HENNEPIN COUNTY RESOURCE RECOVERY PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT

APPENDICES

For Purposes of Public Meetings on

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Metropolitan Council of the Twin Cities Area
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APPENDIX A

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APPENDIX B

DEFINITIONS

"Acceptable waste" means garbage, refuse and other solid waste from residential, commercial, industrial and community activities, which is generated and collected in aggregate, including, in limited quantities, nonburnable construction debris, tree and agricultural wastes and tires; excepting, however, unacceptable waste as defined herein.

"Acre-foot" is a volume equal to 1,613 cubic yards. Based on Metropolitan Council staff estimates, there are approximately 806.5 tons of waste received at a landfill per acre-foot of landfill space used.

"Aluminum" is a light, grey nonferrous metal, typically discarded as scrap beverage cans, house siding, cookingware and furniture.

"Cities" means statutory and home rule charter cities and towns authorized to plan under Minn. Stat., Secs. 462.351 to 462.364.

"Collection" when referring to solid and hazardous waste means the aggregation of solid or hazardous waste from the place where it is generated, and includes all activities up to the time the waste is delivered to a waste facility (Minn. Stat., Sec. 473.121).

"Commercial agriculture region" means the area currently expected to continue in agricultural use indefinitely, as generally mapped on the Metropolitan Council's Development Framework. When the 1985 revisions to the Development Framework Plan are complete, it is expected that this region will be redefined as areas eligible for or in agricultural preserves.

"Commercial solid waste" includes solid waste generated by stores, offices, businesses, restaurants, warehouses and other nonmanufacturing activities, and nonprocessed wastes such as office and packing wastes generated at industrial facilities.

"Compostable yard waste" includes leaves, grass clippings and other organic wastes from lawn and garden maintenance that can readily be transformed into a usable soil amendment through controlled biological degradation.

"Composting" means the controlled biological decomposition of selected solid waste in a manner resulting in a humus-like final product that can be used as a soil amendment.

> "Backyard composting" means small-scale composting of yard and garden wastes by individual homeowners on their own property.
>
> "Centralized composting" means composting of wastes on a larger scale, such as at neighborhood or city-wide composting sites.
>
> "Co-composting" is the composting of sewage sludge or septage with municipal solid waste.

"Corrugated containers" consist of kraft linerboard cartons with corrugated paper, typically used to ship materials. They do not include noncorrugated containers such as chipboard or single-ply boxes (for example, a cereal carton). Some cartons that are heavily coated or waxed and used to ship meats and vegetables are not recyclable, and are classified as "other organics."

"Curbside collection" means collection, at the point of generation, of recyclables or compostable materials.

"Construction and demolition wastes" includes bricks, wood, paving, building materials and rubble resulting from construction, remodeling, repair and demolition.

"Dedicated boiler" means a boiler designed and built to burn a specific fuel such as refuse-derived fuel or mixed municipal solid waste.

"Designation plan" means that document entitled "Hennepin County Designation Plan" which detailed the county's proposal for the designation of waste, and which was approved by the Metropolitan Council on Apr. 25, 1985, pursuant to the statutory designation procedures contained in Minn. Stat., Sec. 115A.90.

"Environmentally sensitive areas" includes areas that are important from an ecological or natural resources management standpoint. They may include, but are not limited to, protected wetlands, floodplains and critical habitats of endangered species. Areas specifically managed by a governmental agency or private organization for their ecological values (for example, fish and wildlife) constitute ecologically sensitive areas as well.

"Ferrous scrap" consists of scrap iron and steel items, including steel food and beverage cans. Iron and steel scrap is any waste material to which a magnet adheres. Bimetal cans (ferrous cans with an aluminum top) are classified as ferrous scrap, as is any item that is at least 75 percent ferrous by volume. Stainless steel scrap (a shiny metal product used for its noncorrosive property and commonly found in appliances and kitchen counter tops) is considered ferrous.

"Ferrous containers" are steel and bimetal food or beverage cans and small, clean metal pails.

"Glass bottles and jars" consists only of glass, food and beverage containers.

"Greyhound facility" means the resource recovery facility to be constructed and operated in Minneapolis, Minn., at the intersection of Seventh St. N. and Sixth Av. N.

"Hazardous waste" means any refuse, sludge, or other waste material or combinations of refuse, sludge or other waste materials or discarded material, or a combination of refuse or discarded materials, in solid, semisolid, liquid, contained gaseous form which, because of the quantity, concentration, or chemical, physical, or infectious characteristics may (a) cause or significantly contribute to an increase in mortality, or an increase in serious irreversible or incapacitating reversible illness; or that cannot be handled by routine waste management techniques because it (b) poses a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed. Categories of hazardous waste materials include, but are not limited to, explosives, flammables, oxidizers, poisons, irritants and corrosives. Hazardous waste does not include source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended (Minn. Stat., Sec. 116.06, subd. 13).

"Identified recoverable materials" or "identified recyclables" means materials that can be separated from solid waste and recovered for reuse in their original form or for use in manufacturing, and which have been identified in the Council's solid waste guide.

"Industrial solid waste" is solid waste resulting from industrial processes and manufacturing. It does not include hazardous wastes.

"Land disposal" means the depositing of waste materials in a sanitary landfill.

"Land disposal facility" means a waste facility permitted by the Minnesota Pollution Control Agency that is designed or operated for the purpose of disposing of waste on or in the land.

"Land disposal site capacity" means the volume of space that is permitted to be filled at a land disposal site.

"Leachate" is water that has percolated through, or has been in contact with, solid wastes and contains waste contaminants removed from the solid wastes.

"Local governmental unit" means any municipal corporation or governmental subdivision other than a metropolitan county located in whole or part in the Metropolitan Area, authorized by law to provide for the processing of solid waste (Minn. Stat., Sec. 473.802).

"Market development" means the location and facilitation of economic markets for materials, substances, energy or other products contained within or derived from waste (Minn. Stat., Sec. 473.842, subd. 2).

"Mass-burn incinerator" means a solid waste combustion facility that is designed to burn unprocessed mixed municipal waste.

"Metropolitan Area" or "region" means the area over which the Metropolitan Council has jurisdiction, including the counties of Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington (Minn. Stat., Sec. 473.121).

"Metropolitan counties" or "counties" refers to the seven counties of Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington.

"Metropolitan Council" or "Council" means the Metropolitan Council established by Minn. Stat., Sec. 473.121.

"Metropolitan Urban Service Area" is the portion of the Metropolitan Area in which urban development or redevelopment exists or is planned.

"Mixed municipal solid waste" means garbage, refuse, and other solid waste from residential, commercial, industrial and community activities that is generated and collected in aggregate, but does not include auto hulks, street sweepings, ash, construction debris, mining waste, sludges, tree and agricultural wastes, tires, and other materials collected, processed and disposed of as separate waste streams (Minn. Stat., Sec. 115A.03, subd. 21).

"Mixed wastepaper" consists of all short- and long-fiber papers that can be repulped. It includes printing, writing and computing papers, magazines, food cartons, envelopes, grocery sacks, and other commercial and residential waste fiber. It does not include items contaminated by other materials such as metal (orange juice cans), plastics (window envelopes), wax (milk carton) or other nonpaper materials, or wastepaper contaminated by food wastes.

"Mulching" means the use or placement of grass clippings or other organic materials over a lawn or garden so as to improve conditions for vegetative growth.

"Municipality" means a city created by or pursuant to state law.

"Newspaper" consists of printed, groundwood newsprint, including glossy advertising inserts and Sunday-edition magazines.

"Organized collection" means a solid waste collection system wherein overlap of a) collection service areas and b) types of collection services is prevented or controlled. The organizing body may be public or private, and may exert its control by directly providing the collection service or by contracting for collection services.

"Other inorganics" consist of other noncombustible, nonmetallic material such as rocks and ceramics.

"Other nonferrous" consists of metals such as copper, brass, zinc and lead.

"Other organics" consists of combustible and compostable waste not otherwise categorized. They include food waste, plastics, rubber, textiles, leather, and paper that is not repulpable, as well as small quantities of other materials so mixed as to not be recyclable.

"Participation rate" is the percent of eligible waste generators who regularly participate in a given abatement program within a specified geographic area.

"Percolation" refers to the movement of a liquid through a porous substance, that is, rainwater moving through solid waste in a landfill.

"Processed waste" means mixed municipal solid waste that has a) yard wastes and identified recoverable materials removed and b) been subject to a process that oxidizes part or all of its organic component or any other process resulting in an organically stabilized material.

"Processible waste" means waste materials that can be source separated or otherwise reclaimed for their material or fuel value. Waste materials that cannot be source separated or reclaimed because of emergency situations will not be considered processible waste.

"Pyrolysis" is the physical and chemical decomposition of organic matter brought about by the action of heat in the absence of oxygen.

"Reasonably available technologies" are state-of-the-art technologies that have been applied at a commercial scale and could be implemented in a cost-effective manner.

"Recovery rate" is the percent of material identified and available for waste reduction or source separation that is actually recovered through a specific abatement program.

"Recyclables" means materials that can be readily separated and used or reused as a substitute for raw materials. They include, but are not limited to, paper, glass, metals, automobile oil and batteries.

"Refuse-derived fuel (RDF)" means the fraction of processed municipal waste that is shredded and can be used as fuel in a boiler; it consists of lighter weight materials, such as paper products, with metals, glass and other noncombustible materials removed.

"Residential solid waste" means the garbage, rubbish, trash and other solid waste resulting from normal household activities.

"Residuals" means waste materials left after recovery of recyclables and processing of remaining wastes.

"Resource conservation" means reducing the amounts of solid waste that are generated, reducing overall resource consumption, and using recovered resources.

"Resource recovery" means the reclamation for sale or reuse of materials, substances, energy or other products contained within or derived from waste.

"Resource recovery facility" means a waste facility established and used primarily for resource recovery.

"Sanitary landfilling" is a method of disposing of solid waste on land without creating nuisances or hazards to public health or safety, by confining the waste to the smallest practical areas, reducing it to the smallest practical volume, and covering it with a layer of earth at the end of each day's operation or more frequently if necessary.

"Secondary materials" are the marketable or usable products derived from solid or hazardous waste through processing or separation.

"Septage" means those solids and liquids that are removed during periodic maintenance of a septic tank, as defined in Minnesota Pollution Control Agency rule WPG40 (6MCAR 4.8040).

"Sewage sludge" means the solid and associated liquids in municipal wastewater that are encountered and concentrated by a municipal wastewater treatment plant for disposal at a sewage sludge disposal facility. Sewage sludge does not include sludge incinerator residues and grit, scum and screenings removed from other solids during wastewater treatment.

"Solid waste" is garbage, refuse and other discarded solid materials. It includes solid waste materials resulting from industrial, commercial and agricultural operations, and from community activities. Solid waste does not include animal waste used as fertilizer; earthen fill, boulders, rock and other materials normally handled in construction operations; solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluents; dissolved materials in irrigation return flows; or other common water pollutants (Minnesota Pollution Control Agency, Solid Waste Regulation No. 1).

"Solid waste management" means the systematic administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment and disposal of solid waste.

"Source separation" means separation of recyclable or compostable materials by the waste generator prior to collection.

"Special wastes" are nonhazardous wastes that are not classified as mixed municipal solid waste. They include, but are not limited to, construction debris, ash, street sweepings, mining waste, sludges, tree and agricultural wastes, and tires.

"Storage" or "holding" means containment of solid or hazardous waste, in an approved manner, after generation and before collection for ultimate recovery or disposal.

"Transfer station" means an intermediate waste facility in which solid or hazardous waste collected from any source is temporarily deposited to await transportation to another waste facility (Minn. Stat., Sec. 115A.03, subd. 3).

"Transfer stations" means the facilities for receiving waste at the following locations:

Hopkins: At the northwest corner of the County Bureau of Public Service facility which is west of County Rd. 18, south of Third St. S., east of Sixth Av. S. and north of Fifth St. S.

Bloomington: East of James Av. S., immediately northeast of the intersection of W. 96th St. and Humboldt Av. S., and south of the railroad spur track.

Brooklyn Park: An approximately 12-acre site northwest of the intersection of I-94 and Hwy. 169 and immediately west of Winnetka Av. N.

Minneapolis South: North of E. 29th St., west of 21st Av. S. and south of the railroad tracks on a site now used as a transfer station by the city of Minneapolis.

"Unacceptable waste" means:

1. Unacceptable Waste at Transfer Stations: Unacceptable waste at the transfer stations includes, but is not limited to, hazardous waste as defined in Minn. Stat., Sec. 116.06, subd. 13 (1984), as amended, and the Resource Recovery Act, 42 U.S.C. 6903 (5); hazardous waste of any kind or nature, such as explosives, radioactive materials, cleaning fluids, crankcase oils, cutting oils, paints, acids, caustics, poisons, drugs or other material that would be likely to pose a threat to health or public safety, or cause injury to or adversely affect the operation of the transfer stations; pathological and biological wastes; ashes; foundry sand; sanitary sewage and other highly diluted water-carried materials or substances; sludges, including sewage sludge and septic and cesspool pumpouts; human and animal remains; auto hulks and other motor vehicles, including such major motor vehicle parts as transmissions, rear ends, springs and fenders; agricultural and farm machinery and equipment; liquid wastes; large quantities of nonburnable demolition debris; street sweepings; mining waste; construction debris, trees, agricultural waste and tires in excess of the quantities allowed as acceptable waste; and waste that was generated outside of the county.

2. Unacceptable Waste at the Greyhound Facility: Unacceptable waste at the Greyhound facility includes unacceptable waste at transfer stations and, in addition thereto, the following: incinerator residue; human waste; automobile and small vehicle tires to the extent the air emission criteria applicable to the Greyhound facility are violated by their combustion; marine vessels and major parts thereof; transformers; trees and lumber more than six feet long or one foot in diameter; nonburnable construction material; demolition or other construction debris; any materials which, if processed at the Greyhound facility, would cause the bottom ash produced at the Greyhound facility to be classified as hazardous waste; and waste that was generated outside of the county.

"Unprocessed mixed municipal solid waste" means mixed municipal solid waste from which yard waste and identified recoverable materials have not been excluded and which has not been subject to a process which oxidizes part or all of its organic component or any other process resulting in an organically stabilized residue.

"Unprocessible waste" means waste materials that cannot be source separated or otherwise reclaimed for their material or fuel value.

"Waste flow designation" means a requirement by a waste management district or county that all or any portion of the solid waste that is generated within its boundaries or any service area thereof and is deposited within the state be delivered to a resource recovery facility identified by the district or county (Minn. Stat., sec. 115A.81, subd. 2).

"Waste district" means a geographic area extending into two or more counties in which the management of solid waste is vested in a special district established pursuant to provisions of the Waste Management Act (Minn. Stat., Sec. 115A.03, subd. 32).

"Waste facility" means all property real or personal, including negative and positive easements and water and air rights, that is or may be needed or useful for the processing or disposal of waste, except property used primarily for the manufacture of scrap metal or paper. Waste facilities include but are not limited to transfer stations, processing facilities and disposal sites and facilities.

"Waste management" means activities that are intended to affect or control the collection, processing and disposal of wastes.

"Waste reduction" is the process of reducing the amount of solid waste generated. It includes product reuse, increased product life, reduced material use in product design, and decreased consumption of products. It also includes activities such as mulching/backyard composting of yard waste.

"Windrow" means a method of centralized composting whereby materials are placed in long rows and periodically turned.

"Wooden waste" consists of waste generated from tree trimming or cutting of trees, and discarded lumber. The following items are included: tree trimmings and shavings (wood chips), discarded lumber from home or commercial construction sites, and other miscellaneous wooden wastes.

"Yard waste" means leaves, grass clippings or other organic material created as a result of lawn and garden maintenance.

APPENDIX C

ORDINANCE NUMBER TWELVE

SOLID WASTE DESIGNATION ORDINANCE

FOR

HENNEPIN COUNTY

DEPARTMENT OF ENVIRONMENT AND ENERGY

ADOPTED BY THE

HENNEPIN COUNTY BOARD OF COMMISSIONERS

OF HENNEPIN COUNTY, MINNESOTA

ON DECEMBER 10, 1985

IN ACCORDANCE WITH

MINNESOTA STATUTES, SECTIONS 473.811 and 115A.86

ORDINANCE NUMBER TWELVE
SOLID WASTE DESIGNATION ORDINANCE
FOR HENNEPIN COUNTY

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SOLID WASTE DESIGNATION ORDINANCE
FOR HENNEPIN COUNTY

An ordinance regulating the flow of solid waste in Hennepin County, Minnesota; defining the geographic area and the types and quantities of solid waste subject to designation; specifying the point or points of delivery of the solid waste; requiring that the designated solid waste be delivered to the specified point or points of delivery; establishing procedures and principles to be followed by the County in establishing and amending rates and charges at the designated facility; excepting from the ordinance certain materials; and stating additional regulations governing waste collectors and other matters.

WHEREAS, the Waste Management Act of 1980 (Minnesota Statutes, Sections 115A.01 to 115A.72, as amended) and Minnesota Statutes, Sections 473.801 to 473.834, as amended (collectively the "Act"), require the County to seek to abate the need for land disposal of solid waste; and

WHEREAS, it is the desire of the County to reduce the volume of solid waste generated in the County that is being deposited in landfills and to recover the energy resources contained in such solid waste; and

WHEREAS, the County has entered into a contract for the design, construction and operation of a large scale solid waste resource recovery facility in the County (the Greyhound Facility), for the purposes of (1) disposal of residential, commercial and industrial solid waste, thereby reducing the volume of solid waste being deposited in landfills, and (2) recovery of materials and energy from solid waste for resale; and

WHEREAS, in order to finance and operate the Greyhound Facility, the County must have assurance that sufficient quantities of Designated Waste will be delivered to the Facility; and

WHEREAS, the County is authorized to designate a resource recovery facility at which all or any portion of the solid waste generated within the County must be delivered pursuant to Minnesota Statutes, Section 473.811, subd. 10, and Sections 115A.80, et seq.; and

WHEREAS, the County has evaluated the benefits of designating a resource recovery facility for required use and found that such a facility will serve public purposes and welfare by conserving and recovering resources, furthering waste management plans and policies, reducing the need for land disposal of solid waste and further finds that the required use of the facility is necessary for the financial support of the facility, and no less restrictive method will assure an adequate reliable supply of waste; and

WHEREAS, the County has adopted a comprehensive solid waste master plan which includes a plan for designation approved by the Metropolitan Council as required by Minnesota Statutes, Section 115A.84; and

WHEREAS, the County has complied with the procedures established for designating a facility for required use under Minnesota Statutes, Section 115A.85; and

WHEREAS, the County is authorized to implement designation by this Ordinance pursuant to Minnesota Statutes, Section 115A.86;

NOW, THEREFORE, the County Board of Hennepin County, Minnesota, does ordain:

SECTION I. DEFINITIONS

The terms defined in this Section shall, for all purposes of this Ordinance, have the meanings herein specified, unless the context clearly otherwise requires:

Subsection 1. "Acceptable Waste" shall mean garbage, refuse, and other solid waste from residential, commercial, industrial and community activities which is generated and collected in aggregate, including, in limited quantities, non-burnable construction debris, tree and agricultural wastes and tires; excepting however, Unacceptable Waste as defined herein.

Subsection 2. "County" shall mean Hennepin County, Minnesota.

Subsection 3. "County Board" shall mean the Hennepin County Board of Commissioners and their authorized representatives.

Subsection 4. "Department" shall mean the County's Department of Environment and Energy.

Subsection 5. "Designated Waste" shall mean "mixed municipal solid waste" as defined in Minnesota Statutes, Section 115A.03, subd. 21, which means garbage, refuse, and other solid waste from residential, commercial, industrial and community activities which is generated and collected in aggregate, but does not include auto hulks, street sweepings, ash, construction debris, mining waste, sludges, tree and agricultural wastes, tires, and other materials collected, processed and disposed of as separate waste streams; excepting, however, Unacceptable Waste as defined herein.

Subsection 6. "Designation" shall mean the requirement contained in Section II herein, that all of the Designated Waste that is generated within the County's boundaries, as required by State law, be delivered to one of the Transfer Stations, or, if permitted by the County, to the Greyhound Facility.

Subsection 7. "Designation Plan" shall mean that document entitled "Hennepin County Designation Plan" which detailed the County's proposal for the Designation of waste, and which was approved by the Metropolitan Council on April 25, 1985, pursuant to the statutory designation procedures contained in Minnesota Statutes, Section 115A.90.

Subsection 8. "Effective Date" shall mean the date from and after which Designated Waste must be delivered to the Facility, as specified in Section VII, Subsection 6 hereof.

Subsection 9. "Facility" shall mean the Greyhound Facility and the Transfer Stations.

Subsection 10. "Greyhound Facility" shall mean the resource recovery facility to be constructed and operated in Minneapolis, Minnesota, at the intersection of Seventh Street North and Sixth Avenue North, as more fully shown on Exhibits A and A-1 hereto.

Subsection 11. "Hauler" shall mean a collector or transporter of Designated Waste licensed under Section III hereof.

Subsection 12. "Hazardous Waste" has the meaning given to it in Minnesota Statutes, Section 116.06, subd. 13, and in the Federal Resource Conservation and Recovery Act (42 U.S.C. Section 6903(5)), and in regulations promulgated pursuant to either of the foregoing, as any of which may be amended from time to time.

Subsection 13. "Person" shall mean any individual, corporation, partnership, joint venture, association, trust, unincorporated association, or government or any agency or political subdivision thereof, including, without limitation, landfill operators, Designated Waste generators and Haulers in the County.

Subsection 14. "Special Fee" shall mean the charge payable by any Person to the County for the disposal of certain special Waste including special fees for Waste delivered by Persons other than Haulers.

Subsection 15. "Tipping Fee" shall mean the charge payable by each Person under Section V of this Ordinance to the County for the disposal of Waste.

Subsection 16. "Transfer Stations" shall mean the facilities for receiving Waste at the following locations:

Hopkins: at the northwest corner of the County Bureau of Public Service facility which is west of County Road 18, south of Third Street South, east of Sixth Avenue South and north of Fifth Street South. [See Exhibit B for a map showing the location.]

Bloomington: east of James Avenue South, immediately northeast of the intersection of West 96th Street and Humboldt Avenue South, and south of the railroad spur track. [See Exhibit C for a map showing the location.]

Brooklyn Park: an approximately 12 acre site northwest of the intersection of I-94 and Highway 169 and immediately west of Winnetka Avenue North. [See Exhibit D for a map showing the location.]

Minneapolis South: north of East 29th Street, west of 21st Avenue South and south of the railroad tracks on a site now used as a transfer station by the City of Minneapolis. [See Exhibit E for a map showing the location.]

Subsection 17. "Unacceptable Waste" shall mean:

(a) Unacceptable Waste at Transfer Stations: Unacceptable Waste at the transfer stations includes, but is not limited to, hazardous waste as defined in Minnesota Statutes, Section 116.06, subd. 13 (1984), as amended, and the Resource Conservation and Recovery Act, 42 U.S.C. 6903 (5); hazardous waste of any kind or nature, such as explosives, radioactive materials, cleaning fluids, crankcase oils, cutting oils, paints, acids, caustics, poisons, drugs, or other material that would be likely to pose a threat to health or public safety, or cause injury to or adversely affect the operation of the transfer stations; pathological and biological wastes; ashes, foundry sand; sanitary sewage and other highly diluted water-carried materials or substances; all sludges, including sewage sludge and septic and cesspool pumpouts; human and animal remains; auto hulks and other motor vehicles, including such major motor vehicle parts as transmissions, rear-ends, springs and fenders; agricultural and farm machinery and equipment; liquid wastes; large quantities of non-burnable demolition debris; street sweepings; mining waste; construction debris, trees, agricultural waste and tires in excess of the quantities allowed as Acceptable Waste; and waste which was generated outside of the County unless accepted by the County pursuant to Section IV, Subsection 8.

(b) Unacceptable Waste at the Greyhound Facility: Unacceptable Waste at the Greyhound Facility includes Unacceptable Waste at Transfer Stations and, in addition thereto, the following: incinerator residue, human waste, automobile and small vehicle

tires to the extent the air emission criteria applicable to the Greyhound Facility are violated by their combustion, marine vessels and major parts thereof, transformers, trees and lumber more than six feet long or one foot in diameter, nonburnable construction material, demolition or other construction debris, any materials which if processed at the Greyhound Facility would cause the bottom ash produced at the Greyhound Facility to be classified as hazardous waste, and waste which was generated outside of the County unless accepted by the County pursuant to Section IV, Subsection 8.

Subsection 18. "Waste" shall mean all solid waste delivered or caused to be delivered to the Facility by any Person.

SECTION II. DESIGNATION

Subsection 1. Application of Ordinance. This Ordinance shall govern the transportation and disposal of all Designated Waste generated or disposed of within the County, as required by State law, and all Persons engaged in transportation or disposal of Designated Waste within the County.

Subsection 2. Designation. On and after the Effective Date all Designated Waste generated within the County, as required by State law, must be delivered to one of the Transfer Stations or, if permitted by the County, to the Greyhound Facility and may not be delivered to any other disposal site except as provided in subsections 3 and 4 herein and in Section IV, subsection 7. The County may from time to time designate additional Facilities. This subsection 2 is binding on all Persons.

Subsection 3. Exceptions. The following materials shall be exempt from Designation:

(a) Materials that are separated from solid waste and recovered for reuse in their original form or for use in manufacturing processes, as provided in Minnesota Statutes, Section 115A.83.

(b) Materials processed at another resource recovery facility, provided that:

1. Such facility was in operation at the time of approval by the Metropolitan Council of the County's Designation Plan, on April 25, 1985;

2. Such materials shall be exempt only at the processing capacity of such other facility in operation at the time of approval of the Designation Plan;

3. The owner of such facility shall provide documentation to the Department within 30 days following a written request to do so by the Department, substantiating the following: the existence of the facility at the time of Designation Plan approval; the amount of materials processed at the facility at that time; that the facility remains in operation, and such other information as the Department may require.

(c) Waste excluded from the County's designation by Metropolitan Council Action on April 25, 1985, but only so long as, and only to the extent that, such exclusions remain in effect and the excluded facility is operational and the waste is delivered to the excluded facility.

(d) Materials otherwise subject to Designation for which negotiated contractual arrangements with the County exist that will require and effect the delivery of the waste to the Facility for the term of the contract; provided that this exception shall apply only during the term of such contract and only while there is no default thereunder.

(e) Materials which the Department determines on a case-by-case basis should be exempt for reasons of public health and safety, under such conditions as the Department may specify. The Department shall make its determination based upon written application. At its option, the Department may convene an informal hearing with the applicant to consider the application.

Subsection 4. Suspension of Designation Requirement. The County, by resolution of the County Board, may suspend the Designation requirement of subsection 2 of this Section at any time. If the County suspends the Designation requirement of subsection 2 of this Section, no Person may deliver any waste to the Facility unless in accordance with the County resolution or until such time as the County reinstates the Designation requirement. This provision does not relieve any Person of any obligation to comply with all other applicable federal, state or local laws or ordinances. The County will provide reasonable notice of any suspension and subsequent reinstatement of the Designation requirement to Haulers, municipalities, and landfill operators in the County.

Subsection 5. Restricted Access to Hopkins Transfer Station. Haulers depositing Waste at the Transfer Station at Hopkins are prohibited from using the following streets for direct ingress or egress from the Transfer Station:

(a) 5th Street South between 6th Avenue South and County Road 18, and

(b) 2nd Avenue South between 5th Street South and 7th Street South, and

(c) Lincoln Drive from West 7th Street to Maloney Avenue, and Washington Avenue from Maloney Avenue to West 3rd Street.

SECTION III. LICENSES

Subsection 1. Licenses Required. On and after the Effective Date, each Person engaged in, and each truck or other conveyance used in, the business of collecting or transporting Designated Waste within the County must have a valid license issued by the County. Annual fees as set by County Board resolution shall be charged for each license. It shall be a condition of the license that the Hauler complies with all requirements set forth in subsections 2 through 11 hereof.

