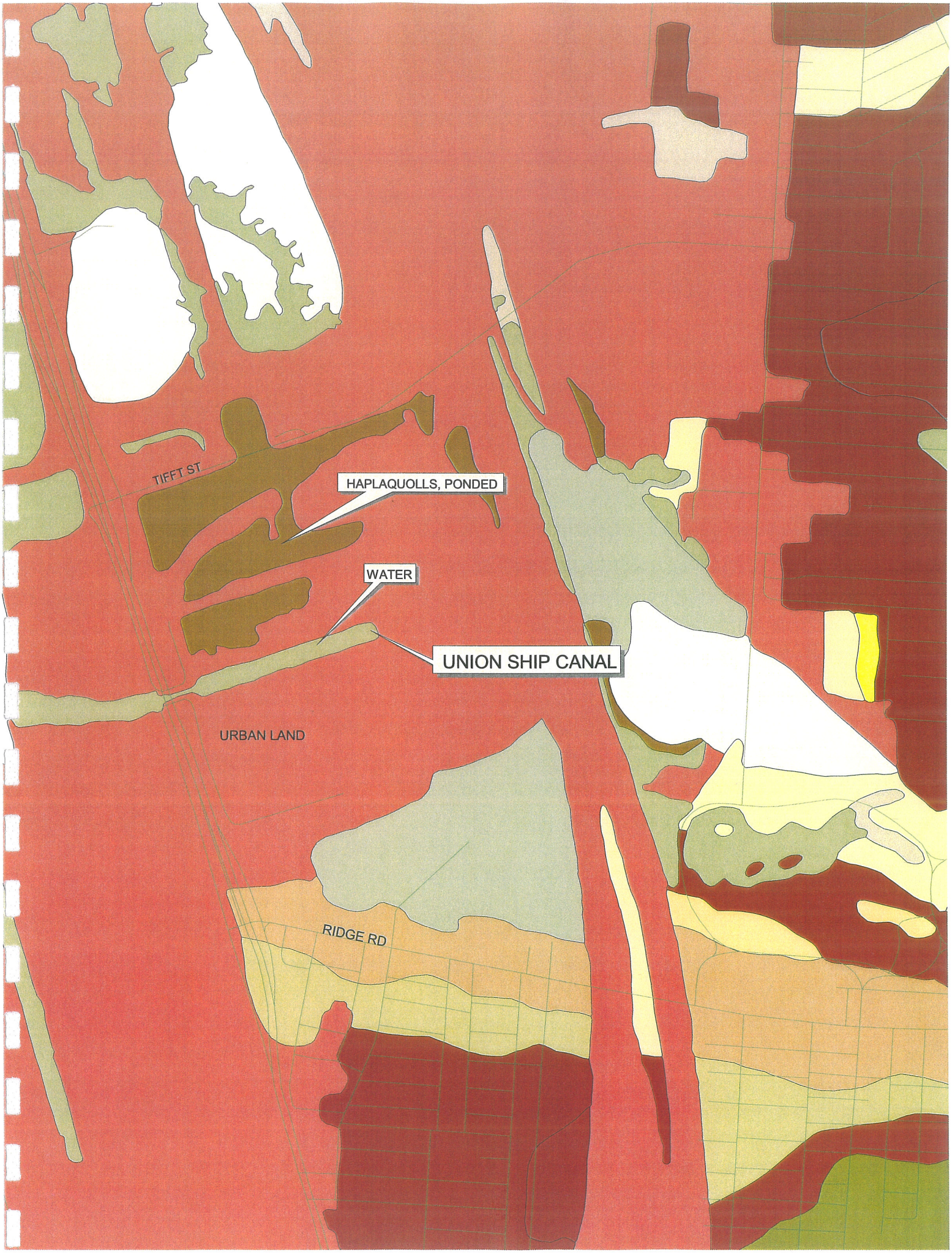
Drainage Flowrate Table

(10 -Year Design Strom - Full Build out)

OUTLET	*FLOWRATE*
"A"	2.34
"B"	2.21
"C"	3.85
"D"	2.19

CLOSED DRAINAGE SUMMARY TABLE

PIPE	SIZE	TYPE	LENGTH	SLOPE	NOTES
A	12"	HDPE	150'	0.50 %	
B	12"	HDPE	150'	0.50 %	
C	12"	HDPE	140'	0.50 %	
D	12"	HDPE	84'	0.50 %	
E	12"	HDPE	134'	0.50 %	
F	12"	HDPE	150'	0.50 %	
G	12"	HDPE	150"	0.50 %	
H	12"	HDPE	125'	0.50 %	
I	12"	HDPE	100'	0.50 %	
J	12"	HDPE	150'	0.50 %	
K	12"	HDPE	100'	0.50 %	
L	12"	HDPE	65'	0.50 %	
M	15"	HDPE	120'	1.33 %	
N	12"	HDPE	106'	0.50 %	
O	12"	HDPE	90'	0.50 %	
P	12"	HDPE	100'	0.50 %	
Q	12"	HDPE	100'	0.50 %	
R	12"	HDPE	94'	1.06 %	
S	12"	HDPE	85'	0.50 %	
T	12"	HDPE	94'	1.03 %	
U	12"	HDPE	85'	0.50 %	
V	12"	HDPE	106'	2.02 %	
W	12"	HDPE	132'	0.30 %	
X	12"	HDPE	95'	0.30%	
Y	12"	HDPE	95'	0.50%	
Z	12"	HDPE	132'	0.21%	
AA	12"	HDPE	150'	0.50%	


TIFFT ST
HAPLAQUOLLS, PONDED
WATER
UNION SHIP CANAL
URBAN LAND
RIDGE RD

Worksheet 2: Runoff curve number and runoff

Project: Corey Mountain [illegible]	By: D. A[illegible]	Date: 12-15-05
Location: City of Buffalo	Checked: [illegible]	Date: 12/[illegible]

Check one: ☒ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☒ acres ☐ mi^2 ☐ %	Product of CN x area
Ve[illegible]	100% Pervious area with ground cover of grass and brush	89			12.25	1090.25
				Totals ➡	12.25	1090.25

[1] Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = ________ = ______ ; **Use CN ➡** 89

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	10 yr.	25 yr.	100 yr.
Rainfall, P (24-hour)	in	3.6	4.0	4.8
Runoff, Q (Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)	in	2.9[illegible]	3.22	4.0[illegible]

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project: Corey Manufacturing	By: D. Ackerman	Date: 10-25-05
Location: City of Buffalo	Checked: SMA	Date: 10/27

Check one: ☒ Present ☐ Developed

Check one: ☒ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet. Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

Segment ID	1		
1. Surface description (table 3-1)	Urban Fallow		
2. Manning's roughness coefficient, n (table 3-1)	0.		
3. Flow length, L (total L † 300 ft) ... ft	300' ±		
4. Two-year 24-hour rainfall, P_2 ... in	2.40		
5. Land slope, s ... ft/ft	0.005		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{\ 0.5}\ s^{0.4}}$ Compute T_t ... hr	0.705	+	= 0.705

Shallow concentrated flow

Segment ID	2		
7. Surface description (paved or unpaved)	Unpaved		
8. Flow length, L ... ft	150' ±		
9. Watercourse slope, s ... ft/ft	0.50%		
10. Average velocity, V (figure 3-1) ... ft/s	1.20		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ... hr	0.034	+	= 0.034

Channel flow

Segment ID			
12. Cross sectional flow area, a ... ft^2			
13. Wetted perimeter, p_w ... ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ... ft			
15 Channel slope, s ... ft/ft			
16. Manning's roughness coefficient, n ...			
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ... ft/s			
18. Flow length, L ... ft			
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ... hr		+	= —
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ... Hr			0.739

WinTR-55 Output Hydrograph **Project: Cobey Manufacturing** 10:24:2005

Subarea: (Outlet 'D') Storm: 1-Yr

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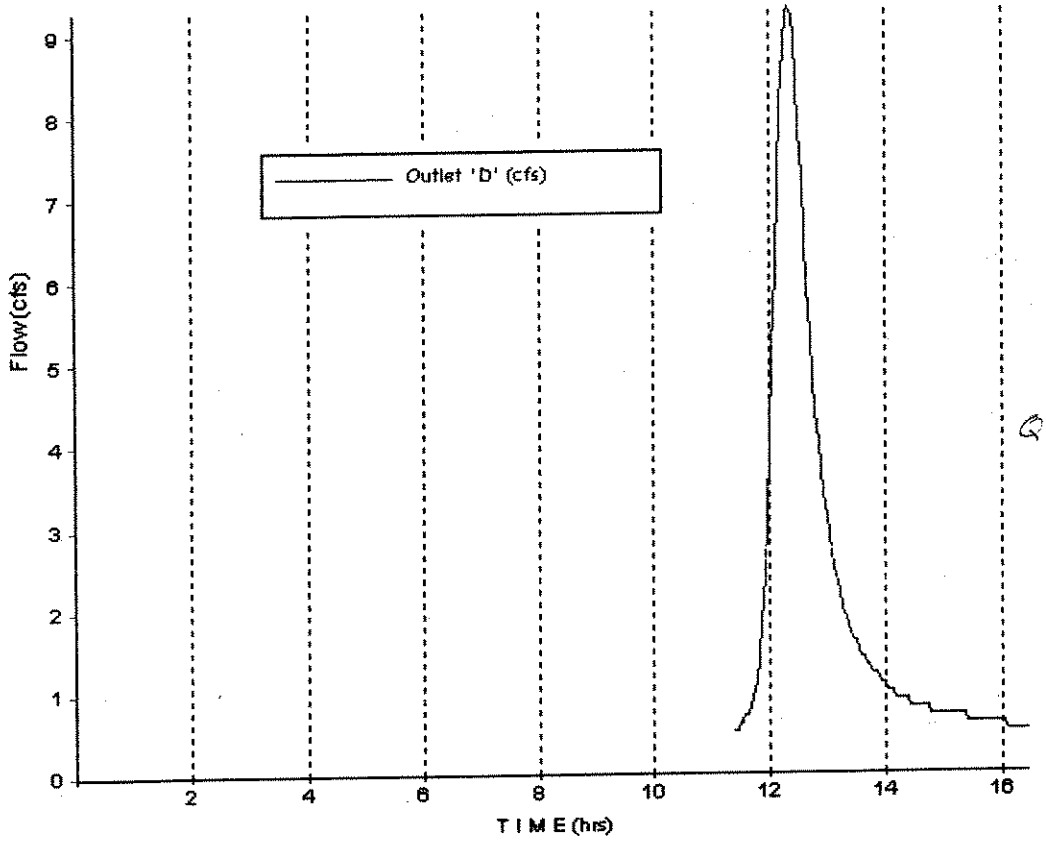

(1 ye. EXISTING STORM)

TYPE II

Q = 9.33 CFS

RUNOFF

RAINFALL, $P_{(24\ HOUR)}$ (1 ye) = 2.40 in

CN = 89

(Fig. 2-1) Q = 1.41 in

VOL. $Q \times A/12 = 1.41 \times 12.25/12 = 1.439$ Ac-FT

OR

62,683 CF

WinTR-55 Output Hydrograph **Project: Cobey Manufacturing** 10:24:2005

Subarea: (Outlet 'D') Storm: 10-Yr

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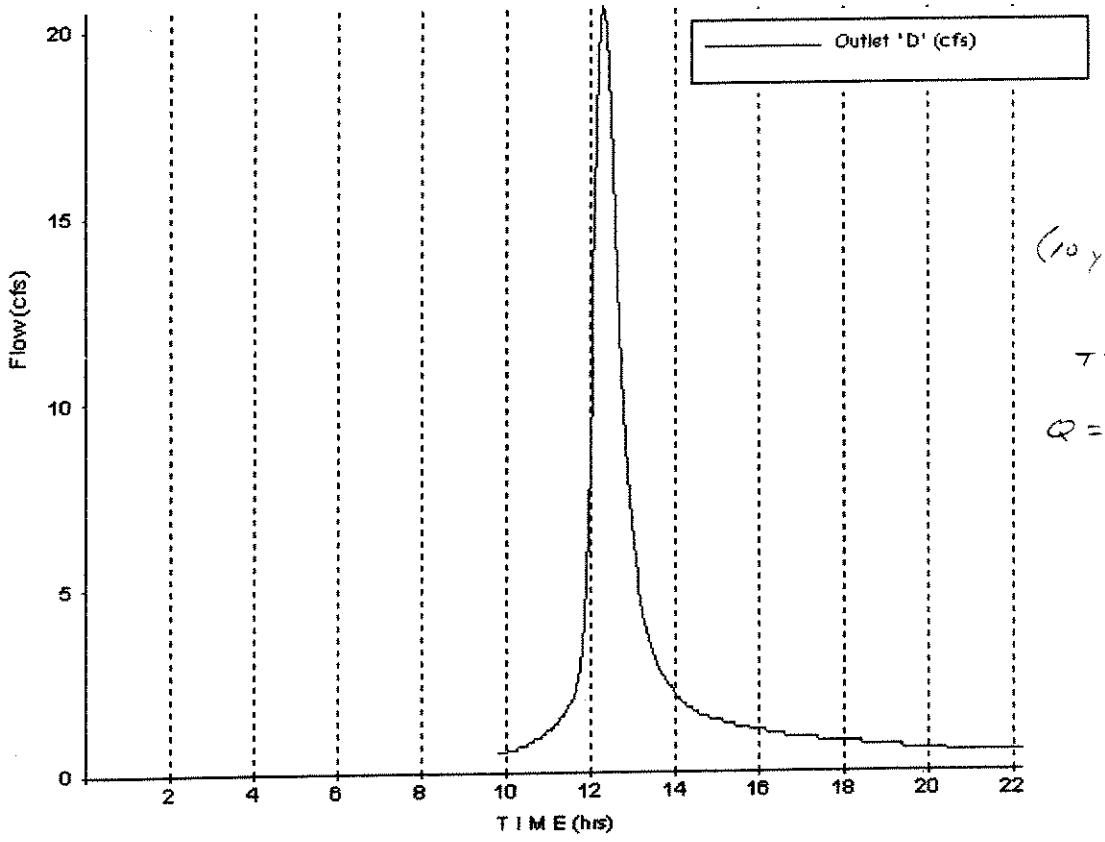

(10 yr. EXISTING STORM)

TYPE II

Q = 20.5 CFS

RUNOFF

RAINFALL, $P_{(24\ HR.)}$ (10 YR.) = 3.60 in

CN = 89

(Fig. 2-1) Q = 2.55 in

VOL.

$Q \times A/12 = 2.55 \times 12.25/12 = 2.603$ AC-FT

OR

113,387 CF

WinTR-55 Output Hydrograph **Project: Cobey Manufacturing** 10:24:2005

Subarea: (Outlet 'D') Storm: 25-Yr

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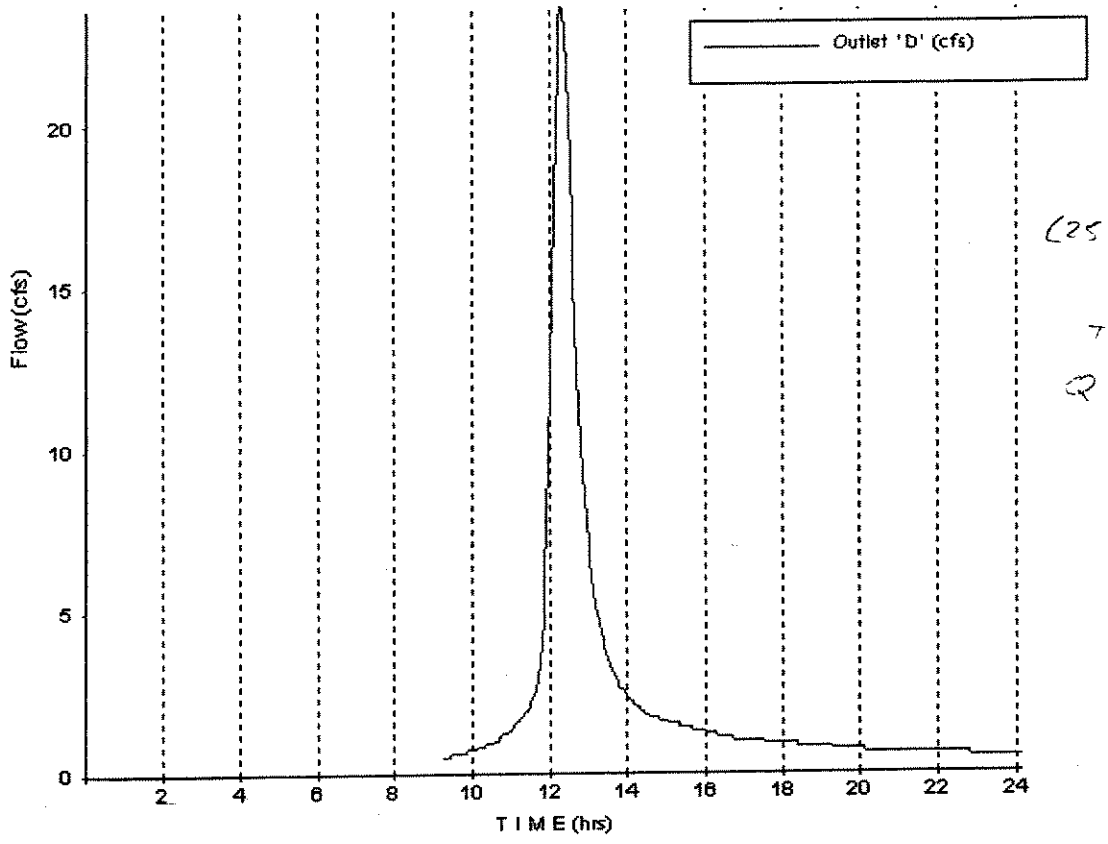

(25 yr. EXISTING STORM TYPE II

Q = 23.63 CFS

RUNOFF

RAINFALL, $P_{(24\text{-HOUR})}$ (25 yr.) = 4.00

CN = 89

(Fig. 2-1) Q = 2.90 in

VOL.

$Q = A/12 = 2.90 \times 8.25/12 = 2.960$ AC-FT

OR

128,956 CF

WinTR-55 Output Hydrograph **Project: Cobey Manufacturing** **10/24/2005**

Subarea: (Outlet 'D') Storm: 100-Yr

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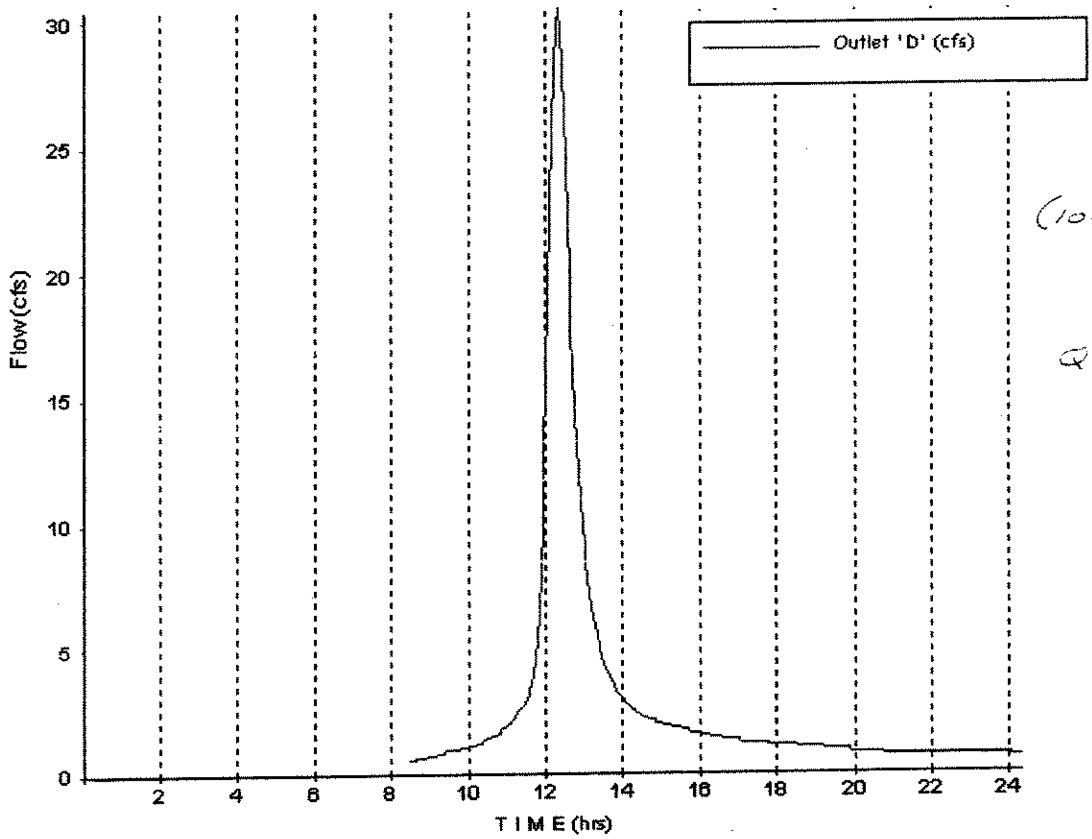


(100 YR. EXISTING STORM TYPE II Q = 30.54 CFS

RUNOFF

RAINFALL, P(24-HOUR)(100 YR.) = 4.80

CN = 89

(FIG. 2-1) Q = 3.60

VOL

Q x A/12 = 3.60 x 12.25/12 = 3.675 AC-FT

OR

160,083 CF

Worksheet 2: Runoff curve number and runoff

Project	By	Date
Corey Manufacturing	Doug Ackerman	10-14-04
Location	**Checked**	**Date**
City of Buffalo	SMA	10/27

Check one: ☐ Present ☒ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1/] Table 2-2	CN [1/] Figure 2-3	CN [1/] Figure 2-4	Area ☒ acres ☐ mi^2 ☐ %	Product of CN x area
Urban Land	Impervious (Buildings + Parking Areas)	98			6.39	626.22
"	Pervious (Grass/Green Space)	89			5.86	521.54
				Totals ➡	12.25	1147.76

[1/] Use only one CN source per line

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1147.76}{12.25} = 93.70$; **Use CN ➡** 94

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	10 yr.	25 yr.	100 yr
Rainfall, P (24-hour)	in	3.6	4.0	4.8
Runoff, Q (Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)	in	3.0	3.40	4.20

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project	By	Date
Corey Manufacturing	Doug Ackerman	10-23-05
Location	**Checked**	**Date**
City of Buffalo	SMA	10/27

Check one: ☐ Present ☒ Developed

Check one: ☒ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

		Segment ID	
1.	Surface description (table 3-1)		
2.	Manning's roughness coefficient, n (table 3-1)		
3.	Flow length, L (total L † 300 ft) ..... ft		
4.	Two-year 24-hour rainfall, P_2 ..... in		
5.	Land slope, s ..... ft/ft		
		[ ] + [ ] = [ ]	

6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t ..... hr

(FROM "HYDRAIN" SOFTWARE: MAX-Tc = 53.80 min.)

Shallow concentrated flow

		Segment ID	
7.	Surface description (paved or unpaved)		
8.	Flow length, L ..... ft		
9.	Watercourse slope, s ..... ft/ft		
10.	Average velocity, V (figure 3-1) ..... ft/s		
		[ ] + [ ] = [ ]	

11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr

Channel flow

		Segment ID	
12.	Cross sectional flow area, a ..... ft^2		
13.	Wetted perimeter, p_w ..... ft		
14.	Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft		
15	Channel slope, s ..... ft/ft		
16.	Manning's roughness coefficient, n		
17.	$V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V .....ft/s		
18.	Flow length, L ..... ft		
		[ ] + [ ] = [ ]	

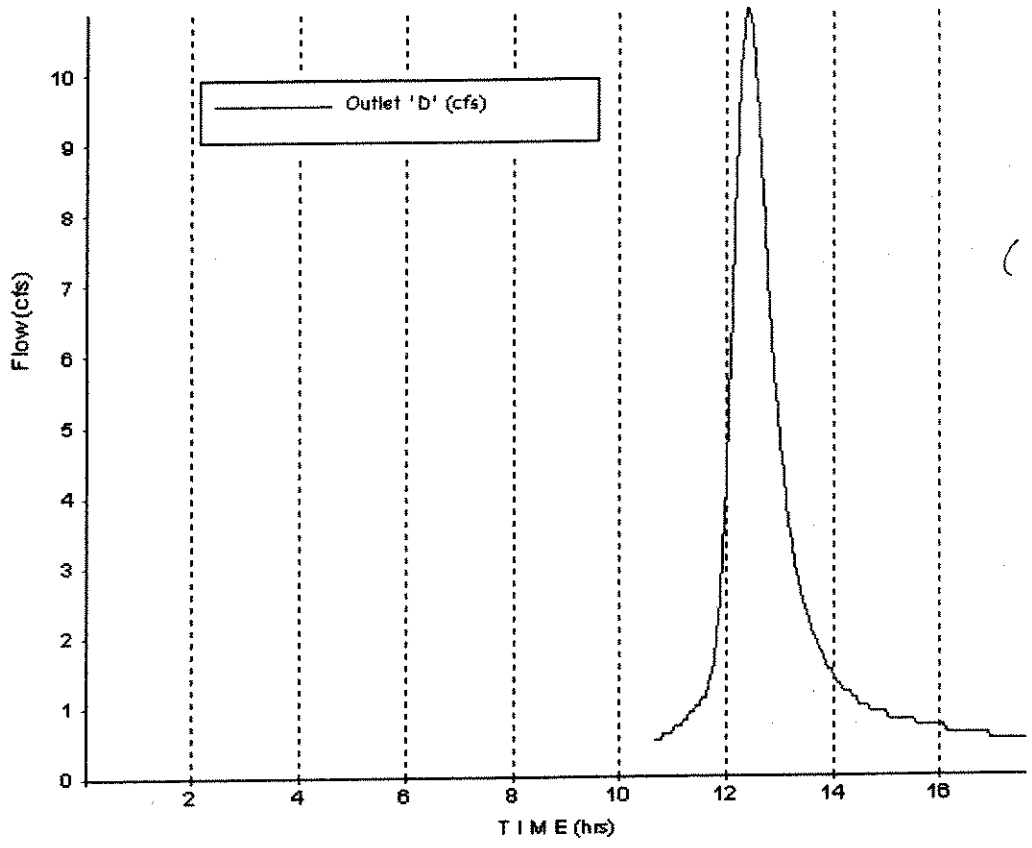
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... Hr [ ]

WinTR-55 Output Hydrograph **Project: Cobey Manufacturing** 10/23/2005

Subarea: (Outlet 'D') Storm: 1-Yr

C:\Documents and Settings\Douglas\Application Data\WinTR-55\proposed1yr.w55



(1 yr. developed storm)

$Q = 10.91$ cfs (Type II)

RUNOFF

Rainfall, $P_{(24\ hr.)}$ (1 yr.) = 2.40 in

CN = 94

(Fig. 2-1) $Q = 1.90$

VOL.

$Q \times A/12 = 1.90 \times 12.25/12 = 1.940$ Ac-Ft

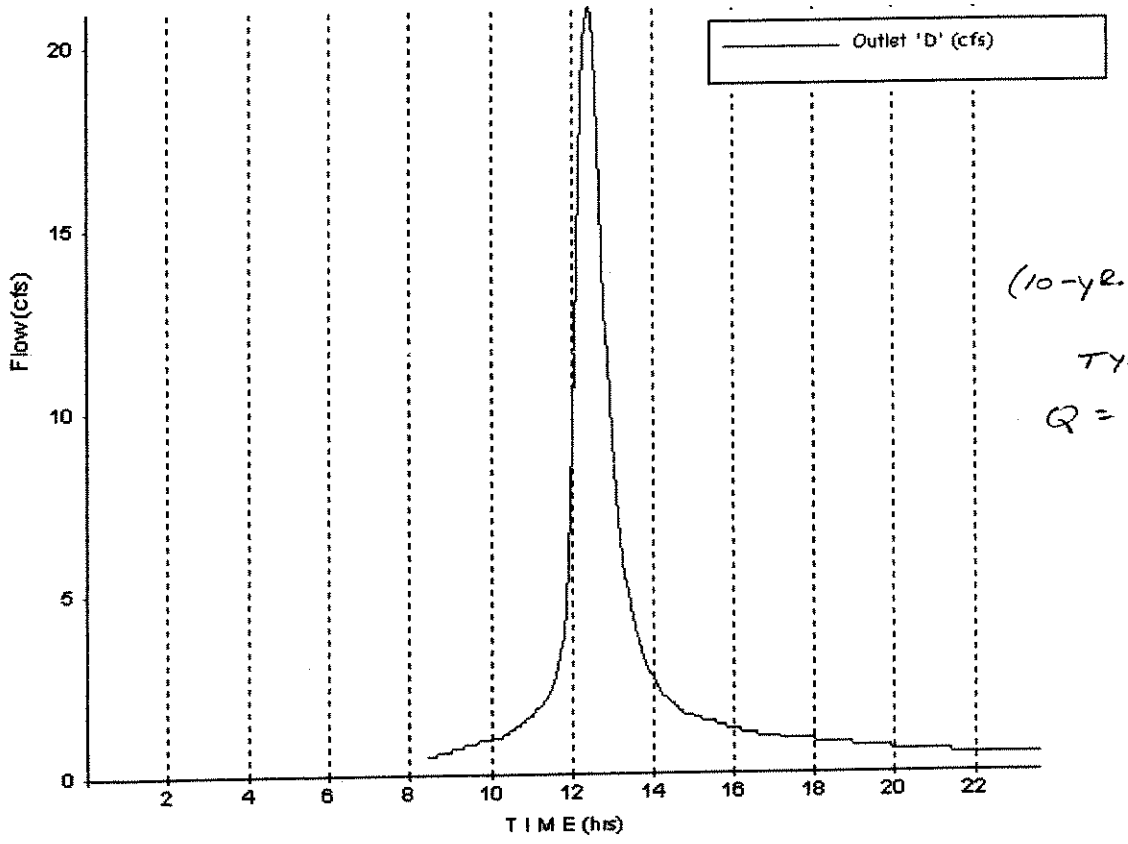
or

84,488 cf

WinTR-55 Output Hydrograph **Project: Cobey Manufacturing** 10/23/2005

Subarea: (Outlet 'D') Storm: 10-Yr

C:\Documents and Settings\Douglas\Application Data\WinTR-55\proposed1yr.w55



(10-yr. Developed Storm)
TYPE II
Q = 21.04 cfs

RUNOFF

RAINFALL, $P_{(24\text{-HOUR})}$ (10 yr.) = 3.60

CN = 94

(Fig. 2-1) Q = 3.00

Vol. $Q \times A/12 = 3.00 \times 12.25/12 = 3.062$ Ac-FT

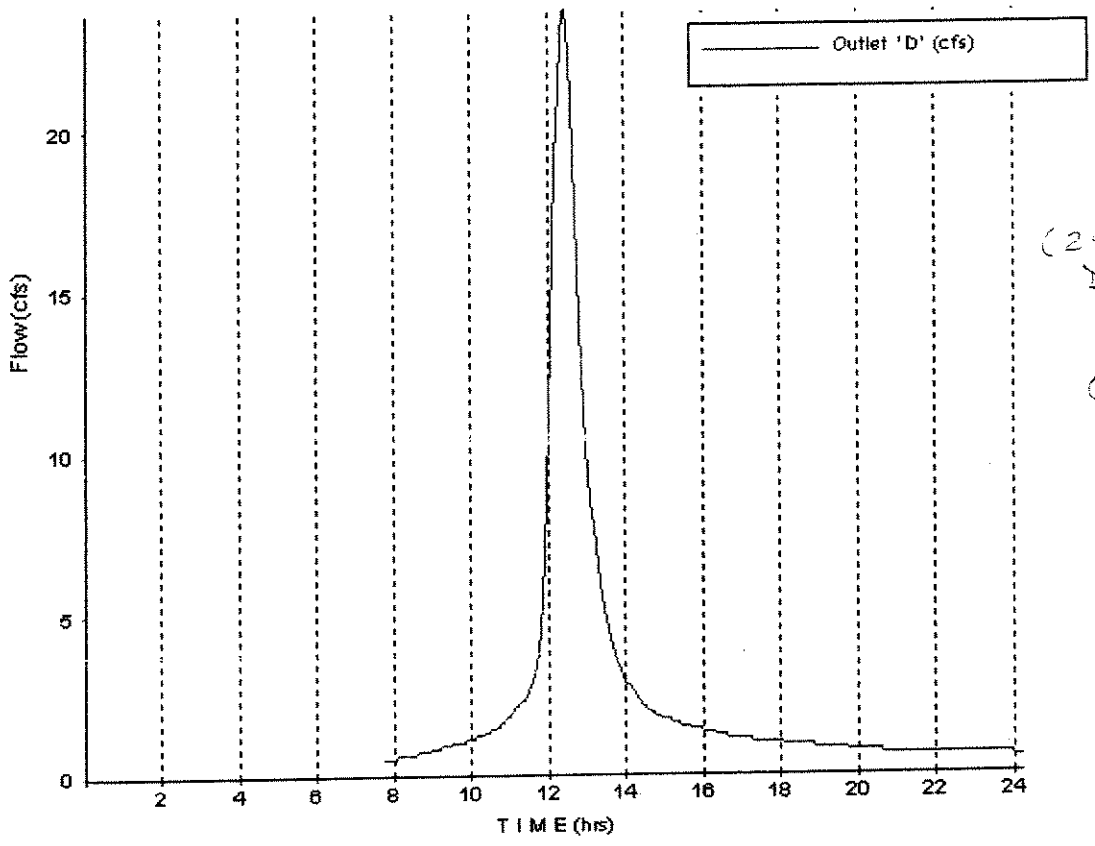
OR

133,403 CF

WinTR-55 Output Hydrograph **Project: Cobey Manufacturing** 10/23/2005

Subarea: (Outlet 'D') Storm: 25-Yr

C:\Documents and Settings\Douglas\Application Data\WinTR-55\proposed1yr.w55



(25-YR
DEVELOPED CONDITIONS
TYPE III
Q = 23.69 CFS

RUNOFF

RAINFALL, P (24-HOUR) (25 YR.) = 4.00

CN = 94

(Fig. 2-1) I = 3.40 IN

VOL:

Q = M/12 = 3.40 X 12.25/12 = 3.471 AC-FT

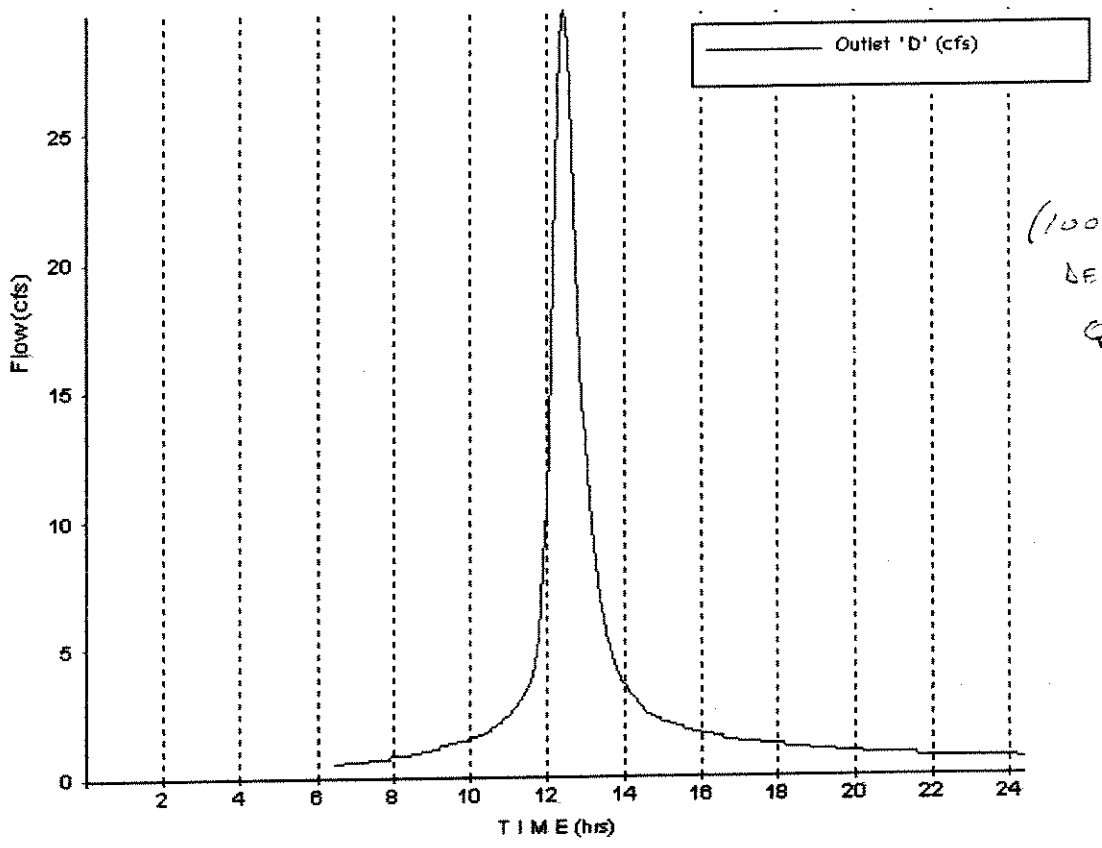
OR

151,190 CF

WinTR-55 Output Hydrograph **Project: Cobey Manufacturing** 10/23/2005

Subarea: (Outlet 'D') Storm: 100-Yr

C:\Documents and Settings\Douglas\Application Data\WinTR-55\proposed1yr.w55



(100-yr. Developed Storm) TYPE II
Q = 29.73 cfs

RUNOFF

RAINFALL, $P_{(24\text{-HOUR})}$ (100 YR.) = 4.80

CN = 94

(Fig. 2-1) Q = 4.20

VOL.