Subsection 2. Guidelines. All Haulers shall operate within the guidelines as set forth in the license. All guidelines shall be established or modified by County Board resolution.

Subsection 3. Lettering. The Hauler's name or firm name, together with his telephone number, shall be printed or painted in legible letters, not less than 3 inches in height, on both sides of all trucks and conveyances used to collect or transport Solid Waste within the County. In addition, each such truck and conveyance shall have affixed to both sides evidence of its license with the County, as specified by the license.

Subsection 4. Equipment. All equipment used for collection and transportation of Solid Waste for delivery pursuant to this Ordinance shall be enclosed or securely covered with no open loads permitted, shall be kept free of leaks and in good repair and safe operating condition and shall comply with all regulations which may from time to time be enacted by resolution of the County Board. Each vehicle for which a license is applied for or which is licensed shall be subject to inspection by the County at the annual renewal date and at all reasonable times; provided that no annual inspection by the County shall be required if evidence is submitted to the County of an inspection of the vehicle which is satisfactory to the County and which was conducted by a municipality within the County within the prior twelve months. The County or other entity receiving the Waste at the Facility may reject any delivery of Waste delivered by equipment in violation of this subsection 4. Each Hauler shall maintain with the County such information concerning equipment of each Hauler as may be reasonably requested from time to time by the County, including identification of each vehicle operating within the County.

Subsection 5. Title to Waste. Each Hauler shall be deemed to have title (ownership) to all Waste delivered to the Facility pursuant to this Ordinance and will defend, indemnify and hold the County harmless from any and all claims of ownership brought against the County with respect to said Waste which may affect the clear title of the County to said Waste at the time of its acceptance by the County. Each Hauler shall retain all rights, title (ownership) and responsibility with respect to Waste until such time as the Waste is delivered to the Facility, dumped into or (as provided below) adjacent to the receiving pits of the Facility and accepted by the County. The County may, for purposes of inspection, require that the Waste be deposited next to the receiving pits for transfer to the pits by the County. When the Waste is deposited at the Facility and accepted by the County as Designated Waste all rights and title (ownership) with respect thereto shall thereupon be transferred from each Hauler to the County, except to the extent the County subsequently rejects previously accepted Waste as Unacceptable Waste as provided in Section IV, subsection 4. For purposes of this subsection 5 the term "County" shall mean either the County or any other entity receiving the Waste at the Facility.

Subsection 6. Indemnification of County. Each Hauler shall take all precautions necessary to protect the public against injury and shall defend, indemnify and save the County harmless from any liability, claims, damages, costs, judgments, expenses and claims of damages that may arise by reason of any tort claim for bodily or personal injury, disease or death or damage to property resulting directly or indirectly from an act or omission of the Hauler, its agents, employees, or independent contractors, including, but not limited to, damages and claims of damages caused by Unacceptable Waste, hot loads delivered by such Hauler, fires or explosions caused by hot loads after delivery, driver caused damage to any part of the Facility and the cost of cleanup of Waste contaminated by such Hauler, and against any and all claims, liens and claims of liens for labor performed or material furnished incident to the performance by such Hauler of its obligations under this Ordinance. Each Hauler shall also defend, indemnify and save the County harmless from and against all liabilities, losses, damages, costs and expenses (including attorneys' fees and expenses of the County), causes of action, suits, claims, demands and judgments of any nature arising from violation of this Ordinance by such Hauler.

Subsection 7. Insurance. Each Hauler shall obtain and furnish to the County evidence of all insurance required under this subsection, covering all vehicles to be used and all operations to be performed by each Hauler, its subcontractors and independent contractors under this Ordinance. Such insurance may be provided by each Hauler and separately by the individual subcontractors and independent contractors; or, in the alternative, each Hauler may furnish evidence of such insurance covering itself as well as all of its subcontractors and

independent contractors as additional insureds. Existence of the insurance required herein shall be established by furnishing certificates of insurance issued by insurers duly licensed within the State of Minnesota, in force on the date of commencement of any performance under this Ordinance, and continuing for a policy period of at least one (1) year and providing public liability insurance, including general liability, automobile liability, products liability (if applicable), and loading and unloading liability, with the following coverages:

(a) Bodily and personal injury liability in the amount of at least $100,000 for injury or death of any one person in any one occurrence.

(b) Bodily and personal injury liability in the amount of at least $300,000 for injuries or death arising out of any one occurrence.

(c) Property damage liability in the amount of at least $100,000 for any one occurrence.

The above limits of liability are subject to change by resolution of the County Board.

Such general liability and automobile liability insurance policy or policies shall provide contractual liability insurance, specifically referring to and covering the obligation of each Hauler, its subcontract haulers and independent contractor haulers to defend, indemnify and save harmless the County, its officers, agents and employees from alleged claims or causes of action for bodily injury or property damage as provided in Section III, subsection 6, hereof.

Said general liability and automobile liability policy or policies shall contain an endorsement as follows:

> "The policy to which this endorsement is attached is intended to comply with and furnish the coverages required by Section III, subsection 7 (Insurance) of Ordinance Number Twelve adopted December 10, 1985, by Hennepin County. If anything in any other attachment, endorsement or rider conflicts with the provisions of said Section III, subsection 7, then the provisions of said Section III, subsection 7 shall prevail.
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> "Any deductible amount provided for in any part of the policy will be paid by the insurer upon establishment of legal liability of any insured, and the insurer shall be entitled to reimbursement from the insured for such deductible amount."

Said policies of insurance shall be furnished by each Hauler to the County for examination and approval, together with a certificate or certificates executed by an authorized representative of the insurer, certifying to the insurance coverage herein required, and stipulating that the policy will not be

cancelled, nor any material change effected, without first giving thirty (30) days' written notice to the County. After examination and approval of said policies by the County, they will be returned to each Hauler or the appropriate subcontractor or independent contractor, but the certificates of insurance will be retained by the County. Upon request by the County, each Hauler or any of its subcontractors or independent contractors shall promptly furnish to the County for examination at any time all contracts of insurance required herein. Each Hauler shall furnish the County with evidence satisfactory to the County of the continuance of such insurance, signed by an authorized representative of the insurance carrier.

Notwithstanding the foregoing, all municipalities and municipally owned and operated waste collection vehicles shall be exempt from all insurance requirements contained in this Subsection 7, provided that they furnish evidence acceptable to the County of their ability to respond to all financial obligations to the limits of their liability under Minnesota Statutes, Chapter 466.

Subsection 8. Reports. On or before January 31 of each year after the Effective Date and on such other dates as the County shall request, each Hauler will submit to the County a written report of its operations within the County during the previous year covering matters relating to this Ordinance as the County shall specify from time to time by resolution of the County Board.

Subsection 9. Compliance with State Laws. Haulers shall at all times operate its business of collecting, transporting and disposing of municipal solid waste in compliance with all rules, regulations and requirements of the State of Minnesota.

Subsection 10. Licenses not Transferable. Licenses issued under the provisions of this Section shall not be transferable. Any attempted transfer of any such license shall immediately void such license.

Subsection 11. Licensing Procedures. The procedure for application for, issuance or denial of license required by this Ordinance shall be as follows:

(a) Application: Application for a license or license renewal shall be made to the Department and shall be on forms furnished by the Department. Applications for license renewal shall be received by the Department at least sixty (60) days prior to the expiration of the current license. The application shall contain such facts as are required by the form for the granting of a license.

(b) Payment of Fee: The fees required for a license shall be paid at the office of the Department. No license fee shall be prorated for a portion of a year and no license fee shall be refunded. No license shall be issued until the fees therefor have been paid in full.

(c) Penalty for Late Payment: Every person whose licensed activity is licensed by the County other than one who has been closed down or who has not operated such activity in the County after the expiration of the licensing year, shall pay to the County Board the regular license fee and in addition thereto the following penalty for late application for a renewal license.

1. One to seven days late, a twenty-five percent penalty.

2. Eight to thirty days late, a fifty percent penalty.

3. After expiration of thirty days from the due date, the activity for which a license is required shall cease. No new license or permit for such activity shall be considered until the owner of the business personally appears before the County Board. If the new license or permit is approved, the fee shall consist of the amount set forth for new licenses and permits, plus the late penalty fee that was not paid for the old license.

(d) Late Payment of the License Fee with Penalty No Bar to Prosecution for Operating Without a License: The late payment of the license fee along with the penalty set forth in paragraph (c) above is no bar to any prosecution by the County for operating any licensed activity within the County without a license therefor.

(e) Issuance or Denial of License:

1. The Department shall have 30 days to issue or deny the license or renewal. Failure by the Department to act on an application for a new license within the 30 days shall constitute a denial without prejudice to the applicant's right to file a further application. Failure by the Department to act on an application to renew a license within 30 days shall leave the existing license in full force and effect until action is taken.

2. Once the Department has decided on the disposition of the license application or renewal application, the applicant shall be notified in writing of its decision.

3. Where a license is denied, the Department shall state the factual basis for its decision and notice of its decision shall be personally served on the applicant or shall be served by registered or certified mail to said applicant at the address designated in the license appli-

cation. The applicant shall have ten working days, exclusive of the day of serivce, to request a hearing. The request shall be in writing stating the grounds for appeal and served personally or by registered or certified mail on the Department by midnight of the 10th County working day following service of the notice of denial. If the applicant fails to request an appeal within the specified time period, any opportunity for a hearing is forfeited and the Department's decision is final. After receipt of an appeal request, the Department shall set a time and place for the hearing.

SECTION IV. DELIVERY OF WASTE

Subsection 1. Delivery of Waste. Each Person shall use its best efforts to deliver only Acceptable Waste to the Facility. The County shall not accept any Waste which does not constitute Designated Waste, except the County will accept Acceptable Waste. The County shall have the right, but not the obligation, to inspect all vehicles delivering Waste to the Facility. The obligation of each Person not to deliver Unacceptable Waste to the Facility shall not be limited by any inspection of such Person's vehicle by the County. If the County in the exercise of its reasonable judgment determines that a vehicle contains any Unacceptable Waste, the County may reject the entire delivery and the Person delivering such delivery shall forthwith remove such entire delivery from the Facility for proper disposal elsewhere. All costs of such removal and disposal shall be borne by each Hauler.

Each Person shall have the sole responsibility to remove from the Facility Unacceptable Waste it has delivered and pay the resulting cost, notwithstanding any prior acceptance of such Waste as Designated Waste by the County. Such removal shall be accomplished promptly after notice, verbal or written, is received by such Person from the County that any Waste previously delivered by such Person is Unacceptable Waste. However, either before or after such notice, if in the judgment of the County the situation requires immediate action, the County may remove and dispose of the Unacceptable Waste and charge the costs of such removal and disposal to such Person.

Subsection 2. Delivery Conditions. Each Person shall deliver all Designated Waste in accordance with the following terms and conditions:

(a) Hours and Days of Delivery at Transfer Stations. The County, unless it posts notice otherwise, shall accept deliveries of Designated Waste and Acceptable Waste at Transfer Stations during the following operating hours (except for the legal holidays listed below, during which no deliveries will be accepted unless the County agrees otherwise):

7:00 a.m. to 6:00 p.m., Monday-Saturday

Legal holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. Any change in the hours or days of delivery, unless for a temporary period due to unusual circumstances, shall be pursuant to resolution of the County Board.

(b) Hours and Days of Delivery at Greyhound Facility. The County, unless it posts notice otherwise, shall accept deliveries of Designated Waste and Acceptable Waste at the Greyhound Facility during the following operating hours:

4:00 a.m. to 8:00 p.m., Monday-Saturday and
4:00 a.m. to 12:00 noon Sundays and all holidays

Any change in the hours or days of delivery, unless for a temporary period due to unusual circumstances, shall be pursuant to resolution of the County Board.

(c) Form of Waste. All Waste shall be in substantially the same form and consistency as when it came under the control of each Hauler, except that such Waste may be compacted when compaction is desirable for transportation.

(d) Facility Rules. Each Hauler or other Person delivering Waste pursuant to this Ordinance will comply with all rules and regulations posted at the Facility.

Subsection 3. Monthly Invoices to Haulers; Payments. The County shall, within ten (10) days following the last day of each month subsequent to the Effective Date, submit to each Hauler a statement of the total tonnage of Waste delivered to the Facility during the preceding month or other applicable period and the amount which each Hauler is required to pay to the County pursuant to this Ordinance. The Tipping Fees for each month shall be computed on the basis of the applicable rate of payment times the total tonnage of Waste delivered by each Hauler to the Facility during such month or part of any month. The monthly invoice shall include the total Tipping Fee due and any other fees and charges due and owing to the County pursuant to this Ordinance.

Invoices for each month's deliveries shall be paid to the County or its order on or before the fifteenth (15th) day from the date of the invoice. Invoices not paid when due shall incur daily interest until paid at an annual rate equal to twelve percent (12%), or the maximum interest rate permitted by applicable law if less than said interest rate, or such other interest rate as is determined by resolution of the County Board. Provisions in this Ordinance regarding monthly invoices for amounts due shall also apply to separate invoices.

Notwithstanding any dispute regarding the amount due listed on the monthly invoice, each Hauler shall pay the disputed amount. If a disputed amount has been paid by a Hauler and the

dispute is resolved in favor of such Hauler, the County shall reimburse the disputed amount plus daily interest on such disputed amount from the date such disputed amount was received by the County, at an annual rate equal to the applicable interest rate as provided in the previous paragraph of this Subsection 3.

If the County at any time determines the amount due listed on the invoice for a particular month was less than the actual amount due, the County may issue a separate invoice for the amount not previously billed or add the amount not previously billed to the next subsequent monthly invoice as a separate item with an accompanying explanation.

Subsection 4. Payments by Persons other than Haulers. Charges for Waste delivered by Persons other than Haulers shall be in accordance with schedules and procedures adopted by resolution of the County Board.

Subsection 5. Street Cleanup Charges. If in the sole judgment of the County a Hauler during any period of time is primarily responsible for all or a portion of waste littering roadways leading to the Facility, the County may charge such Hauler with the entire cost of the removal and disposal of such waste or such portion of such waste. Each Hauler's share of the costs of such removal and disposal shall be added to the next monthly invoice to each Hauler.

Subsection 6. Weighing at Facility. The County shall maintain at the Facility certified weighing scales. The tonnage of Waste delivered at the Facility shall be determined by weighing the vehicle immediately prior to depositing the Waste and immediately after depositing the Waste and subtracting the second weight from the first weight. However, the County reserves the right not to weigh the vehicle immediately after it deposits the Waste. Upon request, the County shall provide to the driver of each Hauler's vehicle making a delivery of Waste to the Facility a receipt setting forth the first weight, the weight after depositing the Waste, the date, time, truck identification, and total tonnage of Designated Waste determined to have been delivered to the Facility by such vehicle. Whenever any Waste is not accepted by the County, the outgoing vehicle shall be weighed and receipted in like manner. All such receipts shall be prepared in duplicate, with the County retaining one copy or a suitable machine record. Such receipts shall be used by the County as the basis for determining the payments required by Section V. For purposes of this subsection 6 the term "County" shall mean either the County or any other entity receiving the Waste at the Facility.

Subsection 7. Duty to Accept Designated Waste; Failure to Accept Designated Waste at Facility. Notwithstanding anything in this Ordinance to the contrary, the Facility will accept all Designated Waste to the extent required by applicable Minnesota

law. If at any time after the Effective Date the County is unable to receive all or any part of each Hauler's Designated Waste at the Facility, the County shall endeavor to verbally notify each Hauler's truck dispatcher and any other responsible party designated by each Hauler for notification as soon as possible, such notification to be followed by written confirmation to each Hauler. The County shall also station an individual or post a sign during normal waste receiving hours to notify truck operators of the suspension of operations and to direct truck operators to an alternate Facility. In such event each Hauler shall be responsible for the transportation of such Waste to such alternative Facility or if no alternative Facility has been identified by the County, to such landfill as each Hauler may choose. All costs of such transportation and disposal shall be borne by each Hauler.

Subsection 8. Acceptance of Acceptable Waste from Other Counties. Upon the written request of a Hauler, accompanied by evidence satisfactory to the County that there is no violation of the other county's ordinances, the County will consider acceptance of Acceptable Waste generated outside of the County which is collected by the Hauler and constitutes a portion of the waste in a vehicle and will accept such Acceptable Waste if approved in writing by the County.

SECTION V. TIPPING FEES AND SPECIAL FEES

Subsection 1. Payment. Each Hauler or other Person who delivers Waste to the Facility must pay a Tipping Fee and/or any applicable Special Fee to the Facility operator for Waste disposed of and accepted at the Facility.

Subsection 2. Establishment of Fees.

1. Procedure. The County Board of Commissioners shall establish or amend the Tipping Fee and Special Fees by resolution and the same shall be on file with the Clerk of the County Board. The County Board shall endeavor to establish the Tipping Fee and Special Fees on or before August 30 of each year for the following calendar year. Notwithstanding the foregoing, the County Board shall have the right to amend the Tipping Fee and Special Fees at any time, but will endeavor to make the effective date of any such amended fee to be at least ninety (90) days after such amended fee is established. The resolution shall state the effective date of the Tipping Fee and Special Fees.

2. Principles. The County shall set the Tipping Fee and Special Fees and any amendments thereto at a reasonable amount, taking into account any of the following factors:

(a) all costs of acquisition, operation and maintenance of the Facility;

(b) the cost to the County of waste management services including those provided by the Facility;

(c) the cost to the Haulers of delivering waste to the Facility;

(d) any economic incentive the County may provide; and

(e) any other factors which the County may determine to have an impact on the reasonableness of the Tipping Fee at the Facility.

SECTION VI. VIOLATIONS AND PENALTIES

Subsection 1. Remedies Cumulative. No remedy set forth in this Ordinance for violation of this Ordinance is intended to be exclusive of any other available remedy or remedies, but each and every such remedy shall be cumulative and shall be in addition to every other remedy given under this Ordinance or now or hereafter existing at law or in equity or by statute. No delay in the exercise of any remedy for any violation of this Ordinance shall later impair or waive any such right or power of the County.

Subsection 2. Misdemeanor. Any person who fails to comply with the provisions of this Ordinance, other than failure to pay when due amounts due and owing to the County, is guilty of a misdemeanor. A separate offense shall be deemed committed upon each day during or on which a violation occurs or continues.

Subsection 3. Injunctive Relief. In the event of a violation or a threat of violation of this Ordinance, the County may institute appropriate actions or proceedings including application for injunctive relief, action to compel performance or other appropriate action to prevent, restrain, correct or abate such violations or threatened violations.

Subsection 4. Costs and Special Assessments. If a Hauler or any Person within said County collects or disposes of Designated Waste in violation of this Ordinance, the County may take the necessary steps to correct such violations and the costs thereof may be recovered in a civil action in any court of competent jurisdiction, or, at the discretion of the County Board, the costs may be certified to the County Director of Property Tax and Public Records as a special tax against the real property owned by such Hauler or Person.

Subsection 5. Orders and Notices. Whenever the Department or its authorized representative shall find a person or vehicle in violation of this Ordinance, the Department may issue

such orders as may be necessary for the enforcement of this Ordinance governing and safeguarding the public health, welfare and safety. Any order or notice issued or served by the Department shall be complied with by the owner, operator, occupant or other person responsible for the condition or violation to which the order or notice pertains. Every order or notice shall set forth a time limit for compliance depending upon the nature of the solid waste and the danger created by the violation. In cases of extreme danger to the health, welfare and safety of the public, immediate compliance shall be required.

Subsection 6. Citations. The Department or any of its duly authorized representatives shall have the power to issue citations for violations of this Ordinance, other than for violations resulting from failure to pay when due amounts due and owing to the County, but this shall not permit such representatives to physically arrest or take into custody any violator except on warrant duly issued.

(a) Form of Citations: Citations shall contain at least the following:

1. The name and address of the person charged with the violation or the owner or person in charge of the premises at which the violation occurs.

2. The date and place of the violation.

3. A short description of the violation followed by the section of this Ordinance violated.

4. The date and place at which the person receiving the citation shall appear and a notice that if such person does not respond, a warrant may be issued for such person's arrest.

5. The name of the person issuing the citation.

6. Such other information as the Court may specify.

(b) Issue of Citations: Whenever any representative of the Department discovers any violation of this Ordinance, he may issue a citation to the person alleged to have committed the violation and such citation shall be in the form specified in paragraph (a) of this subsection 6. Such citation shall be made out in quadruplicate (4). One copy thereof shall be issued to the person alleged to have committed the violation; one copy shall be filed with the Department; two copies thereof shall be filed with the County Ordinance Violation Bureau.

(c) Issuance: The citation shall be issued to the person charged with the violation, or in the case of a corporation or municipality, to any officer or agent

expressly or impliedly authorized to accept such issuance.

(d) Appearance: After the issuance of the citation and within such time as shall be fixed by court rule, the person charged with the violation shall report to the Violation Bureau.

(e) Complaint: If the person charged with the violation does not appear at the Bureau within the time specified by court rule, the Bureau shall send him a notice directing him to respond to the citation within seven days of the date of the notice and if such person fails to respond, the Bureau shall cause a complaint to be signed and a warrant to be issued for the arrest of such person to compel his appearance in court.

Subsection 7. Suspension of License.

(a) Any license required under this Ordinance may be suspended by the Department for violation of any provision of this Ordinance. Upon written notice to the licensee said license may be suspended by the Department for a period not longer than 60 days or until the violation is corrected.

(b) Such suspension shall not occur earlier than ten working days after written notice of suspension has been served personally or by registered or certified mail on the licensee or, if a hearing is requested, until written notice of the County Board action has been served personally or by registered or certified mail on the licensee. Such written notice of Departmental suspension shall contain the effective date of the suspension, the nature of the violation or violations constituting the basis for the suspension, the facts which support the conclusion that a violation or violations has occurred, and a statement that if the licensee desires to appeal, he must within ten County working days, exclusive of the day of service, file a request for a hearing. The hearing request shall be in writing stating the grounds for appeal and served personally by registered or certified mail on the Department by midnight of the 10th County working day following service. Following receipt of a request for a hearing, the Department shall set a time and a place for the hearing. The hearing shall be conducted pursuant to the procedures in Section VI, Subsection 10 of this Ordinance.

(c) If said suspension is upheld and the licensee has not demonstrated within the 60-day period that the provisions of the Ordinance have been complied with

and that such compliance will continue, the Department may serve notice of continued suspension for up to 60 days or initiate revocation procedures.

Subsection 8. Summary Suspension of License.

(a) If the Department finds that the public health, safety or welfare imperatively requires emergency action, and incorporates a finding to that effect in its order, summary suspension of a license may be ordered by the Department. Written notice of such summary suspension shall be personally served on the licensee, or shall be served by registered or certified mail to said licensee at the address designated in the license application. In addition, the Department may post copies of the notice of summary suspension of the license on the Facility. Said posting shall constitute the notice required under this Section.

(b) The written notice in such cases shall be effective on the earlier of when such notice is posted or when such notice is mailed to the licensee, unless the notice specifies otherwise. The written notice shall state the effective date of the suspension and the nature of the violation requiring emergency action, the facts which support the conclusion that a violation or violations has occurred and a statement that if the licensee desires to appeal he must, within ten County working days, exclusive of the day of service, file a request for a hearing. The hearing request shall be in writing stating the grounds for appeal and served personally or by registered or certified mail on the Department by midnight of the 10th County working day following service. Following receipt of a request for an appeal, the Department shall set a time and a place for the hearing.

(c) The summary suspension shall not be stayed pending an appeal or informal review by the Department Head, but shall be subject to dismissal on reinspection by the Department.

Subsection 9. Suspension of Licenses, Reinspection. Upon written notification from the licensee that all the violations for which a suspension or summary suspension was invoked have been corrected, the Department, if appropriate, shall reinspect the vehicle or activity within a reasonable length of time, but in no case more than three County working days after receipt of the notice from the licensee. If the Department finds upon any such reinspection or otherwise that the violations constituting the grounds for the suspension have been corrected, the Department

shall immediately dismiss the suspension by written notice to the licensee.

Subsection 10. Revocation of Licenses.

(a) Any license granted pursuant to this Ordinance may be revoked by the Department for violation of any provision of this Ordinance.

(b) Revocation shall not occur earlier than ten County working days from the time that written notice of revocation is served personally or by registered or certified mail on the licensee, or if a hearing is requested, until the written findings of the hearing have been served personally or by registered or certified mail on the licensee. Such written notice of Departmental revocation shall contain the effective date of the revocation, the nature of the violation or violations constituting the basis for the revocation, the facts which support the conclusion that a violation or violations has occurred and a statement that if the licensee desires to appeal, he must within ten working days, exclusive of the day of service, file a request for a hearing. The hearing request shall be in writing stating the grounds for appeal and served personally or by registered or certified mail on the Department by midnight of the 10th County working day following service. Following receipt of a request for a hearing, the Department shall set a time and a place for the hearing.

Subsection 11. Hearings.

(a) If any applicant or licensee properly requests a hearing on a Departmental denial, suspension, or revocation of license, such hearing shall be held before the County Board and shall be open to the public.

(b) Unless an extension of time is requested by the appellant in writing directed to the Chair of the County Board, the hearing will be held no later than 45 calendar days after the date of service of request for a hearing, exclusive of the date of such service. In any event, such hearing shall be held no later than 90 calendar days after the date of service of request for a hearing, exclusive of the date of such service.

(c) The County Board shall mail notice of the hearing to the appellant and to the Department at least fifteen working days prior to the hearing. Such notice shall include:

1. A statement of time, place and nature of the hearing.

2. A statement of the legal authority and jurisdiction under which the hearing is to be held.

3. A reference to the particular section of the Ordinance and rules involved.

(d) The County Board may by resolution appoint an individual learned in the law, to be known as the hearing examiner, to conduct the hearing to make findings of fact, conclusions, and recommendations to the County Board. The hearing examiner shall submit the findings of fact, conclusions, and recommendations to the County Board in writing. When the County Board exercises the authority to appoint a hearing examiner, the County Board shall accept the hearing examiners report in lieu of conducting a County Board hearing for findings of fact, conclusions or recommendations.

(e) All witnesses shall testify under oath or affirmation with full penalty for perjury. All parties shall have full opportunity to respond to and present evidence, cross examine witnesses, and present argument. The hearing shall be tape recorded and minutes be kept, unless a party requests a transcript, in which case a verbatim transcript shall be made by a qualified court reporter at the expense of the requesting party.

(f) The Department shall have the burden of proving its position by clear and convincing evidence and all findings of fact, conclusions, and decisions by the County Board shall be based on evidence presented and matters officially noticed.

(g) The Rules of Evidence, as applied in the courts, shall not apply to the hearing, but irrelevant, immaterial, and unduly repetitious evidence shall be excluded. The hearing shall be confined to matters raised in the Department's written notice of suspension, summary suspension or termination or in the appellant's written request for a hearing.

(h) A pre-hearing conference shall be held at least five working days prior to the hearing with a designated representative of the County Board. At the conference each party shall:

1. Provide ten copies of any documentary evidence in the possession of that party and two copies of any photographs, slides, or demonstrative evidence. If the demonstrative evidence is not capable of reproduction, the party possessing it shall bring the original, or two copies of an accurate photograph and ten copies of a thorough written description thereof.

2. State the full name and address of all witnesses who will be called at the hearing and a brief description of the facts and opinions to which each is expected to testify. If the names and addresses are not known, the party shall describe them thoroughly by job duties and involvement with the facts in issue.

(i) The representative of the County Board at the pre-hearing conference shall cause one copy of any documentary, photographic, or demonstrative evidence to be delivered promptly to the adverse party. All remaining copies shall be delivered promptly to the Chair of the County Board for distribution among Board members and the Board's legal counsel, and/or for inclusion in the official record.

(j) Evidence not divulged at the pre-hearing conference, as provided above, shall be excluded at the hearing unless:

1. The evidence was not known to the party at the time of the pre-hearing conference; or

2. The evidence is in rebuttal to matters raised for the first time at or subsequent to the pre-hearing conference.

SECTION VII. GENERAL TERMS

Subsection 1. Each Person's Obligations Unconditional. Without limiting any of the other provisions of this Ordinance, all obligations of each Person to make Tipping Fee payments and other payments due to the County under this Ordinance shall be absolute and unconditional, and each Person shall not be entitled to any abatement, diminution, setoff, abrogation, waiver or modification thereof, nor to any termination of this Ordinance by any reason whatsoever, except as expressly provided herein, regardless of any rights of setoff, recoupment or counterclaim that each Person might otherwise have against the County or any other party or parties and regardless of any contingency, unforeseen circumstance, event or cause whatsoever and

notwithstanding any circumstance or occurrence that may arise or take place before, during or after the Effective Date.

Subsection 2. Separability. It is hereby declared to be the intention of the Board of Commissioners of the County that the several provisions of this Ordinance are separable in accordance with the following:

(a) If any court of competent jurisdiction shall adjudge any provision of this Ordinance to be invalid, such judgment shall not affect any other provisions of this Ordinance not specifically included in said judgment.

(b) If any court of competent jurisdiction shall adjudge invalid the application of any provision of this Ordinance to a particular structure, site, facility or operation, such judgment shall not affect the application of said provision to any other structure, site, facility or operation not specifically included in said judgment.

Subsection 3. Provisions Are Accumulative. The provisions in this Ordinance are accumulative and additional limitations upon all other laws and ordinances heretofore passed or which may be passed hereafter, covering any subject matter in this Ordinance.

Subsection 4. No Consent. Nothing contained in this Ordinance shall be deemed to be a consent, license, or permit to locate, construct or maintain a site, facility or operation, or to carry on any activity.

Subsection 5. Statement of Non-Liability. Neither the Department nor the County nor any officer or employee thereof shall be held liable for any damage to persons or property by reason of any inspection, reinspection or failure to inspect, or by reason of the approval or disapproval of equipment or the granting, not granting, suspending or revoking of any license herein.

Subsection 6. Effective Date. This Ordinance shall be in full force and effect upon a date to be specified by resolution of the County Board at least sixty (60) days in advance of the Effective Date.

Passed by the Board of County Commissioners of Hennepin County this 10th day of December, 1985.

COUNTY OF HENNEPIN
STATE OF MINNESOTA

APPROVED:

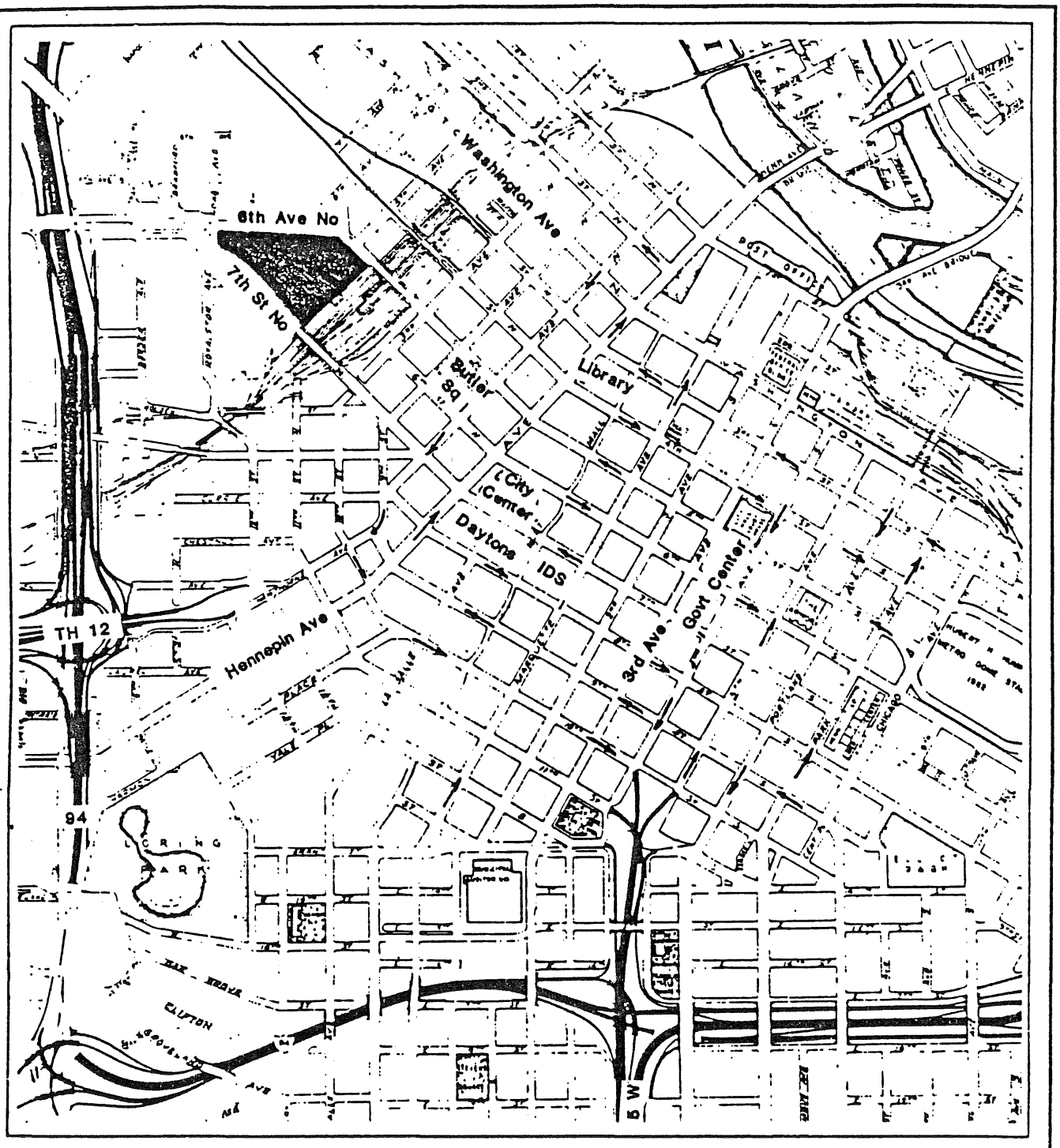
By _____
Chairman of the County Board

_____
Assistant County Attorney

ATTEST:

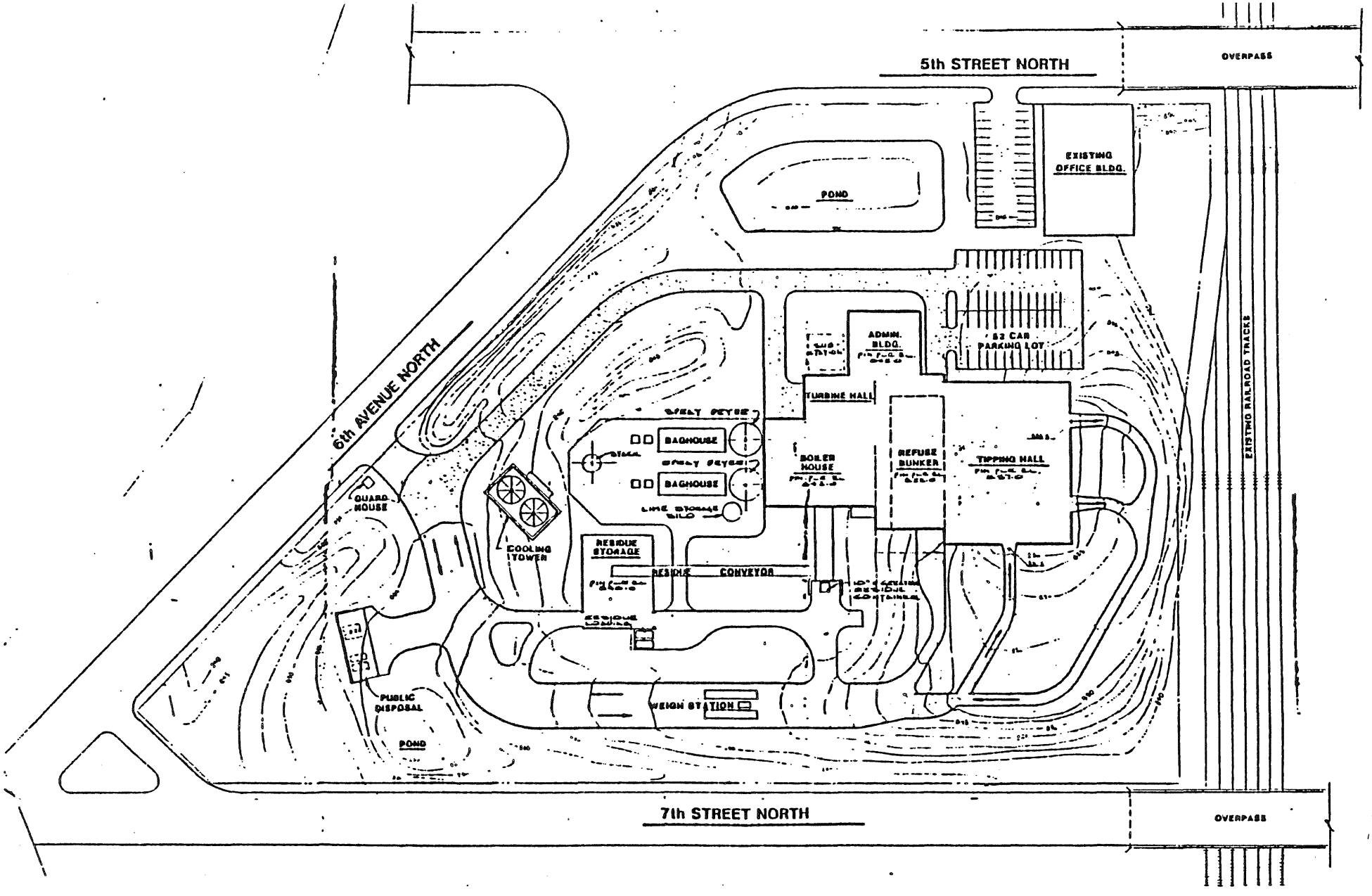
_____
Clerk of the Board DEPUTY

EXHIBIT A



HENNEPIN COUNTY
LARGE SCALE ENERGY RECOVERY PROJECT

GREYHOUND



SITE PLAN

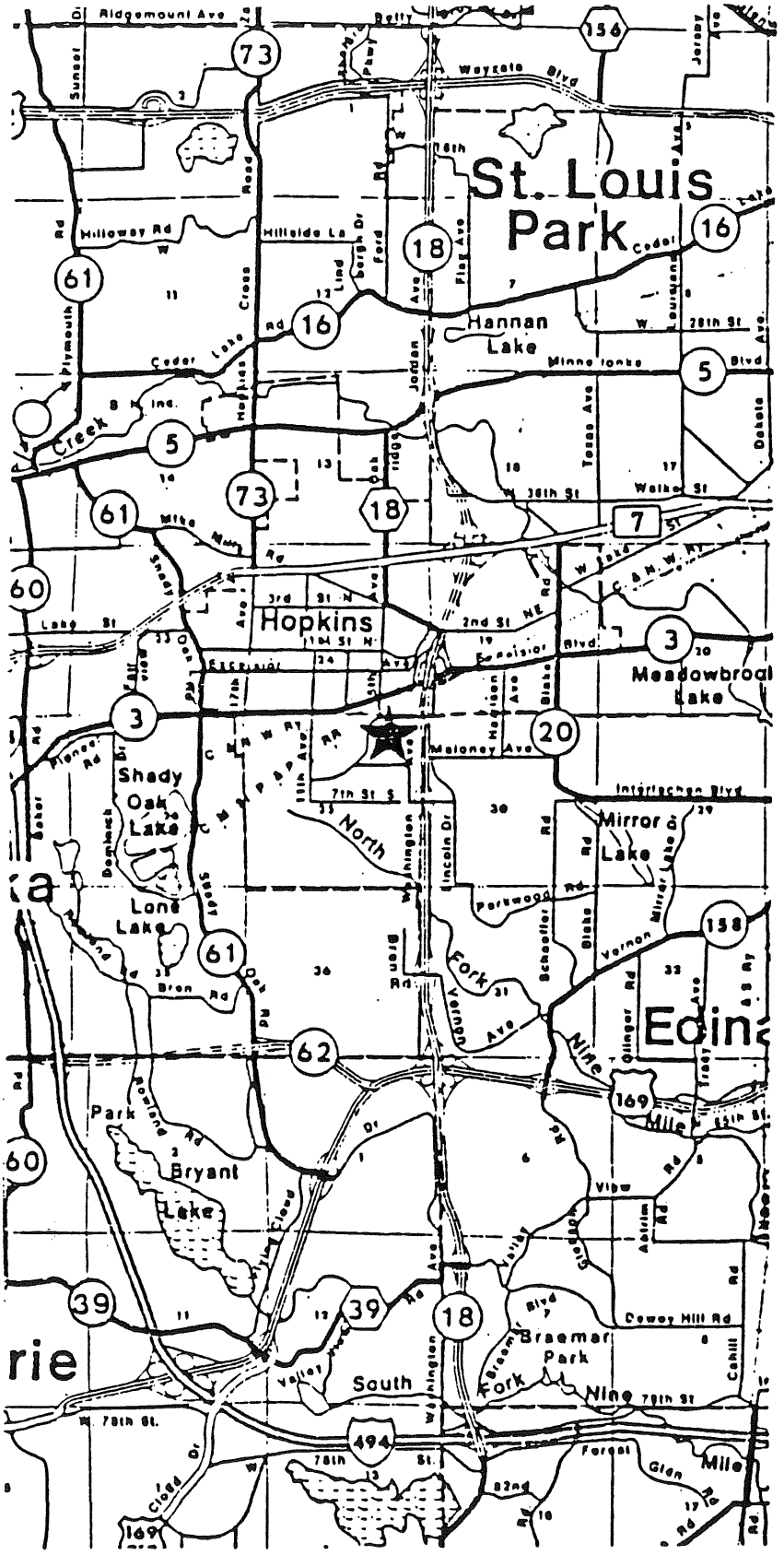
LEGEND

- NEW CONTOUR
- NEW SPOT ELEVATION
- CONCRETE
- ASPHALT

EXHIBIT A-1

EXHIBIT B

GENERAL PROJECT AREA



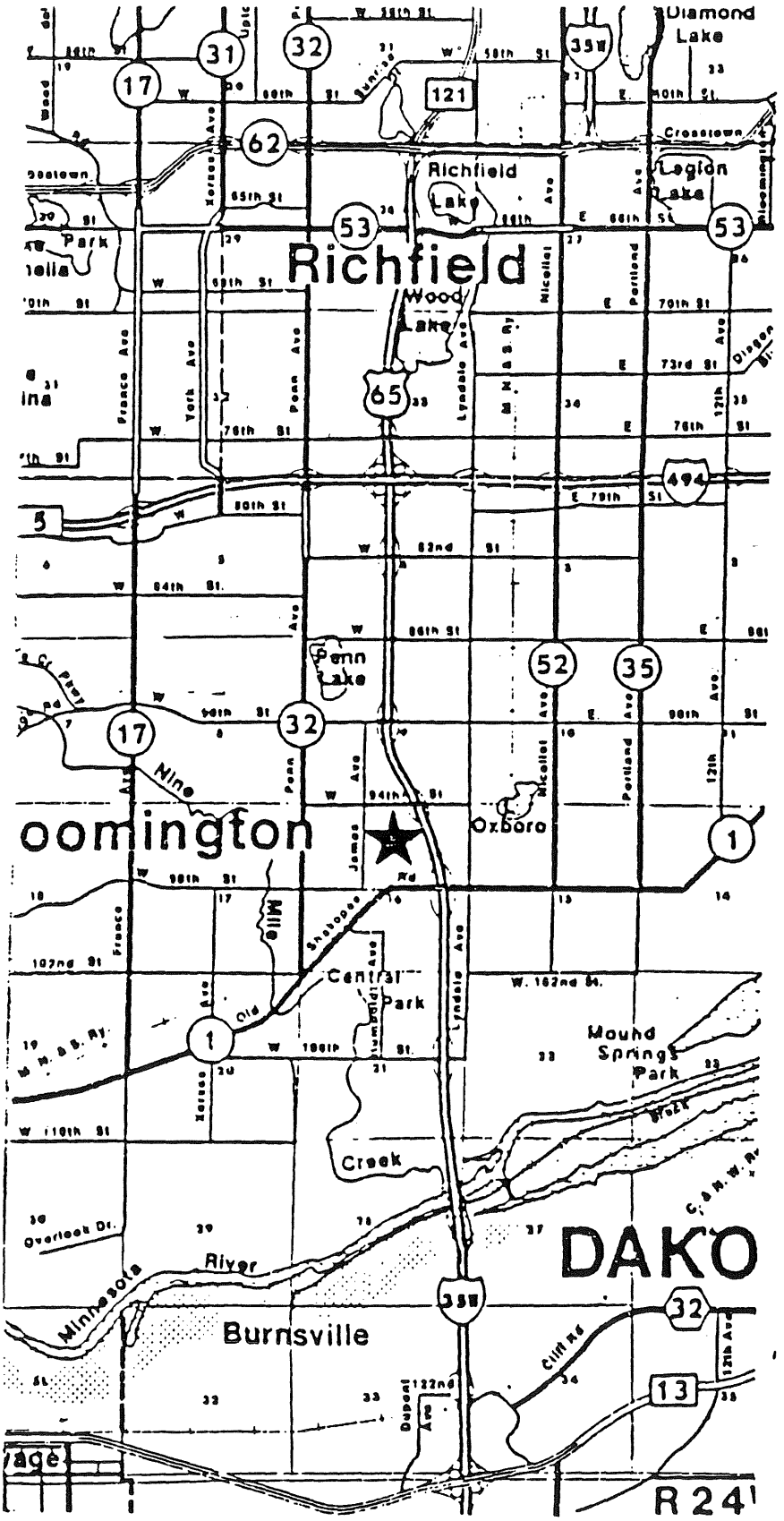
HENNEPIN COUNTY
TRANSFER STATION
HOPKINS DOT SITE – ★

N

HDR
Henningson, Durham & Richardson

EXHIBIT C

GENERAL PROJECT AREA



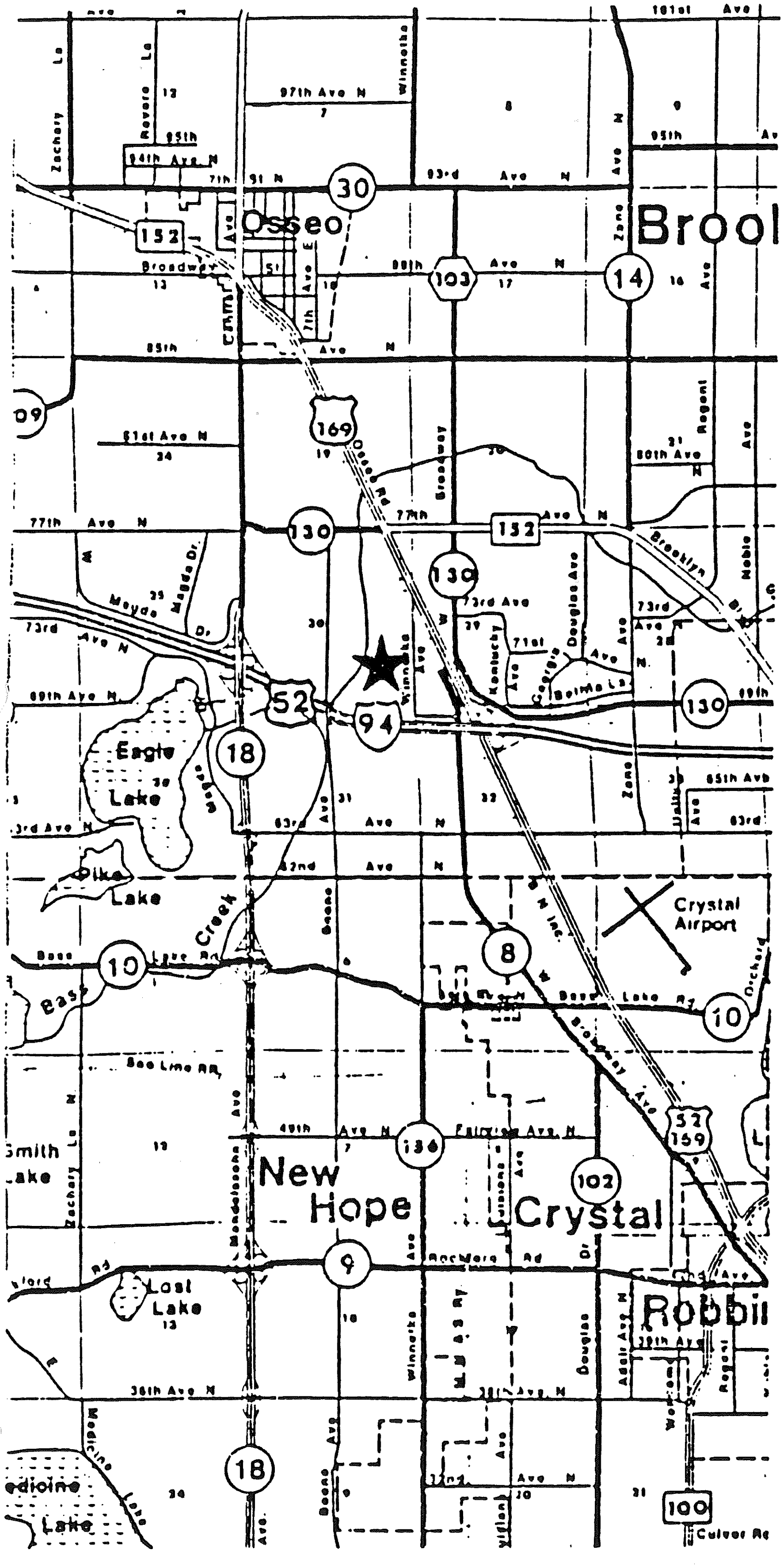
HENNEPIN COUNTY
TRANSFER STATION
BLOOMINGTON EAST SITE

N

HDR
Henningson, Durham & Richardson

EXHIBIT D

GENERAL PROJECT AREA



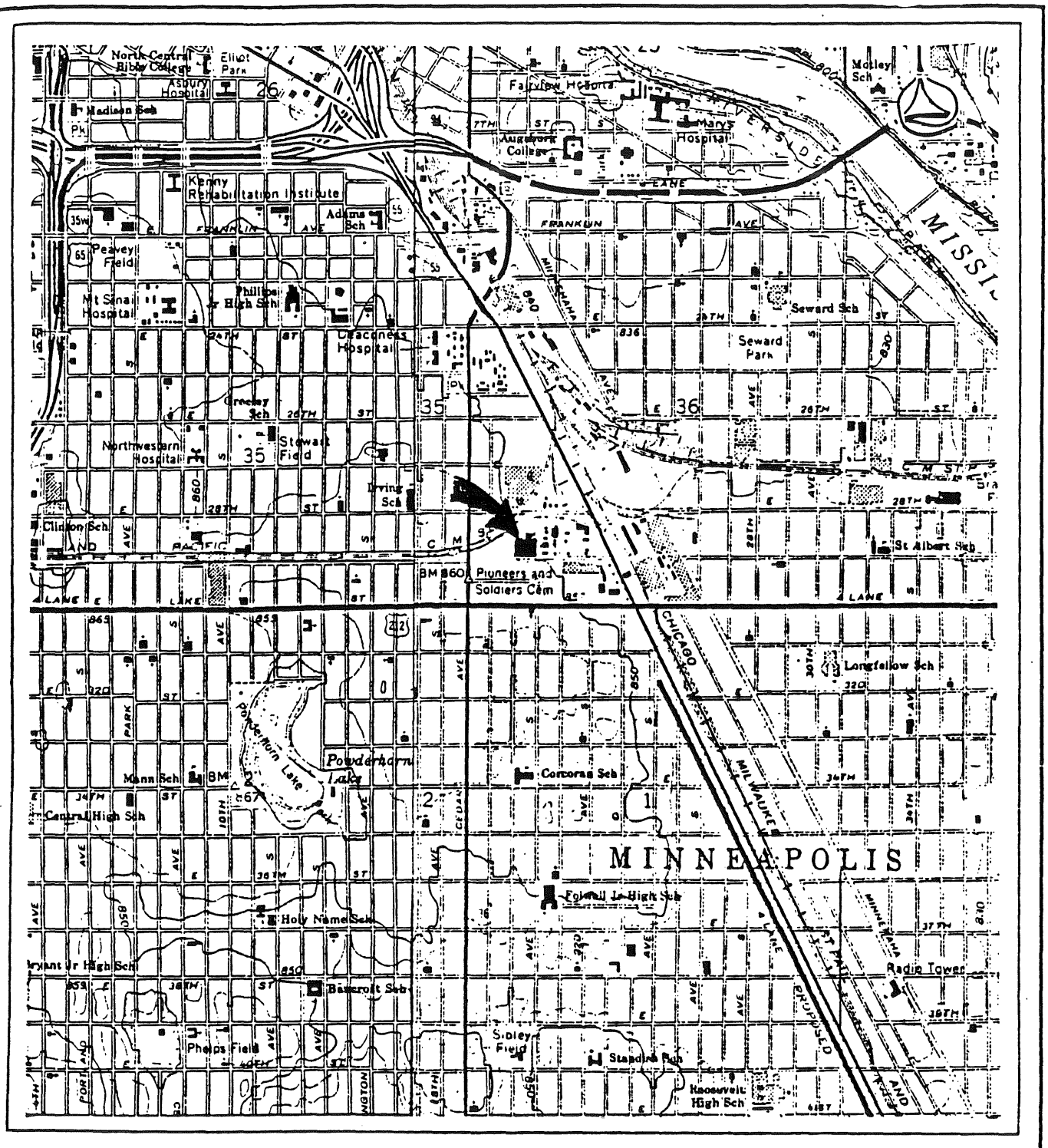
HENNEPIN COUNTY
TRANSFER STATION
BROOKLYN PARK EAST SITE

\- ★

N

HDR
Henningson, Durham & Richardson

EXHIBIT E



HENNEPIN COUNTY
LARGE SCALE ENERGY RECOVERY PROJECT

MINNEAPOLIS SOUTH

APPENDIX D

COMPREHENSIVE EMISSIONS DATA BASE USED IN THE HEALTH RISK ASSESSMENT

MASS BURN INCINERATORS

TABLE A-1

Mass Burn Incinerators

Facility Name	Site Number	Run Number	Chlorinated Benzene Emissions (ug/M*3): Dichloro	Tri-Chloro	Tetra-Chloro	Penta-Chloro	Hexa-Chloro	Total Chloro-Benzenes	Particulate Emissions (mg/M*3)	Sample Duration (hrs)	Sample Volume (M*3)	Reference	Comments
Chicago Northwest	1	1	ND	0.438	0.790	ND	0.110	1.338	NA	NA	NA	2	Samples Collected after ESP; represent total particulate plus vapor phase. Furnace Temperature 650 C (1200 F)
		2	ND	0.457	0.630	ND	0.048	1.135	NA	NA	NA		
		3	ND	1.170	ND	ND	0.260	1.430	NA	NA	NA		
		Average		0.688	0.473	0.000	0.139	1.301					
		Std. Dev.		0.341	0.341	0.000	0.089	0.123					
		Variance		0.116	0.116	0.000	0.008	0.015					
Hampton Virginia	2	3	0.0032	0.361	1.985	4.745	1.435	8.529	100.245	3.00	4.00	4	Samples Collected after ESP; represent total particulate plus vapor phase. Furnace Temperature 550 C (1020 F)
		5	0.654	1.181	1.503	5.500	2.020	10.858	526.715	3.00	4.00		
		7	4.410	19.060	28.660	39.410	11.330	102.870	315.735	5.00	6.00		
		Average	1.689	6.867	10.716	16.552	4.928	40.752	314.232	3.7	5.0		
		Std. Dev.	1.942	8.628	12.690	16.166	4.533	43.934	174.109	0.9428	1.2822		
		Variance	3.772	74.443	161.032	261.347	20.548	1930.202	30314.048	0.8889	1.6441		
		Total of All Samples											
		Average	1.689	3.778	6.714	16.552	2.534	21.027	314.232	3.667	5.0		
		Std.Dev.	1.942	6.843	10.904	16.166	4.001	36.000	174.109	0.943	1.2822		
		Variance	3.772	46.824	120.651	261.347	16.011	1354.212	30314.048	0.889	1.6441		
		Minimum	0.0032	0.361	0.630	4.745	0.048	1.135	100.245	3	4.00		
		Maximum	4.410	19.060	28.660	39.410	11.330	102.870	526.715	5	6.0		
		Number of Values	3	6	5	3	6	6	3	3	3		