$Q \times A/12 = 4.20 \times 12.75/12 = 4.288$ AC-FT

OR

186,764 CF

SCS Runoff curve number method

$$Q = \frac{(P - I_a)^2}{P - I_a + S} = \quad \text{where}$$

$$Q = (P - 0.2S)^2 / (P + 0.8S)$$

Q = Runoff
P = Rainfall
S = Potential maximum retention after runoff begins
I_a = Initial Abstraction
I_a = 0.2S

where $S = \frac{1000}{CN} - 10$

$S = 1000/93 - 10 = 0.753$

EXIST.

$Q_{10} = (3.6 - 0.2 \times 0.753)^2 / (3.6 + 0.8 \times 0.753)$

$= 2.83$ in

$Q_{25} = (4.0 - 0.2 \times 0.753)^2 / (4.0 + 0.8 \times 0.753)$

$= 3.22$ in

$Q_{100} = (4.8 - 0.2 \times 0.753)^2 / (4.8 + 0.8 \times 0.753)$

$= 4.00$ in

PROP

$Q_{10} = (P - 0.2S)^2 / (P + 0.8S)$ where $S = 1000/98 - 10 = 0.204$

$= (3.6 - 0.2 \times 0.204)^2 / (3.6 + 0.8 \times 0.204)$

$= 3.36$ in

$Q_{25} = (4.0 - 0.2 \times 0.204)^2 / (4.0 + 0.8 \times 0.204)$

$= 3.76$ in

$Q_{100} = (4.8 - 0.2 \times 0.204)^2 / (4.8 + 0.8 \times 0.204)$

$= 4.56$ in

OJECT: Corry Manufacturing INC SHEET 14 OF 27

EPARED BY: D. Ackerman DATE: 10/20/05

ECKED BY: Sma DATE: 10/27

DETENTION STORAGE CALCULATIONS

$$V_S/V_R = C_0 + C_1 (Q_o/Q_i) + C_2 (Q_o/Q_i)^2 + C_3 (Q_o/Q_i)^3$$

WHERE: V_S = STORAGE VOL.

V_R = POST-RUNOFF VOL

Q_i = INFLOW (POST-DEVELOPMENT VOL.)

Q_o = OUTFLOW (PRE-DEVELOPMENT VOL.)

(FOR TYPE II RAINFALL DISTRIBUTION: $C_0 = 0.682$

$C_1 = -1.43$

$C_2 = 1.64$

$C_3 = -0.804$

FOR 25 YR STORM OCCURRENCE (PER ERIE AND NIAGARA COUNTIES REGIONAL PLANNING BOARD (ENCRPB))

Q_i (25 YR.) = 23.69 CFS

Q_o (10 YR.) = 20.56

$Q_o/Q_i = 0.868$

$$V_S = 151,190 (0.682 + 1.43(0.868) + 1.64(0.868)^2 - 0.804(0.868)^3)$$

$$V = 151,190 (0.682 - 1.241 + 1.236 - 0.526)$$

$$V_S = 22,830 \times 1.15 = 26,254 \text{ CF}$$

(PER NYSDEC)

OJECT: Core Manufacturing Inc. SHEET 15 OF 27

EPARED BY: L. Ackerman DATE: 10/20/05

IECKED BY: SMA DATE: 10/27

for 100 yr Storm Occurence (Extreme Storm)

$q_{i(100)} = 29.72$ cfs

$q_{o(100)} = 30.5$ cfs

$q_o/q_i = 1.027$

$V_R = 186,764$

$V_S = 186,764 (0.682 - 1.43(1.027) + 1.64(1.027)^2 - 0.804(1.027)^3)$

$V_S = 186,764 (0.682 - 1.469 + 1.730 - 0.871)$

$V_S = 13,447$ cf $\times 1.15$ (per nyc dec) $= 15,464$ cf

for 10 yr Storm Occurence

$q_{i(10)} = 21.04$ cfs

$q_{o(10)} = 20.56$ cfs

$q_o/q_i = 0.977$

$V_R = 133,403$

$V_S = 133,403(0.682 - 1.43(0.977) + 1.64(0.977)^2 - 0.802(0.977)^3)$

$V_S = 133,403(0.682 - 1.397 + 1.565 - 0.748)$

$V_S = 13,607$ cf $\times 1.15$ (per nyc dec) $= 15,648$ cf

OJECT: COREY MANUFACTURING INC SHEET 16 OF 27

EPARED BY: L. Ackerman DATE: 10-20-04

IECKED BY: SMA DATE: 10/27

WATER QUALITY VOLUME

$$WQ_V = (P)(R_V)(A)/12$$

P = 0.85

A = 12.35

$R_V = 0.05 + 0.009(I)$

$= 0.482$

$I = 0.475$

$= 47.5\%$

$= 0.85 \times 0.482 \times 12.25/12$

$WQ_V = 0.418\ A_c - ft = 18,203\ CF$

FOR DETENTION POND: FOREBAY: 10% $0.10 \times 18203 = 1821\ CF$; MICROPOOL: 50% $0.50 \times 18203 = 9105\ CF$

CHANNEL PROTECTION VOLUME (C_{PV})

$$V_S = V_R \left(0.683 - 1.43\left(\frac{q_o}{q_i}\right) + 1.64\left(\frac{q_o}{q_i}\right)^2 - 0.804\left(\frac{q_o}{q_i}\right)^3\right)$$

WHERE: $q_o = 9.33$ ∴ $q_o/q_i = 0.855$

$q_i = 10.91$

$V_R = 84,488\ CF$

$= 84,488\ (0.683 - 1.43(0.855) + 1.64(0.855)^2 - 0.804(0.855)^3)$

(1.223) (1.399)

$V_S = 84,488 \times 0.156 = 13,220\ CF$

OJECT: Corey Manufacturing Inc. SHEET 17 OF 27

EPARED BY: J. Ackerman DATE: 10/20/05

ECKED BY: SMA DATE: 10/27

** CLOSED DRAINAGE SYSTEM DESIGN **

DRAINAGE AREA CALCULATIONS

NOTE: EACH BASIN WILL REQUIRE AREA, 'C' AND Tc for "Hydrain" software to design closed drainage system

* THESE FIRST AREAS ARE FOR THE ASSUMED FULL BUILD OUT OF THE SITE *

(148,000 SF STRUCT.) ** SEE "NODE AND LINK" DIAGRAM BEFORE HYDRAIN PRINTOUTS FOR CLARITY **

BASIN #1 - (APPLYS TO ALL ROOF LOUVISPOUTS)

S = 1%
L = 78'
C = 0.95

AREA = 3000 SF ; C = 0.95

T_c = (ALL ROOF) = $1.8(1.10 - 0.95) \times (78)^{1/2} / (1.0)^{1/2}$

= 2.33 min

BASIN #2 - ALL GRASS; SOUTH SIDE SWALE

NODE 10 NODE 12

'L' OPEN SPACE

AREA = 56612 ; C = 0.16

$T_c = 0.007 (nL)^{0.8} / P_2^{0.5} S^{0.4}$

S = 0.5%
P = 2.4
n = 0.24
L = 150'

$= 0.007 (0.24 \times 150)^{0.8} / (2.4)^{0.5} (0.005)^{0.4}$

$= 0.66 NR$ = 40 min.

OJECT: COBEY Manufacturing Inc. SHEET 18 OF 27

EPARED BY: D. ACKERMAN DATE: 10/20/05

ECKED BY: Jma DATE: 10/27

BASIN #3 - All grass; SOUTH SIDE SWALE

AREA = 3764 SF C = 0.16 'D', OPEN SPACE

NODE 2 → NODE 3

$T_c = 0.007 (nL)^{0.8} / P_2^{0.5} S^{0.4}$ S = 1.0%, P = 2.4, n = 0.24, L = 76

$T_c = 0.007 (0.24 \times 76)^{0.8} / 2.4^{0.5} \; 0.01^{.245}$

$= 0.292 \times 60 = 17.49$ min.

NODE 3 → NODE 4 BASIN #4 (SAME AS BASIN #3)

NODE 4 → NODE 5 BASIN #5 (SAME AS BASIN #3)

5 → 6 NODE BASIN #6

AREA = 9590

C = 0.16, 'D', OPEN SPACE S = 1/160 = 0.62%

$T_c = 0.007 (0.24 \times 160)^{0.8} / 2.4^{0.5} (0.006)^{0.4}$

$= 0.130 / 0.200 = 0.65 = 39$ min.

BASIN #7

NODE 7 TO NODE 13

AREA = 6890 (ALL DAU'T)

C = 0.95 S = 1/130 = 0.77 n = 0.011

$T_c = 0.007 (0.011 \times 130)^{0.8} / 2.4^{0.5} (0.0077)^{0.4}$

$= 0.009 / 0.22 = 0.04 \times 60 = 2.45$ min.

NODE 7 TO NODE 6 BASIN #8

AREA = 8400 (ALL DAU'T)

C = 0.95 n = 0.011 S = 1/160 = 0.62%

$T_c = 0.007 (0.011 \times 180)^{0.8} / 2.4^{0.5} (0.0062)^{0.4}$

$= 0.011 / 0.202 = 0.054 \times 60 = 3.27$ min.

OJECT: Cobey Manufacturing Inc. SHEET 19 OF 27

EPARED BY: D. Ackerman DATE: 10/20/05

ECKED BY: Sma DATE: 10/27

Basin #9

Node 8 to Node 11

A= 34 634 sf

$C = (7076 \times 0.95) + (0.16 \times 27558) / 34634 = 0.32$

(PAV'T)
L = 78'
S = 1.0

$T_c = 0.007 (0.011 \times 78)^{0.8} / 2.4^{0.5} (0.01)^{0.4}$

$= 0.006 / 0.246$

$= 0.0244 \times 60 = 1.47$ min.

(GRASS)
L = 160
S = 0.50%
n = 0.24

$T_c = 0.007 (0.24 \times 160)^{0.8} / 2.4^{0.5} \times (0.005)^{0.4}$

$= 0.129 / 0.186$

$= 0.693 \times 60 = 41.59$ $T_c = 43.06$ min.

Node 8 to Node 10

Basin #10

A= 13870

$C = (7312 \times 0.95) + (6558 \times 0.16) / 13870 = 0.58$

(PAV'T)
L = 54
S = 1.0%

$T_c = 0.007 (0.011 \times 54)^{0.8} / 2.4^{0.5} (0.01)^{0.4}$

$= 0.0046 / 0.2455$

$= 0.0187 \times 60 = 1.12$ min.

(GRASS)
L = 32
S = 0.50%
n = 0.24

$T_c = 0.007 (0.24 \times 32)^{0.8} / 2.4^{0.5} (0.005)^{0.4}$

$= 0.0357 / 0.186 = 0.1919 \times 60 = 11.52$ min.

$T_c = 12.64$ min.

OJECT: Corey Manufacturing Inc. SHEET 20 OF 27
EPARED BY: J. Ackerman DATE: 10/20/05
ECKED BY: sma DATE: 10/27

BASIN #11

NODE 2 TO NODE 1

(PAV'T)
L = 70
n = 0.011
S = 1.0%

(GRASS)
L = 38
n = 0.24
S = 0.5%

A = 26140 S.F.

$C = (8282 \times 0.95) + (17858 \times 0.16)/26140 = 0.41$

$T_c = 0.007(0.011 \times 70)^{0.8}/2.4^{0.5}(0.01)^{0.4}$
$= 0.0057/0.2455$
$= 0.023 \times 60 = 1.39$ min.

$T_c = 0.007(0.24 \times 38)^{0.8}/2.4^{0.5}(0.005)^{0.4}$
$= 0.041/0.186$
$= 0.22 \times 60 = 13.22$ min

$T_c = 14.61$ min.

BASIN #12

NODE 1 TO NODE 2

(PAV'T)
L = 56
n = 0.011
S = 1.0%

(GRASS)
L = 43
n = 0.24
S = 0.5%

A = 12,760 S.F.

$C = (6434 \times 0.95) + (6326 \times 0.16)/12,760 = 0.56$

$T_c = 0.007(0.011 \times 56)^{0.8}/2.4^{0.5}(0.01)^{0.4}$
$= 0.0048/0.2455$
$= 0.020 \times 60 = 1.17$ min

$T_c = 0.007(0.24 \times 43)^{0.8}/(2.4)^{0.5}(0.005)^{0.4}$
$= 0.0453/0.186$
$= 0.243 \times 60 = 14.61$ min.

$T_c = 15.78$ min.

OJECT: Corey Manufacturing Inc, SHEET 21 OF 27

EPARED BY: D. Ackerman DATE: 10-20-05

IECKED BY: Sma DATE: 10/27

BASIN #13 - (GRASS & PAV'T)

A = 19264

C = (0.95 × 10950) + (0.16 × 8314)/19264

C = 0.609

(PAV'T)
L = 27
S = 0.01 (1%)
n = 0.011

$T_c = 0.007(0.011 \times 27)^{0.8}/(2.4)^{0.5} \times (0.01)^{0.4}$

$= 0.00026/0.2455$

$T_c = 0.0106 \times 60 = 0.64$ min.

(GRASS)
L = 92
S = 0.05% ±
n = 0.24

$T_c = 0.007(0.24 \times 92)^{0.8}/2.4^{0.5} \times 0.005^{0.4}$

$= 0.083/0.186$

$= 0.446 \times 60 = 26.76$ min.

$T_c = 27.40$ min.

BASIN #14 (GRASS & PAV'T)

A = 24,834

C = (0.95 × 11185) + (0.16 × 13649)/24834

= 0.515

(PAV'T)
L = 125
S = 0.01 (1.0%)
n = 0.011

$T_c = 0.007(0.011 \times 125)^{0.8}/(2.4)^{0.5} \times (0.01)^{0.4}$

$= 0.009/0.2455$

$= 0.0367 \times 60 = 2.20$ min.

(GRASS)
L = 66
S = 0.5% ±
n = 0.24

$T = 0.007(0.24 \times 66)^{0.8}/(2.4)^{0.5} \times (0.005)^{0.4}$

$= 0.0638/0.186$

$= 0.342 \times 60 = 20.57$ min.

$T_c = 22.77$ min.

OJECT: Corey Manufacturing Inc. SHEET 22 OF 27

EPARED BY: D. Ackerman DATE: 10/20/05

ECKED BY: SMA DATE: 10/27

BASIN #15 (GRASS & PAV'T)

A = 42362

C = (0.95 × 15100) + (0.16 × 27532) / 42362

14345 704.82

C = 0.36

(PAV'T)
L = 80
S = 1.0
n = 0.011

$T_c = 0.007(0.011 \times 80)^{0.8} / 2.4^{0.5}(0.01)^{0.4}$

= 0.0043 / 0.2455

= 0.0257 × 60 = 1.54 min.

(GRASS)
L = 150
S = 0.50
n = 0.24

$T_c = 0.007(0.24 \times 150)^{0.8} / 2.4^{0.5}(0.005)^{0.4}$

= 0.123 / 0.186

= 0.66 × 60 = 40 min.

T_c = 41.54

BASIN #16 – SAME AS BASIN #2

A = 5612
C = 0.95
T_c = 40.00 min.

BASIN #17 (ALL GRASS) A = 5180
C = 0.16

L = 80
S = 1.25%
n = 0.24

$T_c = 0.007(0.24 \times 80)^{0.8} / 2.4^{0.4}(0.0125)^{0.4}$

= 0.0744 / 0.2684

= 0.277 × 60 = 16.63 min.

OJECT: Cobey Manufacturing Inc. SHEET 23 OF 27

EPARED BY: J. McGowan DATE: 10/26/05

ECKED BY: SMA DATE: 10/27

BASIN #18 (GRASS + PAVT)

A = 11,620

C = (0.95 × 9,410) + (0.16 × 2110) / 11,620

C = 0.80

L = 60
n = 0.24
S = 1.67%

$T_c = 0.007(0.24 \times 60)^{0.80} / 2.40^{0.5}(0.0167)^{0.4}$

$= 0.059 / 0.301$

$T_c = 0.195 \times 60 = 11.75$ min.

BASIN #19 (ALL GRASS)

A = 53512

C = 0.16

L = 220
n = 0.24
S = 0.50%

$T_c = 0.007(0.24 \times 220)^{0.80} / 2.40^{0.5}(0.005)^{0.4}$

$= 0.167 / 0.186$

$T_c = 0.897 \times 60 = 53.85$ min.

BASIN #20 (ALL ROOF)

A = 4500 C = 0.95

L = 65
n = 0.011
S = 1.10%

$T_c = 0.007(0.011 \times 65)^{0.8} / 2.4^{0.5} \times (0.01)^{0.4}$

$0.0054 / 0.2455 = 0.021 \times 60$

$= 1.31$ min.

BASIN #21 (ALL ROOF)

SAME AS BASIN #20

PROJECT: COREY MANUFACTURING INC. SHEET 24 OF 27

PREPARED BY: D. ACKERMAN DATE: 10/20/05

CHECKED BY: SMA DATE: 10/27

DRAINAGE AREA CALCULATIONS

* THESE AREA PARAMETERS ARE FOR THE INITIAL BUILD OUT OF THE SITE (90,000 SF STRUCT.)

(THESE CALCULATIONS REPRESENT NEW AREAS MODIFIED FROM FULL BUILD OUT. THEY DO NOT REPRESENT ALL AREAS.)

BASIN #1 - SAME AS FULL BUILD OUT -

A = 3000 S.F

T_c = 2.38 min.

C = 0.95

2,200
3,200

BASIN #2 - SAME AS FULL BUILDOUT -

NODE 1 TO NODE 2

A = 5612 S.F (+ 4 ROOF L.C.)

T_c = 40.0 min.

C = 0.16

BASIN #3 · (ALL GRASS; SOUTH SIDE)

NODE 2 TO NODE 3

A = 5100 SF (+ 2 ROOF L.C.)

C = 0.16

$T_c = 0.1007(0.24 \times 80)^{0.8} / 2.4^{0.5} (0.0125)^{0.4}$

T_c = 0.277 = 16.6 min

BASIN #4 (GRASS + PAVT)

NODE 3 TO NODE 4

A 29,936 (0.687)

C = (18326 × 0.16) + (11,610 × 0.95) / 29,936 = 0.466

(GRASS) L = 60' S = 0.50' n = 0.2

$T_c = 0.1007(0.24 \times 140)^{0.8} / 2.4^{0.5} (0.005)^{0.4}$

= 0.116 / 0.186 = 0.626 × 60 = 37.57 min

INITIAL BUILD OUT CALCULATIONS (CONT.)

BASIN #5 (GRASS & PAV'T)

A = 87,100' (2.00 AC)

C = (13,618 × 0.95) + (73,482 × 0.16) / 103,968 = 0.284

L = 40
n = 0.011
S = 1.0'

$T_c = 0.007 (0.011 \times 40)^{0.8} / 2.4^{0.5} (0.01)^{0.4}$

$= 0.0036 / 0.2455$

$= 0.015 \times 60 = 0.89$ min.

L = 320
n = 0.24
S = 0.50

$T_c = 0.007 (0.24 \times 200)^{0.8} / 2.4^{0.5} (0.005)^{0.4}$

$= 0.1549 / 0.186$

$= 0.833 \times 60 = 49.97$ min.

SHALLOW CONC. FLOW

$T_c = L / 3600 (V) = 100 / 3600 (1.18)$

L = 1
S = 0.5%

$= 0.0235 \times 60 = 1.41$ min.

$T_c = 52.27$

BASIN #6 (GRASS + PAV'T)

A = 32,024

BASIN #12 ↙ BASIN #13 ↘

C = (0.52 × 12,760) + (19,264 × 0.609) / 32,024 = 0.589

T_c = (FROM BASIN # 13) = 27.40

OJECT: COREY Incorporated SHEET 26 OF 27

EPARED BY: D. ACKERMA DATE: 10/20

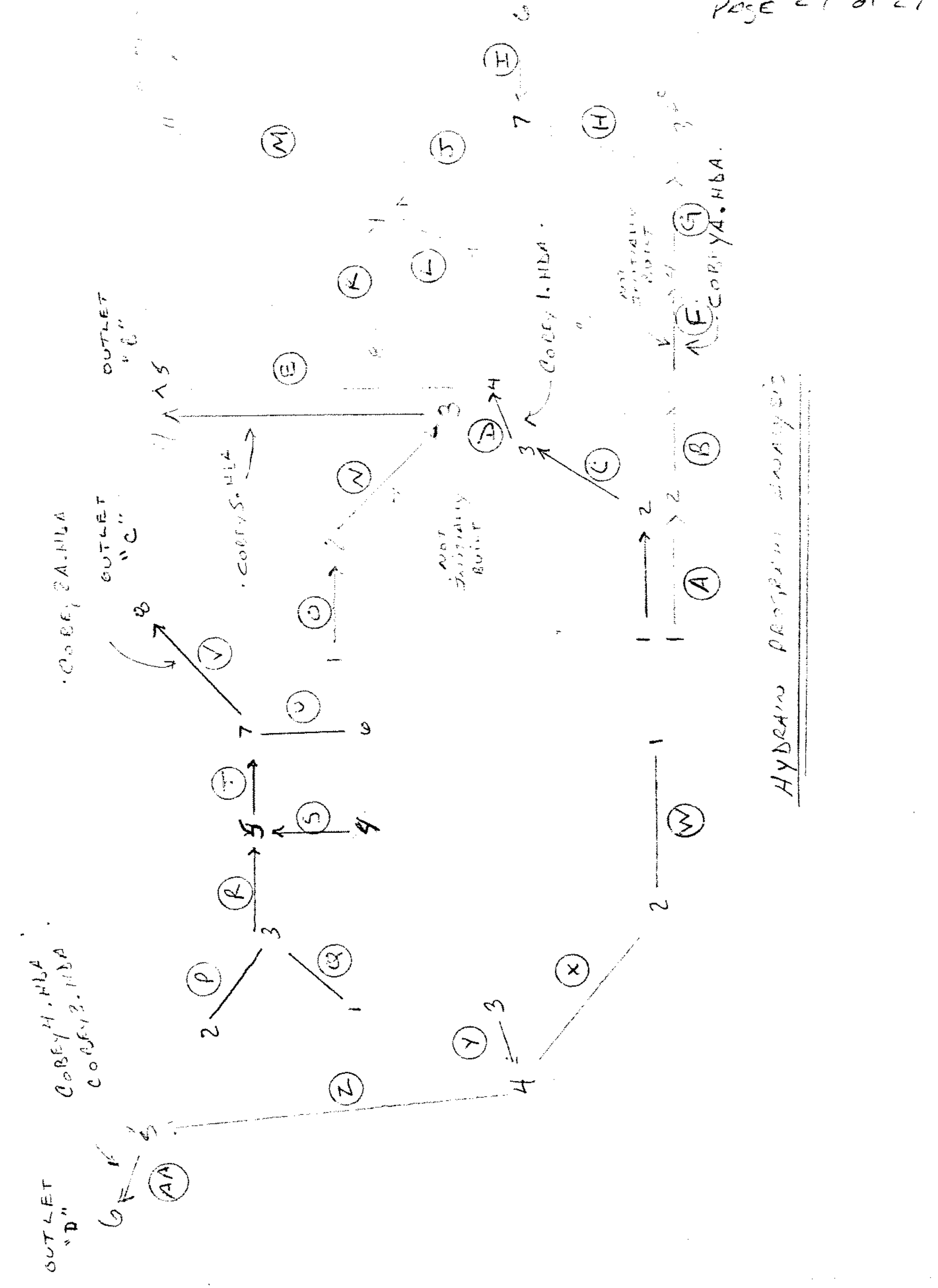
IECKED BY: Sma DATE: 10/27

BASIN #7 (GRASS + ROOF)

$A = 53512$

$C = (9000 \times 0.95) + (0.16 \times 44512) / 53512 = 0.293$

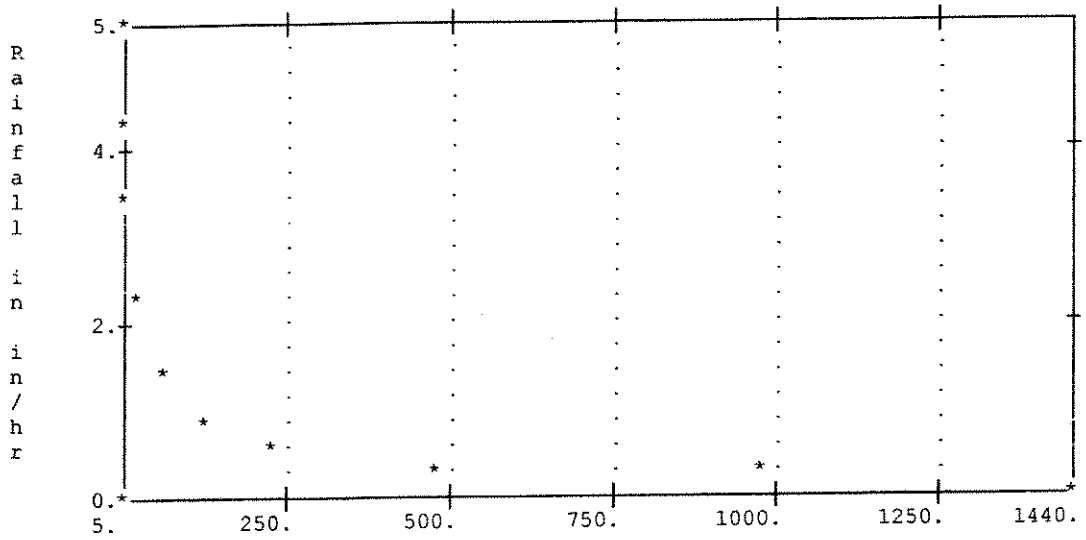
$T_C =$ (T_C from BASIN #9 (FULL BUILDOUT)) = 53.85 min


HYDRAIN PROGRAM ANALYSIS
OUTLET "B"
OUTLET "C"
OUTLET "D"
COBEY 1.HDA
COBEY 5.HDA
COBEY 2A.HDA
COBEY 4.HDA
COBEY 3.HDA
COBEY A.HDA
NOT INITIALLY BUILT

Cobey Manufacturing

```
+++ Commands Read From File cobeya.hda
  JOB
  REM Data in English units
  SWI 2
  PDA 0.013 12 1.00 0.500 2.00 0.005
  RAI cobey.idf
+++ Notice:  Intermediate file has data in English units
```

IDF CURVE



PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	5.46	60.	1.54	960.	.19	0.	.00	0.	.00
10.	4.31	120.	.91	1440.	.14	0.	.00	0.	.00
15.	3.52	240.	.54	0.	.00	0.	.00	0.	.00
30.	2.43	480.	.32	0.	.00	0.	.00	0.	.00

```
  REM Main Laterals south side to east side (Full build) to outlet "A"
  NEW Run #1
  REM Junctions 1 to 2
  STO 0.4043 0.70 40
```


Cobey Manufacturing

```
  PIP 150 582.85 582.85
+++ Tc =  40.0 min
+++ CA =    .3
+++ Link #  1,  Flow depth =    .34 ft, Critical depth =    .32 ft
  PNC 1 2 3 180 0
```

```
+++ CA =     .3
+++ Link #   2,   Flow depth =     .36 ft, Critical depth =     .34 ft
  PNC 2 3 3 180 0
  REM Junctions 3 to 4
  STO 0.086 0.16 17.50
  PIP 150 582.85 582.85
+++ Tc =  41.9 min
+++ CA =     .3
+++ Link #   3,   Flow depth =     .36 ft, Critical depth =     .35 ft
  PNC 3 4 3 180 0
  REM Junctions 4 to 5
  STO 0.086 0.16 17.50
  PIP 150 582.85 582.85
+++ Tc =  42.8 min
+++ CA =     .3
+++ Link #   4,   Flow depth =     .37 ft, Critical depth =     .35 ft
  PNC 4 5 3 180 0
  REM Junctions 5 to 7
  STO 0.220 0.16 39
  PIP 125 585.85 585.60
+++ Tc =  43.7 min
+++ CA =     .4
+++ Link #   5,   Flow depth =     .39 ft, Critical depth =     .37 ft
  PNC 5 7 3 180 0
  HOL 1
  NEW Run #2
  REM Junctions 6 to 7
  STO 0.193 0.95 3.27
  PIP 100 585.35 585.60
+++ Tc =   3.3 min
+++ CA =     .2
+++ Link #   6,   Flow depth =     .46 ft, Critical depth =     .44 ft
  PNC 6 7 3 180 0
  REM Junction 7 to 10
  REC 1
  STO 0.158 0.95 2.45
  PIP 150 585.60 585.35
+++ Tc =  44.4 min
+++ CA =     .7
+++ Link #   7,   Flow depth =     .55 ft, Critical depth =     .51 ft
```


Cobey Manufacturing

```
  PNC 7 10 3 120 0
  HOL 2
  NEW RUN #3
  REM Junction 8 to 10
  STO 0.318 0.58 12.64
  PIP 100 583.52 583.52
+++ Tc =  12.6 min
+++ CA =     .2
+++ Link #   8,   Flow depth =     .37 ft, Critical depth =     .35 ft
  PNC 8 10 3 90 0
  HOL 3
  NEW RUN #4
  REM Junction 9 to 10
  STO 0.028 0.95 2.38
  PIP 65 583.85 583.52
+++ Tc =   2.4 min
+++ CA =     .0
+++ Link #   9,   Flow depth =     .18 ft, Critical depth =     .16 ft
  PNC 9 10 3 180 0
  HOL 4
  NEW RUN #5
  REM Junction 10 to 11
  REC 2
  REC 3
  REC 4
  STO 0.795 0.32 43.06
```

```
   to invert criterion at D/S end
+++ Cover at lower manhole     -.08 ft
+++ Link # 10,  Flow depth =     .55 ft, Critical depth =     .66 ft
  PNC 10 11 3 135 0
  END
 END OF INPUT DATA.
```


Cobey Manufacturing

*** Run #1 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
1	150	12	581.27	.00500	1.6	.5	2.6	.60	0.
			580.52		2.3		3.2	2.52	
2	150	12	580.52	.00500	2.3	1.2	2.7	.67	0.
			579.77		3.1		3.2	2.52	
3	150	12	579.77	.00500	3.1	2.0	2.7	.69	0.
			579.02		3.8		3.2	2.52	
4	150	12	579.02	.00500	3.8	2.7	2.8	.71	0.
			578.27		4.6		3.2	2.52	
5	125	12	578.27	.00500	7.6	6.5	2.8	.77	0.
			577.64		8.0		3.2	2.52	

Length = 725. ft Total length = 725. ft
Cost = 0. Total Cost = 0.

*** Run #2 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
6	100	12	583.77	.00500	1.6	.5	3.1	1.07	0.
			583.27		2.3		3.2	2.52	
7	150	12	577.64	.00500	8.0	6.9	3.3	1.43	0.
			576.89		8.5		3.2	2.52	

Length = 250. ft Total length = 975. ft
Cost = 0. Total Cost = 0.

Cobey Manufacturing

*** RUN #3 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
8	100	12	581.94 581.44	.00500	1.6 2.1	.5	2.8 3.2	.72 2.52	0.

Length = 100. ft Total length = 100. ft
Cost = 0. Total Cost = 0.

*** RUN #4 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
9	65	12	582.27 581.94	.00508	1.6 1.6	.5	1.8 3.2	.16 2.54	0.

Length = 65. ft Total length = 65. ft
Cost = 0. Total Cost = 0.

*** RUN #5 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
10	120	12	576.59 574.99	.01333	6.9 1.0	-.1	5.4 5.2	2.34 4.11	0.

Length = 120. ft Total length = 1260. ft
Cost = 0. Total Cost = 0.

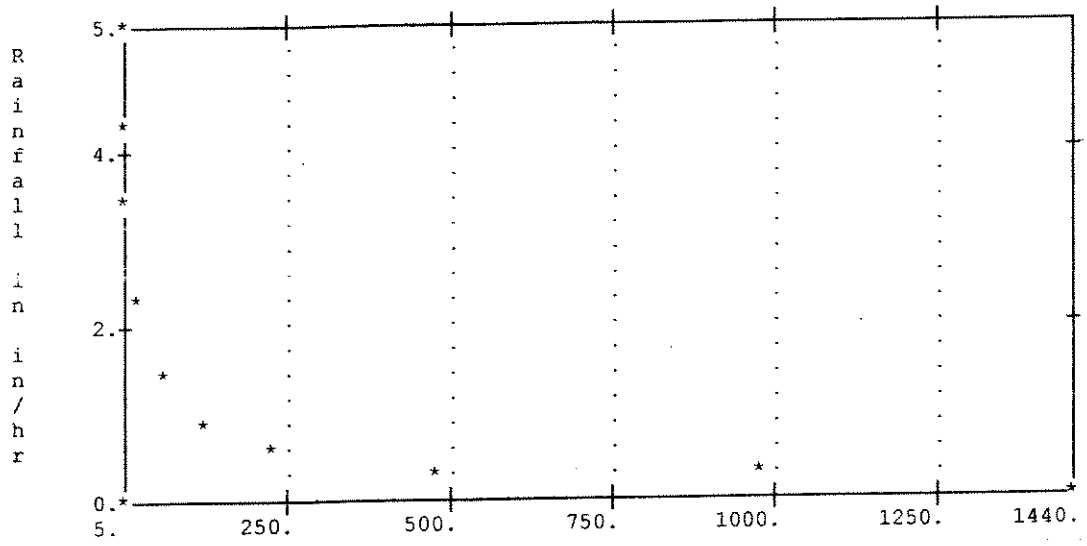
Cobey Manufacturing

NORMAL END OF HYDRA

Cobey Manufacturing

+++ Commands Read From File cobey1.hda
JOB
REM Data in English units
SWI 2
PDA 0.013 12 1.00 0.500 2.00 0.005
RAI cobey.idf
+++ Notice: Intermediate file has data in English units

IDF CURVE



PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	5.46	60.	1.54	960.	.19	0.	.00	0.	.00
10.	4.31	120.	.91	1440.	.14	0.	.00	0.	.00
15.	3.52	240.	.54	0.	.00	0.	.00	0.	.00
30.	2.43	480.	.32	0.	.00	0.	.00	0.	.00

REM Cobey1.hda - Initial build out to Outlet "B"
NEW Run #1
REM Junctions 1 to 2
STO 0.4043 0.70 40

Cobey Manufacturing

PIP 150 582.85 582.85 580.25 579.50
+++ Tc = 40.0 min
+++ CA = .3
+++ Link # 1, Flow depth = .34 ft, Critical depth = .32 ft
PNC 1 2 3 180 0

```
+++ CA =     .3
+++ Link #   2,   Flow depth =     .25 ft, Critical depth =     .34 ft
  PNC 2 3 3 90 0
  REM Junctions 3 to 4
  STO 0.687 0.466 37.57
  PIP 84 582.85 582.85 576.65 576.17
+++ Tc =   41.5 min
+++ CA =     .6
+++ Link #   3,   Flow depth =     .51 ft, Critical depth =     .49 ft
  PNC 3 4 3 130 0
  REM Junctions 4 to 5
  STO 2.00 0.284 52.27
  PIP 134 582.85 582.85 576.17 575.50
+++ Tc =   52.3 min
+++ CA =    1.2
+++ Link #   4,   Flow depth =     .71 ft, Critical depth =     .63 ft
  PNC 4 5 3 180 0
  END
 END OF INPUT DATA.
```


Cobey Manufacturing

*** Run #1 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
1	150	12	580.25 579.50	.00500	2.6 3.3	1.5	2.6 3.2	.60 2.52	0.
2	140	12	579.50 576.65	.02036	3.3 6.2	2.3	4.5 6.5	.68 5.08	0.
3	84	12	576.65 576.17	.00571	6.2 6.7	5.1	3.4 3.4	1.35 2.69	0.
4	134	12	576.17 575.50	.00500	6.7 7.3	5.6	3.6 3.2	2.15 2.52	0.