TABLE A-2

Mass Burn Incinerators

Facility Name	Site Number	Run Number	Chlorinated Phenol Emissions (ug/M**3) Di-Chloro	Tri-Chloro	Tetra-Chloro	Penta-Chloro	Total Chloro-Phenols	Vapor Phase (%)	Particulate Emissions (mg/M**3)	Sample Duration (hrs)	Sample Volume (M**3)	Reference	Comments
Chicago Northwest	1	1	0.240	1.400	1.500	0.190	3.330	NA	NA	NA	NA	2	Samples Collected after ESP; represent total particulate plus vapor phase. Furnace Temperature 650 C (1200 F)
		2	0.280	1.200	1.100	0.160	2.740	NA	NA	NA	NA		
		3	0.630	1.900	1.700	0.430	4.660	NA	NA	NA	NA		
		Average	0.383	1.500	1.433	0.260	3.577						
		Std. Dev.	0.175	0.294	0.249	0.121	0.803						
		Variance	0.031	0.087	0.062	0.015	0.645						
Hampton Virginia	2	3	NA	14.10	4.20	2.60	20.90	72.60	100.20	3.00	4.00	4	Samples Collected after ESP; represent total particulate plus vapor phase. Furnace Temperature 550 C (1020 F)
		5	NA	73.40	31.50	9.50	114.40	98.00	526.70	3.00	4.00		
		7	NA	129.30	64.50	40.60	234.40	97.00	2147.00	5.00	6.00		
		Average		72.267	33.400	17.567	123.233	89.467	924.633	3.7	5.0		
		Std. Dev.		47.037	24.654	16.529	87.385	11.927	881.707	0.9428	1.2822		
		Variance		2212.482	607.820	273.202	7636.856	142.249	**********	0.8889	1.6441		
		Total of All Samples											
		Average	0.383	36.883	17.417	8.913	63.485	89.467	462.317	3.667	5.0		
		Std.Dev.	0.175	48.562	23.652	14.543	86.010	11.927	776.170	0.943	1.2822		
		Variance	0.031	2358.265	559.400	211.489	7397.780	142.249	3.806	0.889	1.6441		
		Minimum	0.240	1.200	1.100	0.160	2.740	72.600	100.200	3.000	4.00		
		Maximum	0.630	129.300	64.500	40.600	234.400	98.000	2147.000	5.000	6.00		
		Number of Values	3	6	6	6	6	3	3	3	3		

TABLE A-3

Mass Burn Incinerators

Facility Name	Site Number	Run Number	Chlorinated Biphenyl (PCB) Emissions (ug/NM3)														Total Chloro-Biphenyls	Vapor Phase (%)	Particulate Emissions (mg/NM3)	Sample Duration (hrs)	Sample Volume (NM3)	Furnace Temp. (F)	Reference	Comments
			Mono-chloro Emissions	Mono-chloro Vapor Phase	Di-Chloro Emissions	Di-Chloro Vapor Phase	Tri-Chloro Emissions	Tri-Chloro Vapor Phase	Tetra-Chloro Emissions	Tetra-Chloro Vapor Phase	Penta-Chloro Emissions	Penta-Chloro Vapor Phase	Hexa-Chloro Emissions	Hexa-Chloro Vapor Phase										
Chicago Northwest	1	1	NA		0.0058		0.0076		0.0092		0.0023		NA		0.0249		NA			1200	2	Sample collected after ESP
		2	NA		0.0060		0.0043		0.0015		0.0010		NA		0.0128		NA			1200		
		3	NA		0.0400		0.0360		-0.0130		0.0045		NA		0.0935		NA			1200		
		Average			0.0173		0.0160		0.0079		0.0026				0.0437					########		
		Std. Dev.			0.0161		0.0142		0.0048		0.0014				0.0355					0.0000		
		Variance			0.0003		0.0002		.0000		.0000				0.0013					0.0000		
Hampton Virginia (1983)	2 (1983)	3	NA		(0.002		0.030		0.431		0.017		0.004		1.284		100.2	3	4.00	1020	4	Sample collected after ESP. Data represent total vapor phase & Particulate.
		5	NA		(0.002		(0.002		(0.002		(0.002		(0.002		(0.010		525.7	.3	4.00	1020		
		7	NA		(0.002		0.051		0.075		0.032		0.040		0.250		315.7	5	6.0	1020		
		Average			0.002		0.294		0.169		0.034		0.018		0.517		314.20	3.7	4.99	1020.0		
		Std. Dev.			0.000		0.379		0.187		0.035		0.021		0.551		174.12	0.9	1.20	0.0		
		Variance			0.000		0.144		0.035		0.001		.000		0.304		30318.17	0.9	1.64	0.0		
Hampton Virginia (1984)	2 (1984)	1	(0.0005		0.071	0.0	(0.0005		(0.0005		0.056	100.0	(0.0005		0.129	43	NA	NA	4.86	1400-1600	1	Samples Collected after ESP.
		2	0.100	88.9	0.700	78.6	0.130	44.6	0.025	100.0	0.001	100.0	0.013	3.9	1.049	73	NA	NA	6.91	1300-1650		
		3	0.200	95.0	0.200	90.0	0.320	53.1	0.051	55.7	0.011	100.0	0.007	100	0.799	73	NA	NA	8.73	1200-1550		
		4	0.230	82.6	0.520	28.9	0.081	34.6	0.018	0.0	0.019	100.0	0.026	100	0.894	47	NA	NA	8.16	1450-1700		
		5	0.091	93.4	0.380	86.7	0.060	28.3	0.002	100.0	(0.0005		(0.0005		0.454	82	NA	NA	6.80	1300-1500		
		Average	0.140	90.0	0.358	56.8	0.118	40.2	0.021	63.9	0.018	100.0	0.009	60.0	0.665	63.6			7.11			
		Std. Dev.	0.084		0.225		0.109		0.022		0.020		0.010		0.332							
		Variance	0.007		0.051		0.012		.000		.000		.000		0.110							
		Average of all Sampling Runs																				
		Average	0.140	89.98	0.168	56.84	0.138	40.15	0.058	63.93	0.018	100.00	0.013	67.97	0.455	63.60	314.200	3.667	6.313			
		Std. Dev.	0.084		0.231		0.236		0.120		0.026		0.016		0.448		174.121	0.943	1.660			
		Variance	0.007		0.053		0.056		0.014		0.001		.000		0.200		30318.167	0.889	2.782			
		Minimum	(0.001		0.002		(0.001		(0.001		(0.001		(0.001		0.010		100.200	3.000	4.000			
		Maximum	0.230		0.700		0.430		0.431		0.082		0.040		1.284		525.700	5.000	8.730			
		Number of Data Sets	5	4	11	5	11	4	11	4	11	4	8	3	11	5	3	3	8			

TABLE A-4

Mass Burn Incinerators

Facility Name	Site Number	Run Number	Mono-chloro Emissions	Mono-chloro Vapor Phase	Di-Chloro Emissions	Di-Chloro Vapor Phase	Tri-Chloro Emissions	Tri-Chloro Vapor Phase	Tetra-Chloro Emissions	Tetra-Chloro Vapor Phase	2,3,7,8,TCDD Emissions	2,3,7,8,TCDD Vapor Phase	Penta-Chloro Emissions	Penta-Chloro Vapor Phase	Hexa-Chloro Emissions	Hexa-Chloro Vapor Phase	Hepta-Chloro Emissions	Hepta-Chloro Vapor Phase	Octa-Chloro Emissions	Octa-Chloro Vapor Phase	Total Chloro-Dioxins	Vapor Phase (%)	Particulate Emissions (ng/M*3)
			Polychlorinated Dibenzo Dioxin (PCDD) Emissions (ug/M*3)																				
Chicago Northwest	1	1	NA		NA		0.0150		0.0072		0.0035		NA		0.014		0.0072		0.0026		0.0495		NA
		2	NA		NA		0.0120		0.0054		0.0036		NA		0.021		0.0078		0.0022		0.0520		NA
		3	NA		NA		0.0110		0.0062		0.0052		NA		0.014		0.0077		0.0028		0.0469		NA
		Average					0.0127		0.0063		0.0041				0.0163		0.0076		0.0025		0.0495		
		Std.Dev.					0.0017		0.0007		0.0008				0.0033		0.0003		0.0002		0.0021		
		Variance					.0000		.0000		.0000				.0000		.0000		.0000		.0000		
Hampton Virginia (1983)	2 (1983)	3	NA		NA		NA		0.180		NA		0.160		0.180		0.260		0.110		0.890		100.2
		5	NA		NA		NA		0.770	91.30	NA		1.020	90.80	1.710	89.80	0.850	76.80	0.220	12.00	4.570		526.7
		7	NA		NA		NA		0.380	83.40	NA		0.540	77.90	0.850	44.80	2.050	15.80	0.490	15.30	4.310		315.7
		Average							0.443	87.35			0.573	84.35	0.913	67.30	1.053	46.30	0.273	13.65	3.257		314.20
		Std.Dev.							0.245	3.95			0.352	6.45	0.626	22.50	0.745	30.50	0.160	1.65	1.677		174.12
		Variance							0.060	15.60			0.124	41.60	0.392	506.25	0.555	930.25	0.025	2.72	2.812		30318.17
Hampton Virginia (1984)	2 (1984)	1	0.013	100.00	0.026	100.00	< 0.0005		0.16	55.00			1.100	38.90	0.730	42.50	0.275	30.90	0.093	32.30	2.3975	40.42	NA
		2	0.007	100.00	< 0.0005		< 0.0005		0.042	19.10			0.270	0.00	0.250	8.40	0.091	4.60	0.021	3.00	0.682	5.94	NA
		3	0.005	81.60	0.038	0.00	0.070	0.00	0.450	1.20			2.800	0.00	0.800	3.50	0.210	2.50	0.036	3.30	4.409	0.96	NA
		4	0.012	26.70	0.130	0.00	0.140	0.00	0.370	0.00			1.500	0.00	0.590	7.30	0.170	10.00	0.039	17.40	2.951	2.33	NA
		5	< 0.0005		< 0.0005		0.020	0.00	0.110	0.00			0.480	0.00	0.160	3.80	0.042	5.20	0.015	5.60	0.828	1.10	NA
		Average	0.0075	77.1	0.0390	33.3	0.0462	0.0	0.2264	15.1			1.230	7.78	0.506	13.10	0.158	10.64	0.0408	12.3	2.2535	10.2	
		Std.Dev.	0.0046		0.0478		0.0533		0.1566				0.8988		0.2565		0.0830		0.0276		1.3896		
		Variance	.0000		0.0023		0.0028		0.0245				0.8078		0.0658		0.0069		0.0008		1.9310		

Montreal Quebec (1982)	3	1	<1.00E-06	<1.00E-06	1.80E-06	<1.00E-06	<1.00E-06	<5.80E-06
		2	<1.00E-06	1.40E-06	<1.00E-06	<1.00E-06	<1.00E-06	<5.40E-06
		3	1.60E-06	1.18E-05	7.00E-06	8.60E-06	5.50E-06	3.45E-05
		4	2.20E-06	2.90E-06	4.30E-06	2.90E-06	1.40E-06	1.37E-05
		Average	1.45E-06	4.28E-06	3.53E-06	3.38E-06	2.23E-06	1.49E-05
		Std. Dev.	4.97E-07	4.40E-06	2.35E-06	3.11E-06	1.90E-06	1.18E-05
		Variance	2.48E-13	1.94E-11	5.51E-12	9.70E-12	3.60E-12	1.40E-10
Montreal Quebec (1983)	3	1	3.20E-04	2.10E-04	3.11E-04	2.52E-04	3.23E-04	1.42E-03
		2	<1.00E-06	<1.00E-06	4.00E-06	9.00E-06	3.40E-05	<4.90E-05
		3	4.50E-05	7.30E-05	8.20E-05	1.24E-04	6.21E-04	9.45E-04
		4	7.00E-05	1.22E-04	8.30E-05	1.43E-04	3.41E-04	7.59E-04
		5	4.20E-05	4.90E-05	3.40E-05	7.10E-05	1.77E-04	3.73E-04
		6	1.13E-04	1.43E-04	4.23E-04	4.55E-04	5.19E-04	1.65E-03
		7	5.00E-06	3.00E-06	1.00E-06	4.00E-06	4.40E-05	5.70E-05
		8	1.22E-04	1.51E-04	1.46E-04	9.40E-05	1.97E-04	7.10E-04
		Average	8.98E-05	9.40E-05	1.36E-04	1.44E-04	2.82E-04	7.45E-04
		Std. Dev.	9.64E-05	7.01E-05	1.44E-04	1.39E-04	1.98E-04	5.49E-04
		Variance	9.29E-09	4.91E-09	2.06E-08	1.93E-08	3.91E-08	3.02E-07

Average of all Sampling Runs

Average	0.008	77.08	0.039	33.33	0.034	0.00	0.108	35.71	0.004	0.342	29.66	0.231	28.59	0.173	20.83	0.045	12.70	0.921	10.15	314.20
Std.Dev.	0.005		0.048		0.045		0.196		0.001	0.668		0.420		0.441		0.108		1.557		174.12
Variance	.000		0.002		0.002		0.038		.000	0.446		0.176		0.194		0.012		2.425		30318.17
Minimum	< 0.001		< 0.001		< 0.001		.000		0.004	0.000		.000		.000		.000		.000		100.20
Maximum	0.013		0.130		0.140		0.770		0.005	2.800		1.710		2.050		0.490		4.570		526.70
Number of	5	4	5	3	8	3	23	7	3	23	7	23	7	23	7	23	7	23	5	3

TABLE A-5

Mass Burn Incinerators

Facility Name	Site Number	Run Number	Polychlorinated Dibenzo Furan (PCDF) Emissions																				Total Chloro-Furans	Vapor Phase (%)	Particulate Emissions (mg/M**3)
			Mono-chloro Emissions	Mono-chloro Vapor Phase	Di-Chloro Emissions	Di-Chloro Vapor Phase	Tri-Chloro Emissions	Tri-Chloro Vapor Phase	Tetra-Chloro Emissions	Tetra-Chloro Vapor Phase	Penta-Chloro Emissions	Penta-Chloro Vapor Phase	Hexa-Chloro Emissions	Hexa-Chloro Vapor Phase	Hepta-Chloro Emissions	Hepta-Chloro Vapor Phase	Octa-Chloro Emissions	Octa-Chloro Vapor Phase							
Chicago Northwest	1	1	NA		NA		0.350		0.089		NA		0.043		0.007		0.0007						0.490		NA
		2	NA		NA		0.280		0.084		NA		0.084		0.007		0.0006						0.456		NA
		3	NA		NA		0.270		0.096		NA		0.059		0.008		0.0005						0.433		NA
		Average					0.300		0.090				0.062		0.007		0.0006						0.460		
		Std.Dev.					0.036		0.005				0.017		.000		.000						0.023		
		Variance					0.001		.000				.000		.000		.000						0.001		
Hampton Virginia (1983)	2 (1983)	3	NA		NA		NA		0.500		0.190		0.310		0.400		0.024						1.424		100.2
		5	NA		NA		NA		3.590	92.2	1.280	89.4	1.550	90.6	0.650	72.3	0.035	64.6					7.105		526.7
		7	NA		NA		NA		2.600	93.1	1.620	90.3	1.770	78.0	2.210	37.0	0.170	22.6					8.370		315.7
		Average							2.230	92.65	1.030	89.85	1.210	84.30	1.087	54.65	0.076	43.60					5.633		314.20
		Std.Dev.							1.288	0.45	0.610	0.45	0.643	6.30	0.801	17.65	0.066	21.00					3.021		174.12
		Variance							1.660	0.20	0.372	0.20	0.413	39.69	0.641	311.52	0.004	441.00					9.125		30318.17
Hampton Virginia (1984)	2 (1984)	1	0.380	81.6	0.400	75.0	1.800	66.7	0.800	58.8	2.800	50.0	0.210	100.0	0.210	36.7	0.008	0.0					6.608	60.6	NA
		2	0.400	92.5	0.490	63.3	1.100	41.8	0.480	27.1	1.300	15.4	0.170	0.1	0.100	6.2	0.009	0.0					4.049	36.6	NA
		3	0.300	80.0	0.500	42.0	2.100	14.8	2.000	5.5	15.000	1.4	1.800	0.2	0.380	1.8	0.240	0.0					22.320	5.0	NA
		4	0.420	66.7	0.700	20.0	3.300	10.9	1.600	6.9	9.200	3.8	0.950	2.6	0.230	6.1	0.018	0.0					16.418	8.1	NA
		5	0.310	58.1	0.440	12.7	1.600	5.1	0.560	1.7	2.900	0.7	0.340	1.5	0.083	4.3	0.009	0.0					6.242	5.7	NA
		Average	0.3620	75.8	0.5060	42.6	1.9800	27.9	1.0880	20.0	6.2400	14.3	0.6940	20.9	0.2006	11.0	0.0568	0.0					11.1274	23.2	
		Std.Dev.	0.0483		0.1035		0.7359		0.6042		5.1554		0.6201		0.1069		0.0917						7.0379		
		Variance	0.0023		0.0107		0.5416		0.365*		26.5784		0.3846		0.0114		0.0084						49.5321		

Montreal Quebec	3 (1982)	1							1.80E-06		1.80E-06		<1.00E-06		<1.00E-06		<1.00E-06		<6.60E-06		
		2							2.10E-06		2.80E-06		<1.00E-06		<1.00E-06		<1.00E-06		<7.90E-06		
		3							1.60E-06		1.88E-05		1.49E-05		1.26E-05		5.50E-06		5.34E-05		
		4							4.30E-06		3.60E-06		3.60E-06		2.90E-06		1.40E-06		1.58E-05		
		Average							2.45E-06		6.75E-06		5.13E-06		4.38E-06		2.23E-06		2.09E-05		
		Std.Dev.							1.08E-06		6.99E-06		5.74E-06		4.81E-06		1.90E-06		1.91E-05		
		Variance							1.17E-12		4.88E-11		3.30E-11		2.32E-11		3.60E-12		3.64E-10		
Montreal Quebec	3 (1983)	1							7.81E-04		5.69E-04		1.51E-04		1.11E-04		8.00E-05		1.69E-03		
		2							<1.00E-06		<1.00E-06		2.00E-06		1.10E-05		1.00E-06		1.60E-05		
		3							3.00E-05		5.90E-05		3.60E-05		4.90E-05		6.00E-05		2.34E-04		
		4							7.00E-05		1.06E-04		4.80E-05		7.20E-05		5.50E-05		3.51E-04		
		5							3.90E-05		3.80E-05		2.50E-05		4.50E-05		4.20E-05		1.89E-04		
		6							4.52E-04		3.75E-04		4.21E-04		1.80E-04		1.14E-04		1.54E-03		
		7							1.00E-05		4.00E-06		2.00E-06		3.00E-06		3.00E-06		2.20E-05		
		8							5.10E-05		7.80E-05		7.10E-05		3.30E-05		5.00E-05		2.83E-04		
		Average							1.79E-04		1.54E-04		9.45E-05		6.30E-05		5.06E-05		5.41E-04		
		Std.Dev.							2.66E-04		1.93E-04		1.31E-04		5.45E-05		3.50E-05		6.32E-04		
		Variance							7.09E-08		3.72E-08		1.72E-08		2.97E-09		1.22E-09		3.99E-07		

Average of all Sampling Runs

Average	0.3620	75.78	0.5060	42.60	1.3500	27.86	0.5391	40.76	1.7146	35.86	0.3168	39.00	0.1863	23.49	0.0224	12.46	3.214	23.20	314.20
Std.Dev.	0.0483		0.1035		1.0002		0.9551		3.6952		0.5773		0.4628		0.0580		5.7195		174.12
Variance	0.0023		0.0107		1.0005		0.9122		13.6542		0.3333		0.2142		0.0034		32.7125		30318.17
Minimum	0.3000		0.4000		0.2700		.0000		.0000		.0000		.0000		.0000		6.60E-06		100.20
Maximum	0.4200		0.7000		3.3000		3.5900		15.0000		1.8000		2.2100		0.2400		22.3200		526.70
Number of Data Sets	5	5	5	5	8	5	23	7	20	7	23	7	23	7	23	7	23	5	3

COMPREHENSIVE EMISSIONS DATA BASE
USED IN THE HEALTH RISK ASSESSMENT

REFUSE DERIVED FUEL (RDF) FACILITIES

TABLE B-1

Refuse Derived Fuel (RDF) Facilities

Facility Name	Site Number	Run Number	Chlorinated Benzene Emissions (ug/M#3) Dichloro	Tri-Chloro	Tetra-Chloro	Penta-Chloro	Hexa-Chloro	Total Chloro-Benzenes	Particulate Emissions (mg/M#3)	Sample Duration (hrs)	Sample Volume (M#3)	Reference	Comments
Toronto Canada	1	1	NA	0.649	1.880	1.100	0.330	3.959	15.600	24.00	15.40	5	Facility utilizes water sprays for flue gas cooling
		2	NA	0.377	0.111	0.222	0.235	0.945	31.700	24.00	16.20		
		3	NA	0.651	2.190	2.190	0.574	5.605	46.400	24.00	16.90		
		Average		0.559	1.394	1.171	0.380	3.503	31.233	24.00	16.17		
		Std. Dev.		0.129	0.916	0.805	0.143	1.930	12.578	0.00	0.61		
		Variance		0.017	0.839	0.648	0.020	3.723	158.216	0.00	0.38		
Hamilton Wentworth Ontario Canada	2	1						54.00	92.00	4.00	2.836	7	The facility is equipped with an ESP. Flue gas samples were collected after the ESP and represent total Particulate/ Vapor phase emissions. The furnace temperature approached a maximum of 677 C (1430 F) although several tests were conducted in which the furnace temperature was below 600 C (1110 F)
		4						24.30	64.00	4.00	1.600		
		5						7.70	675.00	4.00	1.944		
		6						30.70	141.00	4.00	2.822		
		7						76.50	464.00	4.00	1.960		
		8						31.00	321.00	4.00	1.966		
		9						52.00	564.00	4.00	2.273		
		10						22.30	155.00	4.00	2.109		
		11						47.50	293.00	4.00	2.003		
		12						34.50	47.00	4.00	1.969		
		13						102.50	426.00	4.00	2.244		
		14						42.40	158.00	4.00	1.296		
		15						26.30	78.00	4.00	1.747		
		Average						42.500	267.538	4.000	1.943		
		Std. Dev.						24.127	199.732	0.000	0.253		
		Variance						582.123	39892.864	0.000	0.064		
		Total of All Samples											
		Average		0.559	1.394	1.171	0.380	35.188	223.231	7.750	4.610		
		Std. Dev.		0.129	0.916	0.805	0.143	26.558	202.360	7.806	5.563		
		Variance		0.017	0.839	0.648	0.020	705.352	40949.510	60.938	30.944		
		Minimum		0.377	0.111	0.222	0.235	0.945	15.60	4.00	1.296		
		Maximum		0.651	2.19	2.19	0.574	102.5	675.00	24.00	16.90		
		Number of Values		3	3	3	3	16	16	16	16		

TABLE B-2

Refuse Derived Fuel (RDF) Facilities

Facility Name	Site Number	Run Number	Chlorinated Phenol Emissions (ug/M*3) Dichloro	Tri-Chloro	Tetra-Chloro	Penta-Chloro	Total Chloro-Phenols	Vapor Phase (%)	Particulate Emissions (mg/M*3)	Sample Duration (hrs)	Sample Volume (M*3)	Reference	Comments
Toronto Canada	1	1	NA	4.20	2.80	1.50	8.50	92.00	15.60	24.00	15.40	5	Facility utilizes water sprays for flue gas cooling
		2	NA	1.90	1.00	1.50	5.20	100.00	31.70	24.00	16.20		
		3	NA	0.53	2.20	1.10	3.83	99.20	46.40	24.00	16.90		
		Average		2.210	2.267	1.367	5.843	97.067	31.233	24.000	16.167		
		Std. Dev.		1.514	0.411	0.189	1.960	3.598	12.578	0.000	0.613		
		Variance		2.293	0.169	0.036	3.842	12.942	158.216	0.000	0.376		
Hamilton Wentworth Ontario Canada	2	1					41.70		92.00	4.00	2.036	7	The facility is equipped with an ESP. Flue gas samples were collected after the ESP and represent total Particulate/ Vapor phase emissions. The furnace temperature approached a maximum of 677 C (1430 F) although several tests were conducted in which the furnace temperature was below 600 C (1110 F)
		4					23.00		64.00	4.00	1.600		
		5					72.00		675.00	4.00	1.944		
		6					36.60		141.00	4.00	2.022		
		7					48.00		464.00	4.00	1.960		
		8					39.70		321.00	4.00	1.966		
		9					83.60		564.00	4.00	2.273		
		10					74.90		155.00	4.00	2.109		
		11					32.20		293.00	4.00	2.003		
		12					96.50		47.00	4.00	1.969		
		13					102.50		426.00	4.00	2.244		
		14					4.80		158.00	4.00	1.296		
		15					85.90		78.00	4.00	1.747		
		Average					57.031		267.538	4.000	1.943		
		Std. Dev.					29.411		199.732	0.000	0.253		
		Variance					865.007		39892.864	0.000	0.064		
		Total of All Samples											
		Average	2.210	2.267	1.367	47.433	97.067	223.231	7.750	4.610			
		Std. Dev.	1.514	0.411	0.189	33.207	3.598	202.360	7.006	5.563			
		Variance	2.293	0.169	0.036	1102.702	12.942	40949.510	60.938	30.944			
		Minimum	0.530	1.000	1.100	3.830	92.000	15.600	4.000	1.296			
		Maximum	4.200	2.800	1.500	102.500	100.000	675.000	24.000	16.900			
		Number of Values	3	3	3	16	3	16	16	16			

TABLE B-3

Refuse Derived Fuel (RDF) Facilities

Facility Name	Site Number	Run Number	Total Chloro-Biphenyls	Vapor Phase	Particulate Emissions (mg/M*3)	Sample Duration (hrs)	Sample Volume (M*3)	Reference	Comments
Toronto, Ontario Canada	1	1	0.029	89.0	15.60	24	15.4		
		2	0.080	100.0	31.70	24	16.2		
		3	NA		46.40	24	16.9		
		Average	0.055	94.5	31.23	24.00	16.17		
		Std. Dev.	0.026	5.5	12.58	0.00	0.61		
		Variance	0.001	30.3	158.22	0.00	0.38		
Hamilton-Wentworth Ontario Canada	2	1	0.182		92.0		2.036		Samples collected after the ESP. The furnace temperature approached a maximum of 677 C (1250 F)
		4	0.010		64.0		1.600		
		5	0.324		675.0		1.944		
		6	0.089		141.0		2.022		
		7	0.286		464.0		1.960		
		8	0.087		321.0		1.966		
		9	0.202		564.0		2.273		
		10	0.100		155.0		2.109		
		11	2.064		293.0		2.083		
		12	0.609		47.0		1.969		
		13	0.936		426.0		2.244		
		14	0.347		158.0		1.296		
		15	0.687		78.0		1.747		
		Average	0.456		267.5		1.943		
		Std. Dev.	0.533		199.7		0.253		
		Variance	0.284		39892.9		0.064		
		Average	0.402	94.500	223.231	24.000	4.610		
		Std. Dev.	0.514	5.500	202.360	0.000	5.563		
		Variance	0.264	30.250	40949.510	0.000	30.944		
		Minimum	0.010	89.000	15.600	24.000	1.296		
		Maximum	2.064	100.000	675.000	24.000	16.900		
		Number of Data Sets	15	2	16	2	16		

TABLE B-4

Refuse Derived Fuel (RDF) Facilities

Facility Name	Site Number	Run Number	Polychlorinated Dibenzo Dioxin (PCDD) Emissions												Vapor Phase (%)	Particulate Emissions (mg/Nm3)	Sample Duration (hrs)	Sample Volume (Nm3)	Reference	Comments
			Tetra-Chloro Emissions	Tetra-Chloro Vapor Phase	2,3,7,8,TCDD Emissions	2,3,7,8,TCDD Vapor Phase	Penta-Chloro Emissions	Penta-Chloro Vapor Phase	Hexa-Chloro Emissions	Hexa-Chloro Vapor Phase	Hepta-Chloro Emissions	Hepta-Chloro Vapor Phase	Octa-Chloro Emissions	Octa-Chloro Vapor Phase	Total Chloro-Dioxins					
Toronto, Ontario Canada	1	1	0.030	98.0			0.030	93.0	0.130	95.0	0.071	91.0	0.010	71.0	0.287		15.60	24	15.4	
		3	0.030	85.0			0.050	55.0	0.310	54.0	0.210	56.0	0.120	21.0	0.720		31.70	24	16.2	
		5	0.060	99.0			0.130	99.0	0.330	98.0	0.150	93.0	0.040	95.0	0.710		46.40	24	16.9	
		Average	0.040	94.0			0.073	82.3	0.257	82.3	0.144	80.0	0.059	62.3	0.572		31.23	24.00	16.17	
		Std. Dev.	0.014	6.4			0.041	19.5	0.090	28.1	0.057	17.0	0.044	30.0	0.282		12.58	0.00	0.61	
		Variance	.000	40.7			0.002	379.6	0.008	402.9	0.003	288.7	0.002	930.2	0.041		158.22	0.00	0.38	
Hamilton-Wentworth Ontario Canada	2	1	0.57				0.63		0.47		0.30		0.25		2.43		101.0		2.035	Samples collected after the ESP. The furnace temperature approached a maximum of 677 C (1250 F)
		4	0.35				0.50		0.66		0.25		0.32		2.09		27.0		1.600	
		5	0.71				0.81		0.91		0.40		0.44		3.27		51.0		1.944	
		6	2.04				1.41		0.87		0.16		0.16		4.64		271.0		2.022	
		7	0.49				0.78		1.05		0.41		0.18		2.92		371.0		1.950	
		8	0.36				0.25		0.20		0.16		0.09		1.15		400.0		1.966	
		9	0.45				0.35		0.40		0.10		0.10		1.40		159.0		2.273	
		10	0.49				0.49		0.47		0.20		0.15		1.80		62.0		2.109	
		11	0.33				0.36		0.34		0.19		0.08		1.30		116.0		2.003	
		12	0.57				0.63		0.83		0.25		0.20		2.49		61.0		1.969	
		13	0.35				0.31		0.31		0.08		0.09		1.14		85.0		2.244	
		14	2.73				2.05		1.52		0.52		0.37		7.19		163.0		1.296	
		15	0.44				0.70		0.80		0.64		0.54		3.12		61.0		1.747	
		Average	0.760				0.714		0.685		0.298		0.229		1.519		140.3		1.943	
		Std. Dev.	0.714				0.482		0.346		0.171		0.142		1.087		118.5		0.253	
		Variance	0.509				0.232		0.120		0.029		0.020		3.253		14037.9		0.064	
		Average of all Sampling Runs																		
		Average	0.625	94.00			0.594	82.33	0.606	82.33	0.269	80.00	0.197	62.33	1.410		126.356	24.000	4.610	
		Std. Dev.	0.702				0.382		0.356		0.167		0.145		1.727		116.291	0.000	5.563	
		Variance	0.493				0.252		0.127		0.028		0.021		2.984		13523.549	0.000	30.944	
		Minimum	0.030				0.030		0.130		0.071		0.010		0.000		15.600	24.000	1.296	
		Maximum	2.730				2.050		1.520		0.640		0.540		7.190		400.000	24.000	16.900	
		Number of Data Sets	16	3			16	3	16	3	16	3	16	3	26		16	3	16	

TABLE B-5

Refuse Derived Fuel (RDF) Facilities

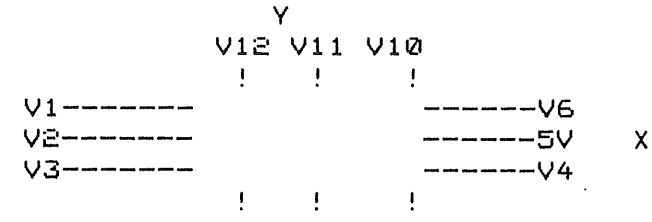
Facility Name	Site Number	Run Number	Polychlorinated Dibenzo Furan (PCDF) Emissions (ug/Nm3) Tetra-Chloro Emissions	Tetra-Chloro Vapor Phase	Penta-Chloro Emissions	Penta-Chloro Vapor Phase	Hexa-Chloro Emissions	Hexa-Chloro Vapor Phase	Hepta-Chloro Emissions	Hepta-Chloro Vapor Phase	Octa-Chloro Emissions	Octa-Chloro Vapor Phase	Total Chloro-Furans	Vapor Phase (%)	Particulate Emissions (mg/Nm3)	Sample Duration (hrs)	Sample Volume (Nm3)	Reference	Comments
Toronto, Ontario Canada	1	1	0.060	97.0	0.070	96.0	0.170	96.0	0.080	97.0	0.014	91.0	0.394		15.60	24.0	15.4		
		3	0.070	91.0	0.080	76.0	0.330	78.0	0.150	63.0	0.025	68.0	0.655		31.70	24.0	16.2		
		5	0.590	99.0	0.340	99.0	0.290	99.0	0.300	99.0	0.020	96.6	1.540		46.40	24.0	16.9		
		Average	0.240	95.7	0.163	90.3	0.263	88.3	0.177	86.3	0.020	85.2	0.863		31.23	24.00	16.17		
		Std. Dev.	0.248	3.4	0.125	10.2	0.068	13.0	0.092	16.5	0.004	12.4	0.498		12.50	0.00	0.61		
		Variance	0.061	11.6	0.016	104.2	0.005	169.6	0.008	272.9	.000	153.1	0.241		158.22	0.00	0.38		
Hamilton-Wentworth Ontario Canada	2	1	3.55		2.98		1.15		0.80		0.17		8.73		101.0		2.036		Samples collected after the ESP. The furnace temperature approached a maximum of 677 C (1250 F)
		4	1.02		1.14		0.72		0.05		0.03		2.98		27.0		1.608		
		5	4.01		3.76		1.73		0.71		0.06		10.27		51.0		1.944		
		6	4.85		3.92		1.21		0.03		0.03		10.04		271.0		2.022		
		7	2.35		3.96		2.12		0.10		0.02		8.55		371.0		1.960		
		8	1.67		1.20		0.52		0.04		0.04		3.47		408.0		1.956		
		9	2.5		1.54		0.86		0.03		0.01		4.94		159.0		2.273		
		10	1.93		0.87		0.61		0.04		0.03		3.48		62.0		2.109		
		11	2.26		1.65		0.80		0.07		0.02		4.80		116.0		2.083		
		12	1.72		1.72		1.15		0.06		0.05		4.70		61.0		1.959		
		13	2.31		1.78		0.77		0.02		0.02		4.90		85.0		2.244		
		14	3.57		3.11		1.06		0.32		0.04		8.10		163.0		1.296		
		15	1.55		1.77		1.12		0.17		0.16		4.77		61.0		1.747		
		Average	2.561		2.262		1.063		0.194		0.054		3.467		148.3		1.943		
		Std. Dev.	1.068		1.078		0.431		0.270		0.049		3.576		118.5		0.253		
		Variance	1.141		1.161		0.186		0.073		0.002		12.789		14037.9		0.064		
Average of all Sampling Runs																			
		Average	2.126	95.67	1.868	90.33	0.913	88.33	0.191	86.33	0.047	85.20	3.166		126.356	24.000	4.610		
		Std. Dev.	1.326		1.272		0.499		0.247		0.047		3.469		116.291	0.000	3.563		
		Variance	1.759		1.617		0.249		0.061		0.002		12.033		13523.549	0.000	38.944		
		Minimum	0.060		0.070		0.170		0.020		0.010		0.000		15.600	24.000	1.296		
		Maximum	4.850		3.960		2.120		0.800		0.170		10.270		408.000	24.000	16.900		
		Number of Data Sets	16	3	16	3	16	3	16	3	16	3	25		16	3	16		

APPENDIX E

TRANSPORTATION ANALYSIS WORKSHEETS

GREYHOUND RESOURCE RECOVERY SITE

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: Olson&7th
Time Period: Am peak hour
Date: 89 design

Identify phasing: 3 phase

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	5	710	540	25	155	50
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	9.25	749.5	571	30.25	166.75	56.5
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	9.736842	788.9473	601.0526	31.84210	175.5263	59.47368

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	150	180	35	70	655	20
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	161.5	193	40.75	77.5	691.75	25
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	170	203.1578	42.89473	81.57894	728.1578	26.31578

Left turn check:	W	X	Y	Z
Cycle length, sec:	80	80	80	80
No. of ch. Intervals:	45	45	45	45
Left turn on Intervals:	90	90	90	90
G/C ratio:	0.375	0.375	0.312	0.635
Opposing vol.(Th.+Rt.):	205	1250	215	675
Left turn on green,vph.:	245	-800	159.4	87
Left turn capacity,vph.:	335	-710	249.4	177
Left turn volume, vph.:	5	25	70	150
Excess Capacity:	330	-735	179.4	27

Signalized Intersection Analysis cont.

Turn Adjustments:

	W		X		Y		Z	
	B2	A1	B1	A2	B4	A3	B3	A4
	LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:	9.736842	601.0526	31.84210	59.47368	81.57894	26.31578	170	42.89473
Opposing volumes:	205		1250		215		675	
Pedestrian volumes:		10		10		10		10
PCE Left, table 3	1		1		1		1	
Left turn vol, pch.:	9.736842		31.84210		81.57894		170	
PCE right, table 4		1		1		1		1
Right turn vol., pch		601.0526		59.47368		26.31578		42.89473
Through vol., pch		788.9473		175.5263		728.1578		203.1578
Total volume, pch	9.736842	1390	31.84210	235	81.57894	754.4736	170	246.0526

Adjusted volumes

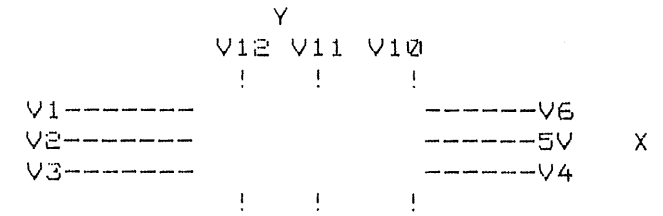
Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane
B2	9.736842	1	1	9.736842	1	9.736842
A1	1390	1.05	1	1459.5	3	486.5
B1	31.84210	1	0.9	28.65789	1	28.65789
A2	235	1	1	235	2	117.5
B4	81.57894	1	1	81.57894	1	81.57894
A3	754.4736	1	0.9	679.0263	1	679.0263
B3	170	1	1	170	1	170
A4	246.0526	1	1	246.0526	2	123.0263

SUM OF CRITICAL VOLUMES: 1045

INTERSECTION LEVEL OF SERVICE B/C

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: Olson&7th
Time Period: Pm peak hour
Date: 89 design

Identify phasing: 3 phase

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	5	265	215	25	765	150
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	9.25	282.25	229.75	30.25	807.25	161.5
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	9.736842	297.1052	241.8421	31.84210	849.7368	170

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	575	700	20	30	260	5
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	607.75	739	25	35.5	277	9.25
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	639.7368	777.8947	26.31578	37.36842	291.5789	9.736842

Left turn check:	W	X	Y	Z
Cycle length, sec:	80	80	80	80
No. of ch. Intervals:	45	45	45	45
Left turn on Intervals:	90	90	90	90
G/C ratio:	0.375	0.375	0.312	0.635
Opposing vol.(Th.+Rt.):	915	480	720	265
Left turn on green,vph.:	-465	-30	-345.6	497
Left turn capacity,vph.:	-375	60	-255.6	587
Left turn volume, vph.:	5	25	30	575
Excess Capacity:	-380	35	-285.6	12

Signalized Intersection Analysis cont.
Turn Adjustments:

W		X		Y		Z	
B2	A1	B1	A2	B4	A3	B3	A4
LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:							
9.736842	241.8421	31.84210	170	37.36842	9.736842	639.7368	26.31578
Opposing volumes:							
915		480		720		265	
Pedestrian volumes:							
10		10		10		10	
PCE Left, table 3							
1		1		1		1	
Left turn vol, pch.:							
9.736842		31.84210		37.36842		639.7368	
PCE right, table 4							
1		1		1		1	
Right turn vol., pch							
241.8421		170		9.736842		26.31578	
Through vol., pch							
297.1052		849.7368		291.5789		777.8947	
Total volume, pch							
9.736842	538.9473	31.84210	1019.736	37.36842	301.3157	639.7368	804.2105

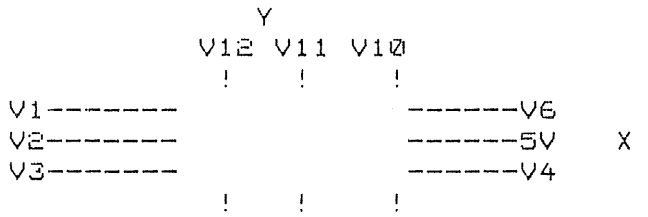
Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane
B2	9.736842	1	1	9.736842	1	9.736842
A1	538.9473	1.05	1	565.8947	3	188.6315
B1	31.84210	1	0.9	28.65789	1	28.65789
A2	1019.736	1	1	1019.736	2	509.8684
B4	37.36842	1	1	37.36842	1	37.36842
A3	301.3157	1	0.9	271.1842	1	271.1842
B3	639.7368	1	1	639.7368	1	639.7368
A4	804.2105	1	1	804.2105	2	402.1052

SUM OF CRITICAL VOLUMES: 1313
INTERSECTION LEVEL OF SERVICE B/C

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: MTC&Olson
Time Period: AM peak hour
Date: 89 design

Identify phasing: 2 phase

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	50	650	115	25	150	100
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	56.5	686.5	124.75	30.25	161.5	109
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	59.47368	722.6315	131.3157	31.84210	170	114.7368

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	45	0	10	30	0	30
Truck Percent:	50	50	50	30	30	30
Local Buses	1	1	1	1	1	1
Passenger Cars:	71.5	4	19	43	4	43
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	75.26315	4.210526	20	45.26315	4.210526	45.26315

Left turn check:	W	X	Y	Z
Cycle length, sec:	90	90	90	90
No. of ch. Intervals:	40	40	40	40
Left turn on Intervals:	80	80	80	80
G/C ratio:	0.5	0.5	0.5	0.5
Opposing vol.(Th.+Rt.):	250	765	10	30
Left turn on green,vph.:	350	-165	590	570
Left turn capacity,vph.:	430	-85	670	650
Left turn volume, vph.:	50	25	30	45
Excess Capacity:	380	-110	640	605

Signalized Intersection Analysis cont.

Turn Adjustments:

	W		X		Y		Z	
	B2	A1	B1	A2	B4	A3	B3	A4
	LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:								
	59.47368	131.3157	31.84210	114.7368	45.26315	45.26315	75.26315	20
Opposing volumes:								
	250		765		10		30	
Pedestrian volumes:								
		1		1		1		1
PCE Left, table 3								
	1		1		1		1	
Left turn vol, pch.:								
	59.47368		31.84210		45.26315		75.26315	
PCE right, table 4								
		1		1		1		1
Right turn vol., pch								
		131.3157		114.7368		45.26315		20
Through vol., pch								
		722.6315		170		4.210526		4.210526
Total volume, pch								
	59.47368	853.9473	31.84210	284.7368	45.26315	49.47368	75.26315	24.21052

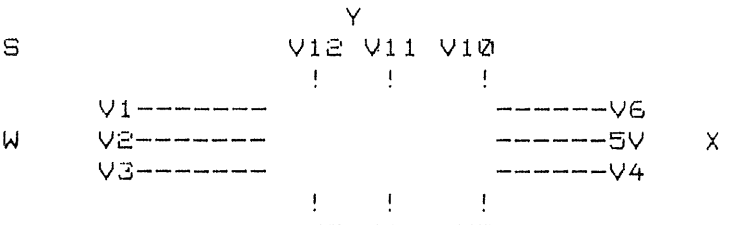
Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane
B2	59.47368	1	0.9	53.52631	1	53.52631
A1	853.9473	1	1	853.9473	1	853.9473
B1	31.84210	1	1	31.84210	1	31.84210
A2	284.7368	1	1	284.7368	1	284.7368
B4	45.26315	1	1	45.26315	1	45.26315
A3	49.47368	1	1	49.47368	1	49.47368
B3	75.26315	1	1	75.26315	1	75.26315
A4	24.21052	1	1	24.21052	1	24.21052

SUM OF CRITICAL VOLUMES: 930

INTERSECTION LEVEL OF SERVICE A/B

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: MTC&Olson
Time Period: Pm peak hour
Date: 89 design

Identify phasing: 2 phase

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	65	215	35	5	870	65
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	72.25	229.75	40.75	9.25	917.5	72.25
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	76.05263	241.8421	42.89473	9.736842	965.7894	76.05263

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	50	0	10	65	0	15
Truck Percent:	50	50	50	30	30	30
Local Buses	1	1	1	1	1	1
Passenger Cars:	79	4	19	88.5	4	23.5
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	83.15789	4.210526	20	93.15789	4.210526	24.73684

Left turn check:	W	X	Y	Z
Cycle length, sec:	90	90	90	90
No. of ch. Intervals:	40	40	40	40
Left turn on Intervals:	80	80	80	80
G/C ratio:	0.5	0.5	0.5	0.5
Opposing vol.(Th.+Rt.):	935	250	10	15
Left turn on green,vph.:	-335	350	590	585
Left turn capacity,vph.:	-255	430	670	665
Left turn volume, vph.:	65	5	65	50
Excess Capacity:	-320	425	605	615

Signalized Intersection Analysis cont.
Turn Adjustments:

	W		X		Y		Z	
	B2	A1	B1	A2	B4	A3	B3	A4
	LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:	76.05263	42.89473	9.736842	76.05263	93.15789	24.73684	83.15789	20
Opposing volumes:	935		250		10		15	
Pedestrian volumes:		1		1		1		1
PCE Left, table 3	1		1		1		1	
Left turn vol, pch.:	76.05263		9.736842		93.15789		83.15789	
PCE right, table 4		1		1		1		1
Right turn vol., pch		42.89473		76.05263		24.73684		20
Through vol., pch		241.8421		965.7894		4.210526		4.210526
Total volume, pch	76.05263	284.7368	9.736842	1041.842	93.15789	28.94736	83.15789	24.21052

Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane
B2	76.05263	1	0.9	68.44736	1	68.44736
A1	284.7368	1	1	284.7368	1	284.7368
B1	9.736842	1	1	9.736842	1	9.736842
A2	1041.842	1	1	1041.842	1	1041.842
B4	93.15789	1	1	93.15789	1	93.15789
A3	28.94736	1	1	28.94736	1	28.94736
B3	83.15789	1	1	83.15789	1	83.15789
A4	24.21052	1	1	24.21052	1	24.21052

SUM OF CRITICAL VOLUMES: 1134
INTERSECTION LEVEL OF SERVICE B

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

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UNSIGNALIZED INTERSECTION ANALYSIS  (T)        V2-------  ------V5
CAPACITY CALCULATION                           V3-------  ------V4
TRB CIRCULAR 281                                      !  !
                                                      !  !
                                                      !  !
                                                     V7  V9

Intersection:      5th&6th
Time Period:       Am peak hour
Date:     89 design

Traffic movements:     2         3         4         5         7         9
Demand Volumes:      200        50       330       485        10        55
Demand in Pch:                           350                  10        60
Critical gap:                              5                   6         5
Capacity Fig. 10.3:                      970                 245      1000
-------------------------------------------------------------------------
Right turn movement from minor street :V9
Conflicting flows, VC:                                 25      +       200
VC9:                                                              225 PCH
Enter Critical Gap:                                                 5 SEC
Potential Capacity from Fig. 10.3:                               1000 PCH
CM9:                                                             1000
----------
if no shared lane, volume:                                        60 PCH
available reserve capacity                                       940 PCH
LEVEL OF SERVICE                                                   A
-------------------------------------------------------------------------
Left turn movement from Major street:V4
Conflicting flows,VC:                                  50      +       200
VC4:                                                              250 PCH
Enter Critical Gap:                                                 5 SEC
Potential Capacity from Fig. 10.3:                               970 PCH
CP4:                                                             970 PCH
Demand, V4:                                                      350 PCH
Capacity Used:                                                36.08247 PERCENT
Impedance Factor:                                             0.711340
Actual Capacity, CM4:                                            970 PCH
Available Reserve:                                               620 PCH
LEVEL OF SERVICE:                                                  A
-------------------------------------------------------------------------
Left turn Movement from minor street,V7:
Conflicting flows,VC:                      25       200       485       330
VC7:                                                            1040 PCH
Enter Critical Gap                                                 6 SEC
Potential Capacity from Fig. 10.3, CP7:                          245 PCH
Actual Capacity, CM7:                                         174.2783 PCH
--------
if no sharedlane-demand=:                                         10 PCH
Available Reserve Capacity:                                   164.2783 PCH
LEVEL OF SERVICE:                                                  D
--------
shared lane demand:                                               70 PCH
shared lane with right turn,capacity:                         578.3974 PCH
Available Reserve Capacity:                                   508.3974 PCH
LEVEL OF SERVICE:                                             B Overall
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.
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UNSIGNALIZED INTERSECTION ANALYSIS  (T)        V2-------   ------V5
CAPACITY CALCULATION                           V3-------   ------V4
TRB CIRCULAR 281                                     !   !
                                                     !   !
                                                     !   !
                                                    V7   V9

Intersection:      5th&6th
Time Period:       Pm peak hour
Date:    89 design

Traffic movements:      2         3         4         5         7         9
Demand Volumes:       565        65        85       200        25       130
Demand in Pch:                              90                  25       135
Critical gap:                                5                   6         5
Capacity Fig. 10.3:                        604              307.78       630
-------------------------------------------------------------------------------
Right turn movement from minor street :V9
Conflicting flows, VC:                              32.5      +           565
VC9:                                                        597.5 PCH
Enter Critical Gap:                                           5 SEC
Potential Capacity from Fig. 10.3:                          630 PCH
CM9:                                                        630
----------
if no shared lane, volume:                                  135 PCH
available reserve capacity                                  495 PCH
LEVEL OF SERVICE                                      A
-------------------------------------------------------------------------------
Left turn movement from Major street:V4
Conflicting flows,VC:                                 65    +           565
VC4:                                                        630 PCH
Enter Critical Gap:                                           5 SEC
Potential Capacity from Fig. 10.3:                          604 PCH
CP4:                                                        604 PCH
Demand, V4:                                                  90 PCH
Capacity Used:                                        14.90066 PERCENT
Impedance Factor:                                     0.880794
Actual Capacity, CM4:                                       604 PCH
Available Reserve:                                          514 PCH
LEVEL OF SERVICE:                                     A
-------------------------------------------------------------------------------
Left turn Movement from minor street,V7:
Conflicting flows,VC:                        32.5       565       200        85
VC7:                                                          882.5 PCH
Enter Critical Gap                                              6 SEC
Potential Capacity from Fig. 10.3, CP7:                     307.78 PCH
Actual Capacity, CM7:                                 271.0909 PCH
--------
if no sharedlane-demand=:                                    25 PCH
Available Reserve Capacity:                           246.0909 PCH
LEVEL OF SERVICE:                                     C/D
--------
shared lane demand:                                         160 PCH
shared lane with right turn,capacity:                 519.1426 PCH
Available Reserve Capacity:                           359.1426 PCH
LEVEL OF SERVICE:                                     B/C Overall
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.
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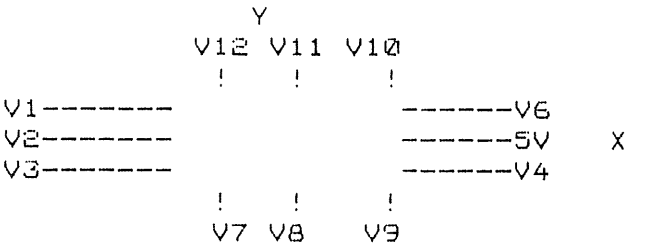
SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: 7th&Hennepin
Time Period: Am peak hour
Date: 89 design

Identify phasing: 2 phase

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	95	1215	0	0	30	0
Truck Percent:	10	10	10	10	10	10
Local Buses	1	1	1	1	1	1
Passenger Cars:	108.5	1340.5	4	4	37	4
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	114.2105	1411.052	4.210526	4.210526	38.94736	4.210526

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	0	590	160	0	0	0
Truck Percent:	10	10	10	10	10	10
Local Buses	1	1	1	1	1	1
Passenger Cars:	4	653	180	4	4	4
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	4.210526	687.3684	189.4736	4.210526	4.210526	4.210526

Left turn check:	W	X	Y	Z
Cycle length, sec:	60	60	60	60
No. of ch. Intervals:	60	60	60	60
Left turn on Intervals:	120	120	120	120
G/C ratio:	0.5	0.5	0.5	0.5
Opposing vol.(Th.+Rt.):	30	1215	750	0
Left turn on green,vph.:	570	-615	-150	600
Left turn capacity,vph.:	690	-495	-30	720
Left turn volume, vph.:	95	0	0	0
Excess Capacity:	595	-495	-30	720

Signalized Intersection Analysis cont.