Length = 508. ft Total length = 508. ft
Cost = 0. Total Cost = 0.

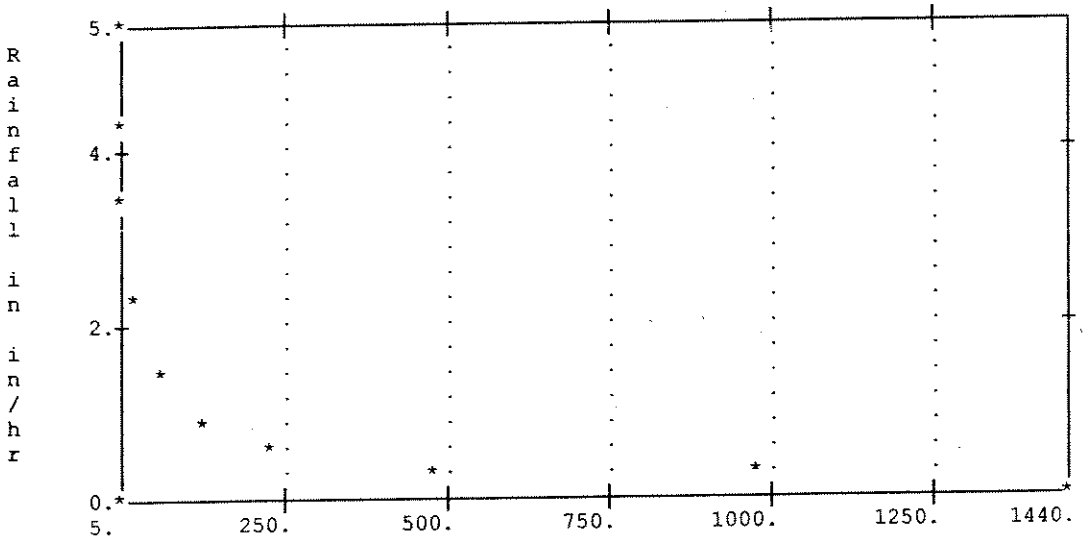
Cobey Manufacturing

NORMAL END OF HYDRA

Cobey Manufacturing

+++ Commands Read From File cobey2a.hda
JOB
REM Data in English units
REM Cobey2.hda - Full and Initial build out (North side laterals to Outlet "C
SWI 2
PDA 0.013 12 1.00 0.500 2.00 0.005
RAI cobey.idf
+++ Notice: Intermediate file has data in English units

IDF CURVE



PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	5.46	60.	1.54	960.	.19	0.	.00	0.	.00
10.	4.31	120.	.91	1440.	.14	0.	.00	0.	.00
15.	3.52	240.	.54	0.	.00	0.	.00	0.	.00
30.	2.43	480.	.32	0.	.00	0.	.00	0.	.00

NEW Run #1
REM Junctions 1 to 3
STO 0.1033 0.95 1.31

Cobey Manufacturing

PIP 100 583.85 582.25 578.10 577.60
+++ Tc = 1.3 min
+++ CA = .1
+++ Link # 1, Flow depth = .34 ft, Critical depth = .33 ft
PNC 1 3 3 150 0

```
  PIP 100 583.85 582.25 578.10 577.60
+++ Tc =   1.3 min
+++ CA =    .1
+++ Link #  2,  Flow depth =    .34 ft, Critical depth =    .33 ft
  PNC 2 3 3 150 0
  REM Junctions 3 to 5
  REC 1
  STO 0.972 0.36 41.54
  PIP 94 582.25 582.25 577.60 576.60
+++ Tc =  41.5 min
+++ CA =    .5
+++ Link #  3,  Flow depth =    .39 ft, Critical depth =    .45 ft
  PNC 3 5 3 180 0
  HOL 2
  NEW RUN #3
  REM Junctions 4 to 5
  STO 0.344 0.95 2.38
  PIP 85 583.85 582.25 577.02 576.60
+++ Tc =   2.4 min
+++ CA =    .3
+++ Link #  4,  Flow depth =    .68 ft, Critical depth =    .60 ft
  PNC 4 5 3 150 0
  REM Junctions 5 to 7
  REC 2
  STO 0.570 0.515 22.77
  PIP 94 582.25 582.25 576.60 575.60
+++ Tc =  41.9 min
+++ CA =   1.2
+++ Link #  5,  Flow depth =    .60 ft, Critical depth =    .67 ft
  PNC 5 7 3 150 0
  HOL 3
  NEW RUN #4
  REM Junctions 6 to 7
  STO 0.275 0.95 2.38
  PIP 85 583.85 582.25 577.02 576.60
+++ Tc =   2.4 min
+++ CA =    .3
+++ Link #  6,  Flow depth =    .58 ft, Critical depth =    .53 ft
  PNC 6 7 3 150 0
  REM Junctions 7 to 8
```


Cobey Manufacturing

```
  REC 3
  STO 0.735 0.589 27.40
  PIP 104 582.25 582.25 576.60 574.50
+++ Tc =  42.2 min
+++ CA =   1.9
+++ Link #  7,  Flow depth =    .66 ft, Critical depth =    .83 ft
  PNC 7 8 3 150 0
  END
 END OF INPUT DATA.
```


Cobey Manufacturing

	(ft)	(in)	(ft)	(ft/ft)	(ft)	(ft)	(ft/s)	(cfs)	($)
1	100	12	578.10 577.60	.00500	5.8 4.7	3.6	2.7 3.2	.62 2.52	0.
			Length =	100. ft	Total length =		100. ft		
			Cost =	0.	Total Cost =		0.		

*** RUN #2 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
2	100	12	578.10 577.60	.00500	5.8 4.7	3.6	2.7 3.2	.62 2.52	0.
3	94	12	577.60 576.60	.01064	4.7 5.7	3.6	4.1 4.7	1.14 3.67	0.
			Length =	194. ft	Total length =		294. ft		
			Cost =	0.	Total Cost =		0.		

*** RUN #3 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
4	85	12	577.02 576.60	.00494	6.8 5.7	4.6	3.5 3.2	1.98 2.50	0.
5	94	12	576.60 575.60	.01064	5.7 6.7	4.6	5.0 4.7	2.43 3.67	0.
			Length =	179. ft	Total length =		473. ft		
			Cost =	0.	Total Cost =		0.		
			Length =	179. ft	Total length =		473. ft		
			Cost =	0.	Total Cost =		0.		

Cobey Manufacturing

*** RUN #4 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
6	85	12	577.02 576.60	.00494	6.8 5.7	4.6	3.4 3.2	1.58 2.50	0.
7	104	12	576.60 574.50	.02019	5.7 7.8	4.6	7.1 6.4	3.85 5.06	0.

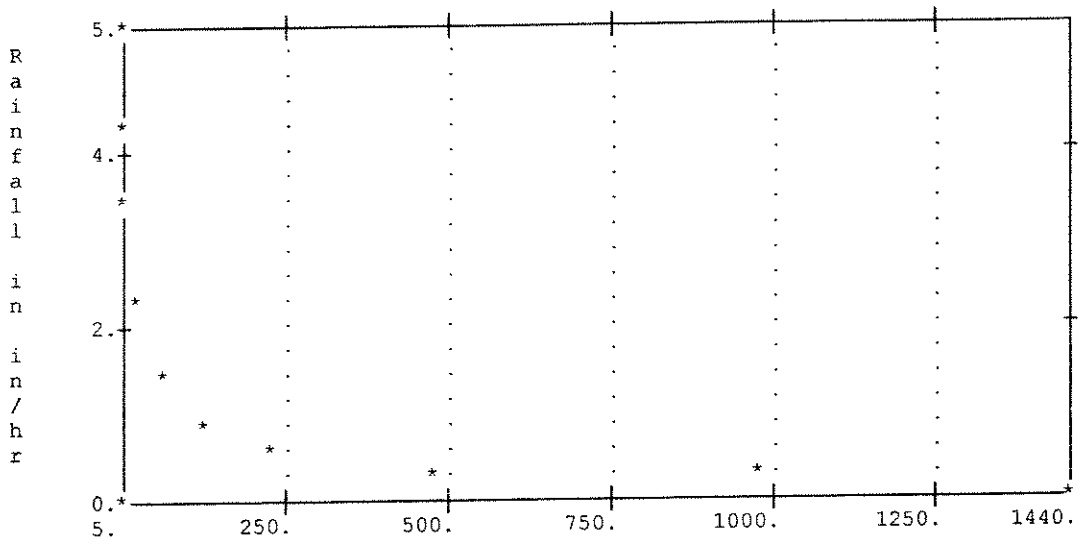
Cobey Manufacturing

NORMAL END OF HYDRA

Cobey Manufacturing

+++ Commands Read From File cobey3.hda
JOB
REM Data in English units
SWI 2
PDA 0.013 12 1.00 0.500 2.00 0.005
RAI cobey.idf
+++ Notice: Intermediate file has data in English units

IDF CURVE



PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	5.46	60.	1.54	960.	.19	0.	.00	0.	.00
10.	4.31	120.	.91	1440.	.14	0.	.00	0.	.00
15.	3.52	240.	.54	0.	.00	0.	.00	0.	.00
30.	2.43	480.	.32	0.	.00	0.	.00	0.	.00

REM Cobey3.hda - Initial build out to Outlet "D"
NEW Run #1
REM Junctions 1 to 2
STO 0.4043 0.70 40

Cobey Manufacturing

PIP 150 583.85 582.85 573.60 573.14
+++ Tc = 40.0 min
+++ CA = .3
+++ Link # 1, Flow depth = .39 ft, Critical depth = .32 ft
PNC 1 2 3 135 0

```
+++ CA =     .3
+++ Link #  2,  Flow depth =     .40 ft, Critical depth =     .33 ft
  PNC 2 4 3 135 0
  HOL 1
  NEW Run #2
  REM Junctions 3 to 4
  STO 0.2066 0.95 2.38
  PIP 95 583.85 582.85 573.23 572.76
+++ Tc =    2.4 min
+++ CA =     .2
+++ Link #  3,  Flow depth =     .49 ft, Critical depth =     .46 ft
  PNC 3 4 3 135 0
  REM Junctions 4 to 5
  REC 1
  STO 0.267 0.800 11.75
  PIP 195 582.80 582.85 571.85 571.43
+++ Tc =  42.1 min
+++ CA =     .7
+++ Link #  4,  Flow depth =     .74 ft, Critical depth =     .52 ft
  PNC 4 5 3 90 0
  REM Junctions 5 to 6
  STO 1.435 0.274 53.85
  PIP 85 582.85 582.85
+++ Tc =  53.8 min
+++ CA =    1.1
+++ Link #  5,  Flow depth =     .66 ft, Critical depth =     .59 ft
  PNC 5 6 3 180 0
  END
 END OF INPUT DATA.
```


Cobey Manufacturing

*** Run #1 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
1	150	12	573.60	.00307	10.3	8.6	2.2	.60	0.
			573.14		9.7		2.5	1.97	
2	132	12	573.14	.00288	9.7	8.6	2.2	.64	0.
			572.76		10.0		2.4	1.91	

Length = 282. ft Total length = 282. ft
Cost = 0. Total Cost = 0.

*** Run #2 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
3	95	12	573.23	.00495	10.6	9.0	3.1	1.19	0.
			572.76		10.1		3.2	2.51	
4	195	12	571.85	.00215	11.0	9.9	2.4	1.48	0.
			571.43		11.4		2.1	1.65	
5	85	12	571.43	.00500	11.4	10.3	3.5	1.91	0.

Cost = 0. Total Cost = 0.

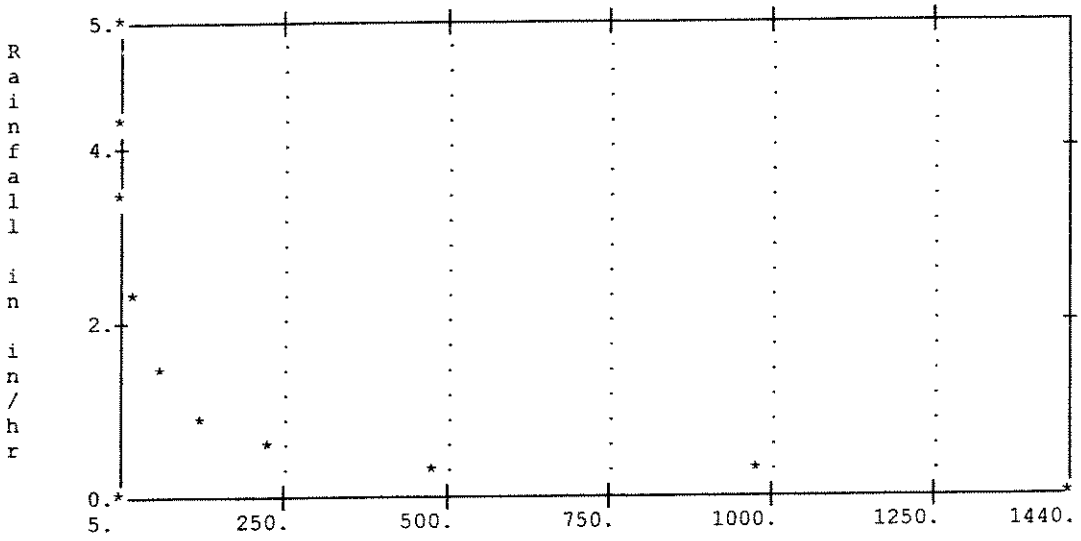
Cobey Manufacturing

NORMAL END OF HYDRA

Cobey Manufacturing

+++ Commands Read From File cobey4.hda
JOB
REM Data in English units
SWI 2
PDA 0.013 12 1.00 0.500 2.00 0.005
RAI cobey.idf
+++ Notice: Intermediate file has data in English units

IDF CURVE



PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	5.46	60.	1.54	960.	.19	0.	.00	0.	.00
10.	4.31	120.	.91	1440.	.14	0.	.00	0.	.00
15.	3.52	240.	.54	0.	.00	0.	.00	0.	.00
30.	2.43	480.	.32	0.	.00	0.	.00	0.	.00

REM Cobey4.hda - Full build out to Outlet "D"
NEW Run #1
REM Junctions 1 to 2
STO 0.4043 0.70 40

Cobey Manufacturing

PIP 150 583.85 582.85 573.60 573.14
+++ Tc = 40.0 min
+++ CA = .3
+++ Link # 1, Flow depth = .39 ft, Critical depth = .32 ft
PNC 1 2 3 135 0

```
+++ CA =     .3
+++ Link #  2,  Flow depth =     .40 ft, Critical depth =     .33 ft
  PNC 2 4 3 135 0
  HOL 1
  NEW Run #2
  REM Junctions 3 to 4
  STO 0.2066 0.95 2.38
  PIP 95 583.85 582.85 573.23 572.76
+++ Tc =    2.4 min
+++ CA =     .2
+++ Link #  3,  Flow depth =     .49 ft, Critical depth =     .46 ft
  PNC 3 4 3 135 0
  REM Junctions 4 to 5
  REC 1
  STO 0.267 0.800 11.75
  PIP 195 582.80 582.85
+++ Tc =   42.1 min
+++ CA =     .7
+++ Link #  4,  Flow depth =     .56 ft, Critical depth =     .52 ft
  PNC 4 5 3 90 0
  REM Junctions 5 to 6
  STO 1.435 0.387 53.85
  PIP 85 582.85 582.85 571.85 571.43
+++ Tc =   53.8 min
+++ CA =    1.3
+++ Link #  5,  Flow depth =     .73 ft, Critical depth =     .63 ft
  PNC 5 6 3 180 0
  END
 END OF INPUT DATA.
```


Cobey Manufacturing

*** Run #1 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
1	150	12	573.60	.00307	10.3	8.6	2.2	.60	0.
			573.14		9.7		2.5	1.97	
2	132	12	573.14	.00288	9.7	8.6	2.2	.64	0.
			572.76		10.0		2.4	1.91	

Length = 282. ft Total length = 282. ft
Cost = 0. Total Cost = 0.

*** Run #2 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
3	95	12	573.23	.00495	10.6	9.0	3.1	1.19	0.
			572.76		10.1		3.2	2.51	
4	195	12	572.76	.00500	10.0	9.0	3.3	1.48	0.
			571.79		11.1		3.2	2.52	
5	85	12	571.85	.00494	11.0	9.9	3.6	2.19	0.

Cost = 0. Total Cost = 0.

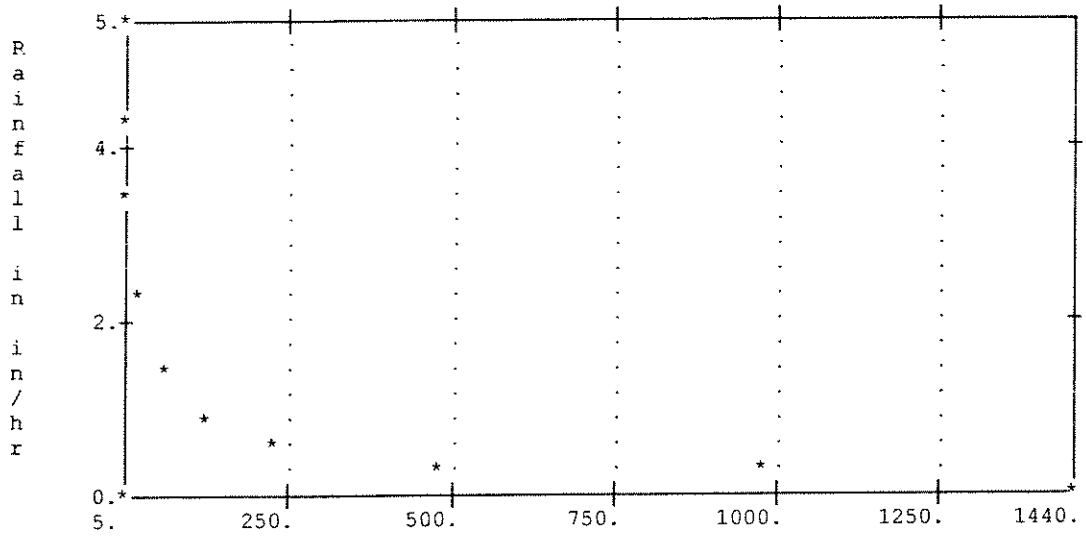
Cobey Manufacturing

NORMAL END OF HYDRA

Cobey Manufacturing

```
+++ Commands Read From File cobey5.hda
  JOB
  REM Data in English units
  SWI 2
  PDA 0.013 12 1.00 0.500 2.00 0.005
  RAI cobey.idf
+++ Notice:  Intermediate file has data in English units
```

IDF CURVE



PLOT-DATA (Time, t(min) vs. Intensity, i(in/h))

t	i	t	i	t	i	t	i	t	i
5.	5.46	60.	1.54	960.	.19	0.	.00	0.	.00
10.	4.31	120.	.91	1440.	.14	0.	.00	0.	.00
15.	3.52	240.	.54	0.	.00	0.	.00	0.	.00
30.	2.43	480.	.32	0.	.00	0.	.00	0.	.00

```
  REM Cobey5.hda - Full build out to Outlet "B"
  NEW Run #1
  REM Junctions 1 to 2
  STO 0.2929 0.56 15.78
```


Cobey Manufacturing

```
  PIP 90 582.85 582.85
+++ Tc =  15.8 min
+++ CA =    .2
+++ Link #  1,  Flow depth =    .33 ft, Critical depth =    .31 ft
  PNC 1 2 3 150 0
```

```
+++ CA =     .2
+++ Link #  2,  Flow depth =     .36 ft, Critical depth =     .34 ft
  PNC 2 3 3 45 0
  HOL 1
  REM Junctions 3 to 4
  REC 1
  STO 0.275 0.95 2.38
  PIP 120 582.85 582.85
+++ Tc =  18.1 min
+++ CA =     .7
+++ Link #  3,  Flow depth =     .73 ft, Critical depth =     .63 ft
  PNC 3 4 3 135 0
  END
 END OF INPUT DATA.
```


Cobey Manufacturing

*** Run #1 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
1	90	12	581.27 580.82	.00500	1.6 2.0	.5	2.6 3.2	.57 2.52	0.
2	106	12	580.82 580.29	.00500	2.0 2.6	.9	2.7 3.2	.68 2.52	0.
3	120	12	580.29 579.69	.00500	2.6 3.2	1.5	3.6 3.2	2.21 2.52	0.

Length = 316. ft Total length = 512. ft
Cost = 0. Total Cost = 0.

Cobey Manufacturing

NORMAL END OF HYDRA

```
  PIP 100 583.85 582.25 578.10 577.60
+++ Tc =   1.3 min
+++ CA =    .1
+++ Link #  2,  Flow depth =    .34 ft, Critical depth =    .33 ft
  PNC 2 3 3 150 0
  REM Junctions 3 to 5
  REC 1
  STO 0.972 0.36 41.54
  PIP 94 582.25 582.25 577.60 576.60
+++ Tc =  41.5 min
+++ CA =    .5
+++ Link #  3,  Flow depth =    .39 ft, Critical depth =    .45 ft
  PNC 3 5 3 180 0
  HOL 2
  NEW RUN #3
  REM Junctions 4 to 5
  STO 0.344 0.95 2.38
  PIP 85 583.85 582.25 577.02 576.60
+++ Tc =   2.4 min
+++ CA =    .3
+++ Link #  4,  Flow depth =    .68 ft, Critical depth =    .60 ft
  PNC 4 5 3 150 0
  REM Junctions 5 to 7
  REC 2
  STO 0.570 0.515 22.77
  PIP 94 582.25 582.25 576.60 575.60
+++ Tc =  41.9 min
+++ CA =   1.2
+++ Link #  5,  Flow depth =    .60 ft, Critical depth =    .67 ft
  PNC 5 7 3 150 0
  HOL 3
  NEW RUN #4
  REM Junctions 6 to 7
  STO 0.275 0.95 2.38
  PIP 85 583.85 582.25 577.02 576.60
+++ Tc =   2.4 min
+++ CA =    .3
+++ Link #  6,  Flow depth =    .58 ft, Critical depth =    .53 ft
  PNC 6 7 3 150 0
  REM Junctions 7 to 8
```


Cobey Manufacturing

```
  REC 3
  STO 0.735 0.589 27.40
  PIP 104 582.25 582.25 576.60 574.50
+++ Tc =  42.2 min
+++ CA =   1.9
+++ Link #  7,  Flow depth =    .66 ft, Critical depth =    .83 ft
  PNC 7 8 3 150 0
  END
 END OF INPUT DATA.
```


Cobey Manufacturing

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
1	100	12	578.10 577.60	.00500	5.8 4.7	3.6	2.7 3.2	.62 2.52	0.
			Length = 100. ft		Total length = 100. ft				
			Cost = 0.		Total Cost = 0.				

*** RUN #2 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
2	100	12	578.10 577.60	.00500	5.8 4.7	3.6	2.7 3.2	.62 2.52	0.
3	94	12	577.60 576.60	.01064	4.7 5.7	3.6	4.1 4.7	1.14 3.67	0.
			Length = 194. ft		Total length = 294. ft				
			Cost = 0.		Total Cost = 0.				

*** RUN #3 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
4	85	12	577.02 576.60	.00494	6.8 5.7	4.6	3.5 3.2	1.98 2.50	0.
5	94	12	576.60 575.60	.01064	5.7 6.7	4.6	5.0 4.7	2.43 3.67	0.
			Length = 179. ft		Total length = 473. ft				
			Cost = 0.		Total Cost = 0.				
			Length = 179. ft		Total length = 473. ft				
			Cost = 0.		Total Cost = 0.				

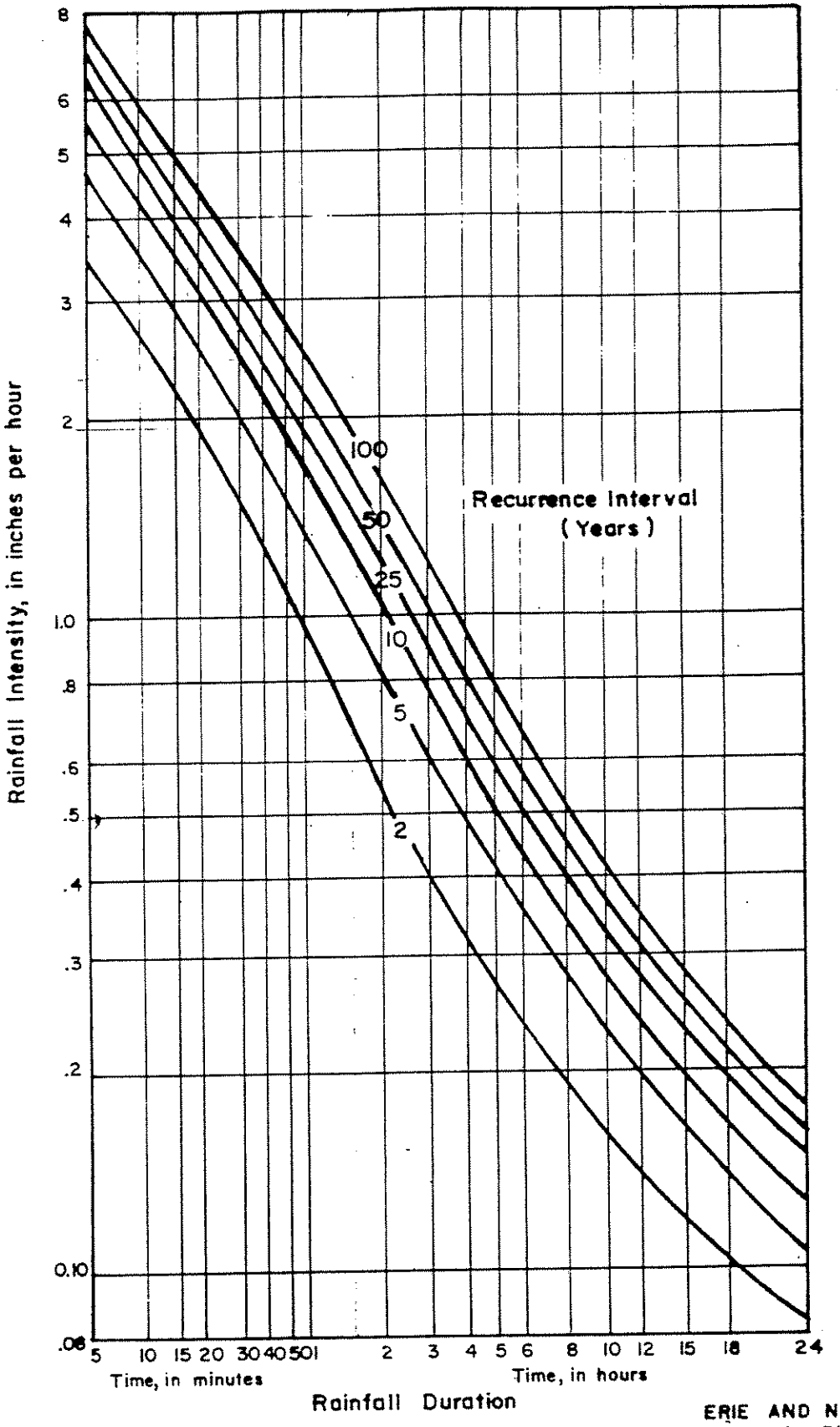
Cobey Manufacturing

*** RUN #4 Pipe Design

Link	Length (ft)	Diam (in)	Invert Up/Dn (ft)	Slope (ft/ft)	Depth Up/Dn (ft)	Min. Cover (ft)	Velocity Act/Full (ft/s)	--Flow-- Act/Full (cfs)	Estimated Cost ($)
6	85	12	577.02 576.60	.00494	6.8 5.7	4.6	3.4 3.2	1.58 2.50	0.
7	104	12	576.60 574.50	.02019	5.7 7.8	4.6	7.1 6.4	3.85 5.06	0.

Cobey Manufacturing

NORMAL END OF HYDRA



THE PREPARATION OF THIS REPORT HAS BEEN FINANCED IN PART THROUGH A GRANT FROM THE UNITED STATES DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT UNDER THE PROVISIONS OF THE HOUSING ACT OF 1954 AS AMENDED.

Source: U. S. Weather Bureau.

ERIE AND NIAGARA COUNTIES
REGIONAL PLANNING BOARD

REGIONAL STORM-SURFACE WATER
DRAINAGE MANAGEMENT STUDY

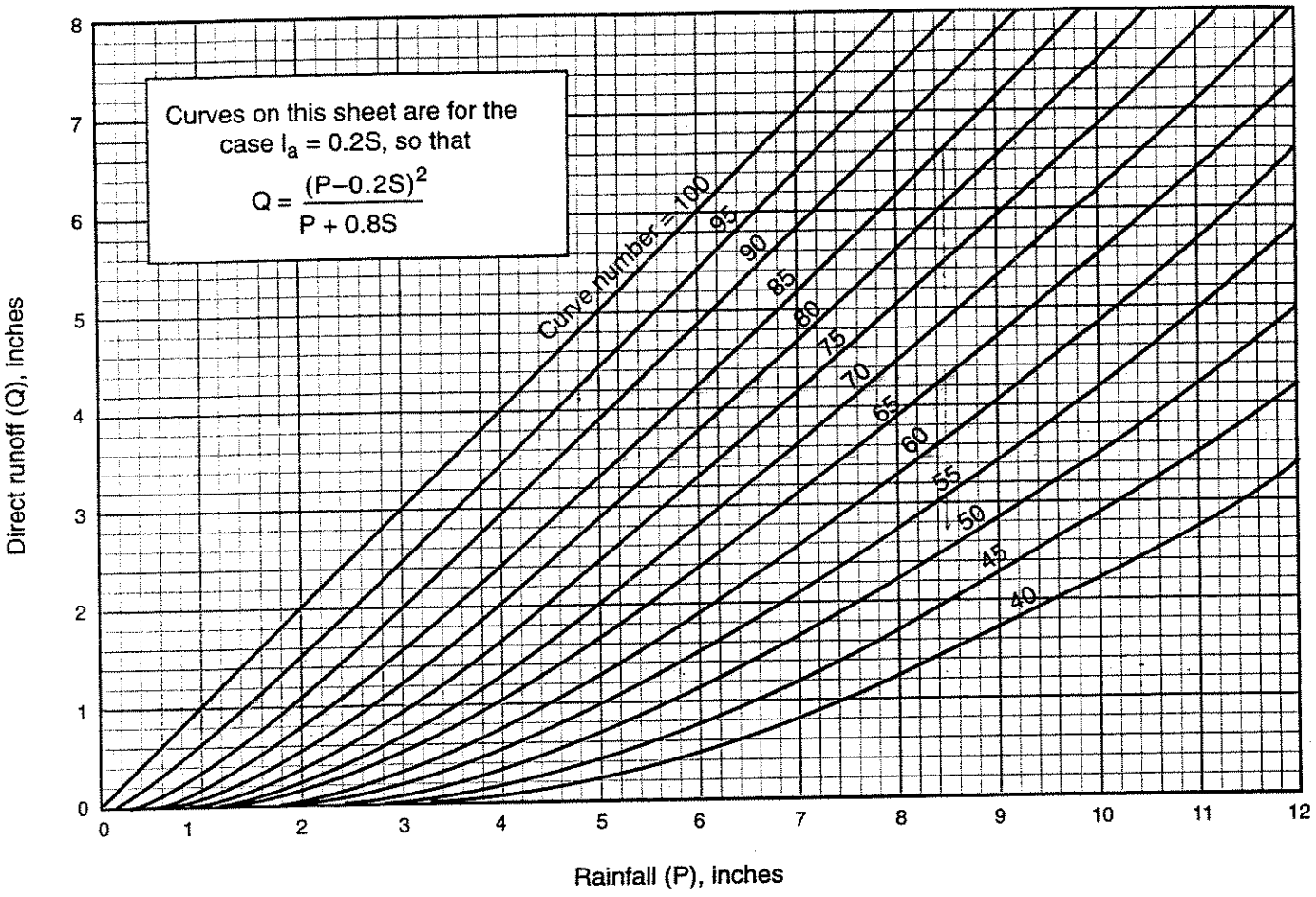
RAINFALL INTENSITY-DURATION FREQUENCY, BUFFALO, NEW YORK

RUNOFF COEFFICIENTS
FOR USE IN THE RATIONAL FORMULA

Hydrologic Soil Group	A			B			C			D		
Slope Range	0-2%	2-6%	6+	0-2%	2-6%	6+	0-2%	2-6%	6+	0-2%	2-6%	6+
LAND USE												
Industrial	0.67 [1/]	0.68	0.68	0.68	0.68	0.69	0.68	0.69	0.69	0.69	0.69	0.
	0.85 [2/]	0.85	0.86	0.85	0.86	0.86	0.86	0.86	0.87	0.86	0.86	0.
Commercial	0.71	0.71	0.72	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.
	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.89	0.89	0.
High Density [3/] Residential	0.47	0.49	0.50	0.48	0.50	0.52	0.49	0.51	0.54	0.51	0.53	0.
	0.58	0.60	0.61	0.59	0.61	0.64	0.60	0.62	0.66	0.62	0.64	0.
Medium Density [4/] Residential	0.25	0.28	0.31	0.27	0.30	0.35	0.30	0.33	0.38	0.33	0.36	0.
	0.33	0.37	0.40	0.35	0.39	0.44	0.38	0.42	0.49	0.41	0.45	0.
Low Density [5/] Residential	0.14	0.19	0.22	0.17	0.21	0.26	0.20	0.25	0.31	0.24	0.28	0.
	0.22	0.26	0.29	0.24	0.28	0.34	0.28	0.32	0.40	0.31	0.35	0.
Agricultural	0.08	0.13	0.16	0.11	0.15	0.21	0.14	0.19	0.26	0.18	0.23	0.
	0.14	0.18	0.22	0.16	0.21	0.28	0.20	0.25	0.34	0.24	0.29	0.
Open Space	0.05	0.10	0.14	0.08	0.13	0.19	0.12	0.17	0.24	0.16	0.21	0.
	0.11	0.16	0.20	0.14	0.19	0.26	0.18	0.23	0.32	0.22	0.27	0.
Freeways and Expressways	0.57	0.59	0.60	0.58	0.60	0.61	0.59	0.61	0.63	0.60	0.62	0.
	0.70	0.71	0.72	0.71	0.72	0.74	0.72	0.73	0.76	0.73	0.75	0.

1/ Lower runoff coefficients for use with storm recurrence intervals less than 25 years.
2/ Higher runoff coefficients for use with storm recurrence intervals of 25-years or more.
3/ High Density Residential - greater than 15 dwelling units per acre
4/ Medium Density Residential - 4 to 15 dwelling units per acre
5/ Low Density Residential - 1 to 4 dwelling units per acre

Figure 2-1 Solution of runoff equation.