Turn Adjustments:

	W		X		Y		Z	
	B2	A1	B1	A2	B4	A3	B3	A4
	LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:	114.2105	4.210526	4.210526	4.210526	4.210526	4.210526	4.210526	189.4736
Opposing volumes:	30		1215		750		0	
Pedestrian volumes:		100		100		100		100
PCE Left, table 3	1		1		1		1	
Left turn vol, pch.:	114.2105		4.210526		4.210526		4.210526	
PCE right, table 4		1.25		1.25		1.25		1.25
Right turn vol., pch		5.263157		5.263157		5.263157		236.8421
Through vol., pch		1411.052		38.94736		4.210526		687.3684
Total volume, pch	114.2105	1416.315	4.210526	44.21052	4.210526	9.473684	4.210526	924.2105

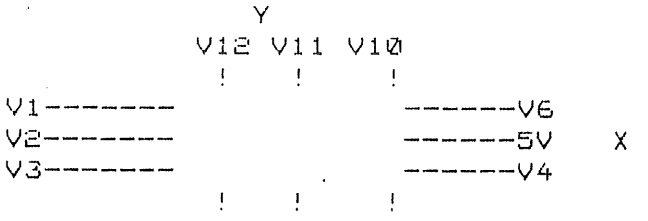
Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane
B2	114.2105	1	1	114.2105	1	114.2105
A1	1416.315	1	1	1416.315	3	472.1052
B1	4.210526	1	1	4.210526	1	4.210526
A2	44.21052	1.05	1	46.42105	3	15.47368
B4	4.210526	1	1	4.210526	1	4.210526
A3	9.473684	1	1	9.473684	1	9.473684
B3	4.210526	1	1	4.210526	1	4.210526
A4	924.2105	1	1	924.2105	3	308.0701

SUM OF CRITICAL VOLUMES: 780

INTERSECTION LEVEL OF SERVICE A/B

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: 7th&Hennepin
Time Period: Pm peak hour
Date: 89 design

Identify phasing: 2 phase

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	175	1160	0	0	55	0
Truck Percent:	10	10	10	10	10	10
Local Buses	1	1	1	1	1	1
Passenger Cars:	196.5	1280	4	4	64.5	4
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	206.8421	1347.368	4.210526	4.210526	67.89473	4.210526

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	0	1155	215	0	0	0
Truck Percent:	10	10	10	10	10	10
Local Buses	1	1	1	1	1	1
Passenger Cars:	4	1274.5	240.5	4	4	4
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	4.210526	1341.578	253.1578	4.210526	4.210526	4.210526

Left turn check:	W	X	Y	Z
Cycle length, sec:	60	60	60	60
No. of ch. Intervals:	60	60	60	60
Left turn on Intervals:	120	120	120	120
G/C ratio:	0.5	0.5	0.5	0.5
Opposing vol.(Th.+Rt.):	55	1160	1370	0
Left turn on green, vph.:	545	-560	-770	600
Left turn capacity, vph.:	665	-440	-650	720
Left turn volume, vph.:	175	0	0	0
Excess Capacity:	490	-440	-650	720

Signalized Intersection Analysis cont.
Turn Adjustments:

W		X		Y		Z	
B2	A1	B1	A2	B4	A3	B3	A4
LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:							
206.8421	4.210526	4.210526	4.210526	4.210526	4.210526	4.210526	253.1578
Opposing volumes:							
55		1160		1370		0	
Pedestrian volumes:							
100		100		100		100	
PCE Left, table 3							
1		1		1		1	
Left turn vol, pch.:							
206.8421		4.210526		4.210526		4.210526	
PCE right, table 4							
1.25		1.25		1.25		1.25	
Right turn vol., pch							
5.263157		5.263157		5.263157		316.4473	
Through vol., pch							
1347.368		67.89473		4.210526		1341.578	
Total volume, pch							
206.8421	1352.631	4.210526	73.15789	4.210526	9.473684	4.210526	1658.026

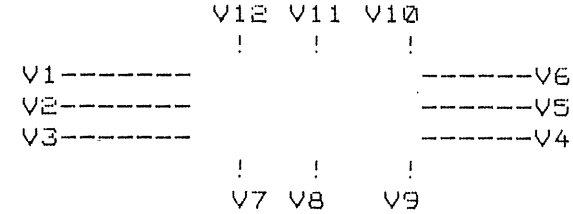
Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane
B2	206.8421	1	1	206.8421	1	206.8421
A1	1352.631	1	1	1352.631	3	450.8771
B1	4.210526	1	1	4.210526	1	4.210526
A2	73.15789	1.05	1	76.81578	3	25.60526
B4	4.210526	1	1	4.210526	1	4.210526
A3	9.473684	1	1	9.473684	1	9.473684
B3	4.210526	1	1	4.210526	1	4.210526
A4	1658.026	1	1	1658.026	3	552.6754

SUM OF CRITICAL VOLUMES: 1002
INTERSECTION LEVEL OF SERVICE B

BLOOMINGTON EAST RESOURCE RECOVERY SITE

UNSIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 281



Intersection: James&W96th
Time Period: Am peak hour
Date: 89 design(11/1/85)

Traffic movements:	1	2	3	4	5	6
Demand Volumes	55	155	10	45	55	110
Demand in Pch:	60			50		
Critical gap:	5.5			5.5		
Capacity Fig.10.3:	970			970		

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	10	10	35	20	20	30
Demand in Pch:	15	15	40	25	25	35
Critical gap:	7	6	5.5	7	6	5.5
Capacity Fig.10.3:	430	585	980	485	625	1050

Right turn movement from minor street :V9,v12			
Conflictiing flows,VC9,VC12:	160	110	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	980	1050	PCH
Percent Capacity Utilized:	4.081632	3.333333	PERCENT
Impedance Factor:	0.967346	0.973333	

Left turn movement from Major street,V4,V1:			
Conflicting flows,VC4,VC1:	165	165	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	970	970	PCH
Percent Capacity Used:	5.154639	6.185567	PERCENT
Impedance Factor:	0.958762	0.950515	

Through movement from Minor street,V8,V11:			
Conflicting flows,VC8,VC11:	425	375	PCH
Critical Gap:	6	6	SEC
Potential Cap. Fig. 10.3,CP8,CP11:	585	625	PCH
Percent Capacity Utilized	2.564102	4	PERCENT
Impedance Factor:	0.979487	0.968	
Actual Capacity,CP8,CP11:	533.1215	569.5743	PCH

Left turn Movement from minor street,V7,V10:			
Conflicting Flows,VC7,Vc10:	475	395	PCH
Enter Critical Gap	7	7	SEC
Potential Capacity from Fig. 10.3, CP7,CP10:	430	485	PCH
Actual Capacity, CM7,CM10:	369.2120	418.7869	PCH

Intersection continued:

Approach Movements 7,8,9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	15	369.2120	369.2120	354.2120	INPUT
8	15	533.1215	533.1215	518.1215	INPUT
9	40	980	980	940	INPUT
If two shared lanes, (7&8)					
7&8	30	436.2796	436.2796	406.2796	INPUT
9	40	980	980	940	INPUT
If two shared lanes, (8,9)					
7	15	369.2120	369.2120	354.2120	A
8&9	55	797.6505	797.6505	742.6505	A
If three shared lanes					
7,8,&9	70	638.8052	638.8052	568.8052	INPUT

Approach Movements 10,11,12

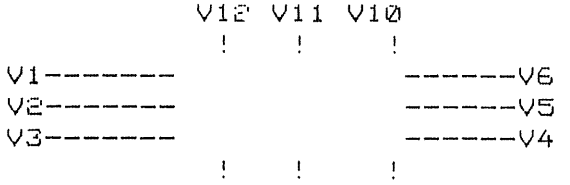
Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	25	418.7869	418.7869	393.7869	INPUT
11	25	569.5743	569.5743	544.5743	INPUT
12	35	1050	1050	1015	INPUT
If two shared lanes, (10&11)					
10&11	50	482.6783	482.6783	432.6783	INPUT
12	35	1050	1050	1015	INPUT
If two snared lanes, (11&12)					
10	25	418.7869	418.7869	393.7869	A
11&12	60	776.9428	776.9428	716.9428	A
If three shared lanes					
10,11,&12	85	620.7914	620.7914	535.7914	INPUT

Approach Movements 1,4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	60	970	970	910	A
4	50	970	970	920	A
If shared lane					
1&4	110	970	970	860	INPUT

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC. LOS A OVERALL

UNSIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 2P1



Intersection: James&W96th
Time Period: Pm peak hour
Date: 89 design(11/1/85)

Traffic movements:	1	2	3	4	5	6
Demand Volumes	15	120	15	35	215	35
Demand in Pch:	20			40		
Critical gap:	5.5			5.5		
Capacity Fig. 10.3:	865			1015		

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	15	20	50	90	15	40
Demand in Pch:	20	25	55	100	20	45
Critical gap:	7	6	5.5	7	6	5.5
Capacity Fig. 10.3:	420	580	1025	440	590	890

Right turn movement from minor street :V9, v12			
Conflictiing flows, VC9, VC12:	127.5	232.5	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	1025	890	PCH
Percent Capacity Utilized:	5.365853	5.056179	PERCENT
Impedance Factor:	0.957073	0.959550	

Left turn movement from Major street, V4, V1:			
Conflicting flows, VC4, VC1:	135	250	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	1015	865	PCH
Percent Capacity Used:	3.940886	2.312138	PERCENT
Impedance Factor:	0.968472	0.981502	

Through movement from Minor street, V8, V11:			
Conflicting flows, VC8, VC11:	427.5	417.5	PCH
Critical Gap:	6	6	SEC
Potential Cap. Fig. 10.3, CP8, CP11:	580	590	PCH
Percent Capacity Utilized	4.310344	3.389830	PERCENT
Impedance Factor:	0.965517	0.972881	
Actual Capacity, CP8, CP11:	551.3241	560.8297	PCH

Left turn Movement from minor street, V7, V10:			
Conflicting Flows, VC7, Vc10:	482.5	452.5	PCH
Enter Critical Gap	7	7	SEC
Potential Capacity from Fig. 10.3, CP7, CP10:	420	440	PCH
Actual Capacity, CM7, CM10:	372.6971	386.4887	PCH

Intersection continued:

Approach Movements 7,8,9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	20	372.6971	372.6971	352.6971	INPUT
8	25	551.3241	551.3241	526.3241	INPUT
9	55	1025	1025	970	INPUT
If two shared lanes, (7&8)					
7&8	45	454.5076	454.5076	409.5076	A
9	55	1025	1025	970	A
If two shared lanes, (8,9)					
7	20	372.6971	372.6971	352.6971	INPUT
8&9	80	808.0489	808.0489	728.0489	INPUT
If three shared lanes					
7,8,&9	100	655.0213	655.0213	555.0213	INPUT

Approach Movements 10,11,12

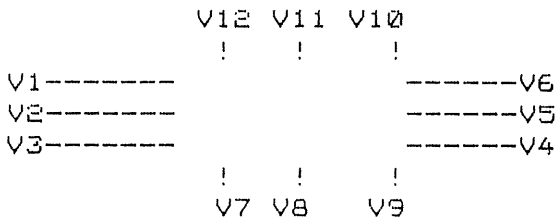
Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	100	386.4887	386.4887	286.4887	INPUT
11	20	560.8297	560.8297	540.8297	INPUT
12	45	890	890	845	INPUT
If two shared lanes, (10&11)					
10&11	120	407.6070	407.6070	287.6070	INPUT
12	45	890	890	845	INPUT
If two shared lanes, (11&12)					
10	100	386.4887	386.4887	286.4887	B/C
11&12	65	753.8570	753.8570	688.8570	A
If three shared lanes					
10,11,&12	165	478.3122	478.3122	313.3122	INPUT

Approach Movements 1,4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	20	865	865	845	A
4	40	1015	1015	975	A
If shared lane					
1&4	60	959.5355	959.5355	899.5355	INPUT

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC. LOS A/B OVERALL

UNSIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 281



Intersection: James&W98th
Time Period: Am peak hour
Date: 89 design (11/1/85)

Traffic movements:	1	2	3	4	5	6
Demand Volumes	160	410	5	35	475	85
Demand in Pch:	180			40		
Critical gap:	5.5			5.5		
Capacity Fig.10.3:	570			690		

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	5	5	5	15	5	40
Demand in Pch:	5	5	5	20	5	45
Critical gap:	7	6	5.5	7	6	5.5
Capacity Fig.10.3:	130	205	690	145	220	600

Right turn movement from minor street :V9,v12			
Conflictiing flows,VC9,VC12:	412.5	517.5	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	690	600	PCH
Percent Capacity Utilized:	0.724637	7.5	PERCENT
Impedance Factor:	0.994202	0.94	

Left turn movement from Major street,V4,V1:			
Conflicting flows,VC4,VC1:	415	560	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	690	570	PCH
Percent Capacity Used:	5.797101	31.57894	PERCENT
Impedance Factor:	0.953623	0.747368	

Through movement from Minor street,V8,V11:			
Conflicting flows,VC8,VC11:	1167.5	1127.5	PCH
Critical Gap:	6	6	SEC
Potential Cap. Fig. 10.3,CP8,CP11:	205	220	PCH
Percent Capacity Utilized	2.439024	2.272727	PERCENT
Impedance Factor:	0.980487	0.981818	
Actual Capacity,CP8,CP11:	146.1051	156.7957	PCH

Left turn Movement from minor street,V7,V10:			
Conflicting Flows,VC7,Vc10:	1212.5	1137.5	PCH
Enter Critical Gap	7	7	SEC
Potential Capacity from Fig. 10.3, CP7,CP10:	130	145	PCH
Actual Capacity, CM7,CM10:	85.50939	100.7387	PCH

Intersection continued:

Approach Movements 7, 8, 9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	5	85.50939	85.50939	80.50939	INPUT
8	5	146.1051	146.1051	141.1051	INPUT
9	5	690	690	685	INPUT
If two shared lanes, (7&8)					
7&8	10	107.8806	107.8806	97.88063	INPUT
9	5	690	690	685	INPUT
If two shared lanes, (8, 9)					
7	5	85.50939	85.50939	80.50939	E
8&9	10	241.1479	241.1479	231.1479	C
If three shared lanes					
7, 8, &9	15	150.0879	150.0879	135.0879	INPUT

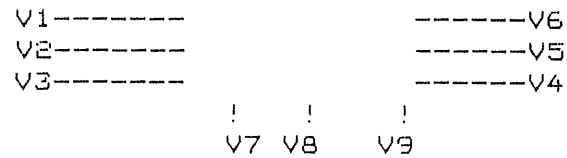
Approach Movements 10, 11, 12

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	20	100.7387	100.7387	80.73879	INPUT
11	5	156.7957	156.7957	151.7957	INPUT
12	45	600	600	555	INPUT
If two shared lanes, (10&11)					
10&11	25	108.4966	108.4966	83.49664	INPUT
12	45	600	600	555	INPUT
If two shared lanes, (11&12)					
10	20	100.7387	100.7387	80.73879	E
11&12	50	467.7766	467.7766	417.7766	A
If three shared lanes					
10, 11, &12	70	229.1911	229.1911	159.1911	INPUT

Approach Movements 1, 4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	180	570	570	390	B
4	40	690	690	650	A
If shared lane					
1&4	220	588.6122	588.6122	368.6122	INPUT

UNSIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
RB CIRCULAR 281



Intersection: James&W98th
Time Period: Pm peak hour
Date: 89 design (11/1/85)

Traffic movements:	1	2	3	4	5	6
Demand Volumes	60	510	10	35	555	30
Demand in Pch:	65			40		
Critical gap:	5.5			5.5		
Capacity Fig.10.3:	550			600		

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	20	10	45	95	10	35
Demand in Pch:	25	15	50	105	15	40
Critical gap:	7	6	5.5	7	6	5.5
Capacity Fig.10.3:	125	200	605	130	200	560

Right turn movement from minor street :V9, v12			
Conflictiing flows, VC9, VC12:	515	570	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	605	560	PCH
Percent Capacity Utilized:	8.264462	7.142857	PERCENT
Impedance Factor:	0.933884	0.942857	

Left turn movement from Major street, V4, V1:			
Conflicting flows, VC4, VC1:	520	585	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	600	550	PCH
Percent Capacity Used:	6.666666	11.81818	PERCENT
Impedance Factor:	0.946666	0.905454	

Through movement from Minor street, V8, V11:			
Conflicting flows, VC8, VC11:	1195	1185	PCH
Critical Gap:	6	6	SEC
Potential Cap. Fig. 10.3, CP8, CP11:	200	200	PCH
Percent Capacity Utilized	7.5	7.5	PERCENT
Impedance Factor:	0.94	0.94	
Actual Capacity, CP8, CP11:	171.4327	171.4327	PCH

Left turn Movement from minor street, V7, V10:			
Conflicting Flows, VC7, Vc10:	1240	1215	PCH
Enter Critical Gap	7	7	SEC
Potential Capacity from Fig. 10.3, CP7, CP10:	125	130	PCH
Actual Capacity, CM7, CM10:	94.96148	97.82008	PCH

Intersection continued:

Approach Movements 7,8,9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	25	94.96148	94.96148	69.96148	INPUT
8	15	171.4327	171.4327	156.4327	INPUT
9	50	605	605	555	INPUT
If two shared lanes, (7&8)					
7&8	40	114.0372	114.0372	74.03727	INPUT
9	50	605	605	555	INPUT
If two shared lanes, (8,9)					
7	25	94.96148	94.96148	69.96148	E
8&9	65	382.0326	382.0326	317.0326	B
If three shared lanes					
7,8,&9	90	207.6569	207.6569	117.6569	INPUT

Approach Movements 10,11,12

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	105	97.82008	97.82008	-7.17991	INPUT
11	15	171.4327	171.4327	156.4327	INPUT
12	40	560	560	520	INPUT
If two shared lanes, (10&11)					
10&11	120	103.3683	103.3683	-16.6316	INPUT
12	40	560	560	520	INPUT
If two shared lanes, (11&12)					
10	105	97.82008	97.82008	-7.17991	E
11&12	55	346.0720	346.0720	291.0720	C
If three shared lanes					
10,11,&12	160	129.8358	129.8358	-30.1641	INPUT

Approach Movements 1,4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	65	550	550	485	A
4	40	600	600	560	A
If shared lane					
1&4	105	568.0327	568.0327	463.0327	INPUT

```
UNSIGNALIZED INTERSECTION ANALYSIS  (T)        V2-------   ------V5
CAPACITY CALCULATION                           V3-------   ------V4
TRB CIRCULAR 281                                     !   !
                                                     !   !
                                                     !   !
                                                    V7   V9

Intersection:      Freeway&W94th
Time Period:       Am peak hour
Date:     89 design (11/1/85)

Traffic movements:      2         3         4         5         7         9
Demand Volumes:       340        30       140       620        15        50
Demand in Pch:                            155                  20        55
Critical gap:                             5.5                   7       5.5
Capacity Fig. 10.3:                       735                 150       750
-------------------------------------------------------------------------------
Right turn movement from minor street :V9
Conflicting flows, VC:                                 15     +          340
VC9:                                                          355 PCH
Enter Critical Gap:                                           5.5 SEC
Potential Capacity from Fig. 10.3:                            750 PCH
CM9:                                                          750
----------
if no shared lane, volume:                                     55 PCH
available reserve capacity                                    695 PCH
LEVEL OF SERVICE                                           INPUT
-------------------------------------------------------------------------------
Left turn movement from Major street:V4
Conflicting flows,VC:                                  30     +          340
VC4:                                                          370 PCH
Enter Critical Gap:                                           5.5 SEC
Potential Capacity from Fig. 10.3:                            735 PCH
CP4:                                                          735 PCH
Demand, V4:                                                   155 PCH
Capacity Used:                                             21.08843 PERCENT
Impedance Factor:                                          0.831292
Actual Capacity, CM4:                                         735 PCH
Available Reserve:                                            580 PCH
LEVEL OF SERVICE:                                               A
-------------------------------------------------------------------------------
Left turn Movement from minor street,V7:
Conflicting flows,VC:                          15        340       620       140
VC7:                                                         1115 PCH
Enter Critical Gap                                              7 SEC
Potential Capacity from Fig. 10.3, CP7:                       150 PCH
Actual Capacity, CM7:                                      124.6938 PCH
--------
if no sharedlane-demand=:                                      20 PCH
Available Reserve Capacity:                                104.6938 PCH
LEVEL OF SERVICE:                                          INPUT
--------
shared lane demand:                                            75 PCH
shared lane with right turn,capacity:                      347.6655 PCH
Available Reserve Capacity:                                272.6655 PCH
LEVEL OF SERVICE:                                               C
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.                   B/C Overall
```

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UNSIGNALIZED INTERSECTION ANALYSIS  (T)        V2-------   ------V5
CAPACITY CALCULATION                           V3-------   ------V4
TRB CIRCULAR 281                                     !   !
                                                     !   !
                                                     !   !
                                                    V7   V9

Intersection:      Freeway&W94th
Time Period:       Pm peak hour
Date:     89 design (11/1/85)

Traffic movements:     2        3        4        5        7        9
Demand Volumes:      695       35       95      525       10      145
Demand in Pch:                          155                20       55
Critical gap:                           5.5                 7      5.5
Capacity Fig. 10.3:                     450               110      460
-------------------------------------------------------------------------
Right turn movement from minor street :V9
Conflicting flows, VC:                          17.5      +          695
VC9:                                                   712.5 PCH
Enter Critical Gap:                                      5.5 SEC
Potential Capacity from Fig. 10.3:                       460 PCH
CM9:                                                     460
----------
if no shared lane, volume:                                55 PCH
available reserve capacity                               405 PCH
LEVEL OF SERVICE                                      INPUT
-------------------------------------------------------------------------
Left turn movement from Major street:V4
Conflicting flows,VC:                           35      +          695
VC4:                                                     730 PCH
Enter Critical Gap:                                      5.5 SEC
Potential Capacity from Fig. 10.3:                       450 PCH
CP4:                                                     450 PCH
Demand, V4:                                              155 PCH
Capacity Used:                                        34.44444 PERCENT
Impedance Factor:                                     0.724444
Actual Capacity, CM4:                                    450 PCH
Available Reserve:                                       295 PCH
LEVEL OF SERVICE:                                         B/C
-------------------------------------------------------------------------
Left turn Movement from minor street,V7:
Conflicting flows,VC:                  17.5     695       525        95
VC7:                                                  1332.5 PCH
Enter Critical Gap                                         7 SEC
Potential Capacity from Fig. 10.3, CP7:                  110 PCH
Actual Capacity, CM7:                                 79.68888 PCH
--------
if no sharedlane-demand=:                                 20 PCH
Available Reserve Capacity:                           59.68888 PCH
LEVEL OF SERVICE:                                     INPUT
--------
shared lane demand:                                       75 PCH
shared lane with right turn,capacity:                 351.7088 PCH
Available Reserve Capacity:                           276.7088 PCH
LEVEL OF SERVICE:                                          C
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.                  B/C Overall
```

```
UNSIGNALIZED INTERSECTION ANALYSIS  (T)        V2-------  ------V5
CAPACITY CALCULATION                           V3-------  ------V4
TRB CIRCULAR 281                                     !   !
                                                     !   !
                                                     !   !
                                                    V7  V9

Intersection:      W.98&Girard
Time Period:       Am peak hour
Date:     89 design(11/1/85)

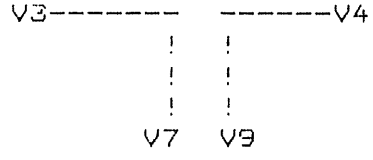
Traffic movements:     2        3        4        5        7        9
Demand Volumes:        1400       60       15     1090        5        5
Demand in Pch:                          15                5        5
Critical gap:                          5.5                7      5.5
Capacity Fig. 10.3:                    166               75      175
-------------------------------------------------------------------------
Right turn movement from minor street :V9
Conflicting flows, VC:                          30      +          1400
VC9:                                                  1430 PCH
Enter Critical Gap:                                    5.5 SEC
Potential Capacity from Fig. 10.3:                     175 PCH
CM9:                                                   175
----------
if no shared lane, volume:                               5 PCH
available reserve capacity                             170 PCH
LEVEL OF SERVICE                                     INPUT
-------------------------------------------------------------------------
Left turn movement from Major street:V4
Conflicting flows,VC:                           60      +          1400
VC4:                                                  1460 PCH
Enter Critical Gap:                                    5.5 SEC
Potential Capacity from Fig. 10.3:                     166 PCH
CP4:                                                   166 PCH
Demand, V4:                                             15 PCH
Capacity Used:                                   9.036144 PERCENT
Impedance Factor:                                0.927710
Actual Capacity, CM4:                                  166 PCH
Available Reserve:                                     151 PCH
LEVEL OF SERVICE:                                      C/D
-------------------------------------------------------------------------
Left turn Movement from minor street,V7:
Conflicting flows,VC:                   30     1400      1090          15
VC7:                                                  2535 PCH
Enter Critical Gap                                       7 SEC
Potential Capacity from Fig. 10.3, CP7:                 75 PCH
Actual Capacity, CM7:                            69.57831 PCH
--------
if no sharedlane-demand=:                                5 PCH
Available Reserve Capacity:                      64.57831 PCH
LEVEL OF SERVICE:                                INPUT
--------
shared lane demand:                                     10 PCH
shared lane with right turn,capacity:            99.56896 PCH
Available Reserve Capacity:                      89.56896 PCH
LEVEL OF SERVICE:                                      E
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.     LOS C/D  OVERALL
```

```
UNSIGNALIZED INTERSECTION ANALYSIS  (T)        V2-------  ------V5
CAPACITY CALCULATION                           V3-------  ------V4
TRB CIRCULAR 281                                     !  !
                                                     !  !
                                                     !  !
                                                    V7  V9

Intersection:      W.98&Girard
Time Period:       Pm peak hour
Date:     89 design(11/1/85)

Traffic movements:     2        3        4        5        7        9
Demand Volumes:        1125       15         5     1380       30       20
Demand in Pch:                             5                35       25
Critical gap:                            5.5                 7      5.5
Capacity Fig. 10.3:                      260                75      260
-------------------------------------------------------------------------
Right turn movement from minor street :V9
Conflicting flows, VC:                                 7.5     +        1125
VC9:                                                         1132.5 PCH
Enter Critical Gap:                                             5.5 SEC
Potential Capacity from Fig. 10.3:                              260 PCH
CM9:                                                            260
----------
if no shared lane, volume:                                       25 PCH
available reserve capacity                                      235 PCH
LEVEL OF SERVICE                                              INPUT
-------------------------------------------------------------------------
Left turn movement from Major street:V4
Conflicting flows,VC:                                   15     +        1125
VC4:                                                         1140 PCH
Enter Critical Gap:                                             5.5 SEC
Potential Capacity from Fig. 10.3:                              260 PCH
CP4:                                                            260 PCH
Demand, V4:                                                       5 PCH
Capacity Used:                                                1.923076 PERCENT
Impedance Factor:                                             0.984615
Actual Capacity, CM4:                                           260 PCH
Available Reserve:                                              255 PCH
LEVEL OF SERVICE:                                                 C
-------------------------------------------------------------------------
Left turn Movement from minor street,V7:
Conflicting flows,VC:                          7.5     1125     1380        5
VC7:                                                         2517.5 PCH
Enter Critical Gap                                                7 SEC
Potential Capacity from Fig. 10.3, CP7:                          75 PCH
Actual Capacity, CM7:                                         73.84615 PCH
--------
if no sharedlane-demand=:                                        35 PCH
Available Reserve Capacity:                                   38.84615 PCH
LEVEL OF SERVICE:                                             INPUT
--------
shared lane demand:                                              60 PCH
shared lane with right turn,capacity:                         103.4825 PCH
Available Reserve Capacity:                                   43.48258 PCH
LEVEL OF SERVICE:                                                 E
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.     LOS C/D  OVERALL
```

UNSIGNALIZED INTERSECTION ANALYSIS (T)
CAPACITY CALCULATION
TRB CIRCULAR 281



Intersection: Humboldt&W98th
Time Period: Am peak hour
Date: 89 design (11/1/85)

Traffic movements:	2	3	4	5	7	9
Demand Volumes:	915	55	10	335	5	5
Demand in Pch:			15		5	5
Critical gap:			5.5		7	5.5
Capacity Fig. 10.3:			325		115	337

Right turn movement from minor street :V9

Conflicting flows, VC:	27.5	+		915
VC9:		942.5	PCH	
Enter Critical Gap:		5.5	SEC	
Potential Capacity from Fig. 10.3:		337	PCH	
CM9:		337		

---

if no shared lane, volume:	5	PCH
available reserve capacity	332	PCH
LEVEL OF SERVICE	INPUT	

Left turn movement from Major street:V4

Conflicting flows,VC:	55	+		915
VC4:		970	PCH	
Enter Critical Gap:		5.5	SEC	
Potential Capacity from Fig. 10.3:		325	PCH	
CP4:		325	PCH	
Demand, V4:		15	PCH	
Capacity Used:		4.615384	PERCENT	
Impedance Factor:		0.963076		
Actual Capacity, CM4:		325	PCH	
Available Reserve:		310	PCH	
LEVEL OF SERVICE:		B		

Left turn Movement from minor street,V7:

Conflicting flows,VC:	27.5	915	335	10
VC7:			1287.5	PCH
Enter Critical Gap			7	SEC
Potential Capacity from Fig. 10.3, CP7:			115	PCH
Actual Capacity, CM7:			110.7538	PCH

---

if no sharedlane-demand=:	5	PCH
Available Reserve Capacity:	105.7538	PCH
LEVEL OF SERVICE:	INPUT	

---

shared lane demand:	10	PCH
shared lane with right turn,capacity:	166.7168	PCH
Available Reserve Capacity:	156.7168	PCH
LEVEL OF SERVICE:	D	

```
UNSIGNALIZED INTERSECTION ANALYSIS  (T)        V2-------   ------V5
CAPACITY CALCULATION                           V3-------   ------V4
TRB CIRCULAR 281                                     !   !
                                                     !   !
                                                     !   !
                                                    V7   V9

Intersection:      Humboldt&W98th
Time Period:       Pm peak hour
Date:     89 design (11/1/85)