Cover type

Table 2-2 addresses most cover types, such as vegetation, bare soil, and impervious surfaces. There are a number of methods for determining cover type. The most common are field reconnaissance, aerial photographs, and land use maps.

Treatment

Treatment is a cover type modifier (used only in table 2-2b) to describe the management of cultivated agricultural lands. It includes mechanical practices, such as contouring and terracing, and management practices, such as crop rotations and reduced or no tillage.

Hydrologic condition

Hydrologic condition indicates the effects of cover type and treatment on infiltration and runoff and is generally estimated from density of plant and residue cover on sample areas. *Good* hydrologic condition indicates that the soil usually has a low runoff potential for that specific hydrologic soil group, cover type, and treatment. Some factors to consider in estimating the effect of cover on infiltration and runoff are (a) canopy or density of lawns, crops, or other vegetative areas; (b) amount of year-round cover; (c) amount of grass or close-seeded legumes in rotations; (d) percent of residue cover; and (e) degree of surface roughness.

Sheet flow

Sheet flow is flow over plane surfaces. It usually occurs in the headwater of streams. With sheet flow, the friction value (Manning's n) is an effective roughness coefficient that includes the effect of raindrop impact; drag over the plane surface; obstacles such as litter, crop ridges, and rocks; and erosion and transportation of sediment. These n values are for very shallow flow depths of about 0.1 foot or so. Table 3-1 gives Manning's n values for sheet flow for various surface conditions.

Table 3-1 Roughness coefficients (Manning's n) for sheet flow

Surface description	n 1/
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses 2/	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods: 3/	
Light underbrush	0.40
Dense underbrush	0.80

1 The n values are a composite of information compiled by Engman (1986).

2 Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.

3 When selecting n , consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

For sheet flow of less than 300 feet, use Manning's kinematic solution (Overtop and Meadows 1976) to compute T_t:

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}} \qquad \text{[eq. 3-3]}$$

where:

T_t = travel time (hr),
n = Manning's roughness coefficient (table 3-1)
L = flow length (ft)
P_2 = 2-year, 24-hour rainfall (in)
s = slope of hydraulic grade line (land slope, ft/ft)

This simplified form of the Manning's kinematic solution is based on the following: (1) shallow steady uniform flow, (2) constant intensity of rainfall excess (that part of a rain available for runoff), (3) rainfall duration of 24 hours, and (4) minor effect of infiltration on travel time. Rainfall depth can be obtained from appendix B.

Shallow concentrated flow

After a maximum of 300 feet, sheet flow usually becomes shallow concentrated flow. The average velocity for this flow can be determined from figure 3-1, in which average velocity is a function of watercourse slope and type of channel. For slopes less than 0.005 ft/ft, use equations given in appendix F for figure 3-1. Tillage can affect the direction of shallow concentrated flow. Flow may not always be directly down the watershed slope if tillage runs across the slope.

After determining average velocity in figure 3-1, use equation 3-1 to estimate travel time for the shallow concentrated flow segment.

Open channels

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle sheets. Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for bankfull elevation.

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2]	Hydrologic condition [3]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

1 Average runoff condition, and I_a=0.2S

2 Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

3 Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2]	A [3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

Figure B-3 2-year, 24-hr rainfall

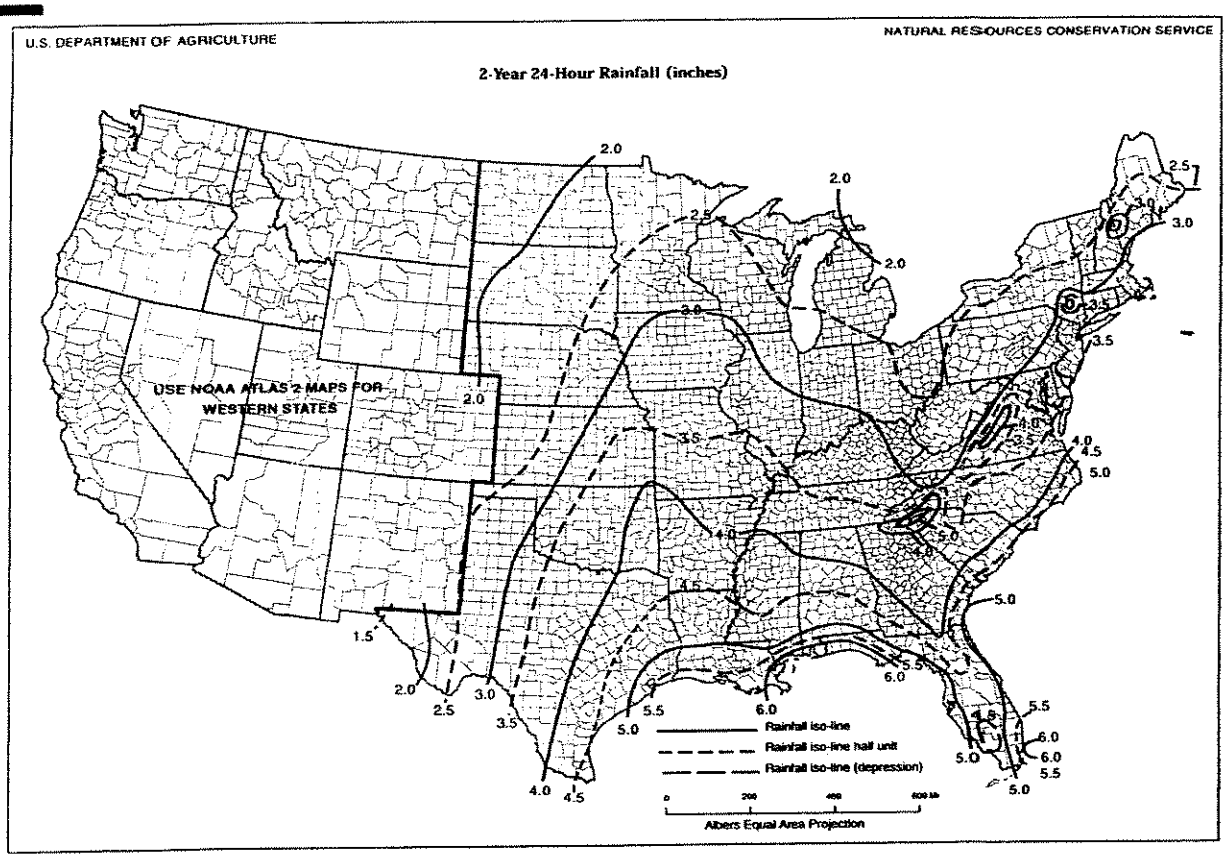


Figure B-4 5-year, 24-hour rainfall

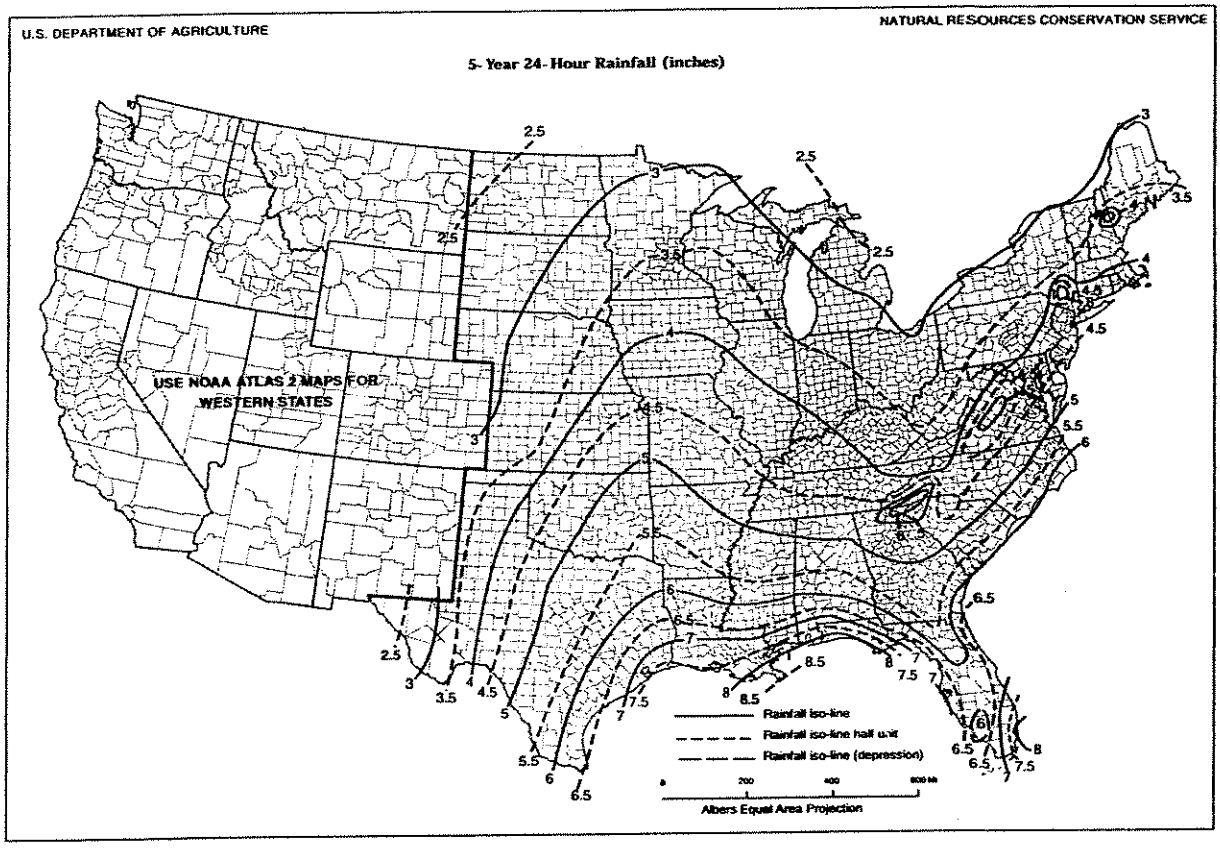


Figure B-5 10-year, 24-hour rainfall

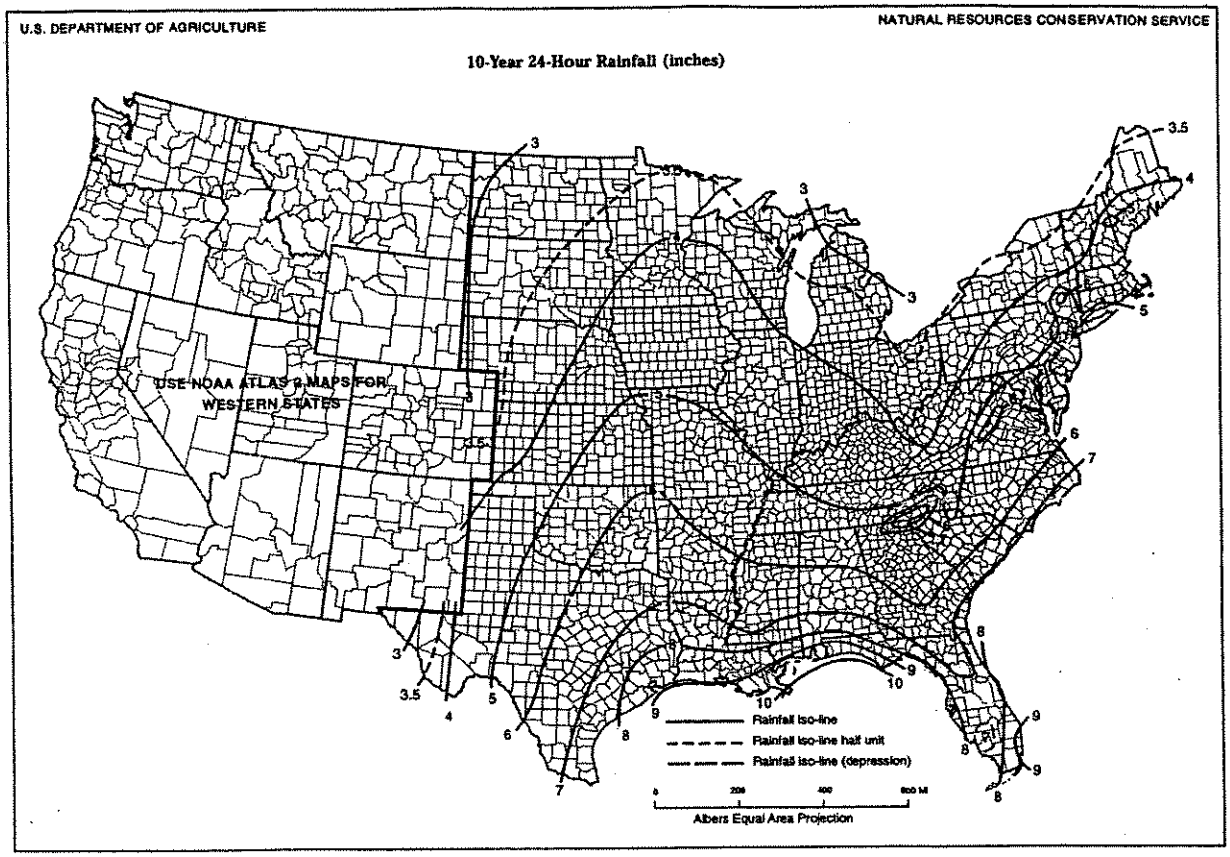


Figure B-6 25-year, 24-hour rainfall

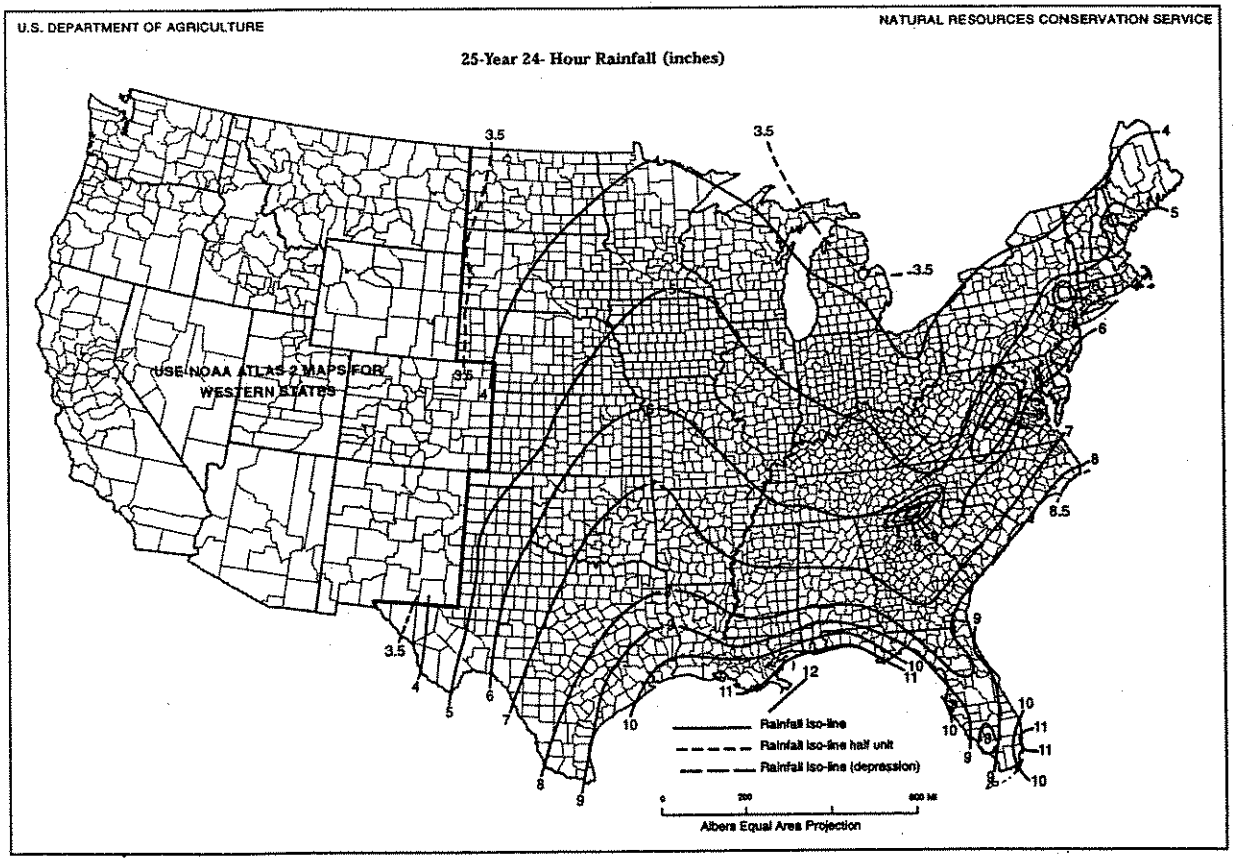


Figure B-7 50-year, 24-hour rainfall

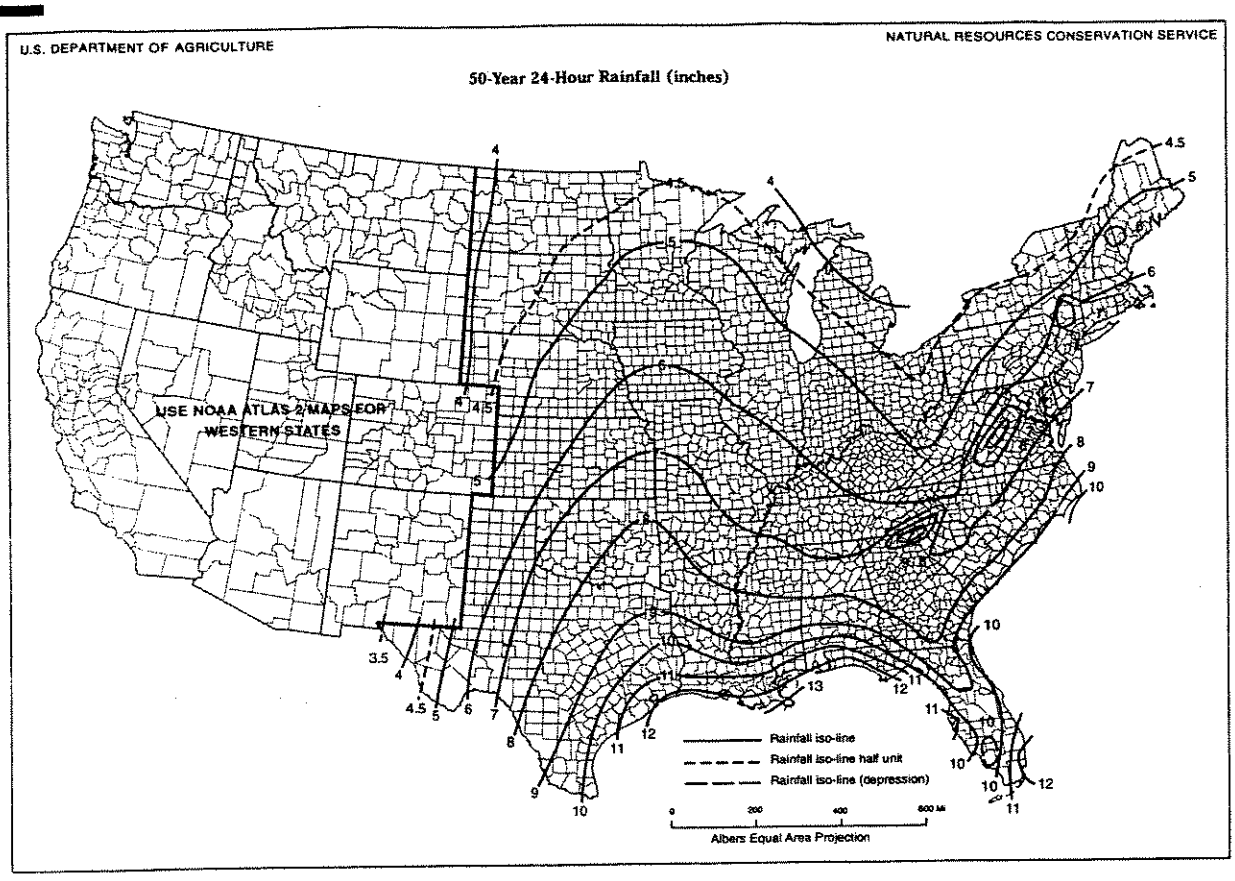


Figure B-8 100-year, 24-hour rainfall

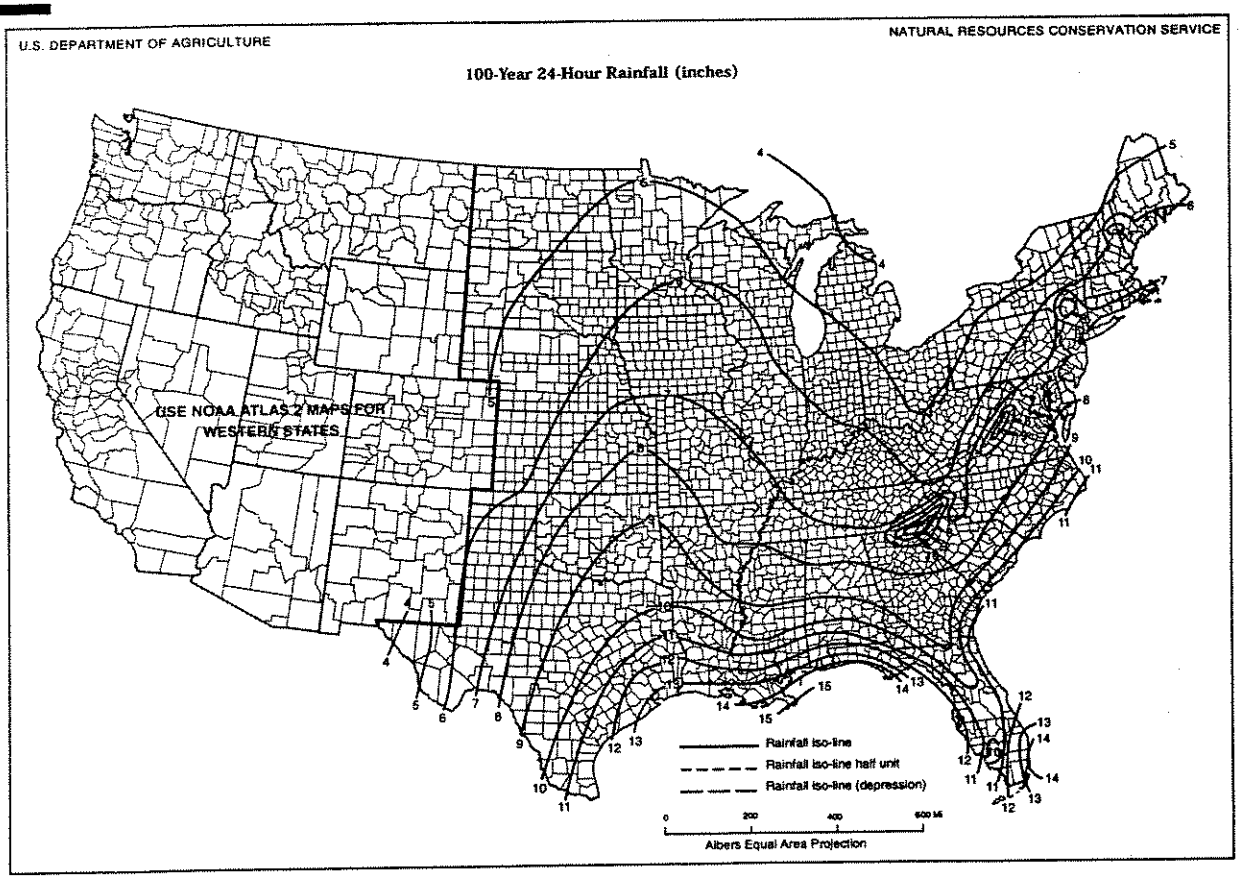


Figure 4.4 One-Year Design Storm

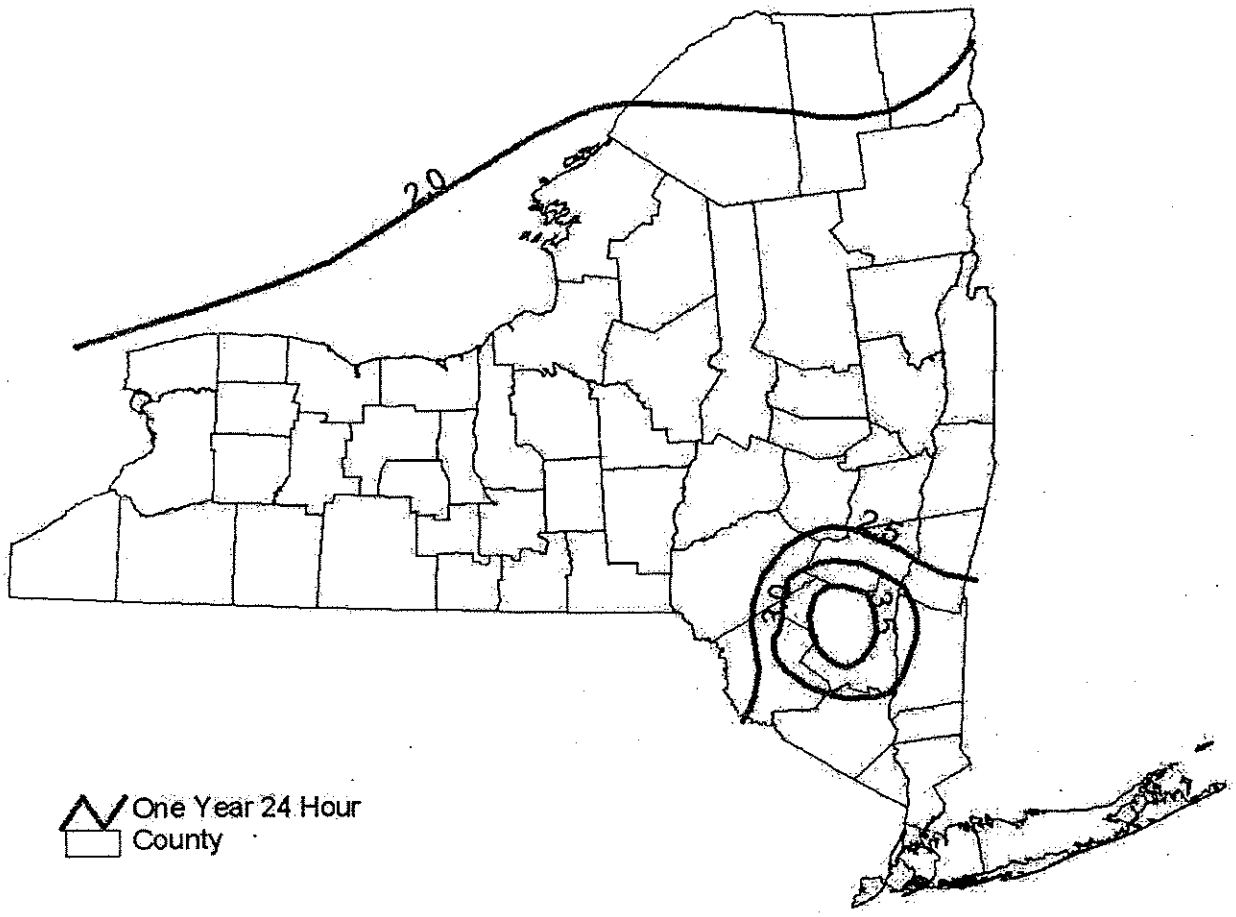
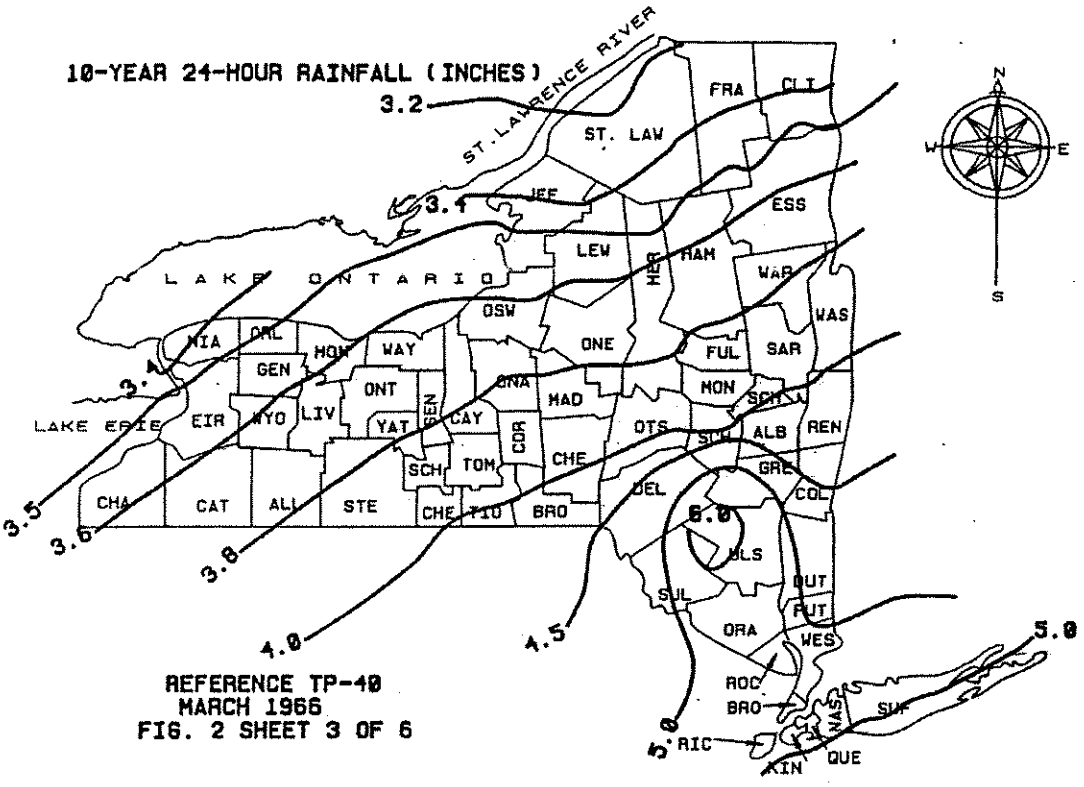
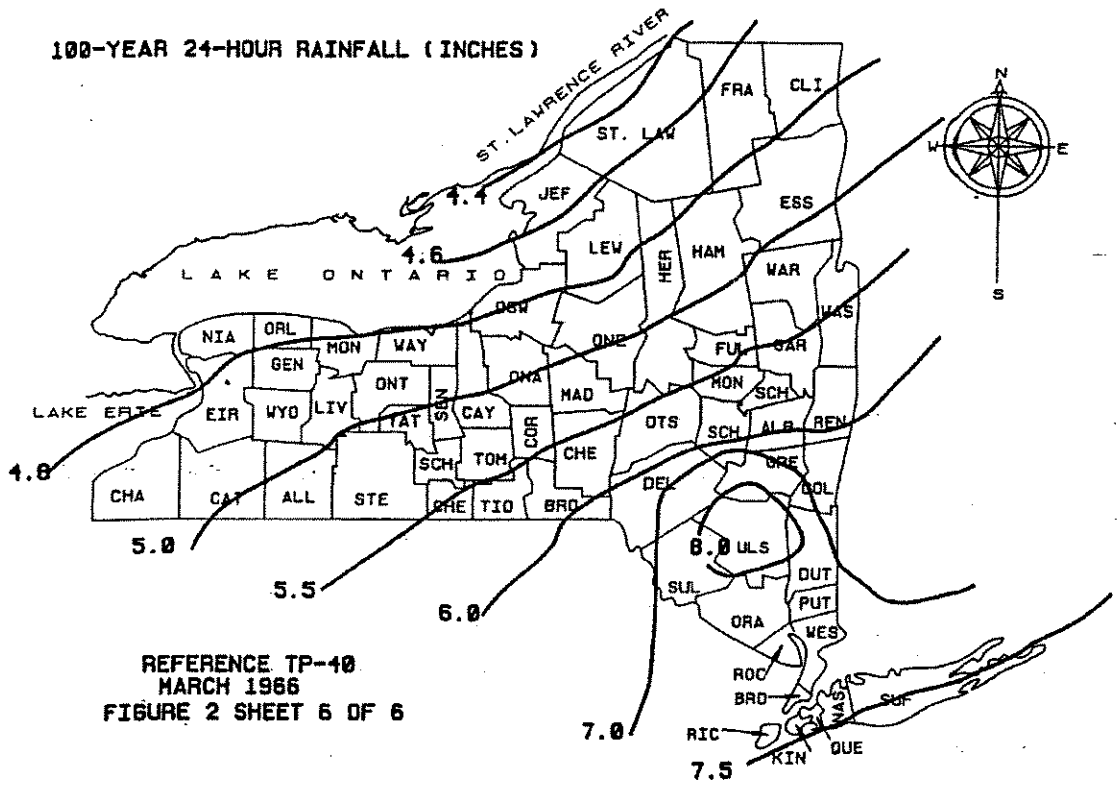


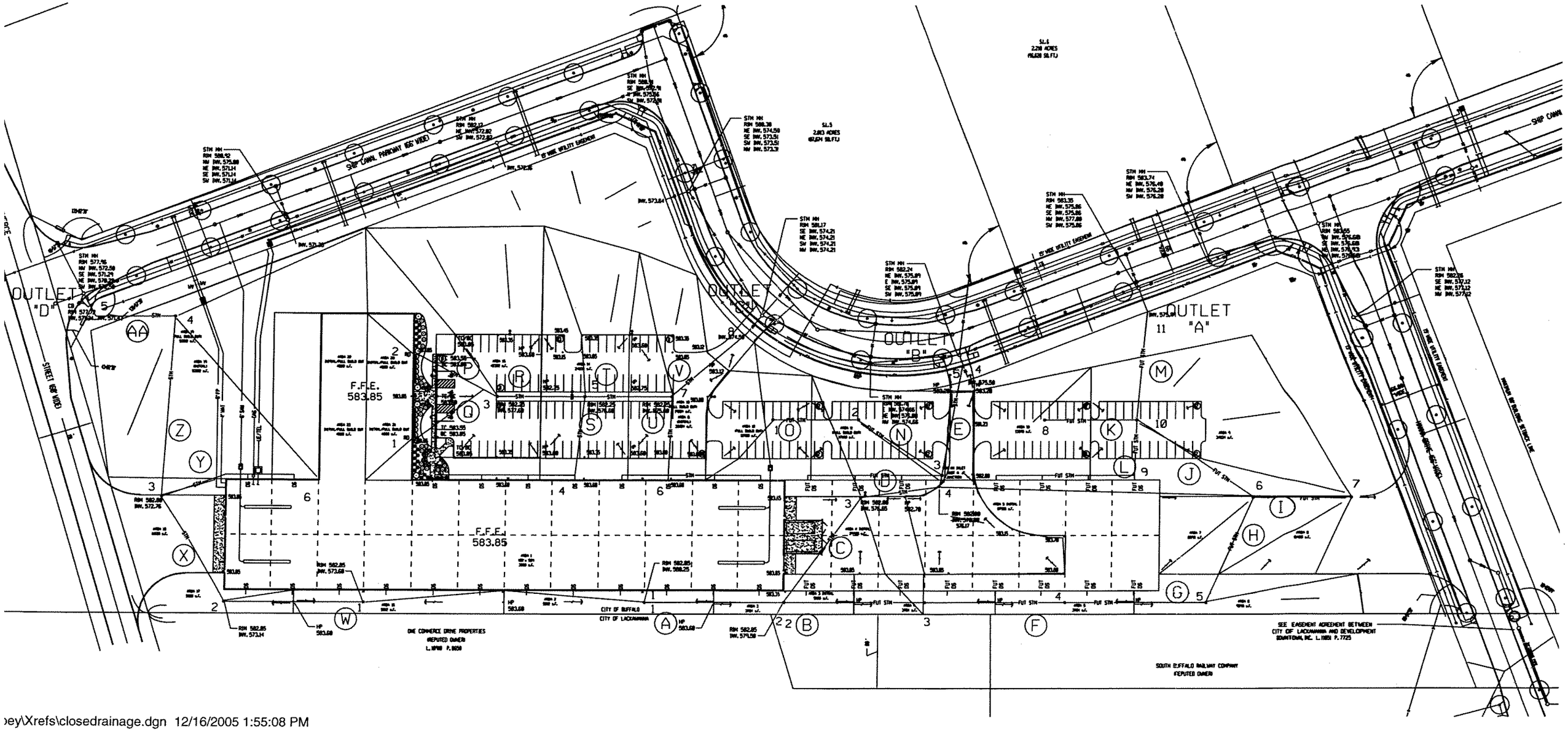
Figure 4.5 10-Year Design Storm



- When determining storage required to safely pass the 100-year flood, model off-site areas under ultimate conditions.

Figure 4.6 100-Year Design Storm





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APPENDIX D

CERTIFICATIONS

SWPPP CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law."

(Signature) *(Date)*

Peter Krog, PE - Owner

(Printed Name and Title)

THE KROG CORP.
4 Centre Drive
Orchard Park, New York 14127
716-667-1234

(Company Name, Address and Telephone Number)

CERTIFICATION OF CONTRACTOR(S)

All contractors and subcontractors identified in the SWPPP shall sign a copy of the following certification statement before undertaking any construction activity at the site identified in the SWPPP:

Made Pursuant to the State Pollution Discharge Elimination System (SPDES) General Permit for Storm Water Discharges from Construction Activity (Permit No. GP-02-01) for the Krog Corporation's Proposed Office Facility, Quaker Centre Office Park, Orchard Park, New York.

PRIME CONTRACTOR CERTIFICATION

"I certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP for the construction site identified in such SWPPP as a condition of authorization to discharge storm water. I also understand that the operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System (SPDES) general permit for storm water discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. I am aware that false statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law."

_____ _____

(Signature) *(Date)*

_____

(Printed Name and Title)

_____

_____

_____

(Company Name, Address and Telephone Number)

CONTRACTOR CERTIFICATION

All contractors and subcontractors identified in the SWPPP shall sign a copy of the following certification statement before undertaking any construction activity at the site identified in the SWPPP:

Made Pursuant to the State Pollution Discharge Elimination System (SPDES) General Permit for Storm Water Discharges from Construction Activity (Permit No. GP-02-01) for the Krog Corporation's Proposed Office Facility, Quaker Centre Office Park, Orchard Park, New York.

SUB-CONTRACTOR CERTIFICATION

"I certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP for the construction site identified in such SWPPP as a condition of authorization to discharge storm water. I also understand that the operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System (SPDES) general permit for storm water discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. I am aware that false statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law."

_____ _____

(Signature) *(Date)*

_____

(Printed Name and Title)

_____

_____

_____

(Company Name, Address and Telephone Number)

APPENDIX E

INSPECTION REPORTS

Permit Number GP-02-01

Quarterly Summary of SWPPP Status with Permit Compliance

Name of Permitted Facility:	Permit Identification #:	Today's Date:	
Location (Town and County):	**Reporting Period:**	**Acres Disturbed:**	**Acres Stabilized:**

Permit Reference; Part IV.D (page 18):

"The operator shall also prepare a written summary of its status with respect to compliance with this general permit at a minimum frequency of every three months during which coverage under this permit exists. The summary should address the status of achieving each component of the SWPPP. This summary shall be handled in the same manner as prescribed for SWPPPs under Part III, subsection B (see Page 9)."

Component of SWPPP (All SWM and E&SC Practices)	**Compliant** (Yes / No)	**Comments on achieving each component of the SWPPP** (Issues related to installation, maintenance, or use of practices)
Permanent EC Measures		*EXAMPLE*
Exposed Slope Stabilization:	Yes	As construction is completed in area 2, slopes have been stabilized with mulch and seed. Grass germination is at 60%. This work has been detailed in the regular inspection reports as to the extent and schedule of completion.

Owner/Operator Certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature of Permittee or Duly Authorized Representative

Name of Permittee or Duly Authorized Representative

Date

__ of __ pages

Duly authorized representatives of the Permittee must have written authorization, submitted to DEC, to sign any permit documents

NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity
Permit Number GP-02-01
Monthly Summary of Site Inspection Activities

Name of Permitted Facility:	**Permit Identification #:**	
Location:	**Today's Date:**	**Reporting Month:**
Name and Telephone Number of Site Inspector:	**Name and Telephone Number of Site Inspector:**	

Permit Reference; Part III.D.3.b (page 15):

"The operator shall post at the site, in a publicly-accessible location, a summary of the site inspection activities on a monthly basis."

Date of Inspection	Type of Inspection and 24 hr Rainfall	Name of Qualified Professional conducting Site Inspections	Major items of concern related to compliance of the SWPPP with all conditions of the general permit	Date Corrected

Owner/Operator Certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature of Permittee or Duly Authorized Representative

Name of Permittee or Duly Authorized Representative

Date

Duly authorized representatives of the Permittee (Owner/Operator) must have written authorization, submitted to DEC, to sign any permit documents.

APPENDIX F

NOTICE OF INTENT (NOI) COPY

4730415688

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-02-01

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required. To properly complete this form, please refer to the Instruction Manual which can be accessed at www.dec.state.ny.us/website/dow/toolbox/instr_man.pdf

-IMPORTANT-

THIS FORM FOR MACHINE PRINT ONLY/USE OTHER FORM FOR HANDPRINT
DO NOT USE HANDWRITING ON THIS FORM

OWNER/OPERATOR **MUST SIGN FORM**

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
The Krog Corp

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Scheedy

Owner/Operator Contact Person First Name
Pat

Owner/Operator Mailing Address
4 Centre Drive

City
Orchard Park

State
NY

Zip
14127 -

Phone (Owner/Operator)
716 - 667 - 1234

Fax (Owner/Operator)
716 - 667 - 1258

Email (Owner/Operator)
psheedy@krogcorp.com

Location Information

Project Site Information

Project/Site Name
Cobey Inc.

Street Address (NOT P.O. BOX)
2 Ship Canal Parkway

City/Town/Village (THAT ISSUES BUILDING PERMIT)
City of Buffalo

State
NY

Zip
14203 -

County
Erie

DEC Region (if known)

Name of Nearest Cross Street
Commerce Drive

Distance to Nearest Cross Street (Feet)
50

Direction to Nearest Cross Street

○ North ○ South ○ East ● West

1. Provide the Geographic Coordinates for the project site in NYTM Units. To do this you **must** go to the NYSDEC Stormwater Interactive Map on the DEC website at:

www.dec.state.ny.us/website/imsmaps/stormwater/viewer.htm

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site go to the dropdown menu on the left and choose "Get Coordinates". Click on the center of your site and a small window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting)
185125

Y Coordinates (Northing)
474942

2. What is the nature of this construction project?

○ **New Construction**

● **Redevelopment with increase in imperviousness**

○ **Redevelopment with no increase in imperviousness**

Project Site Information

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use	Post-Development Future Land Use
○ FOREST	○ SINGLE FAMILY HOME
○ PASTURE/OPEN LAND	○ SINGLE FAMILY SUBDIVISION
○ CULTIVATED LAND	○ TOWN HOME RESIDENTIAL
○ SINGLE FAMILY HOME	○ MULTIFAMILY RESIDENTIAL
○ SINGLE FAMILY SUBDIVISION	○ INSTITUTIONAL/SCHOOL
○ TOWN HOME RESIDENTIAL	● INDUSTRIAL
○ MULTIFAMILY RESIDENTIAL	○ COMMERCIAL
○ INSTITUTIONAL/SCHOOL	○ ROAD/HIGHWAY
○ INDUSTRIAL	○ RECREATIONAL/SPORTS FIELD
○ COMMERCIAL	○ BIKE PATH/TRAIL
○ ROAD/HIGHWAY	○ SUBSURFACE UTILITY
○ RECREATIONAL/SPORTS FIELD	○ PARKING LOT
○ BIKE PATH/TRAIL	○ OTHER
○ SUBSURFACE UTILITY	OTHER
○ PARKING LOT	
● OTHER	
OTHER Brownfield Redevelop	

4. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law ? ○ Yes ● No

5. Is this a project which does not require coverage under the General Permit (e.g. Project done under an Individual SPDES Permit, 401 Certification or department approved remediation)? ○ Yes ● No

6. Is this property owned by a state authority, state agency or local government? ● Yes ○ No

7. In accordance with the larger common plan of development or sale; enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area. Round to the nearest tenth of an acre.

Total Project Site Acreage	Acreage to be Disturbed	Impervious Area within Disturbed
12.3	12.2	5.9

8. Will there be more than 5 acres disturbed at any given time? ● Yes ○ No

9. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	B	C	D
%	%	%	100 %

10. Is this a phased project? (**if yes, The SWPPP must address all planned phases)** * ● Yes ○ No

11. Enter the planned start and end dates of the disturbance activities

Start Date 12/15/2005 – **End Date** 09/30/2006

Receiving System(s)

12. Provide the name of the surface waterbody(ies) into which construction site runoff will discharge.

Union Ship Canal

For Questions 13 and 14 refer to the Instruction Manual for a subset of 303(d) segments and TMDL watersheds subject to Condition A of the permit. These waterbodies and watersheds have been identified for regulation within the stormwater program due to a pollutant of concern. The Instruction Manual can be accessed at www.dec.state.ny.us/website/dow/toolbox/instr man.pdf

13. Has the surface waterbody(ies) in question 12 been identified as a 303(d) segment? * ○ Yes ● No

14. Is this project located in a TMDL Watershed? * ○ Yes ● No

***NOTE:** If you answered Yes to either question 13 or 14, Pursuant to Part I.D.3.(b) of the permit, you must have your SWPPP prepared and certified by a licensed/certified professional and the SWPPP is subject to a 60-business day review.*

15. Does the site runoff enter a separate storm sewer system- including roadside drains, swales, ditches, culverts, etc? **(if no, skip question 16)** ● Yes ○ No ○ Unknown

16. What is the name of the municipality/entity that owns the separate storm sewer system?

City of Buffalo Sewer Authority

17. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ Yes ● No ○ Unknown

Stormwater Pollution Prevention Plan (SWPPP)

18. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book) ? (●) Yes ( ) No*

19. Does this construction activity require the development of a SWPPP that includes Water Quality and Quantity Control components (Post-Construction Stormwater Management Practices) **If no, Skip question 20** (●) Yes ( ) No

20. Have the Water Quality and Quantity Control components of the SWPPP been developed in comformance with the current NYS Stormwater Management Design Manual ? ( ) Yes (●) No*

NOTE: If you answered no to question 18 or 20, Pursuant to Part I.D.3.(b) of the permit, you must have your SWPPP prepared and certified by a licensed/certified professional and the SWPPP is subject to a 60-business day review. Please provide further details in the details/comment section on the last page of this form.

21. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ( ) **Professional Engineer (P.E.)**
- ( ) **Soil and Water Conservation District (SWCD)**
- (●) **Registered Landscape Architect (R.L.A)**
- ( ) **Certified Professional in Erosion and Sediment Control (CPESC)**
- ( ) **Owner/Operator**
- ( ) **Other**

SWPPP Preparer Information
(if different from Owner/Operator info)

SWPPP Preparer: CK & Associates

Contact Name (Last, Space, First): Craig Richardson

Mailing Address: 53 East Home Road

City: Bowmansville

State: NY

Zip: 14026 -

Phone: 716 - 684 - 6256

Fax: - -

Email: ckassoc@adelphia.net

Stormwater Pollution Prevention Plan (SWPPP)

Erosion and Sediment Control Practices

22. Has a construction sequence schedule for the planned management practices been prepared?

● Yes ○ No

23. Select **all** of the erosion and sediment control practices that will be employed on the project site.

Temporary Structural

- ○ Check Dams
- ○ Construction Road Stabilization
- ○ Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ○ Sediment Traps
- ● Silt Fence
- ● Stabilized Construction Entrance
- ○ Storm Drain Inlet Protection
- ○ Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ○ Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ● Mulching
- ○ Protecting Vegetation
- ○ Recreation Area Improvement
- ● Seeding
- ○ Sodding
- ○ Straw/Hay Bale Dike
- ○ Streambank Protection
- ○ Temporary Swale
- ● Topsoiling
- ○ Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ● Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ○ Riprap Slope Protection
- ○ Rock Outlet Protection
- ○ Streambank Protection

Other

Stormwater Pollution Prevention Plan (SWPPP)

Water Quality and Quantity Control

Important:Completion of Questions 24-30 is not required if the project:

Disturbs less than 5 acres and is planned for single-family residential homes(including subdivisions) or construction on agricultural property and does not have a discharge to a 303(d) water or is not located within a TMDL watershed.

Additionally, sites where there will be no future impervious area within the disturbed area and that do not have a change(pre to post development)in hydrology do not need to complete questions 24-30.

24. Indicate **all** the permanent Stormwater Management Practice(s) that will be installed on this site

Post Construction Stormwater Management Practices

Ponds

- ○ Micropool Extended Detention (P-1)
- ○ Wet Pond (P-2)
- ○ Wet Extended Detention (P-3)
- ○ Multiple Pond System (P-4)
- ○ Pocket Pond (P-5)

Filtering

- ○ Surface Sand Filter (F-1)
- ○ Underground Sand Filter (F-2)
- ○ Perimeter Sand Filter (F-3)
- ○ Organic Filter (F-4)
- ○ Bioretention (F-5)

Wetlands

- ○ Shallow Wetland (W-1)
- ○ Extended Detention Wetland (W-2)
- ○ Pond/Wetland System (W-3)
- ○ Pocket Wetland (W-4)

Infiltration

- ○ Infiltration Trench (I-1)
- ○ Infiltration Basin (I-2)
- ○ Dry Well (I-3)

Open Channels

- ○ Dry Swale (O-1)
- ○ Wet Swale (O-2)

● Other

Describe other stormwater management practices not listed above or explain any deviations from the technicial standards. If the SWPPP does not conform to the technicial standards, the SWPPP must be prepared and certified by a licensed/certified professional and is subject to a 60-business day review.

It was determined that excavation to provide an acceptable practice could result in potential exposure risks associated with direct contact with existing site fill material and therefore would be in conflict with the NYSDEC approved RAWP.

Has a long term Operation and Maintenance plan for the post construction management practices been developed? ● Yes ○ No

If Yes, Identify the entity responsible for the long term Operation and Maintenance

Cobey LLC.

Stormwater Pollution Prevention Plan (SWPPP)
Water Quality and Quantity Control

25. Provide the total water quality volume required and the total provided for the site.

Total Water Quality Volume (WQv)

WQv Required	WQv Provided
0.418 acre-feet	0.000 acre-feet

26. Provide the following Unified Stormwater Sizing Criteria for the site.

Total Channel Protection Storage Volume (CPv) - Extended detention of post-developed 1 year, 24 hour storm event

CPv Required	CPv Provided
0.000 acre-feet	0.000 acre-feet

The need to provide for channel protection has been waived because
- (●) **Site discharges directly to fourth order stream or larger**

Total Overbank Flood Control Criteria (Qp) - Peak discharge rate for the 10 year storm

Pre-Development	Post-development
0.00 CFS	0.00 CFS

Total Extreme Flood Control Criteria (Qf) - Peak discharge rate for the 100 year storm

Pre-Development	Post-development
0.00 CFS	0.00 CFS

The need to provide for flood control has been waived because
- (●) **Site discharges directly to fourth order stream or larger**
- ( ) **Downstream analysis reveals that flood control is not required**

IMPORTANT: For questions 27 and 28 impervious area should be calculated considering the project site and all offsite areas that drain to the post-construction stormwater management practice(s) (Total Drainage Area = Project Site + Offsite areas)

27. Pre-Construction Impervious Area - As a percent of the Total Drainage Area enter the percentage of the existing impervious areas before construction begins. **0 %**

28. Post-Construction Impervious Area - As a percent of the Total Drainage Area enter the percentage of the future impervious areas that will be created/remain on the site after completion of construction. **48 %**

29. Indicate the total number of permanent stormwater management practices to be installed **0**

30. Provide the total number of stormwater discharge points from the site (include discharges to either surface waters or to seperate storm sewer systems) **3**

Other Permits

31. Select any other DEC permits that are required for this project or ● None

DEC Permits

○ Air Pollution Control	○ Stream Protection/Article 15
○ Coastal Erosion	○ Water Quality Certificate
○ Hazardous Waste	○ Dam Safety
○ Long Island Wells	○ Water Supply
○ Mined Land Reclamation	○ Freshwater Wetlands
○ Other SPDES	○ Tidal Wetlands
○ Solid Waste	○ Wild, Scenic and Recreational Rivers

Other

If this NOI is being submitted for the purpose of continuing coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned.

NYR

Details/Comments

Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I also certify under penalty of law that this document and the corresponding documents were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction. and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name: Peter

MI:

Print Last Name: Krog

Owner/Operator Signature:

Date: 12 / 08 / 05

MALCOLM PIRNIE

Erosion Control Details

ATTACHMENT

IV

STANDARD AND SPECIFICATIONS FOR STRAW BALE DIKE

Definition

A temporary barrier of straw or similar material used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a bale dike is to reduce runoff velocity and effect deposition of the transported sediment load. Straw bale dikes are to be used for no more than three (3) months.

Conditions Where Practice Applies

The straw bale dike is used where:

1. No other practice is feasible.
2. There is no concentration of water in a channel or other drainage way above the barrier.
3. Erosion would occur in the form of sheet erosion.
4. Length of slope above the straw bale dike does not exceed these limits:

Constructed Slope	Percent Slope	Slope Length (feet)
2:1	50	25
2 -1/2:1	40	50
3:1	33	75
3-1/2:1	30	100
4:1	25	125

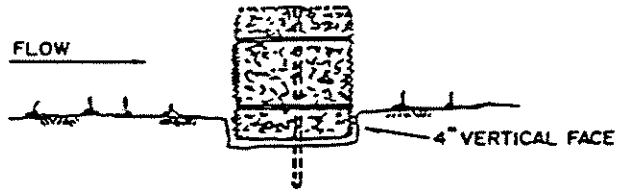
Where slope gradient changes through the drainage area, steepness refers to the steepest slope section contributing to the straw bale dike.

The practice may also be used for a single family lot if the slope is less than 15 percent. The contributing drainage area in this instance shall be less than one acre and the length of slope above the dike shall be less than 200 feet.

Design Criteria

A design is not required. All bales shall be placed on the contour with cut edge of bale adhering to the ground. See Figure 4.3 on page 4.10 or details.

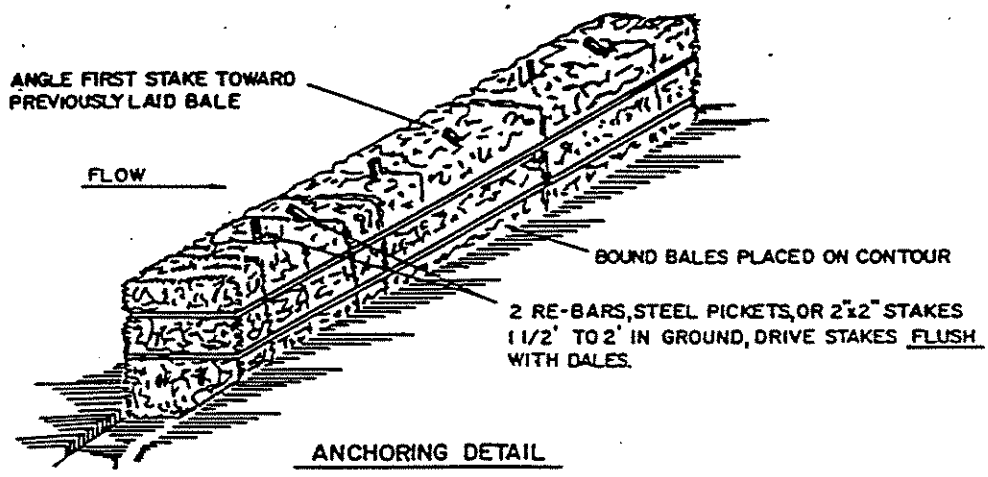
Figure 4.3
Straw Bale Dike Details



BEDDING DETAIL

STANDARD SYMBOL

SBD — DRAINAGE AREA NO MORE THAN 1/4 ac. PER 100 FEET OF STRAW BALE DIKE FOR SLOPES LESS THAN 25%



ANCHORING DETAIL

CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	STRAW BALE DIKE	STANDARD DRAWING SBD-1

STANDARD AND SPECIFICATIONS FOR SILT FENCE

Definition

A temporary barrier of geotextile fabric (filter cloth) used to intercept sediment laden runoff from small drainage areas of disturbed soil.

Purpose

The purpose of a silt fence is to reduce runoff velocity and effect deposition of transported sediment load. Limits imposed by ultraviolet stability of the fabric will dictate the maximum period the silt fence may be used.

Conditions Where Practice Applies

A silt fence may be used subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence are:

Slope Steepness	Maximum Slope Length (Ft)
2:1	50
3:1	75
4:1	125
5:1	175
Flatter than 5:1	200

2. Maximum drainage area for overland flow to a silt fence shall not exceed 1/2 acre per 100 feet of fence; and
3. Erosion would occur in the form of sheet erosion; and
4. There is no concentration of water flowing to the barrier.

Design Criteria

Design computations are not required. All silt fences shall be placed as close to the area as possible, and the area below the fence must be undisturbed or stabilized.

A detail of the silt fence shall be shown on the plan, and contain the following minimum requirements:

1. The type, size, and spacing of fence posts.
2. The size of woven wire support fences. (OPTIONAL)
3. The type of filter cloth used.
4. The method of anchoring the filter cloth.
5. The method of fastening the filter cloth to the fencing support.

Where ends of filter cloth come together, they shall be overlapped, folded and stapled to prevent sediment bypass. See Figure 4.4 on page 4.12 for details.

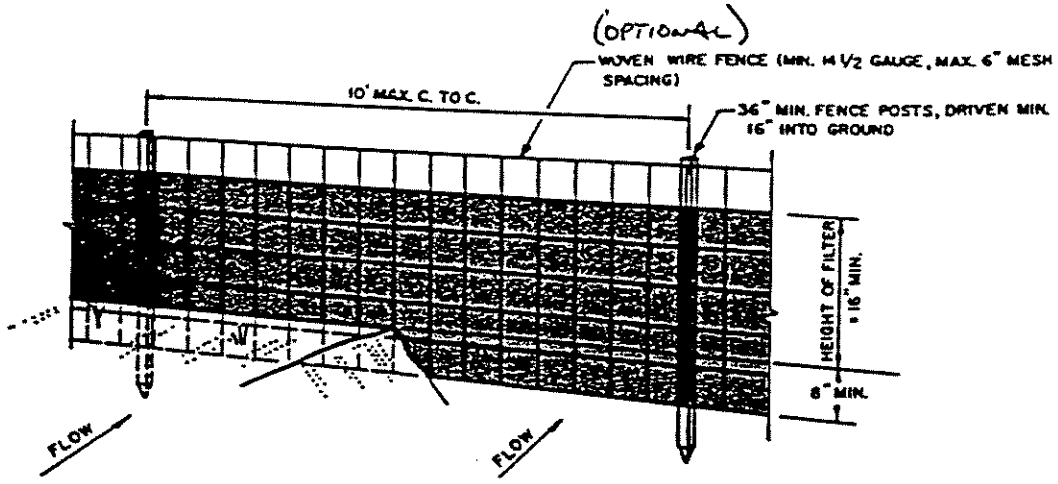
Criteria for Silt Fence Materials

1. Silt Fence Fabric: The fabric shall meet the following specifications unless otherwise approved by the appropriate erosion and sediment control plan approval authority. Such approval shall not constitute statewide acceptance. Statewide acceptability shall depend on in field and/or laboratory observations and evaluations.

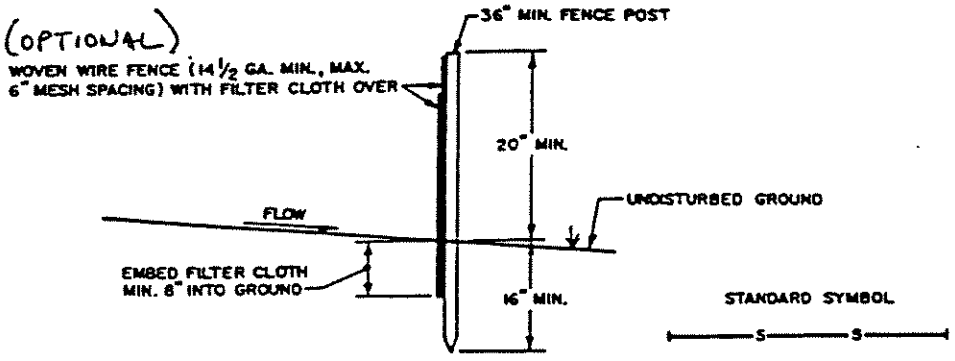
Fabric Properties	Minimum Acceptable Value	Test Method
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (PSI)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751 (modified)
Slurry Flow Rate (gal/min/sf)	0.3	
Equivalent Opening Sizw	40-80	US Std Sieve CW-02215
Ultraviolet Radiation Stability (%)	90	ASTM G-26

2. Fence Posts (for fabricated units): The length shall be a minimum of 36 inches long. Wood posts will be of sound quality hardwood with a minimum cross sectional area of 3.0 square inches. Steel posts will be standard T and U section weighing not less than 1.00 pound per linear foot.
3. Wire Fence (for fabricated units): Wire fencing shall be a minimum 14-1/2 gage with a maximum 6 in. mesh opening, or as approved. (OPTIONAL)
4. Prefabricated Units: Envirofence or approved equal may be used in lieu of the above method providing the unit is installed per manufacturer's instructions.

Figure 4.4
Silt Fence Details



PERSPECTIVE VIEW



SECTION

CONSTRUCTION NOTES FOR FABRICATED SILT FENCE

(OPTIONAL)

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

POSTS: STEEL EITHER T OR U TYPE OR 2" HARDWOOD

FENCE: WOVEN WIRE, 14½ GA. 6" MAX. MESH OPENING (OPTIONAL)

FILTER CLOTH: FILTER X, MIRAFI 100X, STABILINKA T140N OR APPROVED EQUAL

PREFABRICATED UNIT: GEOFAB, ENVIROFENCE, OR APPROVED EQUAL.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	SILT FENCE	STANDARD DRAWING SF-1

STANDARD AND SPECIFICATION FOR TEMPORARY SWALE

Definition

A temporary excavated drainage way.

Purpose

The purpose of a temporary swale is to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet or to intercept sediment laden water and divert it to a sediment trapping device.

Conditions Where Practice Applies

Temporary Swales are constructed:

1. To divert flows from a disturbed area.
2. Intermittently across disturbed areas to shorten overland flow distances.
3. To direct sediment laden water along the base of slopes to a trapping device.
4. To transport offsite flows across disturbed areas such as rights-of-way.

Swales collecting runoff from disturbed areas shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 4.5 on page 4.14 for details.

	Swale A <5 Ac	Swale B 5-10 Ac
Drainage Area		
Bottom Width of Flow Channel	4 ft	6 ft
Depth of Flow Channel	1 ft	1 ft
Side Slopes	2:1 or Flatter	2:1 or Flatter
Grade	0.5% Min. 20% Max.	0.5% Min. 20% Max.

For drainage areas larger than 10 acres, refer to the Standard and Specifications for Waterways on page 4.91.

Stabilization

Stabilization of the swale shall be completed within 10 days of installation in accordance with the appropriate standard and specifications for vegetative stabilization or stabilization with mulch as determined by the time of year. The flow channel shall be stabilized as per the following criteria:

		FLOW CHANNEL	
Type of Treatment	Channel Grade	A <5 Ac	B 5-10 Ac
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.1-5.0%	Seed & Straw Mulch	Seed and cover with Jute or Excelsior; Sod, or lined with 2 in. stone
3	5.1-8.0%	Seed and cover with Jute or Excelsior, Sod line with 2 in. stone	Line with 4-8 in. stone or Recycled Concrete Equivalent
4	8.1-20%	Line with 4-8 in. stone or Recycled Concrete Equivalent[1]	Engineering Design

In highly erodible soils, as defined by local approving agency, refer to the next higher slope grade for type of stabilization.

[1] Recycled Concrete Equivalent shall be concrete broken into the required size, and shall contain no steel reinforcement.

Outlet

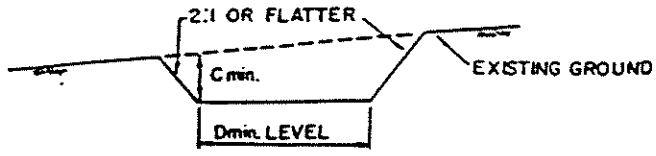
Swale shall have an outlet that functions with a minimum of erosion, and dissipates runoff velocity prior to discharge off the site.

Runoff shall be conveyed to a sediment trapping device such as a sediment trap or sediment basin until the drainage area above the swale is adequately stabilized.

The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet condition.

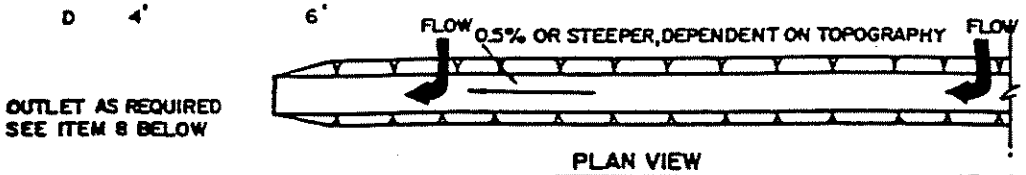
If swale is used to divert flows from entering a disturbed area, a sediment trapping device may not be needed.

Figure 4.5
Temporary Swale Detail



CROSS SECTION

	SWALE A	SWALE B
C	1'	1'
D	4'	6'



PLAN VIEW

STANDARD SYMBOL A-2 B-3

CONSTRUCTION SPECIFICATIONS

1. ALL TEMPORARY SWALES SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTURBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET DIRECTLY INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSIVE VELOCITY.
4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE SWALE.
5. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
6. FILLS SHALL BE COMPACTED BY EARTH MOVING EQUIPMENT.
7. ALL EARTH REMOVED AND NOT NEEDED ON CONSTRUCTION SHALL BE PLACED SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE SWALE.
8. STABILIZATION SHALL BE AS PER THE CHART BELOW:

FLOW CHANNEL STABILIZATION

TYPE OF TREATMENT	CHANNEL GRADE	A (5 AC OR LESS)	B (5 AC - 10 AC)
1	0.5-3.0%	SEED AND STRAW MULCH	SEED AND STRAW MULCH
2	3.1-5.0%	SEED AND STRAW MULCH	SEED USING JUTE OR EXCELSIOR
3	5.1-8.0%	SEED WITH JUTE OR EXCELSIOR; SOD	LINED RIP-RAP 4-8" RECYCLED CONCRETE EQUIVALENT
4	8.1-20%	LINED 4-8" RIP-RAP	ENGINEERED DESIGN

9. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	TEMPORARY SWALE	STANDARD DRAWING TS-1

STANDARD AND SPECIFICATIONS FOR PERIMETER DIKE/SWALE

Definition

A temporary ridge of soil excavated from an adjoining swale located along the perimeter of the site or disturbed area.

Purpose

The purpose of a perimeter dike/swale is to prevent off site storm runoff from entering a disturbed area and to prevent sediment laden storm runoff from leaving the construction site or disturbed area.

Conditions Where Practice Applies

Perimeter dike/swale is constructed to divert flows from entering a disturbed area, or along tops of slopes to prevent flows from eroding the slope, or along base of slopes to direct sediment laden flows to a trapping device.

The perimeter dike/swale shall remain in place until the disturbed areas are permanently stabilized.

Design Criteria

See Figure 4.16 on page 4.34 for details.

The perimeter dike/swale shall not be constructed outside the property lines without obtaining legal easements from effected adjacent property owners. A design is not required for perimeter dike/swale. The following criteria shall be used:

Drainage area - Less than 2 acres (for drainage areas larger than 2 acres but less than 10 acres see earth dike; for drainage areas larger than 10 acres, see standard and specifications for diversion).

Height - 18 inches minimum from bottom of swale to top of dike evenly divided between dike height and swale depth.

Bottom width of dike - 2 feet minimum.

Width of swale - 2 feet minimum.

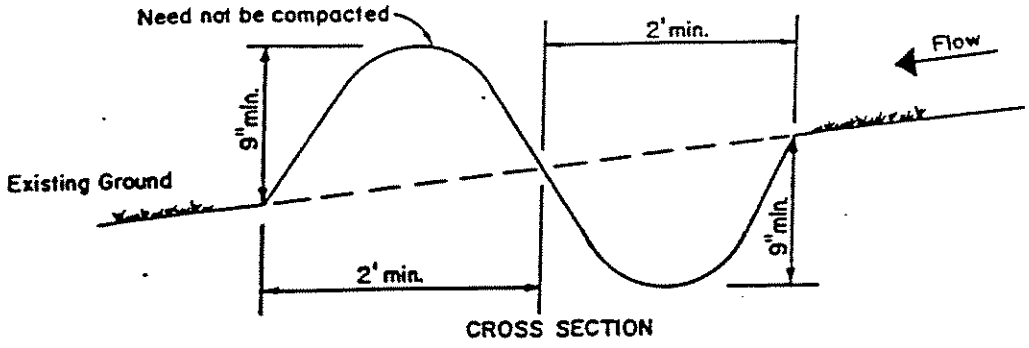
Grade - Dependent upon topography, but shall have positive drainage (sufficient grade to drain) to an adequate outlet. Maximum allowable grade not to exceed 20 percent.

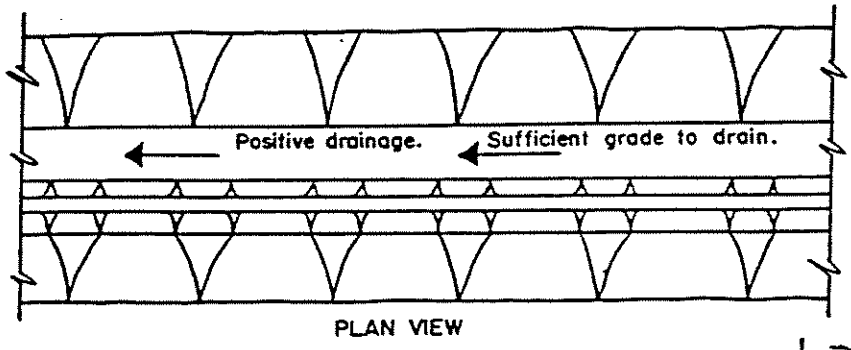
Stabilization - The disturbed area of the dike and swale shall be stabilized within 10 days of installation, in accordance with the standard and specifications for seed and straw mulch or straw mulch only if not in the seeding season.

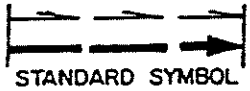
Outlet

1. Perimeter dike/swale shall have an outlet that functions with a minimum of erosion.
2. Diverted runoff from a protected or stabilized upland area shall outlet directly onto an undisturbed stabilized area.
3. Diverted runoff from a disturbed or exposed upland area shall be conveyed to a sediment trapping device such as a sediment trap, sediment basin, or to an area protected by any of these practices.
4. The on-site location may need to be adjusted to meet field conditions in order to utilize the most suitable outlet.