Traffic movements:     2         3         4         5         7         9
Demand Volumes:          410         20         70        795         20         15
Demand in Pch:                      80                    25         20
Critical gap:                      5.5                     7        5.5
Capacity Fig. 10.3:                680                   115        685
-------------------------------------------------------------------------------
Right turn movement from minor street :V9
Conflicting flows, VC:                          10      +           410
VC9:                                                      420 PCH
Enter Critical Gap:                                       5.5 SEC
Potential Capacity from Fig. 10.3:                        685 PCH
CM9:                                                      685
----------
if no shared lane, volume:                                 20 PCH
available reserve capacity                                665 PCH
LEVEL OF SERVICE                                    INPUT
-------------------------------------------------------------------------------
Left turn movement from Major street:V4
Conflicting flows,VC:                           20      +           410
VC4:                                                      430 PCH
Enter Critical Gap:                                       5.5 SEC
Potential Capacity from Fig. 10.3:                        680 PCH
CP4:                                                      680 PCH
Demand, V4:                                                80 PCH
Capacity Used:                                      11.76470 PERCENT
Impedance Factor:                                   0.905882
Actual Capacity, CM4:                                     680 PCH
Available Reserve:                                        600 PCH
LEVEL OF SERVICE:                                          A
-------------------------------------------------------------------------------
Left turn Movement from minor street,V7:
Conflicting flows,VC:                    10       410       795          70
VC7:                                                     1285 PCH
Enter Critical Gap                                          7 SEC
Potential Capacity from Fig. 10.3, CP7:                   115 PCH
Actual Capacity, CM7:                               104.1764 PCH
--------
if no sharedlane-demand=:                                  25 PCH
Available Reserve Capacity:                         79.17647 PCH
LEVEL OF SERVICE:                                   INPUT
--------
shared lane demand:                                        45 PCH
shared lane with right turn,capacity:               163.6433 PCH
Available Reserve Capacity:                         118.6433 PCH
LEVEL OF SERVICE:                                           D
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.     LOS B/C  OVERALL
```

```
UNSIGNALIZED INTERSECTION ANALYSIS              V12 V11 V10
CAPACITY CALCULATION                             !   !   !
TRB CIRCULAR 281                    V1-------                ------V6
                                    V2-------                ------V5
                                    V3-------                ------V4
                                                 !   !   !
Intersection:      Shakepee&W98th                V7  V8  V9
Time Period:       Am peak hour
Date:     89 design (11/1/85)
```

Traffic movements:	1	2	3	4	5	6
Demand Volumes	0	0	0	0	0	680
Demand in Pch:	0			0		
Critical gap:	5.5			5.5		
Capacity Fig.10.3:	1			1		

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	0	335	0	380	915	0
Demand in Pch:	0	370	0	420	1005	0
Critical gap:	7	6.5	5.5	7	6.5	5.5
Capacity Fig.10.3:	1	410	1	310	655	1

Right turn movement from minor street :V9,v12			
Conflictiing flows,VC9,VC12:	0	340	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	1	1	PCH
Percent Capacity Utilized:	0	0	PERCENT
Impedance Factor:	1	1	

Left turn movement from Major street,V4,V1:			
Conflicting flows,VC4,VC1:	0	680	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	1	1	PCH
Percent Capacity Used:	0	0	PERCENT
Impedance Factor:	1	1	

Through movement from Minor street,V8,V11:			
Conflicting flows,VC8,VC11:	680	340	PCH
Critical Gap:	6.5	6.5	SEC
Potential Cap. Fig. 10.3,CP8,CP11:	410	655	PCH
Percent Capacity Utilized	90.24390	153.4351	PERCENT
Impedance Factor:	0.278048	-0.22748	
Actual Capacity,CP8,CP11:	410	655	PCH

Left turn Movement from minor street,V7,V10:			
Conflicting Flows,VC7,Vc10:	1595	675	PCH
Enter Critical Gap	7	7	SEC
Potential Capacity from Fig. 10.3, CP7,CP10:	1	310	PCH
Actual Capacity, CM7,CM10:	-0.22748	86.19512	PCH

Intersection continued:

Approach Movements 7, 8, 9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	0	-0.22748	-0.22748	-0.22748	INPUT
8	370	410	410	40	D/E
9	0	1	1	1	INPUT
If two shared lanes, (7&8)					
7&8	370	410	410	40	INPUT
9	0	1	1	1	INPUT
If two shared lanes, (8, 9)					
7	0	-0.22748	-0.22748	-0.22748	INPUT
8&9	370	410	410	40	INPUT
If three shared lanes					
7, 8, &9	370	410	410	40	INPUT

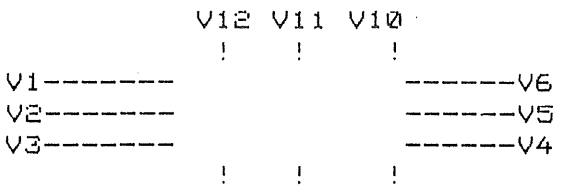
Approach Movements 10, 11, 12

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	420	86.19512	86.19512	-333.804	E
11	1005	655	655	-350	E
12	0	1	1	1	INPUT
If two shared lanes, (10&11)					
10&11	1425	222.4124	222.4124	-1202.58	INPUT
12	0	1	1	1	INPUT
If two shared lanes, (11&12)					
10	420	86.19512	86.19512	-333.804	INPUT
11&12	1005	655	655	-350	INPUT
If three shared lanes					
10, 11, &12	1425	222.4124	222.4124	-1202.58	INPUT

Approach Movements 1, 4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	0	1	1	1	INPUT
4	0	1	1	100	D
If shared lane					
1&4	0	ERR	ERR	ERR	INPUT

UNSIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 281



Intersection: Shakepee&W98th
Time Period: Pm peak hour
Date: 89 design (11/1/85)

Traffic movements:	1	2	3	4	5	6
Demand Volumes	0	0	0	0	0	620
Demand in Pch:	0			0		
Critical gap:	5.5			5.5		
Capacity Fig.10.3:	1			1		

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	0	795	0	655	410	0
Demand in Pch:	0	875	0	720	450	0
Critical gap:	7	6.5	5.5	7	6.5	5.5
Capacity Fig.10.3:	1	445	1	155	685	1

Right turn movement from minor street :V9,v12			
Conflictiing flows,VC9,VC12:	0	310	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	1	1	PCH
Percent Capacity Utilized:	0	0	PERCENT
Impedance Factor:	1	1	

Left turn movement from Major street,V4,V1:			
Conflicting flows,VC4,VC1:	0	620	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	1	1	PCH
Percent Capacity Used:	0	0	PERCENT
Impedance Factor:	1	1	

Through movement from Minor street,V8,V11:			
Conflicting flows,VC8,VC11:	620	310	PCH
Critical Gap:	6.5	6.5	SEC
Potential Cap. Fig. 10.3,CP8,CP11:	445	685	PCH
Percent Capacity Utilized	196.6292	65.69343	PERCENT
Impedance Factor:	-0.57303	0.474452	
Actual Capacity,CP8,CP11:	445	685	PCH

Left turn Movement from minor street,V7,V10:			
Conflicting Flows,VC7,Vc10:	1030	1105	PCH
Enter Critical Gap	7	7	SEC
Potential Capacity from Fig. 10.3, CP7,CP10:	1	155	PCH
Actual Capacity, CM7,CM10:	0.474452	-88.8202	PCH

Intersection continued:

Approach Movements 7,8,9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	0	0.474452	0.474452	0.474452	INPUT
8	875	445	445	-430	E
9	0	1	1	1	INPUT
If two shared lanes, (7&8)					
7&8	875	445	445	-430	INPUT
9	0	1	1	1	INPUT
If two shared lanes, (8,9)					
7	0	0.474452	0.474452	0.474452	INPUT
8&9	875	445	445	-430	INPUT
If three shared lanes					
7,8,&9	875	445	445	-430	INPUT

Approach Movements 10,11,12

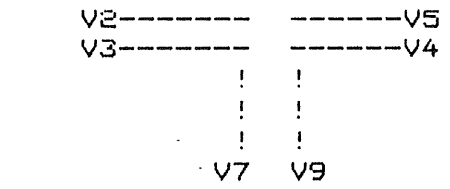
Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	720	-88.8202	-88.8202	-808.820	E
11	450	685	685	235	C
12	0	1	1	1	INPUT
If two shared lanes, (10&11)					
10&11	1170	-157.061	-157.061	-1327.06	INPUT
12	0	1	1	1	INPUT
If two shared lanes, (11&12)					
10	720	-88.8202	-88.8202	-808.820	INPUT
11&12	450	685	685	235	INPUT
If three shared lanes					
10,11,&12	1170	-157.061	-157.061	-1327.06	INPUT

Approach Movements 1,4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	0	1	1	1	INPUT
4	0	1	1	100	D
If shared lane					
1&4	0	ERR	ERR	ERR	INPUT

BROOKLYN PARK EAST RESOURCE RECOVERY SITE

UNSIGNALIZED INTERSECTION ANALYSIS (T)
CAPACITY CALCULATION
TRB CIRCULAR 281



Intersection: Broadway&68
Time Period: Am peak
Date: 89 design (11/1/85)

Traffic movements:	2	3	4	5	7	9
Demand Volumes:	505	65	30	335	40	35
Demand in Pch:			35		45	40
Critical gap:			5		6.5	5.5
Capacity Fig. 10.3:			650		250	585

Right turn movement from minor street :V9

Conflicting flows, VC:	32.5	+		505
VC9:		537.5	PCH	
Enter Critical Gap:		5.5	SEC	
Potential Capacity from Fig. 10.3:		585	PCH	
CM9:		585		

---

if no shared lane, volume:	40	PCH
available reserve capacity	545	PCH
LEVEL OF SERVICE	A	

Left turn movement from Major street:V4

Conflicting flows,VC:	65	+		505
VC4:		570	PCH	
Enter Critical Gap:		5	SEC	
Potential Capacity from Fig. 10.3:		650	PCH	
CP4:		650	PCH	
Demand, V4:		35	PCH	
Capacity Used:		5.384615	PERCENT	
Impedance Factor:		0.956923		
Actual Capacity, CM4:		650	PCH	
Available Reserve:		615	PCH	
LEVEL OF SERVICE:		A		

Left turn Movement from minor street,V7:

Conflicting flows,VC:	32.5	505	335	30
VC7:			902.5	PCH
Enter Critical Gap			6.5	SEC
Potential Capacity from Fig. 10.3, CP7:			250	PCH
Actual Capacity, CM7:			239.2307	PCH

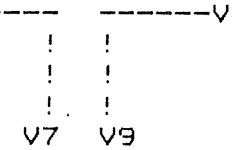
---

if no sharedlane-demand=:	45	PCH
Available Reserve Capacity:	194.2307	PCH
LEVEL OF SERVICE:	INPUT	

---

shared lane demand:	85	PCH
shared lane with right turn,capacity:	330.3504	PCH
Available Reserve Capacity:	245.3504	PCH
LEVEL OF SERVICE:	A/B overall	

UNSIGNALIZED INTERSECTION ANALYSIS (T)
CAPACITY CALCULATION
TRB CIRCULAR 281



Intersection: Broadway&68
Time Period: Pm peak
Date: 89 design (11/1/85)

Traffic movements:	2	3	4	5	7	9
Demand Volumes:	480	60	40	815	55	45
Demand in Pch:			45		60	50
Critical gap:			5		6.5	5.5
Capacity Fig. 10.3:			675		125	605

Right turn movement from minor street :V9

Conflicting flows, VC:		30	+	480
VC9:			510	PCH
Enter Critical Gap:			5.5	SEC
Potential Capacity from Fig. 10.3:			605	PCH
CM9:			605	

---

if no shared lane, volume:	50	PCH
available reserve capacity	555	PCH
LEVEL OF SERVICE	A	

Left turn movement from Major street:V4

Conflicting flows,VC:		60	+	480
VC4:			540	PCH
Enter Critical Gap:			5	SEC
Potential Capacity from Fig. 10.3:			675	PCH
CP4:			675	PCH
Demand, V4:			45	PCH
Capacity Used:			6.666666	PERCENT
Impedance Factor:			0.946666	
Actual Capacity, CM4:			675	PCH
Available Reserve:			630	PCH
LEVEL OF SERVICE:			A	

Left turn Movement from minor street,V7:

Conflicting flows,VC:	30	480	815	40
VC7:			1365	PCH
Enter Critical Gap			6.5	SEC
Potential Capacity from Fig. 10.3, CP7:			125	PCH
Actual Capacity, CM7:			118.3333	PCH

---

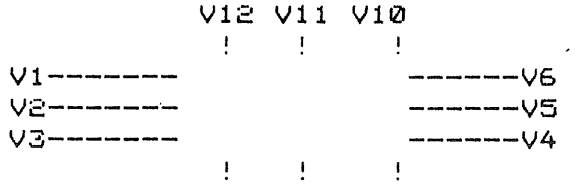
if no sharedlane-demand=:	60	PCH
Available Reserve Capacity:	58.33333	PCH
LEVEL OF SERVICE:	INPUT	

---

shared lane demand:	110	PCH
shared lane with right turn,capacity:	185.4706	PCH
Available Reserve Capacity:	75.47063	PCH
LEVEL OF SERVICE:	B/C overall	

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

UNSIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 281



Intersection: U169&73rd
Time Period: Am peak
Date: 89 design(11/1/85)

Traffic movements:	1	2	3	4	5	6
Demand Volumes	15	560	55	35	1410	20
Demand in Pch:	20			40		
Critical gap:	6			6		
Capacity Fig.10.3:	145			445		

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	170	20	55	10	5	15
Demand in Pch:	190	25	60	15	15	20
Critical gap:	8	7	6	8	7	6
Capacity Fig.10.3:	20	35	465	20	30	145

Right turn movement from minor street :V9, v12

Conflictiing flows, VC9, VC12:	587.5	1420	PCH
Enter Critical Gap:	6	6	SEC
Capacity from Fig. 10.3:	465	145	PCH
Percent Capacity Utilized:	12.90322	13.79310	PERCENT
Impedance Factor:	0.896774	0.889655	

Left turn movement from Major street, V4, V1:

Conflicting flows, VC4, VC1:	615	1430	PCH
Enter Critical Gap:	6	6	SEC
Capacity from Fig. 10.3:	445	145	PCH
Percent Capacity Used:	8.988764	13.79310	PERCENT
Impedance Factor:	0.928089	0.889655	

Through movement from Minor street, V8, V11:

Conflicting flows, VC8, VC11:	2067.5	2085	PCH
Critical Gap:	7	7	SEC
Potential Cap. Fig. 10.3, CP8, CP11:	35	30	PCH
Percent Capacity Utilized	71.42857	50	PERCENT
Impedance Factor:	0.428571	0.6	
Actual Capacity, CP8, CP11:	28.89879	24.77039	PCH

Left turn Movement from minor street, V7, V10:

Conflicting Flows, VC7, Vc10:	2087.5	2275	PCH
Enter Critical Gap	8	8	SEC
Potential Capacity from Fig. 10.3, CP7, CP10:	20	20	PCH
Actual Capacity, CM7, CM10:	8.814845	6.346701	PCH

Intersection continued:

Approach Movements 7,8,9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	190	8.814845	8.814845	-181.185	INPUT
8	25	28.89879	28.89879	3.898798	INPUT
9	60	465	465	405	INPUT
If two shared lanes, (7&8)					
7&8	215	9.589808	9.589808	-205.410	E
9	60	465	465	405	A
If two shared lanes, (8,9)					
7	190	8.814845	8.814845	-181.185	INPUT
8&9	85	85.50274	85.50274	0.502746	INPUT
If three shared lanes					
7,8,&9	275	12.19584	12.19584	-262.804	INPUT

Approach Movements 10,11,12

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	15	6.346701	6.346701	-8.65329	INPUT
11	15	24.77039	24.77039	9.770399	INPUT
12	20	145	145	125	INPUT
If two shared lanes, (10&11)					
10&11	30	10.10443	10.10443	-19.8955	E
12	20	145	145	125	D
If two shared lanes, (11&12)					
10	15	6.346701	6.346701	-8.65329	INPUT
11&12	35	47.07511	47.07511	12.07511	INPUT
If three shared lanes					
10,11,&12	50	16.09308	16.09308	-33.9069	INPUT

Approach Movements 1,4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	20	145	145	125	D
4	40	445	445	405	A
If shared lane					
1&4	60	263.3673	263.3673	203.3673	INPUT

D OVERALL

```
 NSIGNALIZED IN ERSECTION ANALYSIS                V12 V11 V10
CAPACITY CALCULATION                               !   !   !
TRB CIRCULAR 281                        V1-------              ------V6
                                        V2-------              ------V5
                                        V3-------              ------V4
                                                   !   !   !
Intersection:      U169&73rd                       V7  V8  V9
Time Period:       Pm peak
Date:     89 design(11/1/85)

Traffic movements:     1        2        3        4        5        6
Demand Volumes            10     1420      175       40      795       20
Demand in Pch:            15                         45
Critical gap:              6                          6
Capacity Fig.10.3:       340                        115