Figure 4.16
Perimeter Swale Dike Detail







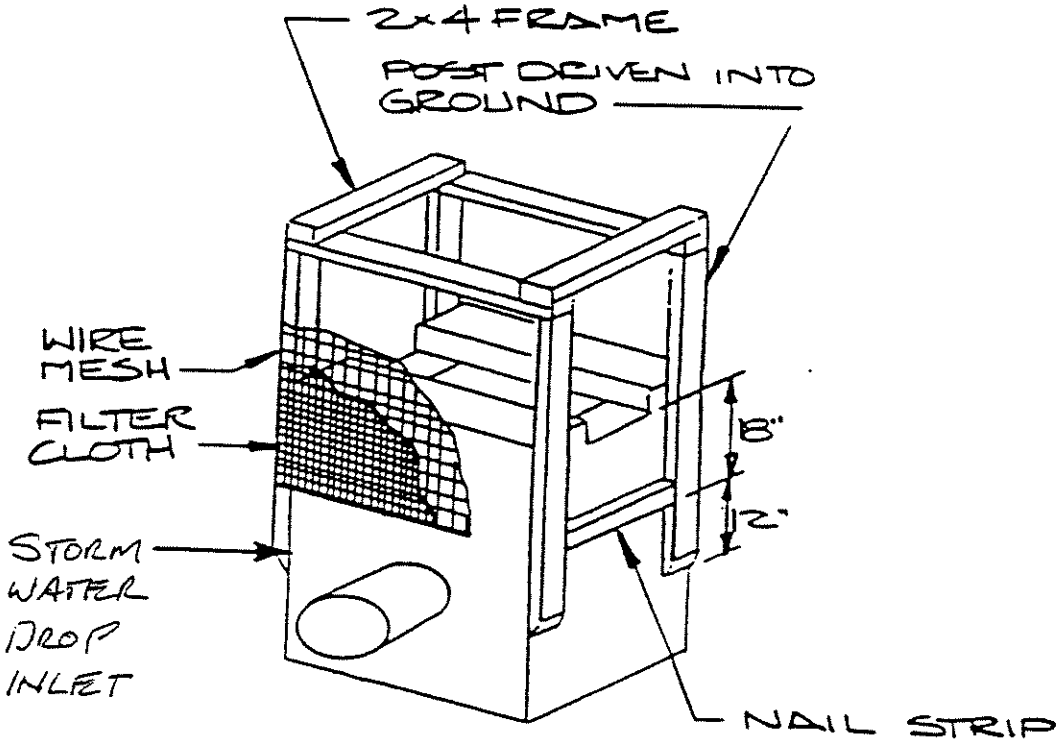
CONSTRUCTION SPECIFICATIONS

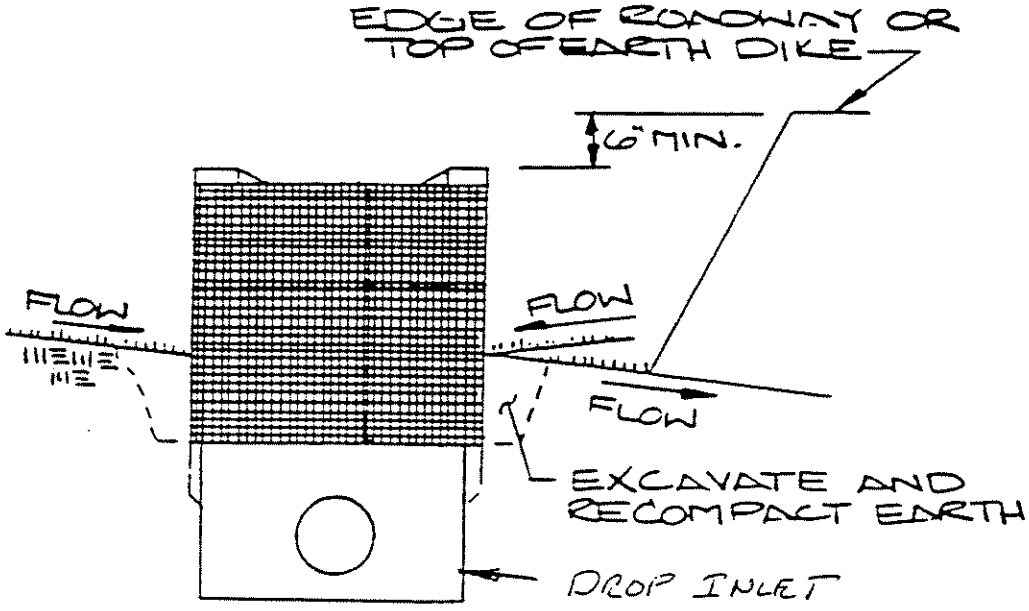
1. ALL PERIMETER DIKE/SWALE SHALL HAVE UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.
2. DIVERTED RUNOFF FROM A DISTRUBED AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE.
3. DIVERTED RUNOFF FROM AN UNDISTURBED AREA SHALL OUTLET INTO AN UNDISTURBED STABILIZED AREA AT NON-EROSION VELOCITY.
4. THE SWALE SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED IN THE STANDARD.
5. STABILIZATION OF THE AREA DISTURBED BY THE DIKE AND SWALE SHALL BE DONE IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SEED AND STRAW MULCH, AND SHALL BE DONE WITHIN 10 DAYS.
6. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

Max. Drainage Area Limit: 2 Acres

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PERIMETER DIKE/SWALE	Standard Drawing PDS-1

Sediment Trap
for
Drop Inlets



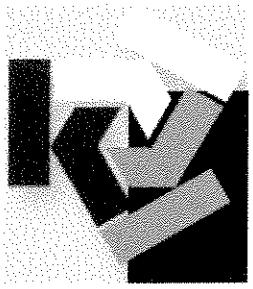


MALCOLM PIRNIE

Health and Safety Plan

ATTACHMENT

V



The Krog Corp.

COBEY, Inc. Site

One Ship Canal Parkway
Buffalo, NY 14203

HEALTH AND SAFETY PLAN

for

Voluntary Cleanup Activities

Prepared by:

Safety*WISE*, Inc.
269 Parkside Ave.
Buffalo, NY 14214
(716) 836-4641

September 30, 2005

BUFFALO LAKESIDE COMMERCE PARK, SUBPARCEL 1 — COBEY, INC. SITE

HEALTH AND SAFETY PLAN FOR VOLUNTARY CLEANUP ACTIVITIES

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BUFFALO LAKESIDE COMMERCE PARK, SUBPARCEL 1 — COBEY, INC. SITE

HEALTH AND SAFETY PLAN FOR VOLUNTARY CLEANUP ACTIVITIES

1.0 INTRODUCTION

1.1 General — Purpose and Requirements

The purpose of this health and safety plan (HASP) is to establish minimum standards, practices, and procedures related to personnel protection and safety during voluntary cleanup and construction activities at the Buffalo Lakeside Commerce Park, Subparcel 1, COBEY Site. This plan is based upon the *"Remedial Action Work Plan"* (RAWP) developed for this site in 2002 by Malcolm Pirnie, Inc.

This plan assigns responsibilities for on-site remedial construction personnel; serves as a minimum standard for the remedial contractor – The Krog Corp. – and all subcontractors; defines the potential hazards and associated risks that may exist at the site; describes action levels for the use and upgrading of personal protective equipment (PPE); and identifies the proper use of work zones to be delineated during the conduct of potentially hazardous activities at the site. The provisions of this plan are mandatory for all on-site personnel performing related remedial construction operations, monitoring, and maintenance. Visitors to the site will check with the Site Safety Officer (SSO) to learn which sections of this HASP will affect them.

This HASP also will serve as a minimum for subcontracted services at the site. All on-site personnel who engage in project activities must be familiar with this plan and comply with its requirements. All subcontractors must sign-off on the "Plan Acceptance Form" (Appendix F) prior to beginning work on the site. The "Plan Acceptance Form" must be submitted to and maintained by the SSO.

All visitors must be accompanied by authorized personnel while on-site. The SSO will ensure that all visitors have been briefed on site safety and security, and have been provided with temporary identification.

The Krog Corp. will stop work whenever a work procedure or a condition at the work site is deemed by the Health and Safety Coordinator, his trained safety representative(s), or the SSO to be unsafe to workers or the community.

1.2 Site History

The COBEY Site Project is at the Former Hanna Furnace Site, a vacant industrial property currently owned Buffalo Urban Development Corp. The Former Hanna Furnace Site surrounds the eastern portion of the Union Ship Canal, and encompasses approximately 113 acres, including the Former Railroad Yard. The COBEY Site is at the Former Railroad Yard Area which has been designated Subparcel 1; it occupies the acreage south of Ship Canal Parkway between Commerce Street and Hanna Drive.

1.3 Parameters of Interest

The environmental investigations found that the constituents of concern in the soils/fill include inorganic analytes and polyaromatic hydrocarbons (PAHs). With the exception of potentially elevated pH, groundwater was not significantly impacted by industrial activities at the site. The results of site investigations have indicated that the constituents of potential concern (COPCs) are:

- Polyaromatic hydrocarbons (PAHs), which were found in soils/fill across Subparcel 1. PAHs present at the site are almost exclusively limited to byproducts of incomplete combustion and impurities in petroleum products. The presence of PAHs at this site is consistent with its urban location and past use as a railroad yard.
- Metals and cyanide, which were found in soils/fill across Subparcel 1. The metals present at elevated concentrations relative to "background" concentrations include arsenic, chromium, copper, and zinc. Many of these metals are components of slag and are present in elevated concentrations as a result of slag deposited on the site.
- Elevated pH measured in groundwater collected from wells, borings, and test pits in the western portion of the Subparcel 1. The cause of the elevated pH may be lime used as a raw material in the pig iron manufacturing process or the material that was used as fill at the turn of the century prior to any construction at the site.

Table 3-1, "Parameters of Interest," identifies concentration ranges for parameters detected during previous field investigations at the site.

1.4 Overview of Cleanup Activities

According to the Remedial Action Work Plans, in order to eliminate potential exposure risks associated with direct contact with site fill material, the entire Subparcel 1 area will be covered as part of site redevelopment. The cover system will be placed directly on top of the regraded on-site fill material and will include clean soil for outdoor, vegetated areas; asphalt for roads and parking lots; or concrete for sidewalks, buildings and heavy use areas. According to Malcolm Pirnie's RAWP, surface coverage over the entire redeveloped subparcel or portion thereof will be required as a precondition of occupancy.

Work to be performed under this HASP includes the excavation and handling of potentially contaminated soils and groundwater (and their treatment or disposal, if necessary) during site construction activities. The HASP requirements establish protocols for use by on-site construction workers during invasive activities at the site. The Community Air Monitoring Plan establishes specific requirements for air monitoring and procedures to mitigate off-site migration of airborne particulates and vapors during the remediation and redevelopment periods.

Protection of on-site workers and the off-site community, which includes surrounding residents and businesses as well as potential future commercial and public users of the site during the redevelopment period, are addressed through a Soil/Fill Management Plan to be executed by The Krog Corp., which includes this HASP. The Soil/Fill Management Plan provides requirements for handling of soils/fill excavated during redevelopment (i.e., for foundation and subsurface utilities) and for placement of the cover system.

2.0 ORGANIZATIONAL STRUCTURE

This chapter of the HASP describes the lines of authority, responsibility and communication as they pertain to health and safety functions at the site. The purpose of this section is to identify the personnel who affect the development and implementation of the HASP and to describe their roles and responsibilities. This section also identifies other contractors and subcontractors involved in work operations and establishes the lines of communications among them for health and safety matters. The organizational structure described is consistent with the requirements of 29 CFR 1910.120(b)(2). This section will be reviewed by the Project Manager and updated as necessary to reflect the current organizational structure at this site.

2.1 Roles and Responsibilities

All personnel on the site must comply with the minimum requirements of this HASP. The specific responsibilities and authority of management, safety and health, and other personnel on this site are detailed in the following paragraphs.

2.2 Project Team Organization

Table 2-1, "On-site Personnel," describes the responsibilities of on-site personnel associated with this project. Each of these individuals shall have appropriate training in first aid/CPR; safe handling procedures for hazardous chemicals/waste, including the proper selection, fitting, and use of personal protective equipment; and shall be experienced with the types of field operations to be conducted at the site. The names of principal on-site personnel associated with this project are as follows:

Project Manager: Patrick Sheedy, The Krog Corp. — 667-1234
Site Superintendent: Andy Metzger, The Krog Corp. — 583-2801
General Foreman: Tim Peters, The Krog Corp. — 818-6714
Site Safety Officer: John Cope (phone to be determined)
Alternate Site Safety Officer: Dominic Capodicasa (phone to be determined)
Health and Safety Coordinator: SafetyWise, Inc.: William Orsborn, CSP — 481-2525
Reisman CIH Services: Heidi M. Reisman, CIH — 390-8494
Medical Consultant: HealthWorks WNY, 55 Melroy, Lackawanna, NY 14218 — 823-5050

2.3 Site-specific Training

The Health and Safety Coordinator is responsible for developing and conducting a site-specific occupational hazard training program for all personnel that will work at the site. This training will consist of the topics described in Section 4.1.2.

In addition, all personnel involved with surface intrusive work on this site shall submit proof of 24-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training and all refresher training, per the requirements of 29 CFR 1910.120, to the Site Safety Officer. The SSO will maintain a file on-site of all training records.

TABLE 2-1
Buffalo Lakeside Commerce Park, Subparcel 1 – COBEY Site Voluntary Cleanup
On-site Personnel Descriptions

Title	General Description	Responsibilities
Project Manager — Provides management oversight for all phases of the construction project, ensuring that specifications are being followed, and work is proceeding on schedule. • Develops Work Plan and schedule for completion of project. • Selects and coordinates work of subcontractors working on various phases of the project. • Oversees performance of all trade contractors. • Reviews architectural and engineering drawings to make sure that all specifications and regulations are being followed. • Administers construction contracts and obtains all necessary permits and licenses. • Supervises Site Superintendent, checks on and corrects any reported difficulties. • Responsible for implementation of HASP. • Reports to owner and architect about progress and any necessary modifications of plans.		
Site Superintendent — Reports to Project Manager. Has authority to direct all site personnel, site work activities and any response operations required. Assumes total control over site activities. • Prepares the project schedule, and organizes and directs all field work activities performed by The Krog Corp. employees or their subcontractors. • Assists in obtaining permission for site access and coordinating work activities with appropriate officials of the regulator branches or other governing agencies. • Ensures that the Work Plan is completed and on schedule. • Coordinates with the SSO for the HASP to ensure that requirements are met and proper documentation has been provided for each daily work activity. • Coordinates requirements of the HASP with SSO and project subcontractors. • Provides quality assurance data to the engineer or regulatory agency in a timely manner to allow work to proceed without delay.		
General Foreman — Responsible for implementing daily work activities. • Manages field operations. • Executes the Work Plan and schedule. • Assists in the enforcement of safety procedures. • Coordinates with the Site Safety Officer in determining protection level. • Enforces site control. • Coordinates daily work activities with Site Superintendent.		
Health and Safety Coordinator (HSC) — Prepares the HASP, assists the SSO in the implementation of the HASP, and advises the Site Safety Officer (SSO) on all issues associated with the HASP. • Advises concerning compliance with governing laws, rules and regulations as well as of good safety practice. • Conducts inspections as often as necessary but at least once a week to assure that the SSO is carrying out the HASP. • Reviews and interprets all qualitative and quantitative monitoring results. • Available for consultation by the SSO. • Available to assist the SSO in follow-up training and if changes in site conditions occur.		

Title	General Description	Responsibilities
Site Safety Officer (SSO) — Daily implements and enforces the HASP. • Coordinates HASP activities with the Project Manager and HSC. • Supervises the Health and Safety Technician. • Maintains records of daily work activities, monitoring forms and other required documentation in an orderly manor for review upon request. • Conducts health and safety meetings with site personnel to review health and safety issues as they pertain to current work activities. • Conducts the initial orientation training of on-site workers with respect to the contents of the HASP. • Provides health and safety orientation training to authorized visitors. • Controls entry and exit at the Access Control Points and maintains entry log. • Establishes site control, decontamination lines and decontamination solutions appropriate for the type of chemical contamination on the site. • Controls the decontamination of all equipment and personnel from the work area.		
Health and Safety Technician — The on-site person who serves as assistant to the SSO. • Serve as the Alternate SSO, performing the duties of the SSO when he has to leave the jobsite. • Assists in the implementation of the HASP. • Conducts air monitoring in active work areas and community monitoring areas. • Assists with the maintenance of safety equipment and the contamination reduction area. • Performs other duties as assigned by the SSO to assist him with his duties.		
Project Personnel — Includes The Krog Corp., their representatives, subcontractors, and Federal, and State, and local Representatives, working or having official business at the Project Site. • Safely completes the on-site tasks required to fulfill the Work Plan. • Complies with Site HASP. • Notifies Site Safety Officer or their Supervisor of suspected unsafe conditions.		
Medical Consultant — The Medical Consultant (MC) is a physician, certified in occupational medicine. The MC: • Will have experience in the occupational health area. • Will manage the medical surveillance requirements of the project. • Will be familiar with potential site hazards of remedial action projects. • Will also be available to provide annual physicals and to provide additional medical evaluations of personnel when necessary.		

3.0 HAZARD EVALUATION

Due to the presence of certain contaminants at the site, the possibility exists that workers will be exposed to hazardous substances during field activities. The principal routes of exposure would be through direct contact with and incidental ingestion of fill/soils, and through the inhalation of contaminated particles or vapors. Other points of exposure may include direct contact with groundwater. In addition, the use of large construction equipment on-site and open excavations will also present conditions for potential physical injury to workers. Furthermore, since work will be performed outdoors, the potential exists for heat/cold stress to affect workers, especially those wearing protective equipment and clothing. Using proper engineering and administrative controls, exposures are not expected to exceed the allowable limits listed in Table 3-2, "Chemical Hazard/Exposure Data Summary." Environmental monitoring will be conducted throughout the field activities to verify this expectation (See Chapter 10). In addition, all workers on the site will have worker training relative to the safe work practices, chemical hazards, work zones and site control, and contingency planning. They will be required to wear personal protective equipment as described in Chapter 8 and follow decontamination procedures outlined in Chapter 9.

3.1 Chemical Hazards

As discussed in Section 1.2 and 1.3, because of previous activities and storage in the Former Railroad Yard Area, polyaromatic hydrocarbons (PAHs), metals and cyanide were found in soils/fill across Subparcel 1. There also is elevated pH measured in groundwater collected from wells, borings, and test pits in the western portion of the Subparcel 1.

Previous field investigations have provided significant information concerning the types of contaminants that may be encountered during construction activities. Table 3-1, "Parameters of Interest," identifies concentration ranges for parameters detected during previous field investigations at the site and for which site-specific action levels (SSALs) have been developed to guide cleanup efforts summarized in Section 1.3 of this HASP. The hazards associated with these chemical substances are discussed in Table 3-2 at the end of this section. Table 3-3 is a "Task and Risk Analysis" which identifies the protective measures to be taken to minimize on-site hazards.

3.2 Physical Hazards

Remedial construction activities at the Former Hanna Furnace Site present many potential physical hazards. Table 3-3 identifies many of the physical hazards that are possible on this site and the protective measures to be taken to minimize on-site hazards. Since it is impossible to list all potential sources of injury, it shall be the responsibility of each individual to exercise proper care and caution during all phases of the work.

3.3 Hazard Control

With respect to the anticipated voluntary cleanup activities discussed in Section 1.4, Table 3-3 presents the Risk Analysis for the cleanup activities including the activity, hazards and protective measures to be taken to minimize exposures.

TABLE 3-1
Buffalo Lakeside Commerce Park, Subparcel 1 – COBEY Site Voluntary Cleanup
Previously-detected Concentrations of Parameters of Interest (POI)

Parameter	Concentration in Groundwater Samples Range (µg/L)	Concentration in Soils/Fill Range (µg/kg)
POLYAROMATIC HYDROCARBONS (PAHs):		
Benzo(a)anthracene	ND	ND-3700
Benzo(a)pyrene	ND	ND-5100
Benzo(b)fluoranthene	ND	ND-6400
Benzo(k)fluoranthene	ND	ND-1900
Chrysene	ND	ND-3800
Dibenz(a,h)anthracene	ND	ND-960
Indeno(1,2,3-cd)pyrene	ND	ND-3700
METALS:		
Arsenic	ND	ND-61.7
Barium	ND-175 — not a POI	ND-327
Cadmium	ND	ND-19.9
Chromium	ND	ND-4700
Lead	ND-5.1 — not a POI	ND-3300
Mercury	ND	ND-0.67
Selenium	ND-114	ND-35.9
Silver	ND-41.2 — not a POI	ND-1170
Cyanide (total)	ND-90 — not a POI	ND-43

Notes:
(1) Constituents are identified as Parameters of Interest in the Voluntary Cleanup site assessment reports for Subparcel 1 (Reference 20-2).
(2) Concentrations ranges as presented in site assessment reports (Reference 20-2).
(3) ND = Not Detected

TABLE 3-2
Buffalo Lakeside Commerce Park, Subparcel 1 – COBEY Site Voluntary Cleanup
Chemical Hazard / Exposure Data Summary

Chemical of Concern	Potentially Contaminated Media	Exposure Limit		Routes of Exposure	Exposure Symptoms & Primary Hazards
		PEL or TLV (in air)	IDLH (in air)		
Polyaromatic Hydrocarbons (PAHs)	• Soil/fill — Across the entire site. • Groundwater	Individual limits do not exist		Inhalation, ingestion, contact	CARCINOGEN HANDLE WITH EXTREME CAUTION. PAHs are characterized by an organic odor. Exposures can cause acne-type blemished in areas of the skin exposed to sunlight. Repeated exposures can cause bronchitis and cancer of the lungs, skin, bladder, and kidneys. Exposure may cause allergic skin rash.
Arsenic	Soils/fill across entire site.	0.01 mg/m^3	5 mg/m^3	Inhalation, ingestion, contact	CARCINOGEN – HANDLE WITH EXTREME CAUTION. Metallic arsenic is a silver-gray odorless solid. Exposure may cause nausea, vomiting diarrhea, and pain in the stomach. Repeated exposures cause ulceration of the nasal septum, dermatitis and skin discoloration.
Barium	Soils/fill across entire site, groundwater	0.5 mg/m^3	N/A	Inhalation, ingestion, contact	Barium compounds are odorless white solids. Exposure can cause irritation to the eyes, nose, throat, bronchial tubes and skin. Higher exposures may cause severe stomach pains, slow pulse rate, irregular heart beat, ringing of the ears, dizziness, convulsions, muscle spasms, and death.
Cadmium	Soils/fill across entire site.	0.005 mg/m^3	9 mg/m^3	Inhalation, ingestion	POSSIBLE CARCINOGEN – HANDLE WITH CAUTION. Cadmium is an odorless solid. Contact with dust may cause irritation of the notes and throat. Inhalation of high levels may cause cough, chest pain, sweating, chills, shortness of breath, weakness, and death. Ingestion of dust may cause nausea, vomiting, diarrhea, and abdominal cramps. Repeated exposure may cause loss of sense of smell, ulceration of the nose, kidney damage and anemia.

Chemical of Concern	Potentially Contaminated Media	Exposure Limit		Routes of Exposure	Exposure Symptoms & Primary Hazards
		PEL or TLV (in air)	IDLH (in air)		
Chromium	Soils/fill across entire site.	0.5 mg/m^3	250 mg/m^3	Inhalation, ingestion, contact	POSSIBLE HUMAN CARCINOGEN – HANDLE WITH CAUTION. Metallic chromium is a shiny, odorless solid. Some forms of chromium may cause irritation to the skin and mucous membranes. High exposures may cause coughing, wheezing, headaches, pain and fever. Repeated exposures may cause lung changes.
Lead	Soils/fill across entire site, groundwater	0.05 mg/m^3	100 mg/m^3	Inhalation, ingestion	TERATOGEN – HANDLE WITH EXTREME CAUTION. Lead is a soft, gray solid. Repeated exposure causes lead buildup in the body. Low levels may cause tiredness, mood changes, headaches, stomach problems, anemia, and trouble sleeping. Higher levels may cause aching, weakness, and concentration or memory problems. Lead also can cause serious permanent kidney or brain damage at high levels. Lead exposure increases the risk of high blood pressure. Contact may cause irritation to the skin.
Mercury	Soils/fill across entire site, groundwater	0.025 mg/m^3	10 mg/m^3	Inhalation, absorption, ingestion, contact	Mercury is an odorless liquid. Exposures may cause headaches, cough, chest paints and difficulty breathing. Higher levels may cause soreness of the mouth, loss of teeth, nausea, and diarrhea. Liquid mercury may irritate the skin and eyes. Repeated exposures may cause fine shaking of the hands, eyelids, lips, tongue, or jaw. In addition, repeated exposures may cause allergic skin rash, insomnia, excessive salivation, personality change, irritability, loss of memory, and intellectual deterioration.
Selenium	Soils/fill across entire site, groundwater	0.2 mg/m^3	1 mg/m^3	Inhalation, ingestion, contact	Selenium and its inorganic compounds are colorless and odorless. Contact with selenium and its inorganic compounds may cause skin rash or blisters, and irritate the eyes. High inhaled levels may cause breathing difficulties. Repeated exposures may cause paleness, coated tongue, stomach problems, nervousness, metallic taste and garlic odor of the breath. Prolonged skin contact may cause skin sensitization.

Chemical of Concern	Potentially Contaminated Media	Exposure Limit		Routes of Exposure	Exposure Symptoms & Primary Hazards
		PEL or TLV (in air)	IDLH (in air)		
Silver	Soils/fill across entire site, groundwater	0.01 mg/m^3	10 mg/m^3	Inhalation, ingestion, contact	Silver is a white metallic solid with no odor. Effects of exposure to elemental silver are minor. Silver nitrate can cause skin burns and permanent damage to the eyes. High exposures can cause discoloration of the eyes, nose throat and skin.
Cyanide	Soils/fill across entire site, groundwater	5.0 mg/m^3	N/A	Inhalation, absorption, ingestion, contact	Cyanide compounds are white solids with an almond odor. Exposure may cause weakness, headache, confusion, nausea, and vomiting. Higher exposures can cause unconsciousness and death. Cyanide compounds can be irritating to the eyes, nose, and skin.

ppm = parts per million
mg/m^3 = milligrams per cubic meter
PEL = Permissible Exposure Limit, established by OSHA, equals the maximum exposure conc. allowable for 8 hours per day @ 40 hours per we
TLV = Threshold Limit Value, established by ACGIH, equals the maximum exposure concentration allowable for 8 hours per day @ 40 hours per week
IDLH = Immediately Dangerous to Life or Health
N/A = Not Available. Exposure should be minimized to the extent feasible through appropriate engineering controls & PPE

TABLE 3-3
Buffalo Lakeside Commerce Park, Subparcel 1 – COBEY Site Voluntary Cleanup
Task and Risk Analysis

Task	Sub-task	Activity	Hazard	Protective Measures
Excavation and trenching	• Excavation of contaminated soil • Trenching for foundation work • Contaminated soil remediation or disposal • Backfilling of excavations • Utility trenches	Use of heavy equipment, trucking, loading and unloading	• ***Chemical*** – Potential exposure from contact with contaminated soils; exposure to airborne dust contaminated with inorganics and PAHs; exposure to vapors from volatile organics in the soil • ***Physical*** – Potential trench cave-in, work around heavy equipment and trucks; struck by equipment; and slip/trips and falls • ***Biological*** – Allergic reactions to plants, spiders, and insects; bites from snakes, rodents and other animals.	• ***Chemical*** – Particulate and chemical monitoring during excavations; monitoring for O_2, LEL, H_2S in any trench >4 ft. deep; use of engineering controls such as water for particulate control, and PPE • ***Physical*** – Competent person supervision of trenches >4 ft. deep, including ladders every 25 ft.; sloping and shoring as needed, keeping at least 2 feet from edge of excavation; proper heavy-equipment operation, and proper loading and unloading; keep eye contact with operator/driver; wearing slip-resistant footwear, watching footing on uneven surfaces • ***Biological*** – Training in the recognition and avoidance of these hazards; awareness of surroundings.
Concrete work	• Prep for concrete pour • Cleanup after concrete set	• Building and setting forms • Stripping forms	• ***Chemical*** – Skin rashes from acids and additives • ***Physical*** – Collapse of forms; strains from material handling; eye injury from splashes or grinding; abrasion from rebar or impalement • ***Biological*** – Allergic reactions to plants, spiders, and insects; bites from snakes, rodents and other animals	• ***Chemical*** – Proper PPE (clothing and gloves) • ***Physical*** – Properly securing of forms; proper technique for lifting and handling materials; proper gloves and eye PPE; rebar caps, fall awareness and prevention • ***Biological*** – Training in the recognition and avoidance of these hazards; awareness of surroundings.

Task	Sub-task	Activity	Hazard	Protective Measures
Groundwater Collection/ Containment System	• Excavations for groundwater collection and barrier system • Construction of groundwater collection and barrier system • On-site pretreatment of groundwater	Use of heavy equipment, trucking, loading and unloading, manual lifting, power and hand tools, pumping and treatment contaminated water	• ***Chemical*** – Potential exposure from contact with contaminated soils and water; exposure to airborne dust contaminated with inorganics and PAHs • ***Physical*** – Potential trench cave-in; work around heavy equipment and trucks; struck by equipment, falling objects; back injury; slip/trip/falls • ***Biological*** – allergic reactions to plants, spiders, and insects. Bites from snakes, rodents and other animals.	• ***Chemical*** – Particulate and chemical monitoring; use of engineering controls such as water for particulate control, proper work practices, and PPE • ***Physical*** – Sloping and shoring as needed, keeping at least 2 feet from edge of excavation; proper operation with and around heavy equipment; proper work practices and proper loading and unloading, proper lifting and material-handing techniques; wearing slip-resistant footwear, watching footing on uneven surfaces • ***Biological*** – training in the recognition and avoidance of these hazards; awareness of surroundings.
Decontamination of equipment	Cleaning of contaminated equipment	Spraying and scrapping mud and dirt	• ***Chemical*** – Potential exposure from contact with contaminated soils. • ***Physical*** – Potential injection hazard because of high pressure water or steam. • ***Biological*** – Depending on area of decontamination, allergic reactions to plants, spiders, and insects; bites from snakes, rodents and other animals.	• ***Chemical*** – Use of special PPE; training in the recognition of this hazard. • ***Physical*** – Training in the recognition of this hazard; keeping water/steam wand away from body parts. • ***Biological*** – Training in the recognition and avoidance of these hazards; awareness of surroundings.

4.0 TRAINING

4.1 Site Workers

All personnel performing intrusive work during voluntary cleanup activities at the site (such as, but not limited to, equipment operators and general laborers) and who may be exposed to hazardous substances, health hazards, or safety hazards and their supervisors/managers responsible for the site shall receive training in accordance with 29 CFR 1910.120(e) before they are permitted to engage in operations in the exclusion zone or contaminant reduction zone. Because these workers are on a site which has been fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and because they work in site areas which are being monitored and the characterization indicates that there are no uncontrolled health hazards or the possibility of an emergency developing, the required training includes a minimum initial 24-hour Hazardous Waste Site Worker Protection Course and 1 day of actual field experience under the direct supervision of a trained, experienced supervisor. If the characterization or health hazards change to a worsened condition, an additional 16-hours of HAZWOPER training shall be required. Additional site-specific training shall also be provided by the SSO prior to the start of field activities. A description of topics to be covered by this training is provided below.

4.1.1 Initial and Refresher Training

Initial training is conducted by a qualified instructor as specified under OSHA 29 CFR 1910.120(e)(5), and is specifically designed to meet the requirements of OSHA 29 CFR 1910.120(e)(3). The training covers, as a minimum, the following topics:

- OSHA HAZWOPER regulations.
- Site safety and hazard recognition, including chemical and physical hazards.
- Medical monitoring requirements.
- Air monitoring, permissible exposure limits, and respiratory protection level classifications.
- Appropriate use of personal protective equipment (PPE), including chemical compatibility and respiratory equipment selection and use.
- Work practices to minimize risk.
- Work zones and site control.
- Safe use of engineering controls and equipment.
- Decontamination procedures.
- Emergency response and escape.
- Heat and cold stress monitoring.
- Elements of a Health and Safety Plan.

Initial training also incorporates workshops for PPE and respiratory equipment use (dust masks). Records and certification received from the course instructor documenting each employee's successful completion of the training identified above are maintained on file at Krog's corporate office and a copy will be filed by the SSO at the site field office. Contractors and Subcontractors are required to provide similar documentation of training for all their personnel who will be involved in on-site intrusive work activities. Any worker who has not been certified as having received health and safety training in conformance with 29 CFR 1910.120(e) is prohibited from working in the exclusion and contamination reduction zones, or to engage in any on-site work activities that may involve exposure to hazardous substances or wastes.

4.1.2 Site Training

Site workers have access to a copy of the HASP and are provided a site-specific briefing prior to the commencement of work to ensure that employees are familiar with the HASP and the information and requirements it contains. The site briefing shall be provided by the SSO prior to initiating field activities and shall include:

- Names of personnel and alternates responsible for site safety and health.
- The site layout including work zones and places of refuge.
- Safety, health and other hazards present on the site.
- The emergency communications system and emergency evacuation procedures.
- Selection and use of PPE.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Purpose of medical surveillance.
- Recognition of symptoms and signs of overexposure as described in Chapter 5 of this HASP.
- Site control and work zones as detailed in Chapter 6 of this HASP.
- Decontamination procedures as detailed in Chapter 9 of this HASP.
- The emergency response plan as detailed in Chapter 13 of this HASP.
- The spill response program as detailed in Chapter 14 of this HASP.
- Recognition of symptoms and signs of heat and cold stress as detailed in Chapter 15 of this HASP.

Supplemental health and safety briefings will also be conducted by the SSO on an as-needed basis during the course of the work. Supplemental briefings are provided as necessary to notify employees of any changes to this HASP as a result of information gathered during ongoing site work activities. Conditions for which the SSO may schedule additional briefings include, but are not limited to: a change in site conditions (viz., based on monitoring results); changes in the work schedule/plan; newly discovered hazards; and safety incidents occurring during site work.

4.2 Supervisor Training

On-site safety and health personnel who are directly responsible for or who supervise the safety and health of workers engaged in hazardous waste operations (viz., SSO) shall receive, in addition to the appropriate level of worker training described in Section 4.1, above, 8 additional hours of specialized supervisory training, in compliance with 29 CFR 1910.120(e)(4).

4.3 Emergency Response Training

Emergency response training is also addressed in Section 13.9 of this HASP's Emergency Response Plan. As it states, all persons who enter this worksite, including visitors, receive a site-specific briefing about anticipated emergency situations and the emergency procedures by the SSO. The SSO, Alternate SSO and General Foreman will have basic first-aid and CPR training. Where this site relies on off-site organizations for emergency response, the training of personnel in those off-site organizations has been evaluated and is deemed adequate for response to this site.

4.4 Site Visitors' Training

The SSO will provide a site-specific briefing to all site visitors and other unfamiliar personnel who enter the site beyond the site entry point. The following shall be posted in the Field Office:

Visitor Training

(To Be Posted in Field Office)

The Site Safety Officer (SSO) or his representative will provide a site-specific briefing to all site visitors and other unfamiliar personnel who enter the site beyond the site entry point at Commerce Street.

- **All visitors must be accompanied by authorized personnel while on-site.**
- **Site hazards** — Primarily:
  - Vehicular and heavy equipment traffic.
  - Intrusive work (excavation and grading), resulting in "contact hazard" with water with elevated pH or contaminated soil.
  - Other building construction activities, depending on the phase of construction.
- **Site layout** — Site map shows three kinds of work zones:
  - *Exclusion Zone* ("ExZ" or "Hot Zone") — The area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. The zone will be delineated by flagging tape or fencing. All authorized visitors must enter and exit the ExZ only through the access control points.
  - *Contamination Reduction Zone* ("CRZ") — The zone where decontamination of personnel and equipment takes place. All authorized visitors must enter and exit the CRZ only through the access control points.
  - *Support Zone* ("SZ" or "Clean Zone") — The part of the site that is considered non-contaminated or "clean."
- **Places of refuge** — Designated by the SSO; otherwise, any enclosures within Support Zone, e.g., main office trailer, personal vehicles.
- **Emergency communications system** — The signaling system for emergency purposes includes voice and hand signals, horns, and radio communication. Cellular phones will be the primary method of off-site communications.
  - *Emergency signals* by portable air horn, siren, or whistle:
    - ✓ *Two short blasts* — personal injury or localized problem.
    - ✓ *One continuous blast* — emergency requiring site excavation.
    - ✓ *Two long blasts* — all clear.
  - *Visual signals*: hand gripping throat, out of air/cannot breathe; hands on top of head, need assistance; thumbs up, affirmative/everything is OK; thumbs down, no/negative; grip partner's wrist or waist, leave area immediately.
- **Emergency evacuation procedures** — If evacuation notice is given, visitors must leave the worksite with their respective guide, if possible by way of the nearest exit, following the guide's instructions.
- **Entry into work zones** — Site visitors must remain in the SZ unless authorized by the SSO to enter the ExZ or CRZ, and then only if they have received the level of HAZWOPER training required for site personnel who are doing the intrusive work.