Traffic movements:     7        8        9       10       11       12
Demand Volumes:           55       10       35       20       25       10
Demand in Pch:            60       15       40       25       30       15
Critical gap:              8        7        6        8        7        6
Capacity Fig.10.3:        15       20      130       10       20      345
---------------------------
Right turn movement from minor street :V9,v12
Conflictiing flows,VC9,VC12:                    1507.5      805 PCH
Enter Critical Gap:                                6        6 SEC
Capacity from Fig. 10.3:                         130      345 PCH
Percent Capacity Utilized:                  30.76923 4.347826 PERCENT
Impedance Factor:                           0.753846 0.965217
-------------------- ----------------------------------------------------
Left turn movement from Major street,V4,V1:
Conflicting flows,VC4,VC1:                      1595      815 PCH
Enter Critical Gap:                                6        6 SEC
Capacity from Fig. 10.3:                         115      340 PCH
Percent Capacity Used:                      39.13043 4.411764 PERCENT
Impedance Factor:                           0.686956 0.964705
-------------------------------------------------------------------------
Through movement from Minor street,V8,V11:
Conflicting flows,VC8,VC11:                  2372.5     2450 PCH
Critical Gap:                                     7        7 SEC
Potential Cap. Fig. 10.3,CP8,CP11:               20       20 PCH
Percent Capacity Utilized                        75      150 PERCENT
Impedance Factor:                               0.4     -0.2
Actual Capacity,CP8,CP11:                   13.25421 13.25421 PCH
-------------------------------------------------------------------------
Left turn Movement from minor street,V7,V10:
Conflicting Flows,VC7,Vc10:                  2407.5     2515 PCH
Enter Critical Gap                                8        8 SEC
Potential Capacity from Fig. 10.3, CP7,CP10:     15       10 PCH
Actual Capacity, CM7,CM10:                  -1.91898 1.998328 PCH
--------
```

Intersection continued:

Approach Movements 7,8,9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	60	-1.91898	-1.91898	-61.9189	INPUT
8	15	13.25421	13.25421	-1.74578	INPUT
9	40	130	130	90	INPUT
If two shared lanes, (7&8)					
7&8	75	-2.48880	-2.48880	-77.4888	E
9	40	130	130	90	D
If two shared lanes, (8,9)					
7	60	-1.91898	-1.91898	-61.9189	INPUT
8&9	55	38.21017	38.21017	-16.7898	INPUT
If three shared lanes					
7,8,&9	115	-3.85554	-3.85554	-118.855	INPUT

Approach Movements 10,11,12

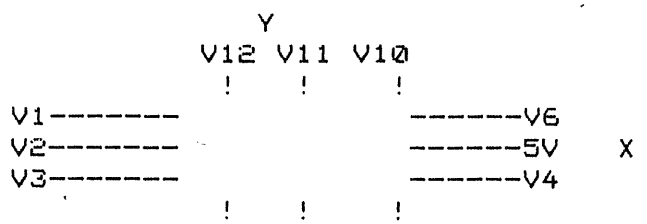
Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	25	1.998328	1.998328	-23.0016	INPUT
11	30	13.25421	13.25421	-16.7457	INPUT
12	15	345	345	330	INPUT
If two shared lanes, (10&11)					
10&11	55	3.722785	3.722785	-51.2772	E
12	15	345	345	330	B
If two shared lanes, (11&12)					
10	25	1.998328	1.998328	-23.0016	INPUT
11&12	45	19.50662	19.50662	-25.4933	INPUT
If three shared lanes					
10,11,&12	70	4.724187	4.724187	-65.2758	INPUT

Approach Movements 1,4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	15	340	340	325	B
4	45	115	115	70	E
If shared lane					
1&4	60	137.7973	137.7973	77.79735	INPUT

D OVERALL

IGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: Broadway&169
Time Period: Am peak
Date: 89 design (11/1/85)

Identify phasing:

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	60	140	80	70	200	30
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	67	151	88	77.5	214	35.5
Phf:	1	1	1	1	1	1
Period Volumes:	67	151	88	77.5	214	35.5

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	135	540	395	35	1555	320
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	145.75	571	418.75	40.75	1636.75	340
Phf:	1	1	1	1	1	1
Period Volumes:	145.75	571	418.75	40.75	1636.75	340

Left turn check:	W	X	Y	Z
Cycle length, sec:	120	120	120	120
No. of ch. Intervals:	30	30	30	30
Left turn on Intervals:	60	60	60	60
G/C ratio:	0.25	0.25	0.75	0.75
Opposing vol. (Th.+Rt.):	230	220	935	1875
Left turn on green, vph.:	70	80	-35	-975
Left turn capacity, vph.:	130	140	25	-915
Left turn volume, vph.:	60	70	35	135
Excess Capacity:	70	70	-10	-1050

Signalized Intersection Analysis cont.
Turn Adjustments:

W		X		Y		Z	
B2	A1	B1	A2	B4	A3	B3	A4
LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:							
67	88	77.5	35.5	40.75	340	145.75	418.75
Opposing volumes:							
230		220		935		1875	
Pedestrian volumes:							
	1		1		1		1
PCE Left, table 3							
1		1		1		1	
Left turn vol, pch.:							
67		77.5		40.75		145.75	
PCE right, table 4							
	1		1		1		1
Right turn vol., pch							
	88		35.5		340		418.75
Through vol., pch							
	151		214		1636.75		571
Total volume, pch							
67	239	77.5	249.5	40.75	1976.75	145.75	989.75

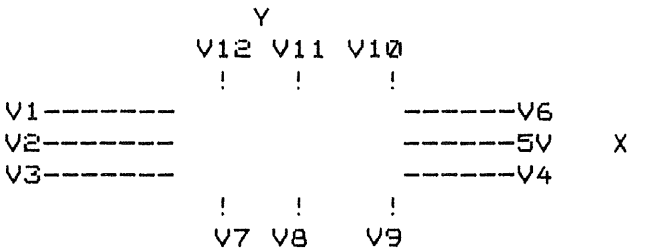
Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane	
B2	67	1	1	67	1	67	
A1	239	1.05	1	250.95	2	125.475	
B1	77.5	1	1	77.5	1	77.5	
A2	249.5	1	1	249.5	1	249.5	*
B4	40.75	1	1	40.75	1	40.75	
A3	1976.75	1.1	1	2174.425	3	724.8083	**
B3	145.75	1	1	145.75	1	145.75	
A4	989.75	1.1	1	1088.725	3	362.9083	

SUM OF CRITICAL VOLUMES: 1697
INTERSECTION LEVEL OF SERVICE E

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: Broadway&169
Time Period: Pm peak
Date: 89 design (11/1/85)

Identify phasing:

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	325	510	120	240	150	50
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	345.25	539.5	130	256	161.5	56.5
Phf:	1	1	1	1	1	1
Period Volumes:	345.25	539.5	130	256	161.5	56.5

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	145	1440	1075	70	705	155
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	156.25	1516	1132.75	77.5	744.25	166.75
Phf:	1	1	1	1	1	1
Period Volumes:	156.25	1516	1132.75	77.5	744.25	166.75

Left turn check:	W	X	Y	Z
Cycle length, sec:	120	120	120	120
No. of ch. Intervals:	30	30	30	30
Left turn on Intervals:	60	60	60	60
G/C ratio:	0.25	0.25	0.75	0.75
Opposing vol.(Th.+Rt.):	200	630	2515	860
Left turn on green,vph.:	100	-330	-1615	40
Left turn capacity,vph.:	160	-270	-1555	100
Left turn volume, vph.:	325	240	70	145
Excess Capacity:	-165	-510	-1625	-45

Signalized Intersection Analysis cont.
Turn Adjustments:

W		X		Y		Z	
B2	A1	B1	A2	B4	A3	B3	A4
LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:							
345.25	130	256	56.5	77.5	166.75	156.25	1132.75
Opposing volumes:							
200		630		2515		860	
Pedestrian volumes:							
1		1		1		1	
PCE Left, table 3							
1		1		1		1	
Left turn vol, pch.:							
345.25		256		77.5		156.25	
PCE right, table 4							
1		1		1		1	
Right turn vol., pch							
130		56.5		166.75		1132.75	
Through vol., pch							
539.5		161.5		744.25		1516	
Total volume, pch							
345.25	669.5	256	218	77.5	911	156.25	2648.75

Adjusted volumes

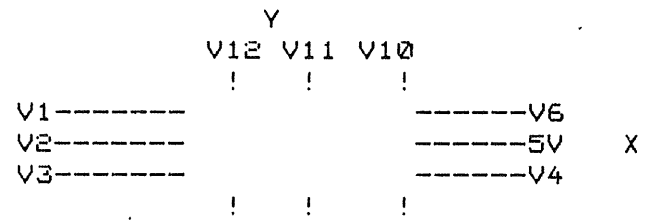
Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane	
B2	345.25	1	1	345.25	1	345.25	
A1	669.5	1.05	1	702.975	2	351.4875	*
B1	256	1	1	256	1	256	
A2	218	1	1	218	1	218	
B4	77.5	1	1	77.5	1	77.5	
A3	911	1.1	1	1002.1	3	334.0333	
B3	156.25	1	1	156.25	1	156.25	
A4	2648.75	1.1	1	2913.625	3	971.2083	**

SUM OF CRITICAL VOLUMES: 2293
INTERSECTION LEVEL OF SERVICE E

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

HOPKINS DOT RESOURCE RECOVERY SITE

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: Ch3&5th
Time Period: Am peak
Date: 89 design (11/1/5)

Identify phasing:

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	40	910	215	140	680	145
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	46	959.5	229.75	151	718	156.25
Phf:	0.92	0.92	0.92	0.92	0.92	0.92
Period Volumes:	50	1042.934	249.7282	164.1304	780.4347	169.8369

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	110	40	165	55	65	180
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	119.5	46	177.25	61.75	72.25	193
Phf:	0.92	0.92	0.92	0.92	0.92	0.92
Period Volumes:	129.8913	50	192.6630	67.11956	78.53260	209.7826

Left turn check:	W	X	Y	Z
Cycle length, sec:	*80	80	80	80
No. of ch. Intervals:	45	45	45	45
Left turn on Intervals:	90	90	90	90
G/C ratio:	0.55	0.55	0.45	0.45
Opposing vol.(Th.+Rt.):	825	1125	205	245
Left turn on green,vph.:	-165	-465	335	295
Left turn capacity,vph.:	-75	-375	425	385
Left turn volume, vph.:	40	140	55	110
Excess Capacity:	-115	-515	370	275

Signalized Intersection Analysis cont.
Turn Adjustments:

	W		X		Y		Z	
	B2	A1	B1	A2	B4	A3	B3	A4
	LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:								
	50	249.7282	164.1304	169.8369	67.11956	209.7826	129.8913	192.6630
Opposing volumes:								
	825		1125		205		245	
Pedestrian volumes:								
		1		1		1		1
PCE Left, table 3								
	1		1		1		1	
Left turn vol, pch.:								
	50		164.1304		67.11956		129.8913	
PCE right, table 4								
		1		1		1		1
Right turn vol., pch								
		249.7282		169.8369		209.7826		192.6630
Through vol., pch								
		1042.934		780.4347		78.53260		50
Total volume, pch								
	50	1292.663	164.1304	950.2717	67.11956	288.3152	129.8913	242.6630

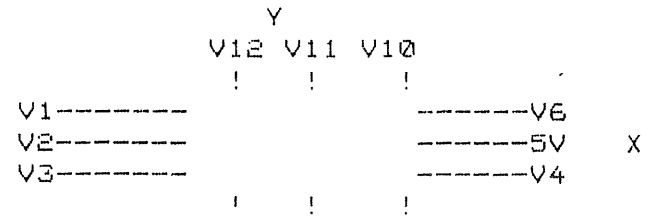
Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane	
B2	50	1	1	50	1	50	
A1	1292.663	1.1	1	1421.929	3	473.9764	*
B1	164.1304	1	1	164.1304	1	164.1304	*
A2	950.2717	1.1	1	1045.298	3	348.4329	
B4	67.11956	1	1	67.11956	1	67.11956	*
A3	288.3152	1.05	0.96	290.6217	2	145.3108	
B3	129.8913	1	1	129.8913	1	129.8913	*
A4	242.6630	1	0.96	232.9565	2	116.4782	

SUM OF CRITICAL VOLUMES: 833
INTERSECTION LEVEL OF SERVICE B

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: Ch3&5th
Time Period: Pm peakhour
Date: 89 design (11/1/5)

Identify phasing:

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	85	1015	205	205	940	280
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	93.25	1069.75	219.25	219.25	991	298
Phf:	0.92	0.92	0.92	0.92	0.92	0.92
Period Volumes:	101.3586	1162.771	238.3152	238.3152	1077.173	323.9130

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	240	105	175	50	65	230
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	256	114.25	187.75	56.5	72.25	245.5
Phf:	0.92	0.92	0.92	0.92	0.92	0.92
Period Volumes:	278.2608	124.1847	204.0760	61.41304	78.53260	266.8478

Left turn check:	W	X	Y	Z
Cycle length, sec:	80	80	80	80
No. of ch. Intervals:	45	45	45	45
Left turn on Intervals:	90	90	90	90
G/C ratio:	0.55	0.55	0.45	0.45
Opposing vol.(Th.+Rt.):	1220	1220	280	295
Left turn on green,vph.:	-560	-560	260	245
Left turn capacity,vph.:	-470	-470	350	335
Left turn volume, vph.:	85	205	50	240
Excess Capacity:	-555	-675	300	95

Signalized Intersection Analysis cont.

Turn Adjustments:

W		X		Y		Z	
B2	A1	B1	A2	B4	A3	B3	A4
LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:							
101.3586	238.3152	238.3152	323.9130	61.41304	266.8478	278.2608	204.0760
Opposing volumes:							
1220		1220		280		295	
Pedestrian volumes:							
	1		1		1		1
PCE Left, table 3							
1		1		1		1	
Left turn vol, pch.:							
101.3586		238.3152		61.41304		278.2608	
PCE right, table 4							
	1		1		1		1
Right turn vol., pch							
	238.3152		323.9130		266.8478		204.0760
Through vol., pch							
	1162.771		1077.173		78.53260		124.1847
Total volume, pch							
101.3586	1401.086	238.3152	1401.086	61.41304	345.3804	278.2608	328.2608

Adjusted volumes

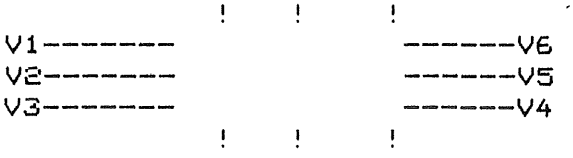
Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane	
B2	101.3586	1	1	101.3586	1	101.3586	
A1	1401.086	1.1	1	1541.195	3	513.7318	
B1	238.3152	1	1	238.3152	1	238.3152	*
A2	1401.086	1.1	1	1541.195	3	513.7318	*
B4	61.41304	1	1	61.41304	1	61.41304	
A3	345.3804	1.05	0.96	348.1434	2	174.0717	*
B3	278.2608	1	1	278.2608	1	278.2608	*
A4	328.2608	1	0.96	315.1304	2	157.5652	

SUM OF CRITICAL VOLUMES: 1204

INTERSECTION LEVEL OF SERVICE C

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

UNSIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 281



Intersection: Fifth&3rd
Time Period: Am peak
Date: 89 design (11/1/85)

Traffic movements:	1	2	3	4	5	6
Demand Volumes	75	110	0	0	60	145
Demand in Pch:	85			0		
Critical gap:	6			6		
Capacity Fig.10.3:	795			905		

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	0	65	0	210	65	50
Demand in Pch:	0	100	0	230	100	55
Critical gap:	6.5	6.5	5.5	6.5	6.5	5.5
Capacity Fig.10.3:	460	545	1050	550	610	1015

Right turn movement from minor street :V9, v12

Conflictiing flows, VC9, VC12:	110	132.5	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	1050	1015	PCH
Percent Capacity Utilized:	0	5.418719	PERCENT
Impedance Factor:	1	0.956650	

Left turn movement from Major street, V4, V1:

Conflicting flows, VC4, VC1:	110	205	PCH
Enter Critical Gap:	6	6	SEC
Capacity from Fig. 10.3:	905	795	PCH
Percent Capacity Used:	0	10.69182	PERCENT
Impedance Factor:	1	0.914465	

Through movement from Minor street, V8, V11:

Conflicting flows, VC8, VC11:	390	317.5	PCH
Critical Gap:	6.5	6.5	SEC
Potential Cap. Fig. 10.3, CP8, CP11:	545	610	PCH
Percent Capacity Utilized	18.34862	16.39344	PERCENT
Impedance Factor:	0.853211	0.868852	
Actual Capacity, CP8, CP11:	498.3836	557.8238	PCH

Left turn Movement from minor street, V7, V10:

Conflicting Flows, VC7, Vc10:	505	582.5	PCH
Enter Critical Gap	6.5	6.5	SEC
Potential Capacity from Fig. 10.3, CP7, CP10:	460	550	PCH
Actual Capacity, CM7, CM10:	349.6425	429.1275	PCH

Intersection continued:

Approach Movements 7,8,9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	0	349.6425	349.6425	349.6425	INPUT
8	100	498.3836	498.3836	398.3836	INPUT
9	0	1050	1050	1050	INPUT
If two shared lanes, (7&8)					
7&8	100	498.3836	498.3836	398.3836	INPUT
9	0	1050	1050	1050	INPUT
If two shared lanes, (8,9)					
7	0	349.6425	349.6425	349.6425	INPUT
8&9	100	498.3836	498.3836	398.3836	B
If three shared lanes					
7,8,&9	100	498.3836	498.3836	398.3836	INPUT

Approach Movements 10,11,12

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	230	429.1275	429.1275	199.1275	INPUT
11	100	557.8238	557.8238	457.8238	INPUT
12	55	1015	1015	960	INPUT
If two shared lanes, (10&11)					
10&11	330	461.3841	461.3841	131.3841	INPUT
12	55	1015	1015	960	INPUT
If two shared lanes, (11&12)					
10	230	429.1275	429.1275	199.1275	C
11&12	155	663.9388	663.9388	508.9388	A
If three shared lanes					
10,11,&12	385	500.3727	500.3727	115.3727	INPUT

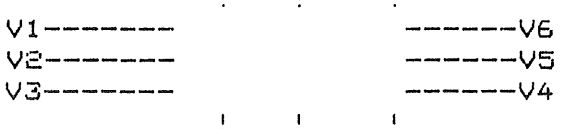
Approach Movements 1,4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	85	795	795	710	A
4	0	905	905	905	A
If shared lane					
1&4	85	795	795	710	INPUT

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

LOS A/B OVERALL

UNSIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 281



Intersection: Fifth&3rd
Time Period: Pm peak
Date: 89 design (11/1/85)

Traffic movements:	1	2	3	4	5	6
Demand Volumes	110	75	0	0	95	220
Demand in Pch:	125			0		
Critical gap:	6			6		
Capacity Fig.10.3:	680			950		

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	0	45	0	215	45	110
Demand in Pch:	0	70	0	235	70	125
Critical gap:	6.5	6.5	5.5	6.5	6.5	5.5
Capacity Fig.10.3:	365	465	1100	510	545	920

Right turn movement from minor street :V9, v12

Conflictiing flows, VC9, VC12:	75	205	PCH
Enter Critical Gap:	5.5	5.5	SEC
Capacity from Fig. 10.3:	1100	920	PCH
Percent Capacity Utilized:	0	13.58695	PERCENT
Impedance Factor:	1	0.891304	

Left turn movement from Major street, V4, V1:

Conflicting flows, VC4, VC1:	75	315	PCH
Enter Critical Gap:	6	6	SEC
Capacity from Fig. 10.3:	950	680	PCH
Percent Capacity Used:	0	18.38235	PERCENT
Impedance Factor:	1	0.852941	

Through movement from Minor street, V8, V11:

Conflicting flows, VC8, VC11:	500	390	PCH
Critical Gap:	6.5	6.5	SEC
Potential Cap. Fig. 10.3, CP8, CP11:	465	545	PCH
Percent Capacity Utilized	15.05376	12.84403	PERCENT
Impedance Factor:	0.879569	0.897247	
Actual Capacity, CP8, CP11:	396.6176	464.8529	PCH

Left turn Movement from minor street, V7, V10:

Conflicting Flows, VC7, Vc10:	655	435	PCH
Enter Critical Gap	6.5	6.5	SEC
Potential Capacity from Fig. 10.3, CP7, CP10:	365	510	PCH
Actual Capacity, CM7, CM10:	248.9718	382.6129	PCH

Intersection continued:

Approach Movements 7,8,9

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lanes					
7	0	248.9718	248.9718	248.9718	INPUT
8	70	396.6176	396.6176	326.6176	INPUT
9	0	1100	1100	1100	INPUT
If two shared lanes, (7&8)					
7&8	70	396.6176	396.6176	326.6176	INPUT
9	0	1100	1100	1100	INPUT
If two shared lanes, (8,9)					
7	0	248.9718	248.9718	248.9718	INPUT
8&9	70	396.6176	396.6176	326.6176	B
If three shared lanes					
7,8,&9	70	396.6176	396.6176	326.6176	INPUT

Approach Movements 10,11,12

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
10	235	382.6129	382.6129	147.6129	INPUT
11	70	464.8529	464.8529	394.8529	INPUT
12	125	920	920	795	INPUT
If two shared lanes, (10&11)					
10&11	305	398.8059	398.8059	93.80591	INPUT
12	125	920	920	795	INPUT
If two shared lanes, (11&12)					
10	235	382.6129	382.6129	147.6129	D
11&12	195	680.7356	680.7356	485.7356	A
If three shared lanes					
10,11,&12	430	477.4315	477.4315	47.43157	INPUT

Approach Movements 1,4

Movement	Pcph	CM	CSH	Reserve Capacity	LOS
If no shared lane					
1	125	680	680	555	A
4	0	950	950	950	A
If shared lane					
1&4	125	680	680	555	INPUT

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

LOS B OVERALL

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NSIGNALIZED INTERSECTION ANALYSIS  (T)        V2-------  ------V5
APACITY CALCULATION                           V3-------  ------V4
TRB CIRCULAR 281                                    !  !
                                                    !  !
                                                    !  !
                                                   V7  V9

Intersection:      E28&20th
Time Period:       Am peak
Date:     89 design (11/1/5)

Traffic movements:     2        3        4        5        7        9
Demand Volumes:          185        30        40        60        15        45
Demand in Pch:                              45                  20        50
Critical gap:                             5.5                   7       5.5
Capacity Fig. 10.3:                       910                 570       925
-------------------------------------------------------------------------------
Right turn movement from minor street :V9
Conflicting flows, VC:                                  15      +         185
VC9:                                                          200 PCH
Enter Critical Gap:                                           5.5 SEC
Potential Capacity from Fig. 10.3:                            925 PCH
CM9:                                                          925
----------
if no shared lane, volume:                                     50 PCH
available reserve capacity                                    875 PCH
LEVEL OF SERVICE                                           NA
-------------------------------------------------------------------------------
Left turn movement from Major street:V4
 onflicting flows,VC:                                   30      +         185
VC4:                                                          215 PCH
Enter Critical Gap:                                           5.5 SEC
Potential Capacity from Fig. 10.3:                            910 PCH
CP4:                                                          910 PCH
Demand, V4:                                                    45 PCH
Capacity Used:                                             4.945054 PERCENT
Impedance Factor:                                          0.960439
Actual Capacity, CM4:                                         910 PCH
Available Reserve:                                            865 PCH
LEVEL OF SERVICE:                                          A
-------------------------------------------------------------------------------
Left turn Movement from minor street,V7:
Conflicting flows,VC:                          15       185        60        40
VC7:                                                          300 PCH
Enter Critical Gap                                              7 SEC
Potential Capacity from Fig. 10.3, CP7:                       570 PCH
Actual Capacity, CM7:                                      547.4505 PCH
--------
if no sharedlane-demand=:                                      20 PCH
Available Reserve Capacity:                                527.4505 PCH
LEVEL OF SERVICE:                                          NA
--------
shared lane demand:                                            70 PCH
shared lane with right turn,capacity:                      788.9714 PCH
)vailable Reserve Capacity:                                718.9714 PCH
LEVEL OF SERVICE:                                          A    OVERALL
ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.
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UNSIGNALIZED INTERSECTION ANALYSIS  (T)        V2-------   ------V5
CAPACITY CALCULATION                           V3-------   ------V4
TRB CIRCULAR 281                                     !   !
                                                     !   !
                                                     !   !
                                                    V7   V9

Intersection:      E28&20th
Time Period:       Pm peak
Date:     89 design (11/1/5)

Traffic movements:     2        3        4        5        7        9
Demand Volumes:      450       20       30       80       15       30
Demand in Pch:                          35                20       35
Critical gap:                         5.5                 7      5.5
Capacity Fig. 10.3:                   640               365      650
-------------------------------------------------------------------------
Right turn movement from minor street :V9
Conflicting flows, VC:                          10      +          450
VC9:                                                   460 PCH
Enter Critical Gap:                                    5.5 SEC
Potential Capacity from Fig. 10.3:                     650 PCH
CM9:                                                   650
----------
if no shared lane, volume:                              35 PCH
available reserve capacity                             615 PCH
LEVEL OF SERVICE                                    NA
-------------------------------------------------------------------------
Left turn movement from Major street:V4
Conflicting flows,VC:                           20      +          450
VC4:                                                   470 PCH
Enter Critical Gap:                                    5.5 SEC
Potential Capacity from Fig. 10.3:                     640 PCH
CP4:                                                   640 PCH
Demand, V4:                                             35 PCH
Capacity Used:                                     5.46875 PERCENT
Impedance Factor:                                  0.95625
Actual Capacity, CM4:                                  640 PCH
Available Reserve:                                     605 PCH
LEVEL OF SERVICE:                                   A
-------------------------------------------------------------------------
Left turn Movement from minor street,V7:
Conflicting flows,VC:                   10     450       80        30
VC7:                                                   570 PCH
Enter Critical Gap                                       7 SEC
Potential Capacity from Fig. 10.3, CP7:                365 PCH
Actual Capacity, CM7:                              349.0312 PCH
--------
if no sharedlane-demand=:                               20 PCH
Available Reserve Capacity:                        329.0312 PCH
LEVEL OF SERVICE:                                   NA
--------
shared lane demand:                                     55 PCH
shared lane with right turn,capacity:              504.8808 PCH
Available Reserve Capacity:                        449.8808 PCH
LEVEL OF SERVICE:                                   A   OVERALL
ENVIRONMENTAL RESEARCH & TECHNOLOGY,  INC.
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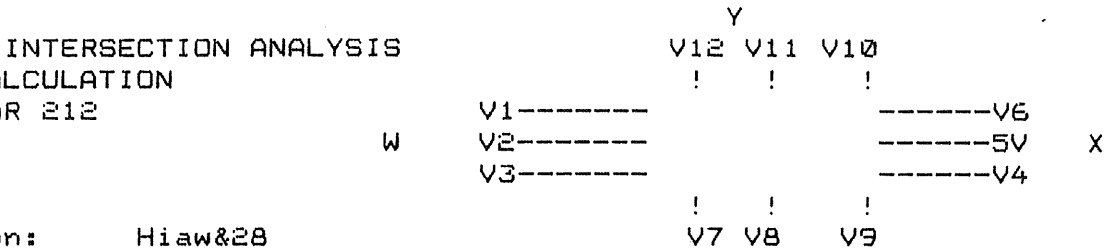


SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212

Intersection: Hiaw&28
Time Period: Am peak
Date: 89 design(11/1/5)

Identify phasing:

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	110	0	160	0	0	0
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	119.5	4	172	4	4	4
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	125.7894	4.210526	181.0526	4.210526	4.210526	4.210526

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	30	1495	0	0	930	35
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	35.5	1573.75	4	4	980.5	40.75
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	37.36842	1656.578	4.210526	4.210526	1032.105	42.89473

Left turn check:	W	X	Y	Z
Cycle length, sec:	90	90	90	90
No. of ch. Intervals:	40	40	40	40
Left turn on Intervals:	80	80	80	80
G/C ratio:	0.4	0.4	0.6	0.6
Opposing vol.(Th.+Rt.):	0	160	1495	965
Left turn on green,vph.:	480	320	-775	-245
Left turn capacity,vph.:	560	400	-695	-165
Left turn volume, vph.:	110	0	0	30
Excess Capacity:	450	400	-695	-195

Signalized Intersection Analysis cont.
Turn Adjustments:

W		X		Y		Z	
B2	A1	B1	A2	B4	A3	B3	A4
LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:							
125.7894	181.0526	4.210526	4.210526	4.210526	42.89473	37.36842	4.210526
Opposing volumes:							
0		160		1495		965	
Pedestrian volumes:							
	1		1		1		1
PCE Left, table 3							
1		1		1		1	
Left turn vol, pch.:							
125.7894		4.210526		4.210526		37.36842	
PCE right, table 4							
	1		1		1		1
Right turn vol., pch							
	181.0526		4.210526		42.89473		4.210526
Through vol., pch							
	4.210526		4.210526		1032.105		1656.578
Total volume, pch							
125.7894	185.2631	4.210526	8.421052	4.210526	1075	37.36842	1660.789

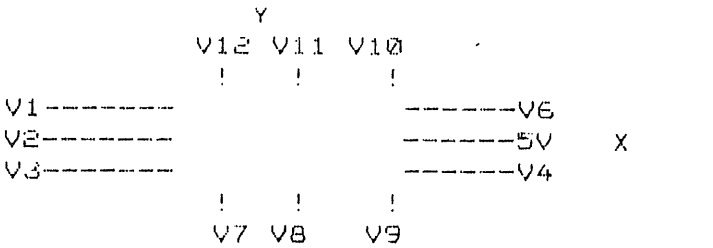
Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane	
B2	125.7894	1	1	125.7894	1	125.7894	
A1	185.2631	1	1	185.2631	1	185.2631	*
B1	4.210526	1	1	4.210526	1	4.210526	
A2	8.421052	1	1	8.421052	1	8.421052	
B4	4.210526	1	1	4.210526	1	4.210526	
A3	1075	1	1	1075	1.5	716.6666	
B3	37.36842	1	1	37.36842	1	37.36842	
A4	1660.789	1	1	1660.789	1.5	1107.192	*

SUM OF CRITICAL VOLUMES: 1295
INTERSECTION LEVEL OF SERVICE B/C

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: Hiaw&28
Time Period: Pm peak
Date: 89 design(11/1/5)

Identify phasing:

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	170	0	245	0	0	0
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	182.5	4	261.25	4	4	4
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	192.1052	4.210526	275	4.210526	4.210526	4.210526

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	30	1305	0	0	1270	50
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	35.5	1374.25	4	4	1337.5	56.5
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	37.36842	1446.578	4.210526	4.210526	1407.894	59.47368

Left turn check:	W	X	Y	Z
Cycle length, sec:	90	90	90	90
No. of ch. Intervals:	40	40	40	40
Left turn on Intervals:	80	80	80	80
G/C ratio:	0.4	0.4	0.6	0.6
Opposing vol.(Th.+Rt.):	0	245	1305	1320
Left turn on green,vph.:	480	235	-585	-600
Left turn capacity,vph.:	560	315	-505	-520
Left turn volume, vph.:	170	0	0	30
Excess Capacity:	390	315	-505	-550

Signalized Intersection Analysis cont.
Turn Adjustments:

	W		X		Y		Z	
	B2	A1	B1	A2	B4	A3	B3	A4
	LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:								
	192.1052	275	4.210526	4.210526	4.210526	59.47368	37.36842	4.210526
Opposing volumes:								
	0		245		1305		1320	
Pedestrian volumes:								
		1		1		1		1
PCE Left, table 3								
	1		1		1		1	
Left turn vol, pch.:								
	192.1052		4.210526		4.210526		37.36842	
PCE right, table 4								
		1		1		1		1
Right turn vol., pch								
		275		4.210526		59.47368		4.210526
Through vol., pch								
	4.210526		4.210526		1407.894		1446.578	
Total volume, pch								
	192.1052	279.2105	4.210526	8.421052	4.210526	1467.368	37.36842	1450.789

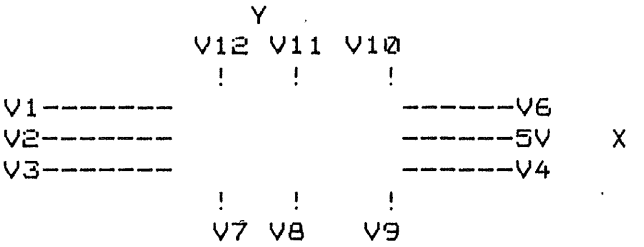
Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane	
B2	192.1052	1	1	192.1052	1	192.1052	
A1	279.2105	1	1	279.2105	1	279.2105	*
B1	4.210526	1	1	4.210526	1	4.210526	
A2	8.421052	1	1	8.421052	1	8.421052	
B4	4.210526	1	1	4.210526	1	4.210526	
A3	1467.368	1	1	1467.368	1.5	978.2456	*
B3	37.36842	1	1	37.36842	1	37.36842	
A4	1450.789	1	1	1450.789	1.5	967.1929	

SUM OF CRITICAL VOLUMES: 1257
INTERSECTION LEVEL OF SERVICE B/C

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
TRB CIRCULAR 212



Intersection: Cedar &28
Time Period: Am peak
Date: 89 design(11/1/5)

Identify phasing:

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	390	230	30	20	0	30
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	413.5	245.5	35.5	25	4	35.5
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	435.2631	258.4210	37.36842	26.31578	4.210526	37.36842

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	0	975	20	20	435	0
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	4	1027.75	25	25	460.75	4
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	4.210526	1081.842	26.31578	26.31578	485	4.210526

Left turn check:	W	X	Y	Z
Cycle length, sec:	90	90	90	90
No. of ch. Intervals:	40	40	40	40
Left turn on Intervals:	80	80	80	80
G/C ratio:	0.4	0.4	0.6	0.6
Opposing vol.(Th.+Rt.):	30	260	995	435
Left turn on green,vph.:	450	220	-275	285
Left turn capacity,vph.:	530	300	-195	365
Left turn volume, vph.:	390	20	20	0
Excess Capacity:	140	280	-215	365

Signalized Intersection Analysis cont.
Turn Adjustments:

	W		X		Y		Z	
	B2	A1	B1	A2	B4	A3	B3	A4
	LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:	435.2631	37.36842	26.31578	37.36842	26.31578	4.210526	4.210526	26.31578
Opposing volumes:	30		260		995		435	
Pedestrian volumes:		1		1		1		1
PCE Left, table 3	1		1		1		1	
Left turn vol, pch.:	435.2631		26.31578		26.31578		4.210526	
PCE right, table 4		1		1		1		1
Right turn vol., pch		37.36842		37.36842		4.210526		26.31578
Through vol., pch		258.4210		4.210526		485		1081.842
Total volume, pch	435.2631	295.7894	26.31578	41.57894	26.31578	489.2105	4.210526	1108.157

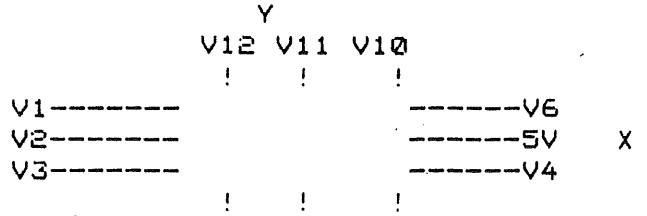
Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane	
B2	435.2631	1	1	435.2631	1	435.2631	*
A1	295.7894	1	1	295.7894	1	295.7894	
B1	26.31578	1	1	26.31578	1	26.31578	
A2	41.57894	1	1	41.57894	1	41.57894	
B4	26.31578	1	1	26.31578	1	26.31578	
A3	489.2105	1	1	489.2105	1.5	326.1403	
B3	4.210526	1	1	4.210526	1	4.210526	
A4	1108.157	1	1	1108.157	1.5	738.7719	*

SUM OF CRITICAL VOLUMES: 1173
INTERSECTION LEVEL OF SERVICE B/C

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

SIGNALIZED INTERSECTION ANALYSIS
CAPACITY CALCULATION
HCM CIRCULAR 212



Intersection: Cedar &28
Time Period: Pm peak
Date: 89 design(11/1/5)

Identify phasing:

Traffic movements:	1	2	3	4	5	6
Demand Volumes:	360	460	90	25	0	65
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	382	487	98.5	30.25	4	72.25
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	402.1052	512.6315	103.6842	31.84210	4.210526	76.05263

Traffic movements:	7	8	9	10	11	12
Demand Volumes:	0	610	20	45	980	0
Truck Percent:	5	5	5	5	5	5
Local Buses	1	1	1	1	1	1
Passenger Cars:	4	644.5	25	51.25	1033	4
Phf:	0.95	0.95	0.95	0.95	0.95	0.95
Period Volumes:	4.210526	678.4210	26.31578	53.94736	1087.368	4.210526

Left turn check:	W	X	Y	Z
Cycle length, sec:	90	90	90	90
No. of ch. Intervals:	40	40	40	40
Left turn on Intervals:	80	80	80	80
G/C ratio:	0.4	0.4	0.6	0.6
Opposing vol. (Th.+Rt.):	65	550	630	980
Left turn on green, vph.:	415	-70	90	-260
Left turn capacity, vph.:	495	10	170	-180
Left turn volume, vph.:	360	25	45	0
Excess Capacity:	135	-15	125	-180

Signalized Intersection Analysis cont.

Turn Adjustments:

	W		X		Y		Z	
	B2	A1	B1	A2	B4	A3	B3	A4
	LT	RT	LT	RT	LT	RT	LT	RT
VOLUMES:								
	402.1052	103.6842	31.84210	76.05263	53.94736	4.210526	4.210526	26.31578
Opposing volumes:								
	65		550		630		980	
Pedestrian volumes:								
		1		1		1		1
PCE Left, table 3								
	1		1		1		1	
Left turn vol, pch.:								
	402.1052		31.84210		53.94736		4.210526	
PCE right, table 4								
		1		1		1		1
Right turn vol., pch								
		103.6842		76.05263		4.210526		26.31578
Through vol., pch								
		512.6315		4.210526		1087.368		678.4210
Total volume, pch								
	402.1052	616.3157	31.84210	80.26315	53.94736	1091.578	4.210526	704.7368

Adjusted volumes

Movement	PCV	U	W	U*W*PCV	Lanes	PCV per lane	
B2	402.1052	1	1	402.1052	1	402.1052	
A1	616.3157	1	1	616.3157	1	616.3157	*
B1	31.84210	1	1	31.84210	1	31.84210	
A2	80.26315	1	1	80.26315	1	80.26315	
B4	53.94736	1	1	53.94736	1	53.94736	
A3	1091.578	1	1	1091.578	1.5	727.7192	*
B3	4.210526	1	1	4.210526	1	4.210526	
A4	704.7368	1	1	704.7368	1.5	469.8245	

SUM OF CRITICAL VOLUMES: 1343

INTERSECTION LEVEL OF SERVICE C

ENVIRONMENTAL RESEARCH & TECHNOLOGY, INC.

MINNEAPOLIS SOUTH RESOURCE RECOVERY SITE