5.0 MEDICAL SURVEILLANCE

Medical monitoring examinations are provided to all site workers involved in intrusive work. These exams include initial employment, annual and employment termination physicals for all workers involved in intrusive field operations. Post-exposure examinations are also provided for employees who may have been injured, received a health impairment, or developed signs or symptoms of overexposure to hazardous substances or were accidentally exposed to substances at concentrations above the permissible exposure limits without necessary personal protective equipment. Such exams are performed as soon as possible following development of symptoms or the known exposure event.

Medical evaluations are performed by HealthWorks WNY, an occupational health care provider under contract with The Krog Corp. Healthwork's local facility is in the former Our Lady of Victory Hospital, 55 Melroy, Lackawanna off of Ridge Road. The facility can be reached at (716) 823-5050 to schedule routine appointments or post-exposure examinations.

Medical evaluations are conducted according to Krog's Medical Monitoring Program and include an evaluation of the workers' ability to use respiratory protective equipment. The examination is specific to the hazards on this site and will include:

- Occupational/medical history review.
- Physical exam, including vital sign measurement.
- Examination of the skin for signs of skin disease.
- Spirometry testing, including FEV and FVC.
- Eyesight testing.
- Audio testing (minimum baseline and exit, annual for employees routinely exposed to greater than 85db).
- EKG (for employees >40 years age or as medical conditions dictate).
- Chest roentgenogram (baseline and exit, and every 5 years).
- Blood biochemistry (including chloride, potassium, sodium, BUN, glucose, globulin, total protein, albumin, calcium, cholesterol, alkaline phosphates, triglycerides, uric acid, creatinine, total bilirubin, phosphorous, lactic dehydrogenase, SGPT, SGOT, and any other testing the physician deems necessary).
- Liver Function.
- Urinalysis, including specific gravity, albumin, glucose, and microscopic on centrifuge sediment.
- Tetanus booster shot (if no inoculation has been received within the last five years).
- Medical certification of physical requirements (viz., musculoskeletal, cardiovascular) for safe job performance and to wear respiratory protection equipment.

The purpose of the medical evaluation is to determine an employee's fitness for duty in intrusive work on the site and to establish baseline medical data.

In conformance with OSHA regulations, Krog will maintain and preserve medical records for a period of 30 years following termination of employment. Employees are provided a copy of the physician's post-exam report, and have access to their medical records and analyses.

6.0 SITE CONTROL AND WORK ZONES

6.1 Security

Site security shall be provided and maintained by Krog. All personnel and visitors must enter and exit the jobsite only through the access control points.

- Vehicular access to the site shall be restricted to authorized vehicles only. Use of on-site designated parking areas shall be restricted to vehicles of a State or Federal on-site representative, The Krog Corp., subcontractor, and service personnel assigned to the site and actually on duty but may also be used on short-term basis for authorized visitors.
- The Krog Corp. shall be responsible for maintaining a log of security incidents and visitor access granted.
- Krog shall require all personnel having access to the project site to sign-in and sign-out, and shall keep a record of all site access.
- All approved visitors to the site shall be briefed by the SSO on safety and security, provided with temporary identification and safety equipment, and escorted throughout their visit. Site visitors shall not be permitted to enter the hazardous work zone unless approved by the SSO with appropriate site access agreement.

Project site shall be posted, "Warning Hazardous Work Area, Do Not Enter Unless Authorized." Warning signs shall be posted at a minimum of every 500 feet.

6.2 Site Control

The Krog Corp. shall provide the following site control procedures as a minimum:

- A site map;
- A map showing site work zones;
- The use of a "buddy system" whenever work requires PPE of Level C or higher; and
- Standard operating procedures or safe work practices.

6.3 Work Zones

Work zones around the areas designated for construction activities will be established by the Project Manager and SSO on a daily basis and communicated to all employees and other site users. It shall be the SSO's responsibility to ensure that all site workers are aware of the work zone boundaries and to enforce proper procedures in each area. The zones will include:

- Exclusion Zone ("ExZ" or "Hot Zone") — The area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. The zone will be delineated by flagging tape or fencing. All personnel must enter and exit the ExZ only through the access control points. All personnel entering the ExZ must wear the prescribed level of personal protective equipment identified in Section 7.
- Contamination Reduction Zone ("CRZ") — The zone where decontamination of personnel and equipment takes place. All personnel must enter and exit the CRZ only through the access control points. Any potentially contaminated clothing, equipment and samples must remain in the Contamination Reduction Zone until decontaminated.

- Support Zone ("SZ" or "Clean Zone") — The part of the site that is considered non-contaminated or "clean." Support equipment will be located in this zone, and personnel may wear normal work clothes within this zone. The function of the Support Zone includes:
  - An entry area for personnel, material and equipment to the Exclusion Zone of site operations through the Contamination Reduction Zone;
  - An exit for decontamination personnel, materials and equipment from the "Decontamination" area of site operations;
  - The housing of site special services; and
  - A storage area for clean safety and work equipment.

In the absence of other task-specific work zone boundaries established by the SSO, the following boundaries will apply to all investigation and construction activities involving disruption or handling of site soils or groundwater:

- Prohibited Areas: Because of unknown contamination in surrounding areas, workers are prohibited from entering areas outside of the COBEY Site.
- Exclusion Zone: 25 foot radius from the outer limit of the intrusive work being done.
- Contaminant Reduction Zone: 50 foot radius from the outer limit of the intrusive work.
- Support Zone: Areas outside the Contaminant Reduction Zone.

Access of nonessential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled by Krog. Only personnel who are essential to the completion of the task will be allowed access to these areas and only if they are wearing the prescribed level of protection. Entrance of all personnel must be approved by Krog's SSO.

The SSO will maintain a Health and Safety Logbook containing the names of workers and their level of protection. The zone boundaries may be changed by the SSO as environmental conditions warrant, and to respond to the necessary changes in work locations on-site. These changes, made in the field may be without the approval of the site project manager.

7.0 SAFE WORK PRACTICES & SAFETY PROCEDURES

All site workers shall conform to the following safe work practices **during all on-site work activities conducted within the exclusion and contamination reduction zones**:

- Strictly regard the distinction of work zones and stay out of prohibited areas.
- Workers must strictly follow the decontamination procedures.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth contact is strictly prohibited. The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in these activities.
- Carrying food, beverage, matches, lighters, Chap-Stick, cosmetics, etc., around the worksite is prohibited, except in the Clean Area exclusively.
- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross contamination and need for decontamination.
- If there is a change in conditions which warrants increased protection above Modified Level D, work will be immediately suspended until there is additional training provided for workers appropriate to Level B or Level C protection.
- On-site personnel shall use the "buddy" system whenever work requires PPE of Level C or higher, at which time no one may work alone (i.e., out of earshot or visual contact with other workers) in the Exclusion Zone (ExZ). Responsibilities of "buddies" include:
  - Assisting and checking PPE
  - Monitoring the body for heat stress and/or chemical exposure
  - If there is an emergency, getting help, primarily; secondarily, getting buddy out of ExZ.
- Personnel and equipment in the contaminated area shall be minimized, consistent with effective site operations.
- The recommended specific safety practices for working around the contractors' equipment (e.g., backhoes, bulldozers, excavators, etc.) are as follows:
  - Although The Krog Corp. and subcontractors are responsible for their equipment and safe operation of the site, personnel are also responsible for their own safety.
  - Heavy equipment should not be operated within 20 feet of overhead wires. This distance may be increased if windy conditions are anticipated or if lines carry high voltage. The site should also be sufficiently clear to ensure the project staff can move around the heavy machinery safely. Care should be taken to avoid overhead wires when moving heavy-equipment from location to location.

SAFETY REGULATIONS

(To Be Posted in Field Office)

The main safety emphasis is on preventing personal *contact* with contaminated soil and water. Towards that end, the following rules have been established.

Regulations:

- All workers have the obligation to immediately report and, if possible, correct unsafe work conditions.
- All personnel shall be familiar with standard operating safety procedures and additional instructions contained in this Health and Safety Plan.
- Hard hats and safety glasses must be worn on the project site.
- Use of contact lenses on-site will not be permitted.
- Medicine and alcohol can synergize the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with Krog's occupational physician. Alcoholic beverages are strictly forbidden during the work day, and illegal drug intake is strictly forbidden at any time.
- The work site should be kept neat. This will prevent personnel from tripping and will allow for fast emergency exit from the site.
- Eating on the site is PROHIBITED except in specifically designated areas.
- All project personnel on the site must wear clean personal protective equipment (PPE) appropriate for the work area and kind of work being done.
- If you get wet to the skin, you must wash the affected area with soap and water immediately. If clothes in touch with the skin are wet, these must be changed.
- You must have a thorough decontamination and wash your hands and face before eating, drinking, smoking, or chewing.
- Strictly regard the different work zones. Only workers with HAZWOPER training and wearing appropriate PPE can enter the Exclusion Zone.
- Closely follow the regulations on decontamination before entering the "Clean Zone," and before going home.

Recommendations:

- Encourage one another for safe work practices.
- Check for any personal habit which could introduce soil or water into the body. Examples: wiping face or nose with a dirty hand or running a dirty hand through hair.
- Check that any regularly worn item is clean. Examples include dirty watchbands, neck chains and a dirty liner on your safety helmet.
- Use a properly-fitted dust mask whenever you feel it is needed.

8.0 PERSONAL PROTECTIVE EQUIPMENT

8.1 Recommended Level of Protection for Site Tasks

Based upon current information regarding both the contaminants suspected to be present and the various tasks of the project, the minimum required Levels of Protection for these tasks shall be as identified in Table 8-1, "Action Levels of Personal Protective Equipment." Table 8-2, "Site-specific Personal Protective Equipment Requirements," defines the site-specific personal protective equipment (PPE) requirements.

8.2 Equipment Selection

PPE will be donned when work activities may result in exposure to physical or chemical hazards beyond acceptable limits, and when such exposure can be mitigated through appropriate PPE. The selection of PPE will be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.

Equipment designed to protect the body against contact with known or suspect chemical hazards are grouped into varying categories according to the degree of protection afforded. These categories, designated A through D are consistent with United States Environmental Protection Agency (USEPA) Level of Protection designation, are:

- Level A: Should be selected when the highest level of respiratory, skin and eye protection is needed.
- Level B: Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required. Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by on-site studies. Level B (or Level A) is also necessary for oxygen-deficient atmospheres.
- Level C: Should be selected when the types of airborne substances are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. In atmospheres where no airborne contaminants are present, Level C provides dermal protection only.
- Modified Level D: Should be used when airborne chemical constituents are not present at levels of concern, but site intrusive activities are causing an increased potential for skin contact with liquids and solids.
- Level D: Should not be worn on any site with elevated respiratory or skin hazards. This is generally work clothing providing minimal protection.

In situations where the types of chemicals, concentrations, and possibilities of contact are unknown, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components are detailed below for Modified Level D and Level D protection. Based upon current information regarding both the contaminants suspected to be present and the various tasks involved, there should be no need for Levels A, B or C protection.

Special Note: If there is a change in conditions which warrants increased protection for workers:

- Work will be immediately suspended,
- Additional HAZWOPER training will be provided for the exposed workers before they proceed with the tasks that have increased risk,
- Tables 8-1 and 8-2 will be modified, along with the listed protection ensembles,
- Increased and risk-appropriate PPE will be obtained, and
- Additional medical surveillance will be obtained.

8.3 Protection Ensembles

8.3.1 Modified Level D Protection Ensemble

Modified Level D protection is primarily a coverall work uniform to protect the employees clothing from contact with potential contaminants. It can be worn in areas where are no inhalable toxic substances and where the atmosphere contains at least 19.5% oxygen. Recommended PPE for Modified Level D includes:

- Washable or disposal cloth or Tyvek coveralls.
- Chemical-resistant overboots, Tyvek booties over safety work boots/shoes.
- Safety glasses or chemical splash goggles.
- Hardhat meeting ANSI Z89.
- Cloth or leather work gloves
- Optional hearing protection.
- Optional dust mask for nuisance particulates.
- Extra PPE is needed for pressure washing during equipment decontamination to prevent an injection-hazard from the high-pressure water or steam — hardhat with face shield, and coveralls, gloves, and boots that are impervious to penetration at the designed highest pressure of the wash system.

8.3.2 Level D Protection Ensemble

Level D protection is primarily basic work clothing. It will be required for all on-site personnel at the project site. Level D will be worn as the initial protection level for project site operations. Recommended PPE for Level D includes:

- Work clothing as prescribed by weather, but not less than long pants and T-shirt with a 3-inch sleeve.
- Work boots/shoes; no athletic shoes.
- Safety glasses or goggles, meeting ANSI Z87.
- Hardhat meeting ANSI Z89.
- Optional hearing protection.
- Optional gloves (to reduce dirtying of hands).
- Optional dust mask for nuisance particulates.

Table 8-1
Buffalo Lakeside Commerce Park, Subparcel 1 – COBEY Site Voluntary Cleanup
Action Levels for Personal Protective Equipment [1]

Task	Planned Level of Protection	Action Level for PPE Upgrade / Downgrade
Excavation of and Work in Contaminated Soils	Modified Level D	• Upgrade to Level C if sustained reading measure 1 – 5 ppm with the PID or 10 – 150 µg/m³ with the Particulate Monitor • Upgrade to Level B if sustained reading measure 5– 50 ppm with the PID or >150 µg/m³ with the Particulate Monitor
Cleaning of Contaminated Equipment	Modified Level D	• Upgrade to Level C if sustained reading measure 1 – 5 ppm with the PID or 10 – 150 µg/m³ with the Particulate Monitor • Upgrade to Level B if sustained reading measure 5– 50 ppm with the PID or >150 µg/m³ with the Particulate Monitor
Contact with Groundwater with Elevated pH	Modified Level D	• Upgrade to Level C if sustained reading measure 1 – 5 ppm with the PID or 10 – 150 µg/m³ with the Particulate Monitor • Upgrade to Level B if sustained reading measure 5– 50 ppm with the PID or >150 µg/m³ with the Particulate Monitor
Other On-site Activities	Level D	• Reestablish work zones

[1] **If there is a change in conditions which warrants increased protection, work will be immediately suspended until there is additional training provided for workers appropriate to Level B or Level C protection.**

Table 8-2
Buffalo Lakeside Commerce Park, Subparcel 1 – COBEY Site Voluntary Cleanup
Site-specific Personal Protective Equipment Requirements

Level of Protection	Respiratory Protection	Protective Clothing	Gloves	Boots	Other PPE Required
Modified Level D[1]	None required; dust mask available for nuisance dust	• Excavation and trench work — Tyvek or cloth coverall • Elevated groundwater pH — chemical/splash-resistant suit	• Excavation and trench work — optional cloth or leather • Elevated groundwater pH — Nitril outer	• Excavation and trench work — Tyvek bootie or overboot • Elevated groundwater pH — water-resistant, chemical-resistant overboot	• Excavation and trench work — hardhat, safety glasses with side shields • Elevated groundwater pH — hardhat and splash-resistant goggles • Hearing protection (if conversations are difficult without raised voices)
Level D	None required; dust mask available for nuisance dust	• Work uniform; • Cloth or Tyvek coverall optional	• None required • Cloth or leather work glove optional	• Safety boot or work shoe • Tyvek boot covers optional	• Hardhat, safety glasses with side shields • Hearing protection (if conversations are difficult without raised voices)

[1] Extra PPE is needed for pressure washing during equipment decontamination to prevent an injection-hazard from the high-pressure stream — Modified Level D in this case includes hardhat with face shield, and coveralls, gloves, and boots that are impervious to penetration at the designed highest pressure of the wash system.

9.0 PERSONAL HYGIENE AND DECONTAMINATION

9.1 Decontamination of Site Personnel

The degree of decontamination required is a function of a particular task and the environment within which it occurs. Specific personnel decontamination procedures shall be adopted to achieve the goal of removing contamination prior to entering the Support Zone ("Clean Zone"). Procedures will be directed by the SSO. Generally it is anticipated that most work involving large pieces of construction equipment will be completed in Modified Level D or Level D. Workers conducting operations in work zones requiring higher levels of protection, particularly laborers, will require more stringent decontamination procedures than personnel not directly in contact with contaminants. The following are decontamination procedures that will remain flexible to the changing environmental conditions which may arise at the site. All personnel leaving the Exclusion Zone (ExZ) will pass through a Contamination Reduction Zone (CRZ) where they will remove their PPE and thoroughly wash/rinse exposed skin with water and biodegradable soap before leaving the project site.

- Station 1 — Equipment Drop: Deposit visibly contaminated (if any) re-useable equipment used in the CRZ and ExZ (e.g., tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic sheeting.
- Station 2 — Boots and Gloves Wash and Rinse: Scrape gross contamination from boot and outer gloves. Wash outer boots and gloves with soap and water solution. Rinse with water. Deposit tape in waste disposal container.
- Station 3 — Tape, Outer Boot and Glove Removal: Remove tape, outer boots and gloves. Deposit tape and gloves in waste disposal container. Store boots in decontamination trailer on shelving. Safety glasses or goggles are removed. Avoid touching face with fingers. Hard hat removed and placed on plastic sheet.
- Station 4 — Mask Change: If worker leaves ExZ to change a dust mask, this is the last step in the decontamination procedure. Worker's dust mask is exchanged, new/cleaned outer gloves and boot cover donned, and worker returns to duty in the ExZ.
- Station 5 — Outer Garment Removal: Disposable protective outer clothing removed and put in a disposal container. Reusable protective clothing will be removed and stored on hooks in the decontamination trailer.
- Station 6 — Inner Glove Removal: Inner gloves are the last personal protective equipment to be removed. Avoid touching the outside of the gloves with bare fingers. Dispose of these gloves in waste disposal container.

Following PPE removal, personnel shall wash hands, face, and forearms at the washing facility provided at the site.

All materials generated during decontamination will be drummed for disposal or cleaning in accordance with applicable local, state, and federal regulations.

9.2 Decontamination For Medical Emergencies

In the event of a minor, non-life-threatening injury, personnel should follow the decontamination procedures as defined, and then administer first-aid.

In the event of a major injury or other serious medical concern (e.g., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu of further decontamination.

9.3 Decontamination of Heavy Equipment

Construction equipment, operated in contaminated work zones must be decontaminated prior to leaving the site. Decontamination will take place within a designated equipment and materials decontamination area. The equipment will be decontaminated to the satisfaction of the SSO in the following manner:

- The construction equipment will be scraped clean of gross contamination using a track spade or shovel. A pressure wash unit capable of providing a nozzle pressure of 150 psi will be utilized to remove dirt and residue from the equipment in all areas of contact with the contaminated materials. Pressure washing may be supplemented with detergents as appropriate to remove dirt and residues.
- Shields and belly pans will be removed and cleaned.
- Degreasing will take place only if required.

The SSO will certify, in writing, that each piece of construction equipment has been decontaminated prior to removal from site. Personnel engaged in vehicle decontamination will wear specialized Modified Level D described in Table 8-2 with a full face-shield. Any expendable equipment which is unable to be decontaminated to the satisfaction of the SSO will be disposed of. At the completion of the project, the decontamination area will be completely cleaned and removed.

Should the exterior of monitoring equipment become grossly contaminated, it will be decontaminated using a phosphate-free detergent solution, such as Alconox, with potable water rinse carefully applied so not to damage the equipment.

10.0 EXPOSURE MONITORING

The Krog Corp. has developed, as part of the HASP, an air monitoring program (AMP). The purpose of the AMP is to determine that the proper level of protective equipment for personnel is used, to document that the level of worker protection is adequate, and to assess the migration of contaminants to off-site receptors as a result of site work.

Based on the results of historic sample analysis and the nature of the proposed work activities at the site, the possibility exists that organic vapors and/or particulates may be released to the air during intrusive construction activities.

10.1 Monitoring Instrumentation

To establish a baseline level, The Krog Corp. will record wind velocity and direction and temperature at the beginning of the day, and again prior to any outdoor intrusive work. Real-time air monitoring will be conducted by the SSO during all subsurface construction activities using a particulate meter and a photo-ionization detector (PID) or equivalent instrumentation capable of measuring total organic vapor concentrations.

Monitoring instruments will be calibrated in accordance with manufacturer's instructions before use. Battery charge level for each instrument will be checked at the beginning and end of each day. All instruments will be operated in accordance with manufacturer's specifications. Equipment manuals for all monitoring instruments will be present on-site during all operations.

10.2 Documentation

All air monitoring readings will be recorded and maintained in the Health and Safety Logbook. The logbook will be available for review by the NYSDEC and New York State Department of Health (NYSDOH). The following will be recorded:

- Air monitoring results, location, date and time of day
- Daily equipment check and calibration.
- Weather conditions
- Actions taken

10.3 Work Zone & Community Monitoring

Routine, real-time monitoring will be conducted by the SSO on the downwind side of the work zone during intrusive activities. Air monitoring will be conducted in accordance with the schedule set forth in Table 10-1, "Summary of Air Monitoring Plan with Action Levels — Photo- ionization Detector (PID) & Particulate Monitor (PM)." If measured concentrations exceed the limits established in Table 10-1, appropriate response actions will be taken to include additional monitoring at the downwind perimeter of the site for exterior intrusive work. Additional monitoring and/or monitoring instruments may be added if site conditions change.

10.3.1 Vapor Emission Response Plan

If the downwind perimeter air concentrations of organic vapors exceed the upwind work area perimeter concentration by 5 ppm but less than 25 ppm for exterior intrusive activities, the following actions will be taken:

- Every 30 minutes monitor the perimeter work area location.
- Every 30 minutes monitor the organic vapor concentration 200 feet downwind of the work area perimeter or half the distance to the nearest receptor, whichever is less. If this reading exceeds the perimeter work area upwind organic vapor concentration by 5 ppm, all work must halt and monitoring increased to every 15 minutes. If, at any time, this reading exceeds the perimeter work area upwind concentration by 10 ppm, the Major Vapor Emissions Response Plan will be initiated.
- If organic vapor levels 200 feet downwind of the perimeter work area or half the distance to the nearest downwind receptor, whichever is less, exceeds by 5 ppm the work area perimeter upwind concentration persistently, then air quality monitoring must be performed within 20 feet of the nearest downwind receptor (20-foot zone). If the readings in the 20-foot zone exceed the perimeter work area upwind concentration by 5 ppm for more than 30 minutes, then the Major Vapor Emissions Response Plan will be implemented.
- Work activities can resume only after the downwind 200 foot reading and the 20-foot zone reading are less than 5 ppm above the perimeter work area upwind concentration. In addition, the downwind perimeter work area concentration must be less than 25 ppm above the perimeter work area upwind concentration.

10.3.2 Major Vapor Emission Response Plan

If the downwind perimeter air concentrations of organic vapors exceed the upwind work area perimeter concentration by more than 25 ppm for exterior intrusive activities, then the Major Vapor Emission Response Plan will be activated. Upon activation, the following activities will be undertaken:

- All work will halt.
- All Emergency Response Contacts as listed in Section 17 will be contacted.
- The NYSDEC or NYSDOH will contact notified the Erie County Health Department and advise them of the situation.
- The local police and fire depart authorities will be immediately contacted by the SSO and advised of the situation.
- Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the SSO and work may resume.

10.4 Personal Monitoring

Real-time personal monitoring will be conducted in conjunction with the work zone monitoring. Since occupational worker exposures are higher than the work zone or community action levels, it is assumed that as long as work zone levels are monitored and appropriate actions are taken that worker exposures will be below the OSHA allowable limits.

TABLE 10-1
Buffalo Lakeside Commerce Park, Subparcel 1 – COBEY Site Voluntary Cleanup
Summary of Air Monitoring Plan with Action Levels

Sample Location	Monitoring Frequency	Instrument	Measured Level	Response Action
Upwind and Downwind Edges of Site Perimeter	• Before start of work each day. • Before start of intrusive work.	PID	Establish background	• Determine action levels.
		PM		
Downwind Side of Work Zone	• Continuously during intrusive work, documenting levels every 15 minutes	PID	Less than **5 ppm** above background	• Continue operations.
			Sustained readings of greater than **5 ppm** above background	• Monitor at downwind site perimeter.
		PM	Less than **150 µg/m³**	• Continue operations.
			Sustained readings of greater than **150 - 250 µg/m³**	• Continue operations. • Initiate engineering controls to reduce dust concentrations. • Monitor at downwind site perimeter.
			Sustained readings of greater than **250 µg/m³**	• Discontinue work. • Monitor at downwind site perimeter.

Sample Location	Monitoring Frequency	Instrument	Measured Level	Response Action
Downwind Site Perimeter when Work Zone Measurements Exceed 5 ppm or 150 µg/m³	• As required.	PID	Less than **5 ppm** above background	• Continue operations. • Monitor every 30 minutes until work zone measurements are below 5 ppm.
			Sustained readings of greater than **5 – 25 ppm** above background	• Discontinue work. • Implement the Vapor Emission Response Plan.
			Sustained readings of greater than **25 ppm** above background	• Discontinue work. • Implement the Major Vapor Emission Response Plan.
		PM	Less than **150 µg/m³** above background	• Continue operations. • Monitor every 30 minutes until work zone measurements are below **150 µg/m³**.
			Sustained readings of greater than **150 µg/m³** above background	• Discontinue work until engineering controls are controlling dust levels. • Monitor every 15 minutes until work zone measurements are below **150 µg/m³**.

PID = Photo-ionization Detector
PM = Particulate Monitor

11.0 FIRE PREVENTION AND PROTECTION

Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs. When required by regulatory authorities, the project management will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper site preparation and safe storage of combustible and flammable materials.
- Availability of coordination with private and public fire authorities.
- Adequate jobsite fire protection and inspections for fire prevention.
- Adequate indoctrination and training of employees.

11.1 Equipment and Requirements

All fire extinguishers will be provided by The Krog Corp. and subcontractors and are required on all heavy equipment and in each field trailer. Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semiannually, and recharged if necessary. Recharge or replacement shall be mandatory immediately after each use.

11.2 Flammable And Combustible Substances

All storage, handling or use of flammable and combustible substances will be under the supervision of qualified persons. All tanks, containers and pumping equipment, whether portable or stationary, which are used for the storage and handling of flammable and combustible liquids, will meet the recommendations of the National Fire Protection Association.

11.3 Hot Work

If the scope of work necessitates welding or blow torch operation, the attached hot work permit (Table 11-1) will be completed by the SSO and reviewed/issued by the Project Manager.

TABLE 11-1
Buffalo Lakeside Commerce Park, Subparcel 1 – COBEY Site Voluntary Cleanup
HOT WORK PERMIT
(MUST BE CONSPICUOUSLY POSTED WHERE HOT WORK IS BEING PERFORMED)

Part 1 — Information

Issue Date:
Date Work to be Performed: Start: Finish (permit terminated):
Performed by:
Work Area:
Object to be Worked On:

Part 2 — Approval (for 1, 2, and 3, mark Yes, No, or NA) *

Will working be on or in:
1 — Metal partition, wall, ceiling covered by combustible material?
2 — Pipes, in contact with combustible material?
3 — Explosive area?

* If any of these conditions exist (marked "yes") a permit will not be issued without being reviewed and approved by _____. (Signature required below)

Part 3 — Required Conditions ** (Circle all conditions that must be met)

PROTECTIVE ACTION	PROTECTIVE EQUIPMENT
Specific Risk Assessment Required	Goggles / visor / welding screen
Fire or spark barrier	Apron / fireproof clothing
Cover hot surfaces	Welding gloves / gauntlets / other:
Move movable fire hazards, specifically	Wellingtons/Knee pads
Erect screen on barrier	Ear protection: Ear muffs/Ear plugs
Restrict Access	B.A.: SCBA / Long Breather
Wet the ground	Respirator: Type:
Ensure adequate ventilation	Cartridge:
Provide adequate supports	Local Exhaust Ventilation
Cover exposed drain/floor or wall cracks	Extinguisher / Fire blanket
Fire watch (must remain on duty during duration of permit)	Personal flammable gas monitor
Issue additional permit(s):	

Other precautions:

** Permit will not be issued until these conditions are met.

Signatures:

Originating Employee: Date:

Site Superintendent: Date:

Part 2 Approval: Date:

12.0 EMERGENCY EQUIPMENT / FIRST AID REQUIREMENTS

12.1 Communications

Krog shall provide telephone communication at the site field office. Emergency numbers, such as police, sheriff, fire, ambulance, hospital, NYSDEC, EPA, NYSDOH, and utilities, applicable to this site shall be prominently posted near the telephone.

On-site, Krog and all subcontractors will use a signaling system for emergency purposes, including voice and hand signals, horns, and radio communication. Cellular phones will be the primary method of off-site communications.

12.2 Emergency Shower and Emergency Eye Wash

The Krog Corp. shall supply and maintain one portable eyewash/body wash facility per active hazardous work zone. The facility shall have a minimum water capacity of 10 gallons and shall conform to OSHA regulations 29 CFR 1910.151. The portable eyewash/body wash facility shall be manufactured/ supplied by Direct Safety Company, Lab Safety Supply Company, or other appropriate suppliers.

12.3 Fire Extinguishers

The Krog Corp. shall supply and maintain at least one fire extinguisher in the field office and one at each hazardous work zone. The fire extinguisher shall be a 20-pound Class ABC dry fire extinguisher with UL-approval per OSHA Safety and Health Training Standards 29 CFR 1910.157. The fire extinguisher shall be manufactured/supplied by Direct Safety Company, Lab Safety Supply Company, or other appropriate suppliers.

12.4 First Aid Kit

The Krog Corp. shall supply and locate in his project office and at each and every hazardous work zone one 24-unit (minimum size) "industrial" or "Contractor" first aid kit, required by OSHA requirements 29 CFR 1910.151. The first aid kit shall be manufactured/supplied by Norton, Scott, or other appropriate suppliers.

12.5 Spill Response Kit

Spill containment supplies and equipment on hand should include:

- Absorbent pads — Three (3) 100 count Bales
- Absorbent booms — Two (2) 4 count Bales (8 inches X 10 feet)
- Granular absorbent — Eight (8) 40 pound bags
- Impermeable Tyvek suits — 3 each
- Nitrile gloves — 3 pairs
- 12 inch chemical- and water-resistant boots — 3 pairs
- Shovels — 5
- Empty 5-gallon pails — 5
- An empty open-top 55-gallon drum.

12.6 Emergency Inventory

In addition to those items specified elsewhere, the SSO will maintain the following inventory of equipment and protective clothing for use at the site in the event of emergencies.

- Washable coveralls and disposable coveralls;
- Gloves — outer and inner;
- Face shields and safety glasses;
- Chemical-resistant boots and boot covers;
- Hard hats; and
- Rain suits.

13.0 EMERGENCY RESPONSE AND CONTINGENCY PLAN

This is the site-specific Emergency Response Plan. This chapter of the HASP describes potential emergencies; procedures for responding to those emergencies; roles and responsibilities during emergency response; and training that workers must receive in order to follow emergency procedures. This plan also describes the provisions this site has made to coordinate its emergency response planning with other contractors on-site and with off-site emergency response organizations.

This emergency response plan is consistent with the requirements of 29 CFR 1910.120(l) and provides the site-specific information in the following sections.

13.1 On-site and Off-site Safety Personnel and Emergency Contacts

The attached master telephone list in Chapter 17 will be completed and prominently posted at the field office. The list will have telephone numbers of all project personnel, emergency services including hospital, fire, police, and utilities. In addition, two copies with telephone numbers are to be given to the NYSDEC and NYSDOH for emergency reference purposes.

13.2 Pre-emergency Planning

This site has been evaluated for potential emergency occurrences, based on site hazards, the required work tasks, the site topography, and prevailing weather conditions. The results of that evaluation indicate the potential for the following site emergencies to occur at the locations indicated.

Type of Emergency:	Source of Emergency:	Location of Source:
Medical	Slip/trip/fall	Nonspecific
	Allergic reaction (i.e., spiders, plants, snakes, rodents, stinging/biting insects)	
	Heat/Cold Stress	
	Struck by injuries (i.e., heavy equipment, falling object)	
	Excavation cave-in	
	Cuts and lacerations	
	Chemical exposure	
	Lifting/Carrying	
	Vehicle traffic	
	Tools	
	Hot work; Electrical	
	Lightning	
Fire/Explosion	Hot work; Electrical	
	Lightning	
Weather	High winds	
	Lightning	
	Heavy rainfall	
	Extreme heat or cold	

13.3 On-site Emergency Response Equipment

Emergency procedures may require specialized equipment to facilitate worker rescue, contamination control and reduction, or post-emergency cleanup. Emergency response equipment stocked on this site is listed below. The equipment inventory and storage locations are based on the potential emergencies described above. This equipment inventory is designed to meet on-site emergency response needs and any specialized equipment needs that off-site responders might require because of the hazards at this site but not ordinarily stocked.

Any additional PPE required and stocked for emergency response is also listed in below. During an emergency, the Emergency Response Coordinator (viz., the SSO) is responsible for specifying the level of PPE required for emergency response. At a minimum, PPE used by emergency responders will comply with Chapter 7, Personal Protective Equipment, of this HASP. Emergency response equipment is inspected at regular intervals and maintained in good working order. The equipment inventory is replenished as necessary to maintain response capabilities.

Emergency Equipment	Quantity	Location
• Fire Extinguisher (Section 12.3)	1 (minimum)	Field Trailer and all heavy equipment
• First Aid Kit (Section 12.4)	1	Field Trailer
• Spill Response Kit (Section 12.5)	1	Field Trailer

Emergency PPE	Quantity	Location
• Chemical-resistant suits	4 (minimum)	Field Trailer

13.4 Emergency Planning Maps

Due to the vast size of the site and likely performance of the work on an area-specific basis, area-specific maps of the site will be developed prior to initiation of field activities. The maps will be clearly marked with critical on-site emergency planning information. Emergency evacuation route(s), places of refuge, assembly point(s), and the locations of key site emergency equipment are identified. Site zone boundaries are shown to alert responders to known areas of contamination. Major topographical features and the direction of prevailing winds/weather conditions that could affect emergency response planning are also marked on the map(s). The map is to be posted at site entry points and at strategic locations throughout the work site.

13.5 Emergency Alerting and Evacuation

Emergency communication systems are used to alert workers to danger, convey safety information, and maintain site control. Any effective system can be employed. Two-way radios or cellular phones are often used when work teams are far from the command post. Hand signals and air-horn blasts are also commonly used. Every system must have a backup. It shall be the responsibility of the SSO to ensure that an adequate method of internal communication is understood by all personnel entering the site. Unless all personnel are otherwise informed, the following signals shall be used:

- *Emergency signals* by portable air horn, siren, or whistle:
  - *Two short blasts* — personal injury or localized problem.
  - *One continuous blast* — emergency requiring site excavation.
  - *Two long blasts* — all clear.
- *Visual signals*: hand gripping throat, out of air/cannot breathe; hands on top of head, need assistance; thumbs up, affirmative/everything is OK; thumbs down, no/negative; grip partner's wrist or waist, leave area immediately.

If evacuation notice is given, site workers leave the worksite with their respective buddies, if possible by way of the nearest exit. Emergency decontamination procedures detailed in Chapter 12 of this HASP are followed to the extent practical without compromising the safety and health of site personnel. Appropriate primary and alternate evacuation routes and assembly areas have been identified and are shown on the Emergency Response Map. Wind direction indicators are located so that workers can determine a safe up wind or cross wind evacuation route and assembly area if not informed by the emergency response coordinator at the time the evacuation alarm sounds. Since work conditions and work zones within the site may be changing on daily basis, it shall be the responsibility of the SSO to review evacuation routes and procedures as necessary and to inform all site workers of any changes.

Personnel exiting the site will gather at the designated assembly point. To determine that everyone has successfully exited the site, personnel will be accounted for at the assembly site. If any worker cannot be accounted for, notification is given to the SSO so that appropriate action can be initiated. Contractors and subcontractors on this site have coordinated their emergency response plans to ensure that these plans are compatible and that source(s) of potential emergencies are recognized, alarm systems are clearly understood, and evacuation routes are accessible to all personnel relying upon them.

13.6 Extreme Weather Conditions

In the event of adverse weather conditions, the SSO in conjunction with the Project Manager and any subcontractors will determine if engineering operations can continue without sacrificing the health and safety of site personnel. Items to be considered prior to determining if work should continue include but are not limited to:

- Potential for heat/cold stress.
- Weather-related construction hazards (viz., flooding or wet conditions producing undermining of structures or sheeting, high wind threats, etc.).
- Limited visibility.
- Potential for electrical storms.
- Limited site access/egress (e.g., due to heavy rains)

13.7 Emergency Medical Treatment and First Aid

Personnel Exposure:

The following general guidelines will be used in instances where chemical exposure is expected:

- Eye or Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Decontaminate and provide medical attention. Eyewash stations will be provided on site. If necessary, transport to HealthWorks WNY or Mercy Hospital.
- Inhalation: Move to fresh air and, if necessary, transport to Mercy Hospital.
- Ingestion: Identify item swallowed. Decontaminate and transport to Mercy Hospital.

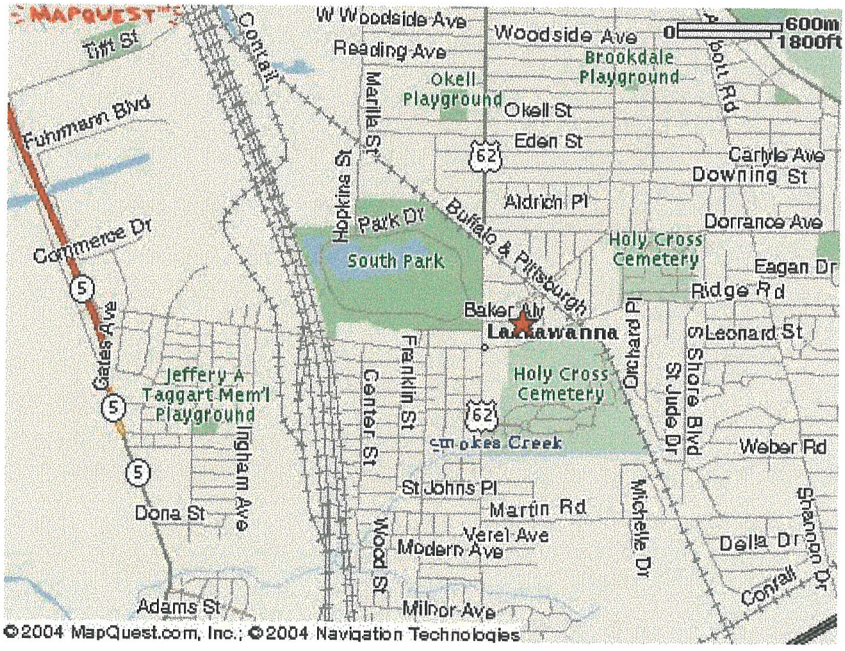
Personal Injury:

Minor first-aid will be applied on-site. If a worker, supervisor or SSO determine that medical treatment is needed, the worker will be transported to HealthWorks WNY. In the event of a life threatening injury, the individual should be transported to Mercy Hospital via ambulance. The SSO will supply chemical specific information to appropriate medical personnel.

First aid kits will conform to Red Cross and other applicable good health standards, and shall consist of a weatherproof container with individually sealed packages for each type of item. First aid kits will be fully equipped before being sent out on each job and will be checked weekly by the SSO to ensure that the expended items are replaced.

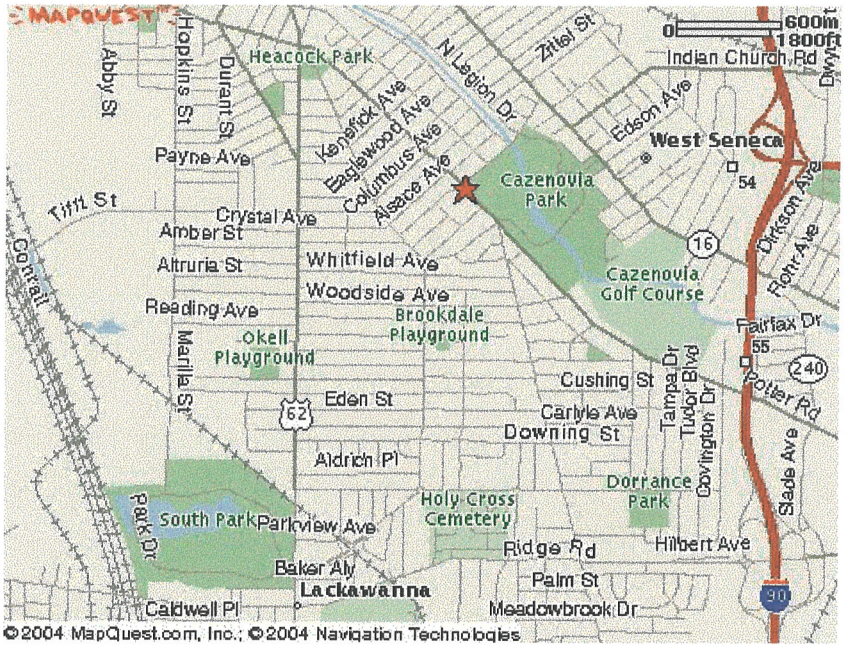
Directions to HealthWorks WNY:

- From the site access, drive to Ridge Road, turn left at the flashing light.
- Continue east on Ridge Road to Melroy, across from the Basilica. Turn left onto Melroy.



Directions to Mercy Hospital:

- From the site access, drive to Ridge Road, turn left at the flashing light.
- Continue east on Ridge Road to Abbott Road. Turn left onto Abbott Road.
- Proceed north on Abbott Road to Mercy Hospital, 565 Abbott Road, Buffalo. Follow signs to emergency room (ER).



13.8 Emergency Response Critique and Recordkeeping

Following an emergency, the SSO and Project Manager shall review the effectiveness of this Emergency Response Plan in addressing notification, control and evacuation requirements. Updates and modifications to the Emergency Response Plan shall be made accordingly. It shall be the responsibility of each employer to establish and assure adequate records of all:

- Occupational injuries and illnesses.
- Accident investigations.
- Reports to insurance carrier or State compensation agencies.
- Records and reports required by local, state, federal and/or international agencies.
- Property or equipment damage.
- Third party injury or damage claims.
- Environmental testing logs.
- Hazardous substances inventories and records.
- Records of inspections and citations.
- Safety training.

13.9 Emergency Response Training

All persons who enter this worksite, including visitors, receive a site-specific briefing about anticipated emergency situations and the emergency procedures by the SSO. The SSO, Alternate SSO and General Foreman will have basic first-aid and CPR training. Where this site relies on off-site organizations for emergency response, the training of personnel in those off-site organizations has been evaluated and is deemed adequate for response to this site.

14.0 SPILL RELEASE / RESPONSE

This chapter of the HASP describes the potential for and procedures related to spills or releases of known or suspected petroleum and/or hazardous substances on the site. The purpose of this Section of the HASP is to plan appropriate response, control, countermeasures and reporting, consistent with OSHA requirements in 29 CFR 1910.120(b)(4)(ii)(J) and (j)(1)(viii). The elements of the spill containment program is detailed in the following sections.

14.1 Potential Spills and Available Controls

An evaluation was conducted to determine the potential for hazardous material and oil/petroleum spills at this site. For the purpose of this evaluation, hazardous materials posing a significant spill potential are considered to be:

- CERCLA Hazardous Substances as identified in 40 CFR Part 302, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).
- Extremely Hazardous Substances as identified in 40 CFR Part 355, Appendix A, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).
- Hazardous Chemicals as defined under Section 311(e) of the Emergency Planning and Community Right-To-Know Act of 1986, where such chemicals are present or will be stored in excess of 10,000 lbs.
- Toxic Chemicals as defined in 40 CFR Part 372, where such chemicals are present or will be stored in excess of 10,000 lbs.
- Chemicals regulated under 6 NYCRR Part 597, where such materials pose the potential for release in excess of their corresponding Reportable Quantity (RQ).

Oil/petroleum products are considered to pose a significant spill potential whenever the following situations occur:

- The potential for a "harmful quantity" of oil (including petroleum and non-petroleum-based fuels and lubricants) to reach navigable waters of the U.S. exists (40 CFR Part 112.4). Harmful quantities are considered by USEPA to be volumes of 1,000 gallons or more, or lesser quantities that either form a visible sheen on the water or violate applicable water quality standards.
- The potential for any amount of petroleum to reach any waters of NY State, including groundwater, exists. Petroleum, as defined by NY State in 6 NYCRR Part 612, is a petroleum-based heat source, energy source, or engine lubricant/maintenance fluid.
- The potential for any release, to soil or water, of petroleum from a bulk storage facility regulated under 6 NYCRR Part 612. A regulated petroleum storage facility is defined by NY State as a site having stationary tank(s) and intra-facility piping, fixtures and related equipment with an aggregate storage volume of 1100 gallons or greater.

The evaluation indicates that, based on site history and decommissioning records, a hazardous material spill is not likely to occur during voluntary cleanup efforts. However, the potential for petroleum product spill may exist if former underground fuel oil transfer lines containing residual petroleum product are encountered during cleanup efforts, or if there is a spill during equipment refueling.

14.2 Initial Spill Notification and Evaluation

Any worker who discovers a hazardous substance or oil/petroleum spill will immediately notify the Project Manager and SSO. The worker will, to the best of his/her ability, report any associated injuries, the material involved, the location of the spill, the estimated quantity of material spilled, the direction/flow of the spill material, and related fire/explosion incidents, if any. The Emergency Response Plan presented in Chapter 13 of this HASP will immediately be implemented if an emergency release has occurred.

Following initial report of a spill, the Project Manager will make an evaluation as to whether the release exceeds RQ levels. If an RQ level is exceeded, the Project Manager will notify the NYSDEC at 1-800-457-7362 within 2 hours of spill discovery. The Project Manager will also determine what additional agencies (viz., USEPA) are to be contacted regarding the release, and will follow up with written reports as required by the applicable regulations.

14.3 Spill Response

In this unlikely scenario of a spill involving materials subject to regulations described in the first paragraph in Section 14.1, outside contractors listed below will be contacted for control and cleanup.

For oil/petroleum product spill situations, the following general response guidelines will apply:

- Only those personnel involved in overseeing or performing containment operations will be allowed within the spill area. If necessary, the area will be roped, ribboned or otherwise blocked off to prevent unauthorized access.
- Ignition points will be extinguished/removed if fire or explosion hazards exist.
- Surrounding reactive materials will be removed.
- Drains or drainage in the spill area will be blocked to prevent inflow of spilled materials or applied materials.

For minor spills, The Krog Corp. and subcontractors operating heavy equipment will maintain Spill Response Kits in the Field Office or other readily accessible storage location. The kits are described in Section 12.5. Spilled materials will be absorbed, and shoveled into a 55-gallon drum for proper disposal (NYSDEC approval will be secured for on-site treatment of the impacted soils/absorbent materials, if applicable). Impacted soils will be hand-excavated to the point that no visible signs of contamination remains, and will be drummed with the absorbent.

In the event of a major release or a release that threatens surface water, a spill response contractor will be called to the site. The response contractor may use heavy equipment (viz., excavator, backhoe, etc.) to berm the soils surrounding the spill site or create diversion trenching to mitigate overland migration or release to navigable waters. Where feasible, pumps will be used to transfer free liquid to storage containers. Spill control/cleanup contractors in the Western New York area that may be contacted for assistance include:

- The Environmental Service Group of NY, Inc.: (716) 695-6720
- C & W Environmental, LLC: (716) 597-0001

14.4 Post-spill Evaluation

If a reportable quantity of hazardous material or oil/petroleum is spilled as determined by the Project Manager, a written report will be prepared as indicated in Section 14.2. The report will identify the root cause of the spill, type and amount of material released, date/time of release, response actions, agencies notified and/or involved in cleanup, and procedures to be implemented to avoid repeat incidents. In addition, all re-useable spill cleanup and containment materials will be decontaminated, and spill kit supplies/disposable items will be replenished.

15.0 HEAT & COLD STRESS MONITORING

The SSO and/or his designee will be responsible for monitoring and documenting all field personnel for symptoms of heat/cold stress.

15.1 Heat Stress Monitoring

Personal protective equipment may place an employee at risk of developing heat stress, a common and potentially serious illnesses often encountered at construction, landfill, waste disposal, industrial or other unsheltered sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. Personal protective equipment may severely reduce the body's normal ability to maintain temperature equilibrium (via evaporation and convection), and require increased energy expenditure due to its bulk and weight.

Proper training and preventive measures will mitigate the potential for serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
- Modify work/rest schedules according to monitoring requirements. When protective clothing is worn the suggested guidelines for ambient temperature and maximum wearing time per excursion are:

Ambient Temperature	Maximum Wearing Time per Excursion (Minutes)
Above 90	15
85 to 90	30
80 to 85	60
70 to 80	90
60 to 70	120
50 to 60	180

- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat (i.e., eight fluid ounces must be ingested for approximately

every 1 lb. of weight lost). The normal thirst mechanism is not sensitive enough to ensure that enough water will be consumed to replace lost perspiration. When heavy sweating occurs, workers should be encouraged to drink more.

- Train workers to recognize the symptoms of heat related illness.

Heat-Related Illness — Symptoms:

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include: muscle spasms; pain in the hands, feet and abdomen.
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating; dizziness; nausea; fainting.
- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism:

- Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 100 beats per minute. If the rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest periods stay the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%.
- Body temperature may be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99.6 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period remains the same. However, if the oral temperature exceeds 99.6 degrees Fahrenheit at the beginning of the next period, the work cycle may be further shortened by 33%. Oral temperature should be measured at the end of the rest period to make sure that it has dropped below 99.6 degrees Fahrenheit. No worker will be permitted to continue wearing semi-permeable or impermeable garments when his/her oral temperature exceeds 100.6 degrees Fahrenheit.

15.2 Cold Stress Monitoring

Exposure to cold conditions may result in frostbite or hypothermia, each of which progresses in stages as shown below.

Frostbite occurs when body tissue (usually on the extremities) begins to freeze. The three states of frostbite are:

- *Frostnip* — This is the first stage of the freezing process. It is characterized by a whitened area of skin, along with a slight burning or painful sensation. Treatment consists of removing

the victim from the cold conditions, removal of boots and gloves, soaking the injured part in warm water (102 to 108 degrees Fahrenheit) and drinking a warm beverage. Do not rub skin to generate friction/heat.

- *Superficial Frostbite* — This is the second stage of the freezing process. It is characterized by a whitish gray area of tissue which will be firm to the touch but will yield little pain. The treatment is identical for Frostnip.
- *Deep Frostbite* — In this final stage of the freezing process the affected tissue will be cold, numb and hard and will yield little to no pain. First aid treatment is identical to that for Frostnip, then get treatment by a medical professional.

Hypothermia is a serious cold stress condition occurring when the body loses heat at a rate faster than it is produced. If untreated, hypothermia may be fatal. The stages of hypothermia may not be clearly defined or visible at first, but generally include:

- Shivering
- Apathy (i.e., a change to an indifferent or uncaring mood)
- Unconsciousness
- Bodily freezing

Employees exhibiting signs of hypothermia should be treated by medical professionals. Steps that can be taken while awaiting help include:

- Remove the victim from the cold environment and remove wet or frozen clothing. (Do this carefully as frostbite may have started.)
- Perform active re-warming with hot liquids for drinking (Note: do not give the victim any liquid containing alcohol or caffeine) and a warm water bath (102 to 108 degrees Fahrenheit).
- Perform passive re-warming with a blanket or jacket wrapped around the victim.

In any potential cold stress situation, usually temperature below 40° F, it is the responsibility of the SSO to encourage the following:

- Education of workers to recognize the symptoms of frostbite and hypothermia.
- Workers should dress warmly, with more layers of thin clothing as opposed to one thick layer.
- Personnel should remain active and keep moving.
- Personnel should be allowed to take shelter in a heated areas, as necessary.
- Personnel should drink warm liquids (no caffeine or alcohol if hypothermia has set in).
- For monitoring the body's recuperation from excess cold, oral temperature recordings should occur:
  - At the Site Safety Technicians discretion when suspicion is based on changes in a worker's performance or mental status.
  - At a workers request.
  - As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind chill less than 20 degrees Fahrenheit or wind chill less than 30 degrees Fahrenheit with precipitation).
  - As a screening measure whenever anyone worker on site develops hypothermia.

Any person developing moderate hypothermia (a core body temperature of 92 degrees Fahrenheit) will not be allowed to return to work for 48 hours without the recommendation of a qualified medical doctor.

16.0 CONFINED SPACE WORK

OSHA 29 CFR 1910.146 identifies a confined space as a space which is large enough and so configured that an employee can physically enter and do assigned work, has limited or restricted means for entry and exit, and is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, trenches more than 4 feet deep, storage tanks, process vessels, pits, sewers, tunnels, underground utility vaults, pipelines, sumps, wells, and excavations.

Confined space entry by Krog employees and subcontractors is not anticipated to be necessary to complete the Voluntary Cleanup activities identified in Section 1.0. In the event that the scope of work changes or confined space entry appears necessary, the Project Manager will be consulted to determine if feasible engineering alternatives to confined space entry can be implemented. If confined space entry by a Krog employee or subcontractor cannot be avoided through reasonable engineering measures, task-specific confined space entry procedures will be developed and a confined-space entry permit will be issued through Krog's Site Safety Officer (SSO) or Health and Safety Coordinator (HSC). Krog employees and subcontractors shall not enter a confined space without these procedures and permits in place. Each subcontractor who will be conducting confined space entry is required to submit their Permit-required Confined Space Program to Krog's HSC for approval before beginning confined space work.

To determine which site work may involve a confined space, the exposing contractor will be required to complete Appendix G, "Confined Space Recognition Form" and submit it to the HSC. If the confined space is determined to *not* be a non-permit space, entry shall be done under procedures for either (1) a full permit- required confined space, (2) a hazardous-atmosphere-only confined space, or (3) a reclassification confined space. To determine which procedure to use for the space to be entered, Appendix H, "Confined Space Profile," shall be completed by the contractor and submitted to the HSC. This shall be used to inform Krog of the following information and to coordinate any entry operations:

- The location of the permit spaces at the jobsite, and that entry into these spaces is only allowed through a permit-space program, hazardous-atmosphere-only procedures or space reclassification.
- The contractor's rationale for listing the space as a permit-space, such as any identified hazards and their experiences with the particular space.
- Precautions that the contractor has implemented or will implement to protect site workers working in or near the space.

The contractor shall conduct a debriefing with Krog's SSO or HSC at the completion of the entry operation, or during the operation if a need arises and if any hazards were confronted or created during their work.

17.0 EMERGENCY INFORMATION

This master telephone list will be completed and prominently posted at the field office.

The site location is: Buffalo Lakeside Commerce Park, Subparcel 1, COBEY Site
One Ship Canal Parkway
Buffalo, New York 14203

Site Phone: (phone to be determined) — Land line
(716) 818-6714 — Cellular
(716) 818-6706 — Cellular

Emergency Telephone Numbers

Project Manager: Patrick Sheedy
Work: (716) 667-1234
Cell: (716) 583-2802
Home: (716) 741-8430

Site Superintendent: Andy Metzger
Work: (716) 667-1234
Shop: (716) 667-2627
Cell: (716) 583-2801

General Foreman: Tim Peters
Site: (phone to be determined)
Cell: (716) 818-6714

Site Safety Officer: John Cope (phone to be determined)

Alt. Site Safety Officer: Dominic Capodicasa (phone to be determined)

Health and Safety Coordinator: William Orsborn
Office: (716) 836-4641
Cell: (716) 481-2525

Heidi M. Reisman
Office: (716) 745-7657
Cell: (716) 390-8494

Emergency Service	***Telephone Number***
Fire Department	911
Buffalo Police Department	911
Ambulance (Rural Metro)	911
Outpatient/Emergency Care Facility (HealthWorks WNY)	(716) 823-5050
Hospital/Emergency Care Facility (Mercy Hospital)	911/(716) 826-7000
Poison Control Center	(716) 878-7654
Chemical Emergency Advice (CHEMTREC)	(800) 424-9300
Erie County Department of Health	(716) 858-7690 (business hours) (716) 898-4225 (after 5 PM)
NYSDEC Region 9 office (Buffalo)	(716) 851-7220
NYSDEC Division of Environmental Remediation, Albany, NY	(518) 457-9285 (800) 342-9296 (leave a message for next work day response)
NYSDOH Western Regional Office	(716) 847-4385
NYSDOH Headquarters (Albany)	(800)-458-1158
OSHA	(800) 321-OSHA

Note: Only call OSHA if there has been a fatality or a catastrophic event that caused three (3) or more workers to be hospitalized; then, it must be reported to OSHA within eight (8) hours.

18.0 COMMUNITY PROTECTION PLAN

The surrounding population within ¼ mile is commercial and possible future public use. Environmental sampling has been performed at the site in support of voluntary cleanup site assessment and planning activities. These samples indicated the presence of byproducts in soils/fill from various operations on the site over the years. The Community Protection Plan outlines the steps being implemented to protect the health and safety of surrounding human population and the environment during the voluntary cleanup activities.

18.1 Air Monitoring

Krog will provide real-time air monitoring during intrusive activities as described in Section 10.3. All readings shall be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Krog will coordinate with local officials to arrange for notification and evacuation of the surrounding community in the event that off-site emissions pose a threat.

18.2 Off-site Spill Response

The Spill Response Plan (Chapter 14) will be coordinated with local officials, in case of an off-site spill of either liquid or solid wastes. The plan shall include transportation routes and times, as well as the minimum requirements set forth in Chapter 14.

The driver shall be supplied with Material Safety Data Sheets (MSDSs), a 24-hour emergency phone number, and instructions for reporting emergencies to local agencies and the project site.

19.0 RECORDKEEPING

19.1 Security Log

There are several security logs:

- A log of all personnel entering and exiting the site — Appendix B
- A log of visitors granted access to the work site — Appendix C
- A report of security incidents — Appendices D
- A daily log of security incidents — Appendix E

All approved visitors to the site will be briefed by the SSO on safety and security, provided with temporary identification and safety equipment, and escorted throughout their visit. Site visitors will not be permitted to enter a hazardous work zone. The project site shall be posted, "Warning: Hazardous Work Area, Do Not Enter Unless Authorized," and access restricted by the use of a fence.

19.2 Safety Log

The SSO will maintain a bound Health and Safety Logbook. The log will include all health and safety matters on site and include, but not be limited to, the following information:

- Date and weather conditions on site;
- A description of the proposed work for the day;
- Times when site personnel arrive and depart;
- Air monitoring data;
- Heat and/or cold stress monitoring;
- Decontamination procedures;
- Type and calibration of air sampling/monitoring equipment used;
- Safety meeting summaries; and
- Accidents.

19.3 Incident Investigation Report

Any emergency or accident will be reported immediately to the SSO. An incident investigation report (Appendix A) must be completed by the supervisor with the assistance of the SSO.

If the incident is work-related and involves worker injury or illness, it will be reported to the Workers' Compensation insurance agency and recorded on the OSHA 300 Log. If there is a fatality or a catastrophic event that causes three (3) or more workers to be hospitalized, it must be reported to OSHA within eight (8) hours by calling 1-800-321-OSHA.

If the emergency or accident is related to environmental contamination, the NYSDEC and NYSDOH will also be notified; Krog will submit a written report immediately to the NYSDEC and the NYSDOH, but no later than 24 hours of its concurrence. The report will include, but not be limited to, the nature of the problem, time, location, areas affected, manner and methods used to control the emergency, sampling and/or monitoring data, impact, if any, to the surrounding community, and corrective actions The Krog Corp. will institute to minimize future occurrences. All spills will be treated as emergencies.

19.4 Daily Work Report

The Krog Corp. shall maintain a daily work report that summarizes the following:

- Work performed,
- Level of protection,
- Air monitoring results,
- Safety-related problems, and
- Corrective actions implemented.

20.0 REFERENCES

20.1 United States Department of Labor, Occupational Safety and Health Administration, Code of Federal Regulations (CFR) — 29 CFR 1910 and 29 CFR 1926

20.2 Malcolm Pirnie, Inc.'s *"Remedial Action Work Plan, Hanna Furnace Site, the Former Railroad Yard Area,"* February 2002

Appendix A — *Supervisor's Incident Investigation Report*

I. GENERAL INFORMATION	EMPLOYER		SHIFT
	EMPLOYEE NAME		JOB TITLE
	SOC. SEC. NUMBER		SEX (MALE/FEMALE)
	DATE OF ACCIDENT		TIME OF ACCIDENT ☐ AM ☐ PM
	TYPE OF ACCIDENT/ILLNESS (e.g., Workers' Comp., Environmental Contamination, Truck/Equipment, etc.):		
	TYPE OF INJURY		
	PART OF BODY INJURED	TREATMENT: FIRST AID ☐ MEDICAL ☐	DID EMPLOYEE RETURN TO WORK THE SAME DAY? ☐ YES ☐ NO
II. DESCRIPTION	WHERE AND HOW DID ACCIDENT HAPPEN? (Use additional sheets if necessary)		
	WITNESSES (Names and Companies):		
III. CAUSES	SPECIFY TRAINING, MACHINE, TOOL, SUBSTANCE, OR OBJECT CONNECTED WITH THE ACCIDENT		
	UNSAFE MECHANICAL/PHYSICAL/ENVIRONMENTAL CONDITION AT TIME OF ACCIDENT (Be specific)		
	PERSONAL FACTORS (Attitude, lack of knowledge or skill, slow reaction, fatigue)		
	PERSONAL PROTECTIVE EQUIPMENT REQUIRED (Circle one) — A B C D Modified-D		
	WAS INJURED EMPLOYEE USING REQUIRED PPE?		
	WAS THERE A CHEMICAL EXPOSURE? CONTAMINANTS:		
IV. RECOMMENDATIONS	ACTION PLAN TO PREVENT RECURRENCE (Modification of machine, mechanical guarding, work environment, training)		
	SUPERVISOR'S NAME & SIGNATURE		DATE
V. FOLLOW-UP	ACTIONS TAKEN ON RECOMMENDATIONS (Include the date the action was completed)		

Instructions for Completing Incident Investigation Report

Please type or neatly print all information. Complete in as much detail as possible.

I. General Information

Fill in all information requested. Name of employee injured, date, exact location, job title, job being performed, etc. For description of type of accident/illness, injury and body part, see the following:

A. Type of Accident/Illness

- slip/fall
- struck by/against
- caught in/on/between
- contact with/by
- over-exertion/lifting
- burn by
- cut by
- amputation

B. Type of Injury

- cut
- bruise
- puncture
- abrasion
- strain
- sprain
- irritation
- swelling
- burn
- fracture
- inhalation
- absorption
- ingestion
- skin contact

C. Part of Body Injured (select as many as needed)

- thumb/finger/hand/wrist
- elbow/arm/shoulder
- toe/foot/ankle
- leg/knee/hip
- head/neck/face
- nose/eye/ear/throat
- chest/abdomen
- upper back/lower back

II. Description of Accident

Describe in as much detail as possible where and how the accident happened. This section is for facts, not opinions. Statements from the injured employee or witnesses made should be detailed. Use an additional piece of paper if more space is needed. Include sketches or photos if they help explain what happened.

III. Causes

Identify and describe in detail the type of equipment, tools, processes, etc., unsafe conditions (mechanical, physical, environmental) and/or personal factors involved in the accident. Discuss the use and requirements regarding any personal protective equipment.

IV. Recommendations

Once causes are identified, action must be taken to prevent the same thing from happening again. Realistic yet effective recommendations should be implemented. The form should be signed and dated by the appropriate supervisor.

V. Follow-up

List actions which have been taken and their respective completion date. Proper follow-up should continue on any incomplete recommendations.

Appendix B
Site Personnel Log-in

Date	Name	Company	Reason

Appendix C
Visitor Log-in

Date	Time In	Time Out	Name	Company	Badge Number, Person to See & Reason for Visit

Appendix D

Security Incident Report

A Security Incident Report should be completed during the same shift as the occurrence. Reportable incidents include any crime, vandalism, thefts, medical emergencies, suspicious activity, threats, injuries, etc. Your cooperation is appreciated.

_____
Report number

Name: _____
Home address: _____
_____
Phone numbers: _____

_____
Date of Incident

_____
Time of Incident

Mark one: ☐ Worker ☐ Visitor ☐ Other: _____

Location of incident: _____
_____

Were you injured? ☐ Yes ☐ No
If yes, please describe: _____
_____

Describe incident (use extra paper, if necessary): _____
_____
_____
_____
_____
_____

List witnesses: _____

Was 9-1-1 called? ☐ Yes ☐ No Who responded? _____

Was EMS transport or treatment refused? ☐ Yes ☐ No ☐ N/A

If applicable: License plate number _____
Make and model of vehicle _____

For worker injuries, complete Appendix A, "Supervisor's Incident Investigation Report."

Comments: _____
_____
_____
_____
_____
_____
_____

Incident report completed by: _____ _____
Print name Date

Appendix E

Security Log

Date	Incident Report Number	Brief Description of the Incident

Appendix F

Plan Acceptance Form

Date: _____

On behalf of our company:

- We acknowledge that we have received a copy of the Health and Safety Plan (HASP) for this remediation project.
- We accept the HASP for this remediation project and agree to comply by its requirements and the requirements of all local, state and federal regulations (e.g., OSHA, DEC, EPA).
- We agree that the Site Safety Officer has the authority to suspend any site operations until such time that hazards are corrected and controlled to his satisfaction.
- We agree that this HASP also will serve as a minimum for health and safety for our personnel at this jobsite and that all on-site personnel for our company will be familiar with this plan and comply with its requirements.

Company Name: _____

Managing Officer: _____
Signature

_____
Print Name

Project Manager: _____
Signature

_____
Print Name

Appendix G

Confined Space Recognition Form

GENERAL INFORMATION

Part I	**Yes**	**No**
Is the space large enough so an employee can bodily enter and perform work?		
Does the space have limited or restricted means for entry and exit?		
Is the space designed for occupancy?		
Part II		
Does the space contain or potentially contain a hazardous atmosphere?		
Does the space contain any chemicals or chemical residues?		
Does the space contain any flammable/combustible substances?		
Does the space contain or potentially contain any decomposing organic matter?		
Does the space have any pipes which bring chemicals into it?		
Does the space have any materials that can trap or potentially trap, or engulf, or down an entrant?		
Is vision obscured by dust at 5 feet or less?		
Does the space contain any mechanical equipment?		
Does the space have converging walls, sloped floors or tapered floor to smaller cross-sections which could trap or asphyxiate an entrant an entrant (Entrapment Hazard)?		
Does the tank or vessel contain rusted interior surfaced?		
Does the space contain thermal hazards (e.g.; extreme hot cold)?		
Does the space contain excessive noise levels which could interfere with communication with an attendant?		
Does the space present any slip, trip, or fall hazards?		
Are there any operations conducted near the space opening which could present a hazard to entrants?		
Are there any hazards from falling objects?		
Are there lines under pressure servicing the space?		
Are cleaning solvents or paints going to be used in the space?		
Is welding, cutting, brazing, riveting, scraping, or sanding going to be performed in the space?		
Does the space have poor natural ventilation which would allow an atmospheric hazard to develop?		
Are there any corrosives which would irritate the eyes in the space?		
Are there any conditions which could prevent any entrants' self rescue from the space?		
Are there any substances used in the space which have acute hazards?		
Is mechanical ventilation needed to maintain a safe environment?		
Is air monitoring necessary to ensure to space is safe for entry due to a potential hazardous atmosphere?		
Will entry be made into a diked area where the dike is 5 feet or more in height?		
Are residues going o be scraped off the interior surfaces of the vessel?		
Are non-sparking tools required to remove residues?		
Does the space restrict mobility to the extent that it could trap an entrant?		
Is respiratory protection required because of a hazardous atmosphere?		
Does the space present a hazard other than those noted above which would make it a permit space?		

Note: *If any of the questions in Part II have been checked yes, the confined space is not a non-permit confined space and entry must be done under procedures for a full permit-required, hazardous atmosphere only, or reclassification confined space.*

Appendix H

Confined Space Profile

GENERAL INFORMATION

Permit Space Location: _____

General Description: _____

CLASSIFICATION

☐ Non - Permit ☐ Permit Required ☐ Reclassified Non- Permit ☐ Hazardous Atmosphere Only

HAZARDS

ACTUAL OR POTENTIAL ATMOSPHERIC HAZARD	YES	NO	ACCEPTABLE LEVEL	ACTUAL READINGS	HAZARD CONTROL	INITIALS
Oxygen Deficiency	☐	☐	19.5% - 23.5%			
Oxygen Enrichment	☐	☐	19.5% - 23.5%			
Explosive (Gas/Vapor)	☐	☐	< 10% LFL			
Explosive Dust	☐	☐	< LFL (5 Ft VISIBILITY)			
Carbon Monoxide	☐	☐	50 PPM			
Hydrogen Sulfide	☐	☐	10 PPM			
Other Toxic gases/vapors	☐	☐				
ENGULFMENT/ ENTRAPMENT	☐	☐			☐ Blank or blind	
					☐ Double block and bleed	
					☐ Locking or tagging valves	
					☐ Disconnecting lines	
					☐	
MECHANICAL	☐	☐			☐ Physically block machinery	
					☐	
ELECTRICAL	☐	☐			☐ Deenergize equipment	
					☐ Lock out electrical circuits	
					☐ Tag out electrical circuits	
					☐	
SUBSTANCE HAZARDOUS TO SKIN OR EYES	☐	☐				
HEAT STRESS	☐	☐				
OTHER POTENTIAL HAZARDS:	☐	☐				

EQUIPMENT REQUIREMENTS

EQUIPMENT	REQUIRED		TYPE
Air Testing Monitor	☐ Yes	☐ No	
Forced Air Ventilation	☐ Yes	☐ No	
Communication	☐ Yes	☐ No	
Lighting	☐ Yes	☐ No	
Barriers	☐ Yes	☐ No	
Entry/Egress (e.g., ladders)	☐ Yes	☐ No	
Rescue Equipment	☐ Yes	☐ No	
Respirator	☐ Yes	☐ No	
Other Equipment	☐ Yes	☐ No	

VENTILATION REQUIREMENTS

Requires continuous forced air	☐ Yes	☐ No
Minimum ventilation time before entry		

SPECIFIC SPACE ENTRY PROCEDURES _____

_____

_____

_____

METHODS TO PREVENT UNAUTHORIZED ENTRY _____

_____

_____

PERSONNEL REQUIREMENTS

DUTY	NO. REQUIRED	DUTIES
CERTIFIED INDIVIDUAL		
ENTRANT		
ATTENDANT		
ENTRY SUPERVISOR		

PROCEDURES TO FOLLOW WHEN ATTENDANT IS MONITORING MULTIPLE SPACES: _____

_____

_____

PROCEDURES TO FOLLOW DURING EMERGENCY RESPONSE: _____

_____

_____

ENTRY PERMIT

IS AN ENTRY PERMIT REQUIRED? ☐ YES ☐ NO

ENTRY PERMIT CAN BE OBTAINED FROM _____

UPON CANCELLATION OF THE ENTRY PERMIT BY THE ENTRY SUPERVISOR, THE ENTRY PERMIT WILL BE RETURNED TO _____

RESCUE PROCEDURES

PROCEDURES FOR SUMMONING RESCUE AND EMERGENCY SERVICES: _____

_____

_____

Name of Rescue Service		**Name of Emergency Medical Service**	
Telephone Number		**Telephone Number**	
Location		**Location**	
Approximate Response Time		**Approximate Response Time**	

MULTI-EMPLOYER PERMIT SPACE OPERATIONS PROCEDURES _____

_____

_____

_____

CLOSURE REQUIREMENTS

List measures taken to close entry portal and return the space to normal operating conditions: _____

_____

_____

PROGRAM REVIEW

_____ will review entry operations if the measures taken did not fully protect employees.

_____ will conduct a review of the permit program at least annually utilizing canceled entry permits. Any inadequacies will be corrected